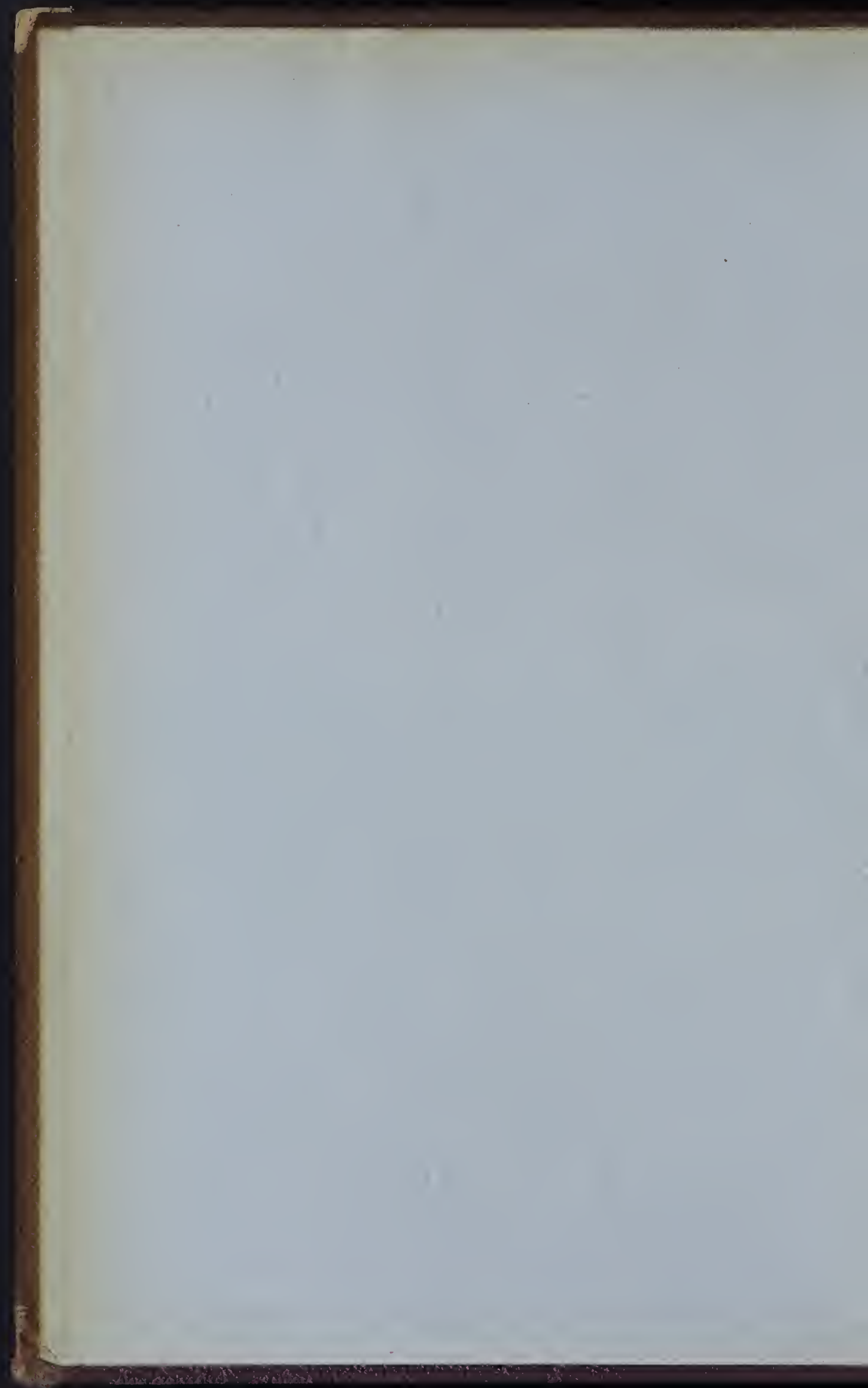


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Society of Arts.





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, may, 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.”

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INDEX TO VOLUME XLVII.

JANUARY TO JUNE, 1885.

CONTENTS.

Articles and Reviews	iii	Letters, Writers of	ix
Notes	v	Miscellaneous	ix
Reports of Meetings, Papers Read, Law Cases, &c.	vi	Architects, &c., of Buildings Illustrated	xi
Letters	viii	Illustrations	xi

ARTICLES AND REVIEWS.

<p>ABATTOIRS, Paris, 829 Abbays: Arbroath, 185; Melrose, 412; Tewkesbury, 47; Westminster, 336 Aberdeen: King's College Chapel, 794; records of St. Andrew's Church, 239 Academy, Royal: admissions, 85; Old Masters at the, 97 Acton drainage scheme, 85 Admiralty Offices: designs for, 760, 863; revised design, 481, 605 Aesthetic analysis of curves of contrary flexure, 752 Agricultural resources of India, 543 Albert Exhibition Palace 634, 672 Alcázar, Segovia, 577 All Saints Church, London-wall, 599 All Saints' Church, Upper Holloway, 99 Alms and Dulwich College, 706 Altar of Pergamos, the, 93 America, street paving in, 474 Amsterdam Exchange, 830 Ancient life from ancient monuments, 856 Antiseptic treatment of timber, 123 Arch art, 153, 437 Arbroath Abbey, 185 Archbishop of Canterbury's award on Peterborough Cathedral, 573 Architectural illustration, 1; notes in Spain, 577; problems for Parliament, 603; style, 644, 703 Architecture: at the Inventions Exhibition, 828; in Malta, 438; in Paris, 8; at the Paris Salon, 647; proportion in, 139; at the Royal Academy, 807, 650, 681, 720, 736; in Tunis, 63 Architects and School Boards, 642 Arns, the Royal, 116 Art: Arab, 437; Coptic, 158; in Paris, 8; Borsani, 437; Phœnician, 238; Russian, 52 Art, relation of the colour-sense to, 124 Art and work, 300 Art Exhibitions in Paris, 195, 330, 476, 609 Artistic law case at Siena, 791 Ashburnham House, staircase at, 305 Ashburn Hall, near York, 99 Asphaltic paving, 475 Athens, the monuments of, 125 Australian woods, 167 Austria, tenure of land in, 91 Austrian discoveries in the Lycia, 127, 261 Avignon, Palace of the Popes, 195 Aylesbury, sewage at, 857</p>	<p>BADGES, heraldic, 132, 785 Bale, M. F.: proposals for contractors' use, 788; on stone-working machinery, 472 Balloon framing, 663 Ballu, the late M., 779, 791 Balloons, new, 49 Baptistery, St. Matthew's, Bayswater, 132 Barry's design for completing the Houses of Parliament, 132, 412, 511 Beck's cooking apparatus, 695, 694 Beer-hotelling stores, Kentish Town, 198 Belfast, Ulster Reform Club, 84 Belgium, tenure of land in, 91 Bell, E.: progress on architecture in Malta, 433 Berlin Parliament: houses, heating and ventilation of, 93 Bills in Parliament and the Metropolitan Board, 549 Birmingham and Ipswich ship canal, 195 Blackfriars, old wall at, 742 Blois, Château, 298 Boiler incrustation, 62 Books, pamphlets, &c.: notices, reviews, and articles as to:— Aitken, G. S., Always of Arbroath, 185 American Journal of Archaeology, 754 Antiquary, the, 261</p>	<p>Books, Pamphlets, &c. (continued):— Architectural Association Sketchbook, 127 Art Journal, the, 161 Austrian Discoveries in Lycia and Caria, 127 Bailey-Dutton, J., Sewage Disposal, 393 Baumstær, A., "Dankmäler des Klas- sischen," 893 Benson, W., History of Diocese of Winchester, 286 Bennard, O., "Ueber ein Werk des älteren Polyklet," 893 Berli's Electrical Directory for 1835, 121 Boulton, A., the Antiseptic-Treatment of Timber, 123 Britton, T. G., Dry Rot in Timber, 577 Brun, Heinrich, Ueber die Kunst- geschichtliche Stellung der Perga- menischen Gigantomachie, 93 Bulletin Mensuel of the Société Centrale des Architectes, 329 Butler, A. J., Ancient Coptic Churches of Egypt, 190 Chadwick, E., Commentaries on the Report of the Royal Commission on Metropolitan Sewage Discharge, 632 Collignon, Maxime, "Mythologie Fi- gurée de la Grèce, 856 Colonna, F., Hymenotomachia Poli- philii, 300 Creeny, W. F., Facsimiles of Monu- mental Brasses of the Continent of Europe, 822 Crow, J. A., and Cavallesse, G. B., Raphael, his Life and Work, 835 Davis, C. T., Steam-Boiler Incrustation, 63 Davis, O. W., Art and Work, 120, 300 Description of l'Égypte, ou Recueil des Observations et des Recherches qui ont été faites pendant l'Exposition de l'Armée Française, 95 Directories, 467, 490, 855 Discoveries, Austrian, in Lycia and Caria, 127 Echoes from Hellas, 474 English Illustrated Magazine, 329 Gansvill, F., and Garnier, E., French Pottery, 186 Gould, R. F., History of Freemasonry, 574, 608 Gave, Augustus J. C., Sketches in Hol- land and Scandinavia, 286 Harrison, J. T., Returns as to Sources of Water Supply for the Metropolis, 94 Hellsbom, A., Technical Railways of the United Kingdom, 541 Hymenotomachia Poliphili, 300 Johnston's Clerk of Works Report Sheets, 288 Kastronow, P. E., The Monuments of Athens, 125 Lexton's Builder's Price-book, 361 Lenz, Notebook the, 194 Maskell, Alfred, Russian Art, 52 Metropolitan Board of Works, Annual Report, 832 Meynzbach, Jacobus, Ortus Sanitatis, 300 Miller, F., Glass-Painting, 499 Ortus Sanitatis, 300 Ferrer, G., and Clappier, O., Histoire de l'Art dans l'Antiquité, 223 Railway Diary and Officials' Directory for 1885, 121 Revue Générale de l'Architecture, 729 Robinson, J., Ipswich and Birmingham Ship Canal, 195 Silverthorne, A., London and Provincial Water Supplies, 62 Sporn's Architect's, Builder's, and Con- tractor's Pocket-book, 322</p>	<p>Books, Pamphlets, &c. (continued):— Stevens, H., Who Spoils our New English Books? 96 Tondeur, Alex., Die Gigantomachie des Pergamenschen Altars, 93 Tredgold, E., and Lark, E. W., Eleme- ntary Principles of Carpentry, 257, 359 Variorum, 63, 186, 233, 437, 499, 895 Vernon-Harcourt, L. E., Harbours and Docks, 471, 567 Wallis, G., Dictionary of Water-Colour Technique, 634 Warsberg, A. F. von, "Homerische Landeskarten," 231 Young, W., Sporn's Architect's, Builder's, and Contractor's Pocket-Book's Prices and Memoranda, 322 Boundaries of new boroughs, 253 Bourne-mouth, 894 Bourne, new, Paris, 473 Brasses, foreign, 823 Breakwaters, construction of, 471 Bridge and gatehouse, Academy design for, 132 Bridges: Putney new, 47; Roman, at South Colingham, 258 Brighton College, 794 Brock, E. P., Lotus, on the Roman bridge, Colingham, 258 Brussels: Palais de Justice, 512; public works at, 357 Builder, the speculating, 306 Building in Edinburgh, 49 Building in private ways, 433 Building Trades Exhibition, 410 Buildings, new, Great Tower-street, 692 Burlington Fine Arts Club: Persian and Arab Art, 437 Burnettian, 123 Burton, sewage purification at, 631</p>	<p>CAIRO, houses in, 232 Callendar House, Shropshire, 8 Canada, timber framing in, 663 Canal, Ipswich and Birmingham, 195 Canal and river transport, 53 Capitals, Saracenic, 659 Caria, Austria discoveries in, 127 Carpenter, the craft of, the, 27 Cathedral site for Liverpool, 224, 212 Cathedral: Chester, 688; Notre Dame, Paris, 225; Peterborough, 57, 573; St. Paul's, decoration of the dome, 164; Salisbury, windows by Burne-Jones, 10, 98; Segovia, 577; Winchester, 236 Cement, strength of, 193 Cement-levelling machine, Michela's, 233 Cements and limes, 51, 86, 118, 152 Cemeteries, new, for Paris, 476 Chair, Florian Church, Malta, 439 Chaucery, laws of descent, 671, 712 Chapels: Kabis College, Oxford, 10; King's College, Aberdeen, 794; St. Wil- frid's Home, Exeter, 898 Charges, railway companies', 327 Charlottenberg, Polytechnic School, 811 Château de Blois, 266 Chelsea Vestry-hall competition, 411, 616, 705 Cheshire Cheese Inn, Wallassy, 830 Chester Cathedral, 688 Chimney, Château de Blois, 266 Childs & Sons' workmen's dwellings, 890 Church: All Saints, Upper Holloway, 99; Easthamstead, London by Burne-Jones, 198; Marylebone, 163; Our Lady, St. John's Wood, decorative paintings, 83; St. Andrew's, Aberdeen, records, 232; St. Bartholomew-the-Great, 416, 531; St. Geneviève, Paris, 536, 638; St. Hippolyte, Blois, 612; St. John the Baptist, Kensington, 721; St. Mary,</p>	<p>Alfrick, 780; St. Mary, Gedding, Suff- folk, 99; St. Matthew's, Bayswater; Baptistery and font, 132; St. Michael Cos- lany, Norwich, 616; St. Padarn, Llan- barn, 108; St. Stephen's, Walbrook, 47; Willy, Warwickshire, 249 Churches: Coptic, 159; by the late M. E. Hatfield, 512; old London, 699; Malta, 439 Circular hospital wards, 9 Classical Museums of Northern Italy, 537 Clubhouses: Conservative, Cardiff, 705; National Liberal, 632; Ulster Reform, Belfast, 84 Coal-plate, Hysward's self-locking, 465 Cobolletter Thor, the, Rotenburg, 830 College, Brighton, 794 Collège Ste. Barbe, Paris, 544 Colingham, Roman bridge over Trent, 253 Colonial woods, 157 Colour-sense, the, in relation to art, 124 Columns of the Temple of Diana, 3 Common things: fanlights, 896 Communications, by General Randall, 63 Competitions, memorial, 454 Completion of Houses of Parliament, Barry's design, 132, 412, 511 Concrete, 119, 152 Congress of French Architects', 706, 829, 859 Conservancy of the Thames, 4 Construction of breakwaters, 471 Contractors pumps, 750 Contracts in tender seal, 542 Cooking apparatus, Becker's, 696, 694 Coptic art, 158 Council of the Institute of Architects, 651 Craft of the carpenter, the, 27 Craftsmen painters, early, 291 Curves of contrary flexure, 752</p>
---	--	---	---	---	--

DAILY NEWS' OFFICES, 863
 Dalou, M., monument by, 544
 Decoration: Dome of St. Paul's, the, 164;
 Parthenon, Paris, 506, 533
 Decorative paintings of Annunciation, 813
 Delacroix, works of, 609
 Delft, Church of St. Hippolyte, 512
 Denmark, tenure of land in, 91
 Descriptive geometry, 218, 252, 285, 331,
 380, 399, 432, 468, 500, 633, 693, 601, 638,
 673, 708, 743, 789, 816, 851, 888, 918
 Design for a seaside pavilion, 463, 529
 Designs for a municipal mansion, 412,
 487, 541, 601
 Diana's temple at Ephesus, 2
 Dinant, Hôtel de Ville, 464
 Diocese of Winchester, 236
 Discoveries by Austrians in Lycia, 127, 261
 Disposal of sewage, 365
 Docks and harbours, 54, 471
 Dome of St. Paul's, decoration of, 164
 Doré, works of, 509, 651
 Dornier, Château de Blois, 266
 Doyle, H., water-colour drawings by, 61
 Drainage of Acton, 85
 Drainage of Greater London, 792
 Drainage outfalls, metropolitan, 792
 Drawings, Fugie's studentship, 231, 300
 Dry-rot in wood, 489
 Dulwich College, 708
 Dust-bins, 778
 Dwellings for workmen: Cartwright-street,
 416; Cubb & Sons', 400

EAST-END DWELLINGS COMPANY,
 the, 416
 East London Industrial Exhibition, 712
 East pediment of the Parthenon, 507
 Eastcheap Warehouse in, 898
 Easthamstead Church, stained-glass
 windows by Burne-Jones, 198
 Eaton Hall, iron lamp standards, 43

<p>Victor Hugo, death of, 701 Victoria Hospital for Children, Chelsea, 899</p> <p>WALDSTEIN, Dr., on the east pediment of the Parthenon, 507</p> <p>Wall, old, at Blackfriars, 742</p> <p>Wallace, "Chester's Cheese" Inn, 830</p> <p>War Offices: revised design, 430, 806; designs for, 700, 893</p> <p>Wards, circular, in hospitals, 9</p> <p>Wardens in Eastcheap, 888</p> <p>Water-colour drawings by R. Doyle, 61</p>	<p>Water-supplies: London and provincial, 63; Glasgow, 821; for the Metropolis, 84</p> <p>Water-transport, 63</p> <p>Ways, private, building in, 636</p> <p>Wenlock Priory, 724</p> <p>Westgarth prizes: Society of Arts, 830</p> <p>Westminster Abbey, 336; tomb of Henry VI., 385</p> <p>Westminster Hall, Sir C. Barry's design for modelling north front, 412, 611; design for re-fronting by Mr. E. A. Hoffer, restoration, 505; roof, 490; south window, 280</p>	<p>Westminster Palace, Sir C. Barry's designs for completion, 155</p> <p>Whiteford, the late Mr. John, 93</p> <p>Whitechapel, Townbee Hall, 232</p> <p>Willey Church, Warwickshire, 249</p> <p>Winchendon sewage-farm, 198</p> <p>Winchester, diocese of, 239</p> <p>Window, Westminster Hall, 285</p> <p>Windows by E. Barris-Jones, 10, 99, 193</p> <p>Wolchenden, house at, 99</p> <p>Wood, J. T., on the Temple of Diana at Epheus, 2</p> <p>Wood: dry-rot in, 490; preservation of, 123; strength of, 197</p>	<p>Woodcuts, fifteenth-century, 300</p> <p>Wood-paving, 475</p> <p>Wood-panels, car, 157</p> <p>Wooden structures, 250</p> <p>Workmen's dwellings, Cartwright-street, 446; Clubb & Sons', 601; in Italy, 237</p> <p>Workmen's houses, notes on, 125</p> <p>Works of: Delacroix, 698; Dorré, 509, 651; the late M. E. Haddeld, 512</p> <p>Wyncegarde's map of London, 162</p>
--	--	--	--

YRIARTE, C., on the decoration of the Pantheon at Paris, 506, 638

NOTES.

<p>Aberystwith, college at, 825</p> <p>Abusia, remains at, 406</p> <p>Accidents: Bourne-mouth, 329; tram-car, 503</p> <p>Acquisitions of the British Museum, 126</p> <p>Acropolis, Athens, 261, 609</p> <p>Addresses in telegrams, 503</p> <p>Admiralty, proposed site, 540</p> <p>African frontier, the, 511</p> <p>Africa, primitive architecture in, 329</p> <p>Amalgamations, railway, 877</p> <p>America, irrigation in, 755, 895</p> <p>American: Exhibition in London, 720; School at Athens, 783</p> <p>American Journal of Archaeology, 754</p> <p>Archeid Madonna, the, 291, 367, 789</p> <p>Anti-restorationists: in Paris, 261, 329; at York, 788, 824</p> <p>Antiquities: Ravenna, 574; sbam, 500</p> <p>Apollo, statue of, 825</p> <p>Arab art, 407</p> <p>Arbitration law, code of, 194</p> <p>Archaeological discoveries, Rome, 508, 5 1</p> <p>Archaeological forgeries at Loughbor, 509</p> <p>Archaeological Society of Berlin, 609</p> <p>Archæology, Greek, and Dr. Curtius, 5, 163, 609</p> <p>Archæology at Athens, 500, 789</p> <p>Archæology and art, 96</p> <p>Archæology and photography, 474</p> <p>Architects of Departments in France, 683</p> <p>Architectural Association, work of the, 718, 789</p> <p>Architectural Association of Scotch-born, 127</p> <p>Architectural matters and the Times, 5, 410</p> <p>Architects and discovery, 329</p> <p>Architecture, public, in France and England, 329</p> <p>Armstrong, Professor, on gas-making, 719</p> <p>Art: a preservative of wood, 477</p> <p>Art: the nude in, 720, 735; Persian and Arab, 407; and archæology, 96; and scientific man, 755; in the Channel Islands, 41</p> <p>Art-Exhibition in Whitechapel, 474</p> <p>Art-classes for women in Paris, 294</p> <p>Art-workers' Guild, the, 650</p> <p>Association of Lecturers, new, 824</p> <p>Associative of the Institute, 291</p> <p>Athens: archæology at, 183, 609, 789; buildings on the Acropolis, 261, 609; excavations at the Propylæa, 406</p> <p>Australia, irrigation in, 789</p> <p>Awards at the Institute, 325</p>	<p>Baldwin's method of transporting goods, 62</p> <p>Ball, the late Theodore, 783</p> <p>Bank of Scotland, Edinburgh, 996</p> <p>Banner of the Doge Andrea Gritti, 896</p> <p>Barry's design for completing the Houses of Parliament, 405</p> <p>Bassano, the fortifications of, 96, 859</p> <p>Bedford, the Duke of, and Covent Garden Market, 720</p> <p>Beeley, Prof., and industrial remembrance, 193</p> <p>Belgium, canals in, 676</p> <p>Belis and bell-music, 127</p> <p>Bengal, irrigation in, 290</p> <p>Berlin: proposed Exhibition in 1898, 683; Hygienic Museum, 649</p> <p>Birmingham, employed at, 126</p> <p>Bismarck-street, the "Paul Pinder," 825</p> <p>Blenheim pictures, the, 291, 367, 441, 789</p> <p>Blunder at Holborn-circus, a, 576</p> <p>Bookham Church, 734</p> <p>Books, new, how they are spoiled, 98</p> <p>Bothies, Highlanders', 754</p> <p>Bougeois, M., 683</p> <p>Bourne-mouth, 329; site of a new building, 329</p> <p>Brickfield, nuisance caused by, 633</p> <p>British Museum, acquisitions to the, 126</p> <p>British School of Archæology at Athens, 783</p> <p>Bromley, sewers at, 474, 632</p> <p>Bronze-foundry, 329, 630</p> <p>Bronze statues found in Rome, 508, 541</p> <p>Browsey House, 734</p> <p>Brown, Dr., on archaic sculpture, 789</p> <p>Bullion, conference on canal navigation, 193</p> <p>Buckenham memorial, the, 542</p> <p>Builders' contracts, 825</p> <p>Building: in private areas, 719, 859; in London, 720</p> <p>Building-uses, 95, 128</p> <p>Buildings on the Acropolis, Athens, 261</p>	<p>Burling grounds: Peol-grove, 589; South-wark, 895; and railway companies, 126</p> <p>Burlington Fins Arts' Club, 407</p> <p>Burlington House colonnade, 411</p> <p>Burn-Jones, Mr., A.R.A., 524</p> <p>Busta: Mr. Gladstone, 6; Mr. Peter Squire, 755</p> <p>Butlerfield, Mr., and Westminster Hall, 473</p> <p>By-products of gasworks, 783</p>	<p>Canadian Pacific Railway, 5, 754</p> <p>Canals: in France and Belgium, 576; in Italy, 328; Manchester ship, 5, 683; Suez, 538</p> <p>Canterbury Cathedral, 541</p> <p>Canturnant, pottery at, 769</p> <p>Carpenters' Hall, lectures at, 96</p> <p>Carves, scolastic, 227</p> <p>Castle of Heidelberg, 683</p> <p>Cathedrals: Canterbury, 541; Peterborough, 85, 120, 610; St. Paul's, decoration of, 611; Winchester, screen, 101; maintenance of, 367</p> <p>Ceramics, Greek, 734</p> <p>Ceramics, on the report of the sewage commission, 683</p> <p>Channel Islands Exhibition, 411</p> <p>Channel tunnel, 4</p> <p>Charges of railway companies, 85, 126, 194, 225, 388, 495, 609, 610</p> <p>Charges of water companies, 368</p> <p>Chelsea Vestry-hall competition, 398</p> <p>Chieftains in the Duomo Perugia, 720</p> <p>Christie's, water-colours at, 269</p> <p>Churches: Bookham, 734; St. Bartholomew the Great, Smithfield, 367; Santa Croce, Florence, 789; San Giovanni-in-Latano, Rome, 755; Whitechapel, 62, York, 788, 824</p> <p>Circular, an insulting, 161</p> <p>Circulars for hospitals, 440</p> <p>City Cross, Edinburgh, 835</p> <p>Clyff Hall Colliery, 694</p> <p>Coal output in 1884, 167</p> <p>Coal gas in Pittsburgh, 84</p> <p>Coal mining, profits of, 825, 894</p> <p>Code of arbitration law, 194</p> <p>College at Aberystwith, 825</p> <p>Colliers' dwellings, 805; wages, 719</p> <p>Colonial and Indian Exhibition, 473</p> <p>Colonnade of old Burlington House, 411</p> <p>Commissions, illicit, 161, 226</p> <p>Costumes of the French army, 755</p> <p>Congress, French architects', 325, 789, 826</p> <p>Continental land tenure, 95</p> <p>Contracts: building, 825; and members of local boards, 649; not under seal, 611</p> <p>Control of theatres, 825</p> <p>Cornets, tombs of, 508</p> <p>Correggio's domes at Parma, 720</p> <p>Costumes of the French army, 755</p> <p>Covant Garden Market, 720</p> <p>Coverings for roofs, 329</p> <p>Cracks in the Assisi Madonna, 789</p> <p>Cremation, 62, 611</p> <p>Crofters' bothies, 754</p> <p>"Crossbones" burial-ground, 895</p> <p>Crystal Palace School of Engineering, 5</p> <p>Crypt, Canterbury Cathedral, 541</p> <p>Curtius, Dr., and Greek archæology, 5, 193, 509</p>	<p>Daly, M., and the obsequies of Victor Hugo, 599</p> <p>Dawson, date of, 624</p> <p>Decline of Railway revenue, 261</p> <p>Decoration of St. Paul's, 611</p> <p>Decorations, mural, in Edinburgh, 755</p> <p>Decrease of water springs, 541</p> <p>Departmental architects, France, 683</p> <p>Detection of flaws in axes, 62</p> <p>Dinner, Institution of Civil Engineers, 612</p> <p>Discovers: at Canterbury Cathedral, 541; at Elinig, 406; at Pergamos, 764; in the Roman Forum, 96; of bronze statues in Rome, 508, 541</p> <p>District Surveyors' fees, 5</p> <p>Dividends, railway, 226, 642</p> <p>Done of St. Paul's, 611</p> <p>Domus, Correggio's, Parma, 720</p> <p>Drawings: by G. W. Allan, 494; by M. Adolphe Guillon, 96; by Alfred Parsons, 409; at the Institute of Architects, 328</p> <p>Drying timber, 542</p> <p>Dudley Gallery, 225</p> <p>Dwellings for workmen, Westminster, 858</p> <p>Dramatic outrages at Westminster and the Tower, 169</p>	<p>Earnings of the working-class, 473</p> <p>East End, People's palace, 895</p> <p>Ecclesiastical Commissioners and open spaces, 260</p> <p>Edinburgh: Bank of Scotland, 896; City Cross, 835; High School, 493; mural decorations, 755; Scottish National Portrait Gallery, 693</p> <p>Egypt, a memorial of Napoleon's expedition, 155</p> <p>Emery, Exploration Fund, 754</p> <p>Etching, die verses at, 406</p> <p>Eleanor Cross, Northampton, 127</p> <p>Elections at the Royal Academy, 824</p> <p>Electric light at the Institute, 825</p> <p>Employers' liability, 853</p> <p>Enemies to new books, 99</p> <p>Enfranchisement of leaseholds, 62</p> <p>Engineering School, Crystal Palace, 5</p> <p>Engravings: at the Fine Art Society, 194; by Woollett, 755</p> <p>Epheus, Temple of Diana, 858</p> <p>Essen, Kraupp's works, 895</p> <p>Etchings, exhibitions of, 755, 825</p> <p>Etruscan tombs, 508</p> <p>Examinations, Institute of Architects, 294</p> <p>Excavations: in Athens, 261, 496, 599; at Epheus, 598; at Nemas, 789; near Rome, 789</p> <p>Exhibitions: American, in London, 720; Berlin, proposed, 683; Indian and Colonial, 473; Society of British Artists, 755; water-colours by deceased artists, 474</p> <p>Explosions at the Institute, 160</p> <p>Explosions at Westminster and the Tower, 160</p>	<p>Factory Inspector's Report, 648</p> <p>Fees of district surveyors, 5</p> <p>Female artists in Paris, 294</p> <p>Finances of gas companies, 260</p> <p>Fine Art Society: drawings by Alfred Parsons, 409; engravings at the, 194</p> <p>Fires in coal-mining, 825</p> <p>Fires in London, 193, 858; at the Japanese Village, 648; at Whitely's and the India Museum, 858</p> <p>First Commissioner of Works, new, 255</p> <p>Flaws in railway axes, 62</p> <p>Florence: Church of Sta. Croce, 729; statue of Hermes, 577</p> <p>Fortifications of Bastiao, 96, 859</p> <p>Forgeries, archæological, at Loughbor, 509</p> <p>Fragment of a Greek vase, 789, 858</p> <p>France, canals in, 576</p> <p>French architects, congress' of, 193, 783, 896</p> <p>French army costumes, 755</p> <p>Funerial of M. Ballu, 788</p> <p>Fury Castle, 624</p>	<p>Gainsborough collection, Grosvenor Gallery, 5</p> <p>Galton, Captain, on London sewage, 223</p> <p>Garden, Gray's Inn, 325</p> <p>Gardens and the unemployed, 406</p> <p>Gas, natural, 194</p> <p>Gas undertakings, returns as to, 260</p> <p>Gas-making, scientific, 719</p> <p>Gas-works: by-products of, 783</p> <p>Gas, a recently-discovered, 789</p> <p>Glass'one, Mr., bust of, for Liverpool, 5</p> <p>Glasgow, City Cross, 895</p> <p>Glasgow, safety of theatres in, 161</p> <p>Gold Medalist of the Institute, 194, 783</p> <p>Gordon Hospital, Port Said, 441</p> <p>Gordon's portrait, by Loves Dickinson, 859</p> <p>Goss, Sir John, monument to, 859</p> <p>Government of London, 292</p> <p>Gray's Inn Garden, 325</p> <p>Gray's Inn-road, trees in, 261</p> <p>Greek: archæology and Dr. Curtius, 5, 193, 509; ceramics, 754; sculpture, 127, 161, 729; terra-cotta, 858</p> <p>Greville-street, old houses, 62</p> <p>Guido Reni, supposed work by, 261</p> <p>Gullon, M. Adolphe, medal for, 96</p>	<p>Hackney, had mortar at, 261</p> <p>Haddeld, the late M. E., 406</p> <p>Haghe, Louis, 367</p> <p>Hall of the Stock Exchange, 62</p> <p>Hall place, near Beiry, 824</p> <p>Harrison, Miss, and Greek sculpture, 127</p> <p>Heidelberg Castle, 683</p> <p>Hellenic society, the, 126, 367</p>	<p>Hermes, statue of, at Florence, 577</p> <p>High School, Edinburgh, 496</p> <p>Hogarth-wood, 280</p> <p>Highlanders' bothies, 754</p> <p>Holborn-circus, a blunder at, 576</p> <p>Holman Hunt, pictures by, 329</p> <p>Home Arts and Industries Association, 859</p> <p>Home Military, for a hot climate, 440</p> <p>Hospital at Port-Said, proposed, 441</p> <p>Hospitals with circular wards, 419</p> <p>Hotel, Wood's, Farnival's Lane, 62</p> <p>Houghton-le-Spring Colliery, 804</p> <p>House of Commons, dynamite outrage, 160</p> <p>Houses, Lord Carrington's, Whitehall, 496</p> <p>House in Lambeth, old, 859</p> <p>House-moving, 406</p> <p>Houses, insalutary, rights of tenant, 283, 440</p> <p>Homas, old, in Greville-street, Hutton-garden, 82</p> <p>Housing of colliers and miners, 895</p> <p>Hôtel Salé, Paris, 161</p> <p>Hygienic Museum, Berlin, 649</p>
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Poore, Dr., on climate and health, 121, 154
Portland cement, 812
Portrait of Mr. Horace Jones, 828
Pratt, H. W., on the Gothic revival, 197; on ventilation, 151
Presentations: to Mr. James Edmeston, 155; to Mr. E. R. Hobson, 362
President's address: Corps of Works' Association, 670; Society of Civil Engineers, 115; Society of Engineers, 215
Price, J. E., on London antiquities, 497
Principles of ancient architecture, 294
Prism for architecture, 6, 633
Private ways, building in, 672, 743, 915
Prizes: Architectural Museum School of Art, 283; at the Institute of Architects, 196, 331, 327
Professional lessons from a boulder, 823
Progress of architecture, 118
Property, sales of, 39, 120, 154, 186, 210, 263, 267, 323, 391, 399, 433, 498, 501, 532, 568, 601, 640, 675, 711, 747, 743, 781, 817, 852, 887, 918
Proportion in architecture, 334, 371, 463
Public buildings, ventilation of, 123, 151
Purvey of air in towns, 249
Railways: Indian, 288; Indo-Chinese, 818
Rawley, J. S., on the West London School of Art, 315
Reading, A., on English and Continental Renaissance, 603
Reckensau, A., on electric tram-car, 747
Refined matter, design of, 294
Refuse matter, disposal of, 571
Remembrance, industrial, 193
Renaissance: English and Continental, 603; Roman, 317, 819
Rendering wood non-inflammable, 599, 615
Report of the Art-Union of London, 635
Report of the Council, Institute of Architects, 613
Restoration of: Westminster Hall, 411, 407; Worcester Cathedral, 118
Revsay, architectural, 197
Richardson, Dr., on refuse disposal, 571
Rickman, T. M., on geology as an aid to architects, 826
Biddett, L. C., on building stones, 445
Ridge, L. W., on lintwork, 580
Roberts, Owen, on the teaching of drawing, 215
Hobson, E. R., presentation to, 362
Roman remains in Algeria, 711
Roman Renaissance, 347, 319
Roman wall of London, 231
Roof-coverings, 262, 442
Roofs: concrete, 263; timber, 378; Westminister Hall, 475
Roslin Chapel, 629
Ross, A., on St. Clement's Church, Row-dial, 268
Royal Academy and architectural education, 68
Royal Academy lectures (see "Lectures")
Royal Meteorological Society, 154
Royal Scottish Society of Arts, 95
Ryder-Jones, T. M. & J., on rendering wood non-inflammable, 599, 615
Saint Bartholomew's-the-Great, 631
St. Clement's Church, Row-dial, 268
St. Ninian's Cave, Glasgow, 283
St. Paul's Ecclesiological Society, 196, 580, 812, 812
St. Paul's School, Kensington, 333
Sales of land, 323, 748, 920
Sales of property, 89, 120, 154, 186, 210, 263, 267, 323, 391, 399, 433, 498, 501, 532, 568, 601, 640, 675, 711, 747, 743, 781, 817, 852, 887, 918, 920
Sang, Dr., on the strains on the Forth Bridge, 283
Sanitary Assurance Association, 186, 254
Sanitary Inspectors' Association, 219, 430, 671, 848
Sanitary uses of disinfectants, 430
Sanitary work in Nottingham, 433
Santon, Dr., on his work, 327
Schumann, J., on his work, 327
School of Art, West London, 215
Scott, R. H., on meteorology, 154
Scottish Society of Arts, 283
Sculpture: Greek, 127, 161; limitations of, 207
Scumper, Gottfried, 232
"Seitz," quarrying and preparation of, 570
Sewage: Acton, 888; London, the, 223; Royal building stones, 397, 429, 441; Shingles as roof-coverings, 442
Shoring of buildings, 369
Sherriff, J., on architectural education, 81; on building stones, 397, 429, 441; on roofing materials, 262, 442
States as roof-coverings, 262, 442
Smith, C. Roach, on the Roman wall of London, 231
Smith, Prof. T. Roger: on architectural education, 81; on geology, 928; on a prism for architecture, 633; on timber roofs, 478
Smokeless houses and manufactories, 510
Social gatherings, 294
Society of Antiquaries of Scotland, 298
Society of Arts: Cantor lectures, 121, 154, 224; disposal of refuse, 571; education in industrial art, 219; labour and wages in America, 154; London sewage, 221
Society for the Encouragement of the Fine Arts, 155, 298, 558, 581
Society of Engineers, 215, 555, 676, 812
Society: Architectural Association, 565; students, National Art Training Schools, 400
Southend and the metropolitan sewage cut-falls, 89
Stained-glass windows, 83
Staircases, 395
Stokes, L., on building stones, 445; on ventilation, 151
Stones, building, 367, 429, 441
Storage of water, 54
Strains on the Forth Bridge, 283
Streets, width of, 239
Students admitted at the Academy, 85
Study and progress of architecture, 118
Suffolk, lint-work in, 578
Sutherland, Dr., on his work, 327
Surrey Archaeological Society, 323
Surveyors and Auctioneers' Clerks' Provident Association, 324
Surveyors' Institution Examinations, 117, 184, 708
Symmetry in design, 293
Tallow Chandlers' Hall, 649
Tarter, E. J., on architectural education, 81
Temple of Jerusalem, the, 863
Tenders, Champaign Hill Infirmary, 400
Themes, sewage in, the, 89
Theophrastus, Plam, on mitigation themes, not the art of art, 207
Tilbury docks: contract, 636; visit of Architectural Association, 742
Tiles as roof-coverings, 262, 442
Timber, non-inflammable, 599, 615
Timber roofs, celebrated, 478
Towns, purity of air in, 249
Tramcars, electric, 747
Tramways, cable, 676
Tripe, J. W., on disinfectants, 430
Trusses, beams, and arches, 264
Truth in building, 260
Turner, H. G.: on farm buildings, 230; on ventilation, 151
Vaulting, Gothic, 888
Velocities of wind, 748
Ventilators: of the Law Courts, 151; of public buildings, 123, 151
Visits of the Architectural Association (see "Architectural Association")
Wages in America, 154
Walstein, Dr., on Greek sculpture, 127, 161
Walford, E., on the history of Hampstead, 331, 378
Walker, L., on fireproof openings in party-walls, 149
Wall, the Roman, 231
Wall-papers and their manufacture, 283
Water storage, 54
Water-supply by meter, 743
Waterhouses, A., on Westminster Abbey, 331, 378
Webb, Aston, on lint work, 580
Wehner, J. J., on constructional ironwork, 354
West London School of Art, 215
Westminster Abbey, Mr. Waterhouse on, 331, 373
Westminster Hall: Restoration, 411, 407; roof, 478
Whiteford, the late John, 149
White, W., on the fireproof closing of openings in party-walls, 149
White, W. H., on French slating, 262
Whitelead, 357
Width of streets, 259
Wind velocities, 748
Wishup, G., on water supply by meter, 743
Wood, J. Tertius, on water storage, 54
Wood, W. H., on architectural revivals, 198
Wood, non-inflammable, 599, 615
Wood pavement, 232
Wood-working machinery, 104
Woodhouse, E., on fire-proof openings in party-walls, 149
Work of the Architectural Association, 703, 682
Work of the Institute of Architects, 817
Working-classes, future of, the, 818
Workmen's dwellings, 603
York Architectural Association, 232, 300, 503, 641, 818
Yong, A., on farm buildings, 223, 239
Zinc as a roof covering, 411

LETTERS.

Aberdeen, Greyfriars Church, 384
Aesthetic perception, 250
Alfred Palace, 672
Architects: and arsenic, 498; and corporations, 531
Architects' Benevolent Society, 252
Architects' club, proposed, 85, 118, 151, 182
Architectural Association, work of, 814
Architectural drawings, Lambeth Palace Library, 217
Architectural style, 708
Architecture: in the nineteenth century, 637; street, in London, 465, 498, 530
Areas of boroughs, 65
Arms, the Royal, 182, 183, 320, 359, 369
Arsenic and architects, 498
Asbestos paint, 152
Aspheltizer, the, 708, 744
Barr's design for remodelling Westminster Hall, 439, 511
Bell-ringing, 49
Boroughs, areas of, 85
Buildings for agricultural purposes, 283
Campo Sauto, Westminster, 358
Carpentry, Tredgold's, 369
Case made by the Building Act, 885
Castle, Kimbriid, 231
Cathedrals: Peterborough, 182; St. Paul's, 405, 217, 672
Cathodes, 6, 252
Cement, coloured, 498, 567
Central towers, 885
Changes in London, 85
Chelsea Vestry-hall competition, 530, 744
Church, Greyfriars, Aberdeen, 254
Church, St. Matthew's, Baywater, 183
Circular hospital wards, 9
Cistern cleaning, 859
City streets, widening, 850
Closet and dustbin, 234
Club, National Liberal, 669
Club-room at the Institute, 85, 118, 151, 182
Collapse of a large-sized sewer, 530, 567
Coloured Portland cement, 486, 567
Compensation cases, taxation of surveyors' charges, 389, 431
Competitions Committee, R.I.B.A., 217
Concrete walling, 884
Cooking apparatus for large institutions, 604, 657, 672, 708
Corporations and architects, 531
Cost of labourers' dwellings, 885
Croydon street improvements, 217
Curves of contrary declivity, 814, 849
Damp dwellings, 252, 321
Decoration of St. Paul's Cathedral, 431, 672
Design for a municipal mansion, 601
Disposal of sewage, 431
Docks and harbours, 569
Dome of St. Paul's, 217, 672
Domestic water supply, 850
Drain-pipes, tubular, 636, 708
Drawings in Lambeth Palace Library, 217
Dustbin and closet, 284
Dwellings, damp, 252, 321
Farm buildings, 283
Fireproof closing of openings in party-walls, 152, 217
Fireproof floors, 321, 530
Gas-fires in houses, 884
Gordon Hospital, Port Said, 530
Government tenders, 282
Greyfriars Church, Aberdeen, 254
Harbours and docks, 566
Hospital, proposed, Port Said, 530
Hospitals with circular wards, 9
House of Dr. Johnson in Bolt-court, 49
Houses, rear of, 539, 567
Huggins, the late Mr. R., 182
Hot-water coil, ventilating, 916
Institute, proposed club, 85, 118, 151, 182
Institute, reform of, the, 672, 734, 819
"Invitations," the, 861
Iron columns, spermimposed, 567
Iron tie-rods in spires, 431
Italian silver-grey shades, 814, 850, 918
Johnson's house in B.-l.-court, 49
Kelly Castle, 884
Kinnaird Castle, 251
Labour, unemployed, 744
Labourers' Dwellings, 885
Lambeth Palace Library, drawings in, 217
Lime-mortar, ranged with Portland Cement, 530, 567, 744
London, changes in, 85
Louth borough surveyor, 398
"Magasin du Printemps," 320
Mansion House subway, 251
Manchester air-pipe, 884
Mkissan, Maria della Grazie, 885
Mkissan, St. Maria della Grazie, 885
Municipal mansion, design for a, 601
National Liberal Club, 669
Nineteenth-century architecture, 637
Nomenclature, circles, 217
Non-acceptance of lowest tender, 183, 217, 252, 284, 321, 369, 388, 465, 530
Non-conductors of sound, 85
Open spaces in rear of houses, 539, 567
Openings in party-walls, 152, 217
Paint: fireproof, 152; on front door, 183, 217
Paragon Theatre, 915
Parthenon, eastern pediment, 707
Party-wall openings, 183, 217
Peterborough Cathedral Tower, 182
Port Said, proposed hospital, 530
Portland cement: coloured, 498; in lime-mortar, 530, 567, 744
Proportion, Aesthetic, 259
Pumps for contractors' purposes, 834, 816
Rates in the Inns of Court, 50
Rear of houses, 539, 567
Records of changes in London, 85
Reform of the Institute, 672, 744, 849
Restoration of Westminster Hall, 411, 216
Right way, 118, 151
Rifles, interlocking, 597
Royal arms, the, 182, 183, 320, 359, 388, 431, 672
St. Maria della Grazie, Milan, 885
Sculptures of the Parthenon, 707
Sewage disposal, 431
Sewage in the Thames, 251
Sewer, collapse of a, 530, 567
Sewer ventilation, 182, 217
States, Italian, 814, 850, 918
Stoane Medalian Design for a Municipal Mansion, 691
Society of Arts, Westgate Essays, 850
Sound, non-conductors of, 85
Specification writing, 250, 283
Spires, iron turrets in, 431
Stockholm, 284
Stone used at Westminster Abbey, 394, 410
Street architecture in London, 465, 498, 530
Streets, non, 183, 465
Style, architectural, 708
Subway, Museum House, 251
Superimposed iron columns, 567
Surfaces, impermeable, 232
Surveyors, Louth, 398
Surveyors' charges, taxation of, 359, 388, 431
Ter, 284
Temple Bar, 497, 530, 779
Tender, non-acceptance of lowest, 183, 217, 252, 484, 321, 369, 388, 465, 530
Tenders, Government, 242
Themes sewage nuisance, the, 251
Tie-rods in spires, 431
Tiles, interlocking, 567
Tower of Peterborough Cathedral, 182
Tower, central, 85
Tredgold's carpentry, 359
Tubular drain-pipes, 636, 708
Valuation, a question of, 779
Ventilating hot-water coil, 918
Ventilation of sewers, 182, 217
Ventilators, 183, 251
Vestry hall, Chelsea, 539, 744
Water supply, domestic, 850
Water-gate, York House, 779
Westgate Essays, Society of Arts, 850
Westminster Abbey, stone used at, 394, 410
Whitewash, 915
Widening City streets, 850
Writing specifications, 259
Wood-engraving as a medium of architectural illustration, 320
York House Water-gate, 779

LETTERS, WRITERS OF.

Aitchison, G., architecture in the nineteenth century, 637
 Aitken, G. S., Kelly Castle, 884; Einneird Castle, 291
 Aldwinkle, T. W., cooking apparatus for large institution, 601, 672

 Baker, A., central towers, 855
 Bale, M. F., pumps for contractors' purposes, 916
 Banner Bros. & Co., ventilators, 183
 Barry, C., Westminster Hall, 216, 430, 511
 Barley, W. K., street architecture in London, 465
 Becker, C., cooking apparatus for large institutions, 637, 708
 Bird, J., damp dwellings, 252
 Blake, W. E., the dome of St. Paul's, 217
 Braby, E. & C., Italian slates, 850
 Brewer, H. W., Westminster Hall, 216
 Brewster, J., custom-cleansing, 850; white-wash, 915
 Brydon, J. M., proposed architects' club, 182; Temple Bar, 539
 Bubb & Co., Italian slates, 916
 Buchan, W. P., ventilation and ventilators, 217, 251

 Carpenter, R. H., Peterborough Cathedral Tower, 182
 Chadwick, E., origin of tubular drains, 636
 Chapple, John S., decoration of St. Paul's, 431
 Clarke, Somers, decoration of St. Paul's, 431

Clow, L. F., rates in the Inns of Court, 53
 Cockburn, E., the Royal Arms, 152, 254
 Collins, F. H., space in rear of houses, 567
 Cooke, G. W., fireproof widening of openings in party-walls, 182
 Copland & Gilmore, closing City streets, 850
 Crane, R., cooking apparatus, 672; ventilation-hot-water coil, 916
 Carroy, H., Competitions Committee, R.I.B.A., 217
 Dockett, T., paint on front door, 217

 Fergusson, James, Westminster Hall, 181
 Fisher, J. A., asbestos paint, 152
 Fletcher, B., rear of houses, 630; taxation of surveyors' charges, 368
 Fletcher, T., gas fires in houses, 884
 Fowler, J., Louth borough surveyorship, 308
 Francis, F. & H., Albert Palace, 672
 Gattie, G. B., York House Water-gate, 778
 Gayling, F., bull-ringing, 49
 Gregg, E., Mansion House subway, 251

 Haves, W., St. Matthew's Church, Bayswater, 183
 Heffer, E. A., the Royal Arms, 152
 Hibbert, J., the late Samuel Higgins, 182
 Hibbs, T., Paragon Theatre, 815
 Hobbs, Hart, & Co., fireproof closing of openings in party-walls, 182
 Howard, F., Dr. Johnson's house in Bolt-court, 49

Kemp, F. A., areas of boroughs, 85
 Kerr, R., club-room at the Institute, 115
 Kershaw, S. W., drawings in Lambeth Palace Library, 217
 Knightley, T. E., reform of the Institute, 672, 745, 815
 Krass, A., non-acceptance of lowest tender, 465

 Lee, P. B., fireproof openings in party-walls, 217
 Lee, Brox, & Pain, taxation of surveyors' charges in compensation cases, 359, 431
 Lewis, M. A., case under Building Act, 885

 Marshall, John, F.R.S., circular hospital wards, 9
 Masey, P. E., the Royal Arms, 359
 Murgatroyd, J., wood-engraving as a medium of architectural illustration, 320

 Nash, W. H., records of changes in London, 85
 Newman, A. A., Chelsea Vestry-hall, 744
 Newman, F., cost of labourers' dwellings, 885

 Phillips, C. D., interlocking tiles, 567
 Phillips, John, tubular draughtpipes, 708

 Roknson, Drew, & Co., fireproof floors, 539
 Rudduck, J. B., unemployed labour, 734

Sedding, J. D., the Architectural Association, 814
 Seddon, J. B., the dome of St. Paul's, 217
 Smith, T. Roger, space in rear of houses, 567

 Tapp, E. W., curves of contrary flexure, 814; Tredgold's carpentry, 359
 Tarver, E. J., architectural style, 708
 Thomas, W., Cave; æsthetic proportion, 250; curves of contrary flexure, 819
 Thomson, J., design for a municipal mansion, 601
 Travis, H., stone used at Westminster Abbey, 358, 410

 Vernon-Harcourt, L. F., docks and harbours, 667

 Waldstein, C., eastern pediment of the Parthenon, 707
 Walton-Wilson, J. W., Campo Santo, Westminster, 358
 Watson, A., National Liberal Club, 669
 West, F. & J. P., concrete walling, 884
 White, W., arsenic and ochre, 498; fireproof closing of openings in party-walls, 182; non-acceptance of lowest tender, 217, 530
 White, W. H., Architects' Benevolent Society, 252
 Wilkinson, W. B., sewage disposal, 431
 Williams, W. A., non-acceptance of lowest tender, 359
 Wood, W. H., non-acceptance of lowest tender, 252, 321

MISCELLANEA.

Abhey, Furness, 502
 Abingdon, Corn Exchange, 374; cottage hospital, 320
 Accidents, 529, 508, 503, 567, 832
 Acroptition, 500 schools, 329; surveyorship, 181
 Acton sewerage scheme, 85, 434, 688
 Agricultural Hall, Kensington, 458
 Albert Palace, Battersea Park, 823
 Alho-carbon light, 120
 Alms and refreshes, 88
 Amalgamated Society of Engineers, 675
 Ambulances in Paris, 121
 America, natural gas in, 120
 Ansdell, R., death of, 608
 Appointments, 283, 412, 712
 Archaeological discoveries, Roche Abbey, 618
 Archaeology at University College, 531
 Architecture, Armenian, 54
 Art at Liverpool, 748
 Art Museum for Bath proposed, 782
 Artists' dwellings, Lambeth, 51; Liverpool, 570; Petticoat-square, 89
 Asbestos, 747
 Aske's Schools, Hatching, 502
 Asphalt, 673, 710
 Assessment regulations, 53
 Astragal, 917
 Ateger to bore a square hole, 532
 Auger-bit, 887
 Australian timber, 817
 Autocypist, black, 641
 Award to Mr. H. Donlton, 817

 Bacteria and bricks, 64
 Bell-valves, 501
 Bells and North Sea Canal, 853
 Banks, Liverpool, 284; Rochdale, 779; Salford, 502
 Banner's system of ventilation, 651
 Baptist Church, Hendon, 120
 Bath, art-museum for, 785
 Baths: Fore-st Hill, 677; monials for, 918; Stockport, 529
 Beaumont's tunnelling machine, 464
 Bench holdfast, 816
 Birkenhead, the Mersey Tunnel, 470
 Birmingham, building in, 288
 Black autocypist, 128, 641
 Blackburn schools, 445
 Blinds, Venetian, 133
 Bloemfontein Government Buildings, 712
 Boiler-plates, measuring thickness of, 604
 Boston, new dock, 59
 Botting's tube-stopper, 918
 Bournemouth: old house at, 468; Upper Bourne estate, 198
 Brandon, Mr. D., and the Institute, 711
 Brass, a memorial, 783
 Brass, W., & Son, 216, 251

Breakwaters: Colombo, 920; floating, 230
 Brick moulds, 219
 Bricks, 287, 323, 887; bacteria and, 54; damp-proof, 219; improvements in, 53; louvre, 837
 Bridges: a steel, 187; Sunderland, 853; Teddington, 748
 Bristol: tobacco factory, 50; waterworks, 465
 British Museum lectures, 285
 Broad-streets, improvements in, 120
 Bruses, 601
 Bucket mechanism for raising liquids, 322
 "Buckingham" Theatre, the, 302
 Builders, German, 83
 Builders' Clerks' Benevolent Institution, 570
 Builders' stage, 322
 Building: on disused burial-grounds, 51; in Sydney, 302
 Buildings: for Poor Law administration, 7; in Queen Victoria-street, 51; portable, 637, 673
 Burns Memorial, Westminster Abbey, 411
 Burtinsland harbor, 535

 Cabmen's shelters, 858
 Cambrian Academy of Arts, 221
 Cambridge, Gray Memorial, 782
 Canals: Manchester ship, 593; North Sea and Baltic, 853
 Cardiff, masons' strike, 288
 Carey & Latham's floating bridge, 220
 Carpenters' Hall lectures, 120
 Cement, 637
 Cast-iron columns, safety of, 571, 888
 Cathedral: Gouthorn, 288; Peterborough, 543; Winchester, screen, 502
 Cause of soot-clouds, 154
 Cement, 637
 Cemetery, Lowestoft, 651
 Cemetery-chapel, 817
 Centre-bit mortise-lock, 220
 Ceramic plates, 673
 Chain pulleys, 111
 Chapman Hill Infirmary, 470
 Chancery-lane safe deposit, 570
 Chapels, cemetery, 434
 "Chelsea" centre-bit mortise-lock, 220
 Chelsea Vestry-hall competition, 643
 Cheshire lines extension contract, 249
 Chester Museum, 284
 Chimney-tops, 153, 287, 467, 815
 China, coal-mining in, 879
 Cholera, the, 324, 676
 Church Building News.—Alcester, 50; Aston, 54; Aveton Gilliard, 531; Ballyshoolins, 917; Birmingham, 678, 917; Blackburn, 181; Brampton, 118; Brierfield, 469; Cliffe-at-Hoo, 185; Deane, 59; Douve, 518; Earl's Reston, 640; East-

bourne, 81; Edale, 915; Farnley, 531; Gaddling, 69; Great Bookham, 754; Hagbourne, 469; Halifax, 434, 917; Hampstead, 51; Hawkebury, 746; Headon, 490; Heron, 811, 867; Hereford, 434, 431; Holywell, 748; Hornsey, 187; Hulme, 85; Ilkeston, 251; Kennington, 499; Kingsbury, 499, 431; Kirby Ravensworth, 532; Lewisham, 96; Liverpool, 469, 532; London, 51, 324; Macclesfield, 118; Manchester, 531, 917; Marlborough, 163; Middlesbrough, 603; Moseley, 217; Neesley Common, 543; Netley, 920; Norwich, 618; Nottingham, 815; Overstone, 254; Penance, 532; Plymouth, 629; Poynton, 499; Prestwich, 783; Queensbury, 532; Queenstown, S. Africa, 499; Rame, 746; Southampton, 672; Staffs-bridge, 799; Stanford-in-the-Vale, 917; Stockton-on-Tees, 746; Stone, 469; Strathsham, 746; Sway, 469; Swinton, 289; Timbath, 749; Tyldesley, 583; Uppington, 499; Waterloo, 499; Whiston, 151; Wigan, 51; Winslow, 85; Wolverhampton, 815
 Church burned down, 818
 Church-arrangements, 165
 Cistern ball-valves, 501
 City: improvements, 120; law-courts, 182
 City and Guilds of London Institute, 412
 Clerks of works, reports, 288
 Clocks, 121, 254, 465, 531, 741
 Closest and dust-bin combined, 153
 Clubhouses: Exeter, 985; National Liberal, 618; Southampton, 603
 Coal-mining in China, 676
 "Cook" Tavern, site of the, 712
 College, Training, Norwich, 320
 Colombo breakwater, 920
 Colonial and Indian Exhibition, 324
 Combination of employers and workmen, 288
 Commercial failures, 89
 Commissioners, illness, 201
 Competitions:—Baptist Church, Hendon, 120; Baths, Stockport, 529; Church, Moseley-common, near Tylealey, 643; Church (R.C.), St. James's, Manchester-square, 743; Church, Stalbridge, 708; co-operative stores, Jarro, 329; Corn Exchange, Abingdon, 374; drainage, Hexhill-on-Sea, 708; Exchange, Amsterdam, 830; Hartwood Asylum, Glasgow, 446; Hospital, cottage, Abingdon, 329; Liverpool, Newbury, 132, 320; Independent Church, Stand, 216; Infirmary, Worthington, 800; Institute, Meanwood, near Leeds, 917; Lowestoft Cemetery, 651; public, entomb, 216; Public buildings, Newcastle-under-Lyme, 512; Presby-

terian Church, Whalley, 636; Schools, Accrington, 529; Schools, Blackburn, 445; Schools and mission church, Blackburn, 151; Schools, London, 329; Schools, London, 600; Schools, Little Harwood, 289; Schools, Chester-le-street, 708; Three Cups Hotel, Colchester, 636; Training college, Norwich, 329; Upper Bourne Estate, Bourne-mouth, 132; Vestry-hall, Chelsea, 360, 441, 543, 618, 705; Wesley Chapel, Preston, 651; Winter garden, Tenby, 58; Workhouses extension, Tyne-mouth, 89
 Concrete: blocks, 359; mixing-machine, 917
 Congregational Hall, Wandsworth, 63
 Construction, fireproof, 673
 Construction, ironwork, 288
 Conversation, Institution of Civil Engineers, 550
 Copper-plate Institution, proposed, 434
 Coventry: Fever hospital, 711; sewage, 434
 Covers for manholes, 55
 Cowl and ventilator, 119, 657
 Cramps, flooring, 119, 852
 Craven House, Northumberland-avenue, 324
 Crown lands and street improvements, 640
 Cynnie, 676

 Darlington Hospital, 284
 Day in the country, a, 819
 Deptford District Surveyorship, 187, 220, 320
 Diespeker's mosaic, 362
 Discoveries: Polkstone, 920; Roche Abbey, 618
 Dissenting Church-Building News: Abercorn, 885; Bagworth, 885; Birmingham, 632; Bolton, 885; Brighton, 885; Edgbaston, 533; Hendon, 120; Hull, 862; Leek, 81; Lottwitshill, 782; Petermaritzburg, 712; Preston, 651; Scarborough, 532; Southampton, 649; Telford, 632; Truro, 632; Ventnor, 216; Whalley, 636
 Docks, Boston, Lincolnshire, 50
 Door-knocker and bell, 533
 Door-spring, 363, 657
 Doulton, Mr. H., award to, 817
 Drain-pipes, 852
 Drain-scrappers, 657
 Drains, ventilation of, 219, 534
 Drill-hall, Wigton, 152
 Dry-rot in wood, 64
 Dulwich, proposed park, 289
 Durran's: covers for manholes, 65; soil-pipe valve, 254
 Dust-bin and closet, 153
 Dutton-Walker, the late S., 689

Tobacco factory, Bristol, 60
Tool: entrenching, 637; gasfitters', 359
Torquay water supply, 284, 502
Tower of St. Magnus's Church, London
Traverse, 324
Travelling Institute, Montreal, 320
Tramways, steam-worked, 229
Traps, sanitary, 467
Tree of mystery, the, 88
Truant School, Clapton, 324
Tube-stopper, Bottins's, 918
Tunnel-driving, rail, 464
Trunks, 324
Trustees, of the, Liverpool, 919
Murray, 400; New York, proposed, 499
Turner Memorial Home, Liverpool, 120
Turmatils at Inventions Exhibition, 628
Tynemouth workhouse extension, 39
Typhoid, neglected nuisances and, 748

University College, architecture at, 534
Union of Orman holders, 38
Upper Bourne Estate, Bournemouth, 132
Upton House Truant School, Clapton, 324
Val de Travers asphalt, 602
Valves, 219; for soil-pipe, Durrans's, 254
Varnish for woods, 367
Vegetable market, proposed new, 503
Venetian blinds, 153
Ventilation of drains, 219, 534; Herbert House, 374; at the Inventions Exhibition, 631; at the Law Courts, 217, 503
Ventilator and chimney cowl, 119, 537
Ventilators, 467, 637, 712, 852, 887
Ventnor Pier, 216
Vestry-hall, Chelsea, 543
Vice, 467
Victoria Coffee-hall, 120
Virginia Water sanatorium, 888

Wages of the working classes, 163
Wakleys, 87, 852, 861
Walthamstow, sanitary work at, 711
Wandsworth: Congregational Hall, 63;
Union Workhouse, 229
Water companies' powers, 250
Water-closets, 322, 567; connexions of, 87
Water pressure regulator, 286
Water supply: Andover, 51; Bristol, 1, 465; Glasgow, 321; Kenilworth, 88; Lambeth, 150; Loughborough, 152; Market Harborough, 531; New York, 929; Richmond, 201; Torquay, 284, 502
Water-waste preventers, 322, 501
Waterloo Station enlargement, 154
Weighing machine, monster, 676
Well, St. Clement's, 536
Westminster Abbey, Burns memorial, 411
Westminster Hall restoration, 571, 615
Westminster Union Workhouse, 265
Westwood House, electric lighting, 752
Widening of New Broad-street, 120
Wilberforce Mission House, Newington, 333
Winchester Cathedral, 502, 570

Window-blinds, 710
Window-fasteners, 816
Window-sashes, 153, 710, 852, 917
Wings, 782
Winter gardens: New Brighton, 779;
Tonby, 545
Wires: fences, 781; saw, 230
Wires, overhead, 641, 782
Wolves in sheep's clothing, 117
Wood, dry-rot in, 54
Wood mantelpieces, 817
Wood-block flooring, 51, 493, 534, 833
Woolwich steam ferry, 502
Workhouses: Lambeth, 71; St. George's-in-the-East, 7; Tynemouth, 89; Wandsworth, 20; Westminster Union, 266
Workington Infirmary, 690
Worthington's dwellings: in Liverpool, 670; of the Peabody Trust, 154
World tree, the, 88
Zinc roofing, 63, 748

ARCHITECTS, ETC., OF BUILDINGS ILLUSTRATED.

Adams, G. O., Oodwin Bursary Medal, 705
Airey, George, Holborn Restaurant, 170, 171, 174, 175
Armstrong, H. H., memorial figures of the late Dean Cole, 726
Bastall, E. T., design at Midhurst, 628
Baker, A., St. Zadaru Church, Llanberis, 204, 205
Barry, Sir C.: design for the completion of the Houses of Parliament, 134-137; design for the north front of Westminster Hall, 414, 415
Bateman & Keates, house, "Collyers," near Petersfield, 423, 429
Bates, Harry, sculpture, subjects from the *Æneid*, 874, 875
Bazalgette, Sir J. W., Putney Bridge, 40, H., 44, 45
Becker, C., cooking apparatus for large institutions, 504
Bell, E. Ingress, sketches in Malta, 439, 453, 454
Ball, E. Ingress, & Clarke, Sir A., design for a military hospital for a hot climate, 658, 659, 662, 663, 666
Blomfield, A. W., design for restoration of south transept, Chester Cathedral, 690, 691
Bliss, H. P., design for restoration of west front of Westminster Hall, 181
Foot, J. T., Eugin Studenthip Medal, 705
Froum, M., equestrian statue, "Hercules d'Armes," 905
Fry, S., sculptured figure, "Play," 803
Garling, H. B., design for Admiralty and War Offices, 560, 867
Grayson, G. E., Mersey Tunnel Railway Stations, Birkenhead and Liverpool, 302, 303, 307
Green, T. K. & Son, premises, Kentish Town, 205
Oreg, E., proposed subway at the Mansion House, 251
Grove, D., heating and ventilating arrangements, Berlin House of Parliament, 109, 113

Chapu, M., sculpture, "The Four Seasons," *Magasins du Printemps*, Paris, 272, 273, 276, 277
Chorley & Connon, Askham Hall, near York, 99, 111
Clark, Sir A., and Bell, E. I., design for a military hospital for a hot climate, 658, 659, 662, 663, 666
Clarke, T. Chaffield, offices of the *Daily News*, 870, 871, 153
Cox, A. A., design for a municipal mansion, 494, 495, 497
Crockett, E. A. B., offices, Great Tower-street, 692
Cutts, J. E. K., All Saints' Church, Upper Holloway, 106
Cypars, P. J., St. Hippolyta's Church, Perth, 518, 519
Delou, M., monument in the Place da la Nation, Paris, 547
Davis & Emmannell, labourers' dwellings, Curlew-street, 469, 471
Dawber, E. G., Academy design for a gate-house and bridge, 132, 143, 157
Demallie, M., sculptured figure in the *Salon*, Paris, 514
Ferguson, J., design for treating the west front of Westminster Hall, 181
Foot, J. T., Eugin Studentship Medal, 705
Froum, M., equestrian statue, "Hercules d'Armes," 905
Fry, S., sculptured figure, "Play," 803
Garling, H. B., design for Admiralty and War Offices, 560, 867
Grayson, G. E., Mersey Tunnel Railway Stations, Birkenhead and Liverpool, 302, 303, 307
Green, T. K. & Son, premises, Kentish Town, 205
Oreg, E., proposed subway at the Mansion House, 251
Grove, D., heating and ventilating arrangements, Berlin House of Parliament, 109, 113
Haddell, M. E.: Conventual Church of the Sisters of Notre Dame, Liverpool, 523; St. Chad's Church, Manchester, 323; St. Marie's Church, Blackbrook,

523; St. Marie's Church, Bursley, 622; St. Marie's Church, Sheffield, 622
Heffer, E. A., suggestion for treating west side of Westminster Hall, 774
Hire, T. C., & Son, house at Nottingham, 81
Hobbs, E., Toynton Hall, Whitechapel, 249
Jackson, T. O.: Brighton College, 796, 797; house, Kensington-court, 909
Johnson, J., baptistry and font, St. Matthew's Church, Baywater, 136
Jones, R. Burns, window, Easthamstead Church, 291; window, Salisbury Cathedral, 12, 13, 102, 103
Knightley, F. E., shop, No. 321, Strand, 239
Langston, H. H., house, Wrotham Heath, 378
Lawson, G. A., figure of a Spartan dancing girl, 767
Leeming & Leeming, revised design for Admiralty and War Offices, 432, 453, 455, 457
Legg, H. S., house, Gainsborough Gardens, Hampstead, 739
L'Honneur, M., Collège Ste. Barbe, Paris, 545, 555, 659, 663
Lucas, Hitzig, & Raschdorf, Polytechnic School, Charlottenburg, 811
Lyon, W. F., Willey Church, 219
Margall & Littlewoods, shops, Oldham, 89
Marvin, P. J., design for Admiralty and War Office, 762, 763
Michels, V. de, cement-testing machine, 891
Mitchell, A. B., design for a municipal mansion, 412, 418, 419
Mullies, E. M., figure of Autolyens, 786
Newman, E., oratory, St. Wilfrid's Home, Exeter, 908
Newman & Newman, design for Chelsea Vestry Hall, 698, 699, 703
Ogée, M., sculptured figure in the *Salon*, Paris, 845
Peebles, Alex., warehouse in Eastcheap, 801, 801
Pirie & Clyde, re-eroos, St. Andrew's Church, Aberdeen, 235
Poelaert, Herr, Palais de Justice, Brussels, 514, 515

Ravescroft, W.: house at Wokingham, 110; shops at Reading, 593
Ridgway, G. S., house near Charlwood, Surrey, 832, 833
Seddon, J. P.: design for decoration of the steeple of St. Paul's, 169, 167; suggestion for a cathedral at Liverpool, 238, 239
Seddon, J. P., & Carter, J., Coates, Penarth Conservative Club, 702
Sédille, P., *Magasins du Printemps*, Paris, 266, 262, 263
Simpson, F. M., Academy studentship design for a block of houses, 212, 213
Sister, J. A., Academy premiated design for an internal staircase, 74, 75
Snell, H. S. & Son, Victoria Hospital for Children, 812
Strangford, Lady, plan of hospital with circular wards, 10
Taylor & Gordon, residences, Montreal, Canada, 396
Thomson, J., design for a municipal mansion, 662
Thorncroft, Ham, equestrian statue of Edward I., 901
Turner, H. O., Nabbury District Hospital, 422
Violet-le-Duc, spires of Notre Dame, Paris, 238, 239
Wade, F. B., lamp standards, Eaton Hall, 48
Walton-Wilson, J. W., proposed Campossanto, 358
Waterhouse, A. R. A., National Liberal Club-house, 652, 651, 655, 667
Webb, Aston, St. Mary's Church, Alfrick, 774, 777
Westlake, N. H. J., painted panels, "The Annunciation," Church of Our Lady, St. John's Wood, 68, 69
Willis, E. P., tint tracery, St. Michael's, Colston, Norwich, 614, 627
Woolner, T., memorial figure of Lord F. Cavendish, 727
Wren, Sir C., St. Stephen's Church, Walbrook, 32, 33, 36, 37
Yonn, A., farm buildings, 223, 247

ILLUSTRATIONS.

ABSEY, Melrose: Carving, drawn by T. McLaren, 426;
Bay Window, drawn by T. McLaren, 427
Abbey, Tewkesbury: West Front, drawn by H. H. Statham, 20, 21
Abbey, Westminster: Plan, 331; Bay of Sacraminum, 340; East Wall, 340; Interior Face of South Wall of South Transept, drawn by J. Atwood Slater, 348, 347, 350; Inner Vestibule to Chapter-house, drawn by E. C. Shearman, 355, 381; Screen surrounding the Tomb of Henry VII., drawn by H. O. Crosswell, 338, 339, 382; Two Bays in North Walk of Cloisters, drawn by T. McLaren, 350, 351, 354, 355
Abbey, Westminster, in the Seventeenth Century, from a Print by Hollar, 354
Admiralty and War Offices: Revised Design, Messrs. Leeming & Leeming, Architects, 432, 453, 455, 457; Design by Mr. H. B. Garling, 866, 867; Design by M. P. J. Marvin, 762, 763
Alcalázar, the, Segovia, 584, 635
Annunciation," the, Panels for the Church of Our Lady, St. John's Wood, painted by N. H. J. Westlake, 68, 69
Apparatus for Testing Lightning Conductors, 812
Abraham House, Westminster, Staircase, &c., drawn by Mr. Harry Surr, 339, 362, 393

Askham Hall, near York, Chorley & Connon, Architects, 99, 111
BAND-SAW Filing Machine, Selig, Souenthal, & Co.'s, 40
Baptistry and Font, St. Matthew's Church, Baywater, John Johnson, Architect, 149
Brass of Martin de Vasch, Bruges Cathedral, 833, 837
Brass of Princess Sidonia, of Bohemia, at Meissen, 840
Bridge, Putney, new, Sir J. W. Bazalgette, Engineer, 40, 41, 44, 45
Bridge and Gatehouse, Design for, by E. G. Dawber, 112, 113, 147
Bridge-pier at Collingham, Roman, 259
CAIRO, Houses in, 242, 243
Candler House, Stirlingshire, 28, 29
Capitals, Saracenic, 669
Carving, Melrose Abbey, drawn by T. McLaren, 426
Carving, Ivory, 169
Cathedral, Chester, Design for Restoration of South Transept Front, A. W. Blomfield, Architect, 691, 691
Cathedral, Gloucester: South Porch, sketched by W. H. Blakelock, 311
Cathedral, Notre Dame, Paris, as Restored with its Spire

by M. Violet-le-Duc, arranged upon the Site for a Cathedral at Liverpool, by J. P. Seddon, 238, 239
Cathedral, St. Paul's, Design for Decoration of Dome, by J. P. Seddon, Architect, 168, 167
Cathedral, Salisbury: Window of South Choir Aisle, Designed by E. Burns-Jones, A.R.A., 12, 13, 102, 103
Cathedral, Segovia, 583, 589
Cement-Testing Machine, Michels's, 283
Chair, Florian Church, Malta, 439
Chandelier, Bronze, Hôtel de Ville, Paris, M. Fremiet, Sculptor, 905
Chapel of Kible College, Oxford, W. Butterfield, Architect, 16, 17
Chapel, King's College, Aberdeen, Screen and other Details, drawn by J. C. War, 801, 804, 805
Chapel, St. Wilfrid's Home, Exeter, F. Newman, Architect, 908
Château de Blois, Dormer, 268
Chimney, Chitney, 169
Church, Wilford, Worcestershire, as Enlarged and Restored, Aston Webb, Architect, 770, 771
Church, All Hallows', London-wall, 597
Church, All Saints', Upper Holloway, J. E. K. Cutts, Architect, 143



ILLUSTRATIONS.

Portion of a Window in the South Choir Aisle, Salisbury Cathedral.—Designed by Mr. E. Burne Jones 12-13
 The Chapel, Keble College, Oxford: Exterior and Interior Views.—Mr. W. Butterfield, Architect 16, 17
 West Front of Tewkesbury Abbey.—From a Drawing by Mr. H. H. Statham 20-21
 The Tower of London in the Time of Elizabeth 25-28
 Calendar House, Stirlingshire 28-29
 St. Stephen's Church, Walbrook: Transverse Section, Plans, and Details.—Measured and Drawn by Mr. Edmund H. Sedding 32-33, 36, 37
 Sections, Details, and Elevation of New Putney Bridge.—Sir J. W. Bazalgette, C.B., Engineer 40, 41, 44, 45
 Lamp-Standard, Eaton Hall 49
 Plan of Hospital of One Story, with Circular Wards, for Egypt.—Designed by the Viscountess Strangford, 1884 10

CONTENTS.

Architectural Illustration 1
 The Temple of Diana, Ephesus: By J. T. Wood, F.S.A. 2
 Financing on the Thames 4
 Notes 4
 The Tower at the Close of the Sixteenth Century 6
 The Iron Trade in 1884 7
 From Paris 8
 A Notable Old Mansion: Calendar House, Stirlingshire 8
 Circular Hospital Wards 9
 Window in South Choir Aisle, Salisbury 10
 Keble College Chapel 10
 West Front, Tewkesbury Abbey 17
 Drawings of St. Stephen's, Walbrook 17
 Patney New Bridge 47
 The Tower of London in the Time of Elizabeth 47
 Calendar House, Stirlingshire 47
 The Institution of Civil Engineers 48
 Wrought-Iron Lamp Standard, Eaton Hall 48
 A New Band Saw Filing Machine 49
 Edinburgh 49
 Bell-Ringing 49
 Dr. Johnson's House in Bolt-court 49
 Rates in the Inns of Court 49
 Provincial News 50
 Church-Building News 50
 Disenting Church-Building News 51
 School-Building News 51
 The Student's Column: Lime, Cement, and their Uses 54
 Books: Mackell's Russian Art (Chapman & Hall); Davie's Treatise on Steam Boiler Incrustation, &c. (Sampson Low); Silverthorne's London and Provincial Water Supplies (Crosby Lockwood & Co.) 56
 Variorum 56
 Recent Patents 57
 Meetings 57
 Building on Blessed Burial Grounds 54
 Miscellaneous 54
 Civil and Mechanical Engineers' Society 54
 The Destruction of Bricks through the Action of Bacteria 54

Architectural Illustration.



NOT very many years ago the question of the best method of illustrating architectural works in an architectural journal was of necessity a very simple one. There was practically but one available method, that of engraving on wood from a drawing furnished to the engraver, or drawn for him on the wood by the architectural draughtsman. Steel-engraving was for the most part out of the question for periodicals appearing at regular and short intervals, both from the time required to produce the work, and from its costly nature; which latter factor especially would render it commercially impossible, unless as a rarity and in special instances, for any but monthly or quarterly publications giving a comparatively small number of illustrations. Accordingly, for a long time wood-engraving was the recognised medium by which the works of the architect were translated into pictorial illustration for further publicity.

Certain disadvantages are inseparable, no doubt, from this method of illustration. Though so much cheaper and a good deal more expeditious than steel engraving, it is still, under all the circumstances of weekly journalism, a costly and a slow process, and it is one which will not bear being hurried. A more definite drawback to it, from the architect's and artist's point of view, is that it introduces between the original drawing and the final result another hand than that of the original draughtsman: it is not a reproduction of his drawing, but a translation of it into another form. The intro-

duction of lithography offered the means of reproducing the exact styles and artistic manner of the original draughtsman, but this did not make very much way as long as it was weighted by the necessity of drawing on the stone itself. The old system of chalk drawing on a stone with a fretted surface was, indeed, a pleasant one enough to the draughtsman, and allowed all possible freedom of hand; but it is a style of representation eminently unsuited for architectural subjects, except for the representation of ancient or ruinous architecture, in which picturesque effect is the object rather than the clear definition of architectural design and detail in its perfect state; and drawing with a pen or a fine brush on the stone is not a process favourable to freedom of hand or breadth of effect: some practice, too, is necessary to acquire facility in the process of drawing the reverse way on the stone. The introduction of "transfer paper" got over this last difficulty, and enabled the ordinary architectural draughtsman to make his drawing as it was to be finally seen; but it gave him a surface medium even more uninviting than the stone, with the chance of some loss of sharpness and effect in the process of transference. With the introduction of photolithography, whereby the drawing made on paper with ordinary pen and ink could be almost absolutely reproduced line for line and mark for mark, came an important and entirely new opening in the possibilities of architectural illustration. The process was both cheaper and more expeditious than engraving, and the draughtsman's own style and technique appeared in multiplied form with little diminution of its original effect. In some cases, we might say, photolithography afforded even an improvement on the original drawing by its capability of reducing scale, by which a drawing which

originally may have appeared somewhat coarse in execution, acquired in reduction an appearance of delicacy and finish which the original draughtsmanship did by no means convey. This trust in the refining powers of photographic reduction is not, however, to be recommended as a principle of working. To trust to that is to foster artistic indolence and carelessness, as well as to lead to possible disappointment in the final result; for photolithography is capricious in its behaviour in this respect, and sometimes unexpectedly revenges itself on the draughtsman who trusts too much to its kindness in hiding or refining away his deficiencies.

Photolithography, however, has become a great power in architectural illustration, but the many advantages connected with its use have led in many quarters to an exaggerated and perfectly unfair depreciation of wood-engraving as a means of illustration. This has been carried so far that many architects seem to think that the mere fact of an illustration being a wood-engraving is sufficient to render it unworthy their notice. They seem even to forget that as there is good and bad pen drawing, so there is good and bad wood-engraving. This is, of course, mere prejudice, and hardly worth arguing with; but to those who are more reasonable, we may suggest that there are certain undeniable powers and advantages in wood-engraving, which are not to be had by the more recently advanced processes. One practical merit is in the superior certainty and facility of production in large quantities. The printings from a carefully-cut wood-block are far more uniform and certain in result than those from a lithographic stone, when impressions are counted by thousands, and they are produced far more quickly, as far as the mere printing is concerned. In fact, the number of impressions required for a journal like this

could not be produced in reasonable time, except by transferring the impressions and working in duplicate, and such transference involves the risk of some diminution of sharpness and clearness of line. But there are definite artistic points in which carefully-executed wood-engraving has the superiority. It gives a force of effect in contrasts of light and shadow surfaces which can hardly be attained in lithography without a blurred and blotted appearance; it can attain a hardness and brilliancy of texture and sharpness of line which is eminently favourable to the representation of architecture. This, of course, means when it is carefully executed from clean and precisely-defined drawings or photographs. We may safely instance in this respect the engraving of the exterior of Keble College, in the present number; and as another example, those of the Post-office buildings at Rostock, in Germany, in the *Builder* for April 19, 1884. Both these examples were executed in the atelier of Mr. J. D. Cooper, from very clear and well-defined photographs; and the engravings may fairly be said to rival the photographs in clearness of definition, giving at the same time more force of contrast of light and shade. But similar results cannot be expected, of course, when the engraver is not given clear and well-defined originals, whether drawings or photographs, to work from. Another important advantage which engraving has over photolithography from pen drawings, is in the capacity for producing distance and middle-distance tints. In lithography nothing but greater fineness of line can be relied on for distant effect; and as the ink always spreads more or less on the stone, lines which are fine enough in the original drawing come out coarser and thicker on the stone, and in consequence it is hardly possible in lithographed line-drawing to keep the distance or the sky in their places; they always obtrude in such a way as to lose atmospheric effect. In wood engraving the lines do not spread in this way, and (what is a much more important point) the wood-engraving is treated by "over-lays," as they are called, of various thicknesses of paper on the opposing surface, by which the paper is pressed on to the block, so as to print the darker parts more heavily and the distant portions lightly. The first impression of an engraving, before it is "brought up" by this treatment, is a very different thing from the final impression.*

The ordinary processes of photolithography, however, still left the necessity of producing coloured drawings or photographs by engraving. The beautiful processes called "auto-type" and "photogravure" are, from their costliness and slow production, quite out of the question for weekly journalistic illustration. But the perfection by Messrs. Sprague, not very long since, of their "ink-photo" process, was a most important step in facilitating architectural illustration. This process produces a facsimile of a water-colour drawing so far as balance of tone (not colour) is concerned, or of a photograph, at no exorbitant cost, and, as worked by the firm who have introduced it, with great regularity and certainty of production, and in a time not much longer than is required for ordinary photolithography. We give in the present number two examples of their work; one, the stained-glass design by Mr. Burne Jones, reproduced from a photograph; the other, the west front of Tewkesbury Abbey, from a sepia drawing. The process spreads a stipple-like grain over the surface, which in some classes of subjects assists the effect materially; in the Tewkesbury Abbey plate, for example, it actually adds a surface texture to the masonry which materially improves the effect. Essentially it is, therefore, not so suitable for reproducing line drawing; the line tends to lose its sharpness, and the process is a little capricious in this way. We have seen some examples recently in which lines were produced with great sharpness; but something depends on the tone of the paper. If this is at all of a

bluish white, it tends to enhance sharpness of line, as the natural tone of the paper disappears from the result; if the paper employed is at all of a tendency to buff or yellowish tint, this asserts itself in the photographic impression, and gives a more or less blurred effect. In reproducing from photographs, the best results are obtained from those which give opposed masses of light and shadow, and shaded and modelled surfaces, rather than sharply-defined lines or details. Hence it is exceedingly successful in reproducing sculpture photographs; and one eminent sculptor, when we illustrated some of the sculpture in the Academy last year by this process, wrote to us to say that he had never had one of his works so well illustrated. In the treatment of water-colour drawings, of course, the reproduction is subject to the usual difficulties of photography; blues become faint or disappear, yellows become dark, and so on. A coloured drawing which is not made for the purpose of reproduction in this way, therefore, may considerably surprise and disappoint the author if he is not alive to the behaviour of various colours under photography. A sepia drawing, however, can always be trusted to come out well under the process.

It may be useful to add a word as to line drawings for ordinary photolithography, in which mistakes are sometimes made which lead to disappointment. In the first place, consideration should be given to the degree of reduction in size (if any) which is intended. If a large drawing is intended to be reduced, for instance, to one-half or one-third its original size, lines for shading must not be drawn so close that in the reduction they may tend to run into each other: inattention to this often leads to great disappointment in the effect of the lithograph. Spaces which are shaded heavily, unless quite black, should nevertheless be shaded in distinct and clear lines, leaving the interspaces, however small, of untouched white; to scribble or scumble over such shadows with thin lines to give more depth, as some draughtsmen do, is fatal to the lithographic effect, and produces only a "mess" on the plate. It is still supposed by some draughtsmen that drawings must be in black ink for photo-lithography; this is a mistake,—red, or warm brown, such as sepia, take equally well; but it is important that when black ink is used it should be quite black; thinly-mixed ink gets grey, which is an approach to blue, and fails accordingly. For the same reason, ordinary writing ink, which some people like to use for pen-drawing, and which produces a very pleasing effect in the original drawing, is exceedingly risky for photolithography, and should never be used with that object.

We give an example in this number of another photographic method of reproducing coloured drawings in the view of Callendar House, which is a reproduction from a sepia sketch, made mainly for the purpose of experiment. The process, which is carried on in Paris by Messrs. Boussod & Co. (late Goupil), results in the production of a metal engraving in very low and delicate relief, which, mounted on a block, is printed in the same manner as a wood-engraving. As will be seen, the process spreads a grain or stipple over the surface, but in a more mechanical kind of manner than in Sprague's process, and so far inferior. The reproduction of coloured drawings by this method, being by means of photography, is subject to the same partial falsification of effect which enters into all the processes in which photography is used; but the provision of a reproduction of this kind, which will print like an engraving, is often a great convenience. The present plate reproduces very well the effect of the sepia sketch. We have the proof by us of a better and more effective example which it was intended to print with this, but our Parisian friends have not yet acquired those virtues of certainty and punctuality of delivery which so admirably characterise our leading London lithographers, and the block has not arrived in time for press.

The use of new processes, or those which have not been in habitual use for weekly pub-

lications, we have found to be in other cases somewhat hampered by difficulties in regard to speedy and prompt execution. These things arrange themselves in time, however, and further developments in this direction may be looked for, our object being to have for each class of architectural drawing its best and most artistically favourable method of reproduction.

THE TEMPLE OF DIANA, EPHEBUS.

BY J. T. WOOD, F.S.A.



ALTHOUGH the chief results from the discovery of the Temple of Diana at Ephesus have now been before the public for some years in the book I published on the subject in 1877, wherein I described the discoveries made by excavations under the auspices of the Trustees of the British Museum, between the years 1863 and 1874, much remains to be told appertaining to those discoveries, and something more may be added as the results of the excavations which I carried on by private subscription under a committee of noblemen and gentlemen from March, 1883, to February, 1884, excepting the three summer months during which no men can be found to work for a continuance in the pestilential district of Ephesus. Even at the time when the city was in the height of its glory and magnificence, Ephesus was unhealthy by reason of an immense marsh, which all the four rivers which flowed through the plain were not capable of draining, and, we are distinctly told by Strabo, that the Temple was built on a marsh; but now that the city is entirely deserted and consists of nothing more than a number of heaps of ruins of its public buildings, and the river banks being no longer maintained, the whole plain is silted up to a considerable depth, and the marsh north of the city is a source of malaria, which makes its neighbourhood more unhealthy than that of any other of the ruined cities in Asia Minor.

The deadly fever which prevails at Ephesus is one of the great difficulties which present themselves to the explorer who seeks to unearth the treasures of antiquity which lie hidden so many feet below the present surface of the ground.

If it had not been for the fever, I should have carried on the excavations at the Temple during the summer months.

For the first three years of my explorations I worked on without cessation, although I could only get a small gang of men to work for a few days at a time during the hot weather. At the same time, I made my survey of the city, and my life was nearly sacrificed at the end of the third hot season.

But, besides the fever, there are other reasons why the exploration of the Temple cannot go on so well during the summer. The rains in February, March, and April cause the water to rise in the excavations to a height of several feet above the pavement on which rest all the sculptured marble and fragments of architecture which are scattered all over the site. A wet season considerably aggravates this difficulty, and makes it impossible to do more from May to September than to remove the upper strata in preparation for a harvest which can only be reaped in the autumn and winter months.

There is still another difficulty during the summer. Brigandage is rife all over Asia Minor, and the neighbourhood of Ephesus is a favourite resort for the brigands, who are formed in bands of from four or five to twenty-five. These men can live comfortably up in the mountains during the warm months, and the nature of the country is extremely favourable to their evasion of pursuit when they have succeeded in making prisoners, who are taken for a ransom. Even during the winter months I have been obliged for some years to provide myself with a body guard of four cavasses. These men were extremely useful as gangers at the time when I had more than 300 men at work.

The marbles acquired by the excavations during the five years in which I was employed in clearing the site of the Temple are now

* We may add, however, that our experience leads us to discourage wood engraving from small views of large buildings, where the details are necessarily shown to a very small scale. The material is not pian enough to work detail on a small scale.

arranged in the gallery in the British Museum, which has been recently cleared out for their accommodation, and which has been for so many years the Mausoleum Gallery; so the remains of two of the seven wonders of the ancient world have found their home in our National Collection of Grecian Antiquities.

In the Ephesian Gallery will be seen the sculpture on the south side, the architecture on the north. I should have preferred a *vice-versa* arrangement, and would have taken the south light for the sculpture; but my opinion and wishes did not prevail.

The mutilated remains of five sculptured drums are ranged in line; and although they stand much nearer together than they did in the Temple itself, they give the *imaginative* visitor some faint idea of the rich effect which a group of eighteen sculptured columns would have as they were arranged in the pronaos and the posticum of the Temple. The most complete of the five sculptured drums in the Museum is 6 ft. 0½ in. in diameter; but the one next to it, with the upper halves of two figures, is only 5 ft. 6½ in. in diameter. I am obliged, therefore, to conclude that these columns were sculptured to about one-third of their height. The different style of sculpture in these drums is most remarkable.

At each end of the gallery, on a line with the sculptured drums, are two very interesting sculptured blocks, each with an enriched bed mould; the character of these blocks, and the positions in which they were found, induce me to believe that they were the angle blocks of a sculptured frieze. This is a question which can only be cleared up by further excavations. On the upper surface of these blocks are to be seen traces of a curved line, which prove, I think, that they were cut out of the drums of columns of an earlier temple. Opposite the central sculptured drum may be seen the remains of the base of one of the fluted columns, which belonged to the outer line of columns of the peristyle on the south side of the Temple; upon a similar base, I presume, the sculptured columns were placed. The great beauty of the outline of this base is most striking. It is probable that between the two astragals, which are here three times repeated, there was a fillet of gold. I had the good fortune to find an example of two astragals of the same size, which had between them a thin strip of lead doubled, and pressed firmly in between the astragals, and within the folded lead were the remains of a strip of thin gold, which must have formed a narrow fillet. The flutings of the columns were elliptical, and the points from which the extremities of the ellipse were struck were set in 1 in. from the face of the fillet dividing the flutings, the arrises therefore were extremely sharp. The acute angle here, and in the marble fillets of the base which divided the cavetti from the astragals, as well as in many other fragments, is most remarkable. Such work could only be executed with the material of which the Temple was built. On showing a sample of this marble to a London marble merchant, he said that it was too hard to be worked in the present day, even by machinery, and it was quite unmarketable.

On a line with the base I have here described there are two examples of the noble capitals which surmounted the fluted shafts of the columns; in both examples the whole of the abacus has been chopped away, but I fortunately found a fragment of another capital with a portion of the abacus remaining. It consisted of the egg-and-tongue enrichment, 6 in. deep. The eye of the volute of one of the capitals has been cut out, and two pin-holes show that a coloured or gilded disc was inserted to complete the volute. In the other example the eye has not been cut out, and the compass-points remain from which the volute was described; each perfect revolution consisted of eight arcs of circles struck from centres with increasing radii from the eye of the volute.

A large fragment of the architrave was found consisting of three fasciæ and what remains of the capping of the upper fasciæ. The latter has been so much chopped away that it is impossible to restore even the outline,

much less the enrichments of which it was composed. It is much to be deplored that nothing has been found of the cornice but two fragments of the beautiful cymatum, 2 ft. in depth, which is enriched by the honeysuckle ornament, deeply and artistically cut. The largest of these was found in the earlier excavations; the other, which enables me to obtain a correct outline of the whole, was found recently near the spot where the first was found. The gutter for the rain-water cut in this stone shows exactly where the lions' heads occurred which formed the water-spouts. These were placed immediately over the columns.

For lack of the parts I have mentioned it is impossible to restore the order, or to fix the places for the numerous varieties of the bead and reel enrichment which were scattered far and wide with a few ogée and other enrichments. Some of these were of a very large size, and many of them retained traces of colour, which justify me in concluding that the whole of the Temple was painted, excepting, perhaps, some of the fillets which might have been left white. On the same site were found the remains of three temples, built one over another, and, as far as I could ascertain, of the same size, but differing in their details and proportion. My recent excavations, carried on at a time when the water stood at a low level, enabled me to study with advantage some of the details of the earliest of the three temples. On the north side, in the foundation pier of one of the inner columns of the peristyle, I found, after minute examination, the remains of the base of a column of the first temple, which was similar to that of the last, and as the cella wall of this Temple was 6 ft. 3 in. thick and the ante must have had a projection of at least 1½ in., I suppose the columns of this earlier temple were at least 6 ft. 6 in. in diameter. This supposition is justified by the remark of Vitruvius in describing the last temple. He says,—the *improvised* Ionic order was employed in this building; that is, the columns were 8½ diameters in height *exclusive* of the base. I have, therefore, computed their height to have been 55 ft. 8¾ in. with the base.

The number of these columns (100) is decided by the position of the south ante in the pronaos; the cross wall at the west end, the 11-ft. length of the lowest step of the platform on which this temple was raised, and the remains of the surrounding portico at the east end. Vitruvius describes the Temple as octastyle, and this is fully borne out by the discovered remains.

The position of the Temple at the foot of a hill, which rises at a steep angle, at a short distance from it, is hard to account for; there was ample space, however, to allow of a wide road to pass from north to south, and a large open space in addition; but its position in that part of the plain of Ephesus is only accountable by surmising such a circumstance as the finding of an aerolite or meteoric stone (the image which fell down from Jupiter) which had fallen there, and the man to whom the ground belonged might have taken advantage of his opportunity to get a large sum for it.

The allusion to the image in the town-clerk's speech, Acts xix., gives us strong evidence of an authentic tradition.

It is an extraordinary fact that the site of the Temple was a had one. It could not be seen from a single house in the city, nor from the Theatre, nor from the Forum. Situated as it was a mile from the city, and at the foot of the hill at Ayaslouk, its remains were silted up and completely hidden from view many centuries before the time of Sultan Selim, who built a large mosque, and a considerable city in that part of the plain.

In the course of a short and hurried discussion which followed the reading of my paper on the Temple of Diana at the Royal Institute of British Architects on the 9th of June, 1884, my friend, Mr. R. P. Pullan, expressed his opinion that the ancient Greeks did not employ sculpture in the tympana of their *Ionic* temples. I am not at present in a position to prove, beyond doubt, that the Temple at Ephesus had sculpture in that position. I

found an angle of the west tympanum which was quite plain; but even if there had been sculpture in the tympanum, it might not have extended so far into the angle. Mr. Pullan cited three *Ionic* temples which he had dug up, and which were without sculpture in the tympana; but these temples might not have been completed, or they might not have been perfect examples of the most highly-finished temples; such a temple as that at Ephesus, without sculpture in the tympana, but so rich in sculpture elsewhere, would have a very unfinished and incomplete appearance. The Ephesian medal of Hadrian, and a medal of Gordianus, exhibit sculpture in the tympanum. The latter is figured in Professor T. L. Donaldson's "Architectura Numismatica." I found at each end of the Temple at Ephesus legs of statues, life size, in high relief, showing just one small attachment in each case. These might have come from the tympana, or from the frieze, on some other part of the Temple. These fragments of sculpture were some of the results of my recent excavations, which yielded altogether about sixty fragments.

Amongst the remains of the earliest Temple found on taking to pieces the massive piers of rubble masonry, which were built, as I presume, by the early Christians of Ephesus as foundations for an intended church, were two most interesting examples: one is a female head with a peculiar coiffeur and ear adornments, which cannot properly be called ear-rings; the face is of a peculiar and harsher type, with thick lips and broad fleshy nose, the eyes wanting; they had, apparently, been represented by colour. This head was attached to a rounded surface, and it evidently formed part of a sculptured column. The whole was painted. The other fragment is still more interesting. It represents the lower portion of a draped male figure in low relief against a rounded surface; the legs, feet, and close-fitting drapery are so archaic in character that I have no hesitation in saying that this fragment, as well as the female head, must have belonged to a sculptured column of the earliest temple, built by Ctesiphron and his son Metagenes in the sixth century B.C., and to which Cressus has the credit of contributing so generously. In the same foundation-piers were found some very fine examples of lions' heads from the same temple; also one very fine and nearly perfect example of a lion's head, which had formed a gargoyle or water-spout, from the last temple. The archaic fragments above described justified the demolition of the piers of rubble masonry in which they were found, although upon the piers themselves there was imprinted a most interesting record. They had been built against the cella walls of the temple, which remained at the time up to the height of many feet, and before the mortar was quite dry the walls were taken down: the impression of every stone and the joints of the masonry could be seen perfectly upon the rubble piers. I took care to leave undisturbed sufficient of the angle piers to enable any one who wished to do so to check such parts of my restoration of the Temple as formed part of my data. Small portions of the cella wall on the south side and at the west end remain undisturbed, and these are beautiful examples of the masonry of that period, the sixth century B.C. The general surface of the marble was tooled with a sharp-pointed hammer; a margin of 1½ in. was drafted round each stone, and the edge was slightly hevelled to preserve the arrises from injury by earthquake. This beautiful walling had evidently served as part of the foundation of the temples which were raised over it.

As very few of the wall-stones remain loose on the spot, it must be presumed that they were all removed after the destruction of the Temple to construct some neighbouring buildings, and some were taken to the city, as I found six of them in the proscenium of the great theatre. This is no mere surmise, for these stones had upon them twenty-six decrees of the Council and the people of Ephesus, conferring the citizenship upon various persons for their services, and the decrees were ordered to be inscribed on the walls of the Temple, where

similar decrees were inscribed. The date of one of these decrees is 290 B.C.

A question particularly interesting to the architect is whether there was an amphitheatre at Ephesus in which it was possible to have encounters between men and wild beasts. The passage in St. Paul's First Epistle to the Corinthians, 15th chapter, wherein he says,—"If, after the manner of men, I fought with beasts at Ephesus," misleads many people, but the "beasts" that St. Paul fought with must have been wicked men. If he had really fought with lions or other wild beasts, he would have mentioned it in writing afterwards to the Corinthians, 11th chapter of the Second Epistle, where he gives a most pathetic enumeration of all the sufferings he had gone through, including even the number of times that he had been beaten with rods. He would certainly not have omitted to include his encounters with wild beasts, if he had ever been so persecuted. There is no record even that St. Paul was imprisoned at Ephesus. The archons of the city, indeed, appear to have befriended him.

I looked carefully for the remains of an amphitheatre at Ephesus, but found no signs of one. There were, indeed, only two amphitheatres in Asia Minor,—at Pergamos and Cyziens. We may be allowed to suppose that this kind of persecution was not generally practised in Asia Minor.

A curious bas-relief was found in the ground over the site of the Temple, and about 12 ft. from the present surface, having two panels, one representing a man armed with a club, with which he has struck the lion on the head on the second day of his encounter; on the third day the lion has won the victory, the man is prostrate, and the lion is tearing out his bowels. The panel representing what took place on the first day is missing, but the man must have been victorious, as on the second day. This bas-relief is an interesting proof that men sometimes survived more than one encounter with wild beasts.

When the excavations were suspended in 1874 the whole of the site of the Temple had been explored, and the surrounding ground for 31 ft. beyond the lowest step of the platform, excepting at the east end on the north side.

The recent excavation has been undertaken for the purpose of exploring the portico surrounding the Temple area, up to which point it is possible some sculptured drums might have been rolled to clear the road around the Temple which was needed for the removal of the wall-stones. It is also hoped that some more of the frieze may be found, as well as enough of the architrave and cornice to complete the order.

Most of the remains of the last Temple which have hitherto been found are now exhibited in the Ephesian Gallery. It may here be repeated that this was the Temple which was built by Diodotus in the time of Alexander the Great, and which succeeded the Temple built by Ptolemy and burned down by Hierostratus.

My recent excavations, and further study of the foundations and other portions of this Temple remaining *in situ*, have enabled me to modify my plan in a few particulars.

I now place the Temple complete with its customary three steps upon a platform which is approached by a continuous flight of ten steps. The dimension taken on the lowest step from north to south is 239 ft. 4½ in.; the treads of the steps were 22 in.; the height 8 in.; the platform was, therefore, 206 ft. 4½ in. wide. The length of the platform cannot be decided from the results of the present excavations, but if it was 425 ft., as recorded by Pliny, there would be ample space for the altars which I have supposed to have existed in front of the Temple at the west end. The pavement of the peristyle was 9 ft. 5½ in. above the pavement at the foot of the steps.

The Temple itself was 163 ft. 9½ in. in width and 342 ft. 6½ in. in length.


The naos or cella was nearly 70 ft. in width and about 110 ft. in length.

Full particulars of the Temple with illustrations are given in the Transactions of the

Royal Institute of British Architects for the session 1883-84.

The readers of the *Builder* will be glad to hear that a fund for the further prosecution of the excavations on the site of the Temple is being raised, the hon. treasurer of which is Sir John Lubbock.

FINANCING ON THE THAMES.

EW persons, it is probable, are aware that the navigation of the Upper Thames (such as it is), and the degree of attention that is paid to the maintenance of its channel, and to the escape of its flood waters, are mainly provided for by the actual sale of a definite quantity of the water of the river. It is a matter of some importance, both to the riverain residents and to the inhabitants of half London, that it should be known to how great an extent the funds applied to the Conservancy of the river, west of London, are furnished by five of the metropolitan water companies. The fact, however, is undeniable. The authority for the statement will be found in two Parliamentary Returns issued in July last, one of which is a "Return prepared by the Auditor of the Accounts of the Thames Conservancy Board, showing the Income and Expenditure on account of the River from 1777 to 1882," and the other is the "General Report of the Conservators of the River Thames, from 1st January, 1883, to 31st December, 1883."

The powers of the Conservators of the river Thames extend from Yantlet Creek, in the county of Kent, to the City stone above Staines Bridge, and thence to Cricklade, in the county of Wilts. The measured navigable stream, from London to Lechlade, where the Thames and Severn Canal leaves the Thames, is stated by Professor Ansted at 148 miles, and the distance from Lechlade to Cricklade is eleven miles. The first entry of tolls received on this portion of the river on record is the sum of 525*l.* 14*s.* 2*d.* for the five months from May to September, 1777. In 1778 the tolls amounted to 1,518*l.*, and they gradually rose to 2,264*l.* in 1810. In 1811-12 a rapid rise coincided with the construction of the Regent's Canal. In 1813 the receipts were 10,445*l.*, and the improvement continued until 1827, when the maximum of 15,924*l.* was attained. The river traffic, as measured by the tolls, remained tolerably steady until 1841, when the effect of railway competition may first be noted. It was not, however, until 1848, in which year the proposal to carry minerals on the London and North-Western Railway at the charge of ½*d.* per ton per mile was denounced by Mr. Robert Stephenson as a robbery of the railway company, that a very serious decline of the river traffic set in. The tolls in 1848 were 10,951*l.*, or about 500*l.* more than in 1813. At this period the acquisition of the canals by the railway companies, and the obstruction of the inland water traffic, commenced. Five canals were thus acquired in 1845, eleven in 1846, seven in 1847, and three in 1848. The Kennet and Avon Canal was acquired by the Great Western Railway Company in 1852, and the tolls on the Thames fell to 6,403*l.* in the following years. From 1852 to 1871 eighteen more canals were acquired by the railway companies, and the tolls on the Upper Navigation of the Thames reached their minimum of 3,282*l.* in 1873. The effect of the railway policy in abstracting from the rivers and canals of the country a traffic the conduct of which has (some persons maintain) involved a heavy loss to the railway shareholders, while its abstraction has rendered the River Conservators unable to carry out their requisite duties, is thus accurately illustrated by the comparison of the dates above given with the decline in the tolls on the Thames.

Since 1873, in spite of the poverty thus brought on the Conservators of the Thames, the traffic has slightly improved, the receipts standing at 4,135*l.* in 1882. But the cost of maintenance in that year (exclusive of interest on debt) amounted to 17,059*l.* The navigation would thus have become utterly bankrupt but for the contributions of the water com-

panies, aided by the annual payments made by the Grand Junction and the Regent's Canal companies as compensation for loss of tolls.


In 1844 the first payment for water taken from the river, amounting to 50*l.* 19*s.* 5*d.*, was made by the Grand Junction Water Company. The Lambeth Company commenced a series of annual payments of 200*l.* in 1853; the Southwark and Vauxhall and the West Middlesex companies began to pay 300*l.* a year each in 1854; and the Chelsea Company paid a like sum in 1855; in which year the contribution of the Grand Junction Water Company was also of the same amount. In 1867 the contributions from the water companies rose to 5,000*l.*; in 1871 to 6,000*l.*; and in 1879 to the present figure of 12,050*l.* per annum.

During the past year the water companies, taken together, have derived from 80 to 85 millions of gallons daily from the Thames. The payment above stated is about equivalent to a price of 8*s.* per million gallons of water. This is equal to about 40 per cent. of the entire cost of the water supply of the city of Chicago; which, again, is almost identical with that of raising the water of the artesian well of Passy into a reservoir, at the height of 53 metres, at Paris. Thus, while the maintenance of the upper river is now chiefly supported by the contributions of the water companies, it cannot be denied that the payments made by the latter represent a fair equivalent for the quantity of water that they collectively derive from the Thames.

From 1777 to 1834 nearly 5,250*l.* per annum has been spent in improvements of the navigation of the Thames, together with repairs of the locks and towing-path, and wages of the lock-keepers. From 1834 to 1857, the expenditure has risen to upwards of 10,000*l.* per annum, 19,127*l.* having been spent in improvements in the last-named year. From 1857 to 1882, the total expenditure on the Upper Navigation was 266,000*l.*, of which 85,331*l.* is carried to capital account, or, in plain words, represents accumulation of debt. During this period the expenditure which appears to have been actually incurred in the necessary work of maintenance has averaged over 8,800*l.* a year. And out of the total revenue receipts of 185,000*l.*, the contributions of the water companies came to 118,000*l.*

It seems pretty plain that this state of things cannot continue indefinitely. There is small room to wonder why the residents of the Thames Valley suffer so disastrously at one time from flood, and at another from want of water, while the Conservators are thus reduced, by the abstraction of the traffic of the river, to eke out their inefficient funds by the creation of a "capital account." It seems to us to be of no little importance that the public should be made acquainted with the facts above brought together. True, "if it be confessed, it is not redressed"; but confession is a necessary preliminary to redress.

NOTES.

HE renewal of the notices of an application to Parliament for a tunnel under the Channel points to the resumption of a conflict which it is the interest of all persons concerned as to our public works to avoid. It ought to be insisted on that the town authorities and other bodies who may feel compelled to oppose such a Bill should not be put to that expense unless on the condition of the deposit, by the promoters, of a definite estimate of the traffic which they proposed to carry, of the price at which it was to be conveyed, and of the proportion of the resulting profit to the capital cost of the work. In our early railway times such a statement was indispensable to the passing of the preamble of a Bill. The Channel Tunnel projectors have always eschewed this honest preliminary step, and that, as it seems to us, from a consciousness of their want of a case. In the first place, they have to show that they could convey goods from shore to shore at a cost price in any way approaching the cost of ocean transport. In the second place, they would have to show, on the grounds of the definite knowledge that we

possess of the minimum cost and time which would be required for ventilating the tunnel, what gross tonnage could possibly be passed through it in twenty-four hours, and what per centage the charge for the goods so carried would pay on the cost of the line. These are plain questions, and if they are blinled the public may know what opinion to form.

THE removal of the constriction in the great east and west route near the Mansion House, now about to be carried out, is only an attempt to remedy a crying scandal. The constant increase which each year brings upon the traffic through London may reconcile us to the failure to carry out Sir Christopher Wren's plan of reconstruction after the Great Fire. That a well-ordered network of streets, fully adequate for the wants of the London of 1666, with its noble central waterway, would have been designed by the architect of St. Paul's Cathedral, there can be no doubt. But that the width of the streets would have become inadequate for the centre of a province of 5,000,000 inhabitants is no less obvious, and in the very excellence of the work of Wren we should have found a reason against that demolition which is now being effected piecemeal. It is possible that we shall never be able to render the street accommodation of London what it ought to be. But we can, at all events, avoid constrictions, and refuse to allow two wide streets to be turned into one narrow one.

THE Manchester Chamber of Commerce have had under consideration the proposal of the Bridgewater Canal Directors to deepen the River Irwell and the upper part of the Mersey to a depth of 10 ft., so as to provide improved barge access to Manchester. The Chamber has resolved that no such measure will be acceptable to the large interests which they represent unless it be accompanied by substantial guarantees as to a reduction of rates and charges between Liverpool and Manchester. This resolution of the Board has the more significance from the fact, as stated in the discussion, that the effect of the passing of the Bills deposited by several railway companies for the ensuing session of Parliament will be to raise the present charge of 8s. for conveying a ton of cotton from Liverpool to Manchester to 11s. 2½d. With such opposite views entertained by carriers on one side, and by customers on the other, a lively time may be expected by those concerned in Parliamentary Committees.

IT appears from a report by the Superintending Architect of the Metropolitan Board of Works that the gross amount of fees received by District Surveyors during the year 1883 was 46,441l. 19s. 10d. in respect of 26,479 works, from which it would seem that the average fee is 1l. 15s. for every work surveyed. The gross fees show a falling-off in comparison with the amount received in the previous year. The largest sum received as fees by a District Surveyor during the year was 2,443l. 8s. 6d., the amount returned by Mr. Andrew Moseley for the district of Fulham. The next largest sum is 1,628l. 10s. 6d., the gross amount of fees received by Mr. T. E. Knightley for the district of Hammersmith. The district of West Hackney, of which Mr. George Legg is the district surveyor, and the district of St. Giles's, Camberwell, of which Mr. H. Jarvis is the district surveyor, show an annual income of upwards of 1,500l. each. The southern division of Lambeth (Mr. H. Parsons), and the parish of Clapham and the southern division of Battersea (Mr. Edward Panson), produced about 1,200l. in each case. The smallest amount of fees received was that returned by the district surveyor for the detached portion of Clerkenwell, near Muswell Hill (Mr. R. Parkinson), whose annual income from his district was only 14l. 3s. 9d. without deduction for office expenses. The average value of a district appears from this return to be 674l., a sum which, when the usual earnings of surveyors is taken into consideration, must be looked upon as sufficiently remunerative. The oldest

district surveyor in point of standing is Mr. Edmund Woodthorpe, who was appointed to the district of St. Anne, Limehouse, St. John, Wapping, the precinct of St. Katherine, and the Hamlet of Ratcliffe, in 1839.

THE Crystal Palace School of Engineering completed its thirty-sixth term on Saturday, when the certificates awarded to the students by the Examiners were presented by Mr. C. Douglas Fox, M.Inst. C.E. Twelve years ago the school opened with nine students; the number has increased continuously, until, in the year and term just completed, 86 students, the highest number ever reached, have been in attendance. At the end of the first year Mr. Douglas Fox, the chairman of to-day, was one of the Examiners. In the first year Mr. Percy W. Britton, A.I.C.E., was a student in the school, and was assigned by the Examiners, the Principal of the School, and by his fellow students, the honourable position of *primus*. Mr. Britton acts at the end of the thirty-sixth term as one of the Examiners of the work of his successors in the school. His colleague in the examination was Mr. Edward Easton, M.I.C.E., M.I.M.E. Both of the Examiners' reports are highly favourable as regards the scope of the instruction given and the methods adopted. Of the Civil Engineering section Mr. Britton says:—"I believe the system followed, as the result of long experience of the best methods, to be unsurpassed in its thoroughness."

PHOTOTYPES of the beautiful bust of Dr. Ernst Curtius, executed in commemoration of his seventieth birthday, and recently completed and presented to him, have just reached English subscribers. The bust is of Carrara marble, by Professor G. Schaper, and admirably reproduces the beautiful but austere features which in real life have much of the set fixity of marble. Each phototype is accompanied by a text containing a short account of the life and work of Dr. Curtius, an account of the proceedings on the festival day, and a list of subscribers. We are glad to see that out of a list of two hundred and fifty-nine, ninety-three are from England and America. In addition to the bust, four offerings in literary form were made.—1. A collection of twenty-seven essays (by pupils and admirers), some of which have been already noticed in the *Builder*. For these essays Dr. Curtius returns special thanks in graceful pentameter verse. 2. An account of his childhood and school-life, printed as manuscript. 3. An important memoir on the Pergamon altar frieze, which we hope to notice shortly. 4. A plate representing a view of the Acropolis and, very appropriately,—the Altis of Olympia; between them a dedication in Greek. This tribute was offered to Dr. Curtius by a deputation of Greeks resident in Germany, at their head Dr. Herr Rangabé, Greek Minister at Berlin.

A BUST of Mr. Gladstone, executed by Mr. A. Bruce Joy, has just been presented to the corporation of Liverpool by Mr. S. Stitt, and accepted by them. Sir James Pieton, speaking for the corporation, characterised the bust as being admirable both in execution and as a likeness.

IT appears that the working men are strongly in favour of the proposed new subway from the Marble Arch to the City. They consider it would provide quick and cheap travelling accommodation between East and West London, which is not now to be had, and for want of which many men are wasting time and strength in walking "nine or ten miles to their daily employment." The "nine or ten miles," we presume, must mean counting going and returning. This is one side of the matter, and an important one. Cheap as the omnibus conveyance seems to the City clerk, it is too expensive for the working man, and consumes a good deal of time too. Mr. Greathead, the engineer for the proposed subway, states that no disturbance of the roadway would be occasioned in making it, except at a few points where the stations would ultimately be placed. But we imagine the disturbance

at those "points" would be very considerable, and not at all restricted within the mathematical definition of a point. Still, the working-men's interest, if correctly represented, is very important, and should have every consideration.

THE Canadian Pacific Railway is the great Canadian road from the Atlantic to the Pacific, and will become the shortest route from England to China and Japan. From Montreal to Vancouver, the east and west posts, is a stretch of rail of about 2,900 miles, passing over the Rocky Mountains at an altitude of 5,300 ft. above the sea, through the grandest mountain scenery, over boundless prairies, and opening up the finest wheat-growing and grazing countries in the world. The rail route is not yet complete, and traffic during the open season is carried across the lakes from Owen Sound to Port Arthur on the north-western side of Lake Superior. The stations along the line are at present of the simplest and rudest class of building, the country being but sparsely settled or reclaimed from its primeval wildness. Eagle River station is about midway between Port Arthur and Winnipeg, picturesquely situated amongst the hills.

ON the 31st of December the *Times* devoted ten columns and more to a review of the principal events of the passing year, ranging from questions of domestic and foreign policy of the highest interest to the deaths of the ballet-danceurs Tagioni and Fanny Elssler. The Garroyle breach-of-promise case and the Adams-Coleridge libel-case were thought worthy of a place in the long record, in which even the ex-convict Orton is not forgotten. But from first to last there is not a word about art. Such trifling matters as the decision of the judges in the Government Offices competition, the re-building of the tower of Peterborough Cathedral, and the restoration of Westminster Hall, were, it is presumed, too insignificant for notice. Strange fatuity, which thus ignores works which will for good or evil endure ages after the political and social squabbles of the day shall have been buried in oblivion!

YESTERDAY (Friday, January 2nd) was the anniversary of the foundation of the Institution of Civil Engineers, which was established on the 2nd of January, 1818. From a new list of members just printed, it appears that there are now on the books 20 Honorary Members, 1,447 Members, 1,889 Associate-Members, 508 Associates, and 804 Students,—together 4,668, against a total at the same date last year of 4,443.

THE exhibition of the Gainsborough Collection at the Grosvenor Gallery is of exceptional interest, and an admirable pendant to the previous exhibition of the works of Reynolds in the same Gallery. We will notice it in detail next week.

A BILL is to be applied for in Parliament next session by the local authorities of Kingston for the dissolution of the Lower Thames Valley Main Sewerage Board, and for the provision for the formation of separate Boards, to be called respectively the Richmond District Main Sewerage Board, the Kingston-upon-Thames Main Sewerage Board, and the Molesey, Hampton, &c., Main Sewerage Board. The stated object is to convey the sewage to some convenient place where it may be purified by application to land or by chemical treatment, and rendered fit for discharge into any stream or watercourse beyond the action of the Rivers Pollution Act or of the Thames Conservancy Acts. Apparently this points to the adoption of the same principles as were recommended in the Report of the Royal Commission on Sewage,—the chemical treatment of the solids and the reduction of the liquids to a comparatively innoxious effluent.

IN reference to this said sewage subject, Sir John Lawes startles us by a long letter in the *Times* of the 29th ult., urging that the most remunerative way of disposing of the

sewage of London is by pouring it into the river or into the sea, which will do as well. "It largely increases the production of fish, provided it is sufficiently diluted, and does not interfere with their health." It supplies a large proportion of the chemical ingredients,—nitrogen, phosphoric acid, and potash,—which are carried away by the fish, and which, in fact, form part of their composition. If this can be established, it is a delightfully easy solution of the problem. Only let us have it carried further out to sea to feed the fishes, and not make the larder under our very noses, as it were. "A long shot, Sir John, if you love us!"

THE TOWER AT THE CLOSE OF THE SIXTEENTH CENTURY.

A short time back we gave a description of the ancient residences of our monarchs at Westminster, and we now propose to say a few words respecting their chief city residence "The Tower." Our intention is simply to convey to our readers some notion of its appearance towards the close of the sixteenth century,* and not in any way to deal with its history, a subject so voluminous and so full of interest that to write it would be little short of undertaking a history of England.

Although "The Tower" still preserves a good deal of its Mediaeval arrangements, and in this respect differs widely from the "Old Palace of Westminster," yet it must not be supposed that it has not suffered very numerous and regrettable alterations and degradations during the past three centuries. In one respect its aspect and plan are greatly changed, and that in a most important feature. We allude to the entire and complete destruction of the noble "palace" which stood within its walls: not one trace of this building now exists! The "White Tower," or Norman keep of Gundulf, still rears its lofty walls in the midst of the fortress; the outer hallum, with its bastions and towers, is still tolerably perfect; the inner hallum is, for the most part, entire; the old Chapel of St. Peter ad Vincula, the house of the Lieutenant, the "Bloody Tower," of fearful notoriety, the Beauchamp Tower, carved with the memorials of many an ill-fated prisoner, are still to be seen; but what has become of the palace of our kings? Alas! not one stone of it remains.

By a kind of poetical justice the inscriptions, mottoes, and names of the victims of tyranny and oppression, carved by their own hands, are everywhere to be seen and read, but the noble palace of those who were too often the oppressors has so thoroughly disappeared that, were it not for ancient documents and drawings, its very existence might be a matter of doubt! It is a most singular fact that the Mediaeval palaces of our kings in and near the metropolis have almost entirely disappeared. Of the ancient palace of Westminster the Hall alone remains; of the Brixwell not one stone exists; of the two "Nonsuches" not a vestige; of Baynard's Castle nothing whatever; of Kennington even the site is doubtful; of Richmond a single gateway; of Whitehall the doubtful foundations of a wall; of Greenwich nothing whatever; of the Savoy the Chapel; and of St. James's the gateway, possibly the chapel, and portions of the court-yard. The only Mediaeval palace which remains in anything like a state of entirety is Hampton Court, and that does exist as a monument of shame and infamy, a terrible sermon upon the text, "Put not your trust in princes!"

The Tower differed from all the other palaces in the fact that it was at once a citadel, a fortress, and a palace. Probably, as originally erected, the Keep, or White Tower, was used as the residence of royalty, though, looking at its great plainness, almost rudeness of construction and detail, it is difficult to believe that it could have been intended for a royal residence except during times of war or civil commotion, and there seems to have been a separate palace, erected at a very early period, probably even as early as the time of William Rufus. The buildings were, however, re-erected and greatly added to by that "Builder-King" Henry III., and, however we may disapprove of that monarch's political acts, it is but just to acknowledge that he was a most munificent

patron of the arts, especially architecture. Apart from the "White Tower," most incorrectly called "Caesar's Tower," the larger portion of the Tower of London dates from his reign.

Of the original buildings of the Tower, Gundulf's Keep, called the "White Tower," is the only important edifice now existing. It is an interesting rather than a fine example of Early Norman work, but vastly inferior both in design and construction to many of our Norman castles. It is singularly plain and devoid of ornament. The chapel alone possesses anything in the way of architectural detail; four of the original windows exist; they are almost rude in their simplicity and bear little resemblance to the windows lately executed by way of restoration.

The great palace of the Tower was situated to the south and east of the White Tower; it was bounded to the west by the wall leading from the "Garden Tower," now called the "Bloody Tower," at the north end of which, close to the White Tower, was a gate called "Cold Harbour," which gave admittance to the court of the palace, immediately in front of the White Tower; facing south was the jewel-house; on the opposite side of the courtyard was the Great Hall, erected by Henry III.; to the east was a series of buildings called the Queen's Lodgings, in which was a gate passing to the second court, or Privy Court of the Palace. This court formed an irregular square with a tower at each angle. Those on the north side were called the Wardrobe Tower and the Broad-arrow Tower (the latter still exists); between these was a range of buildings called "The Wardrobe." The wall of the inner ballium connected the "Broad-arrow Tower" with the "Salt Tower." Probably there was a gallery or row of buildings within the wall. The Salt Tower is the only existing tower which may possibly be regarded as a portion of the old palace, though it does not appear to have contained any of the apartments of the royal residence. In documents of the reign of Henry VIII. the Salt Tower is called "Julius Cesar Tower." The curtain wall of the inner ballium did not return to the south parallel to the outer ballium, but was carried straight on to the "Well Tower," where it joined the outer ballium (that is to say, if ancient plans and representations are correct). A building, called the "Queen's Gallery," which appears to have been partly of wood, or post-and-pan work, went in an oblique direction from the Salt Tower to the "Lanthon Tower," and another building, called the "King's Gallery," extended from the Lanthon Tower to the outer ballium, which, with the walls and buildings previously mentioned, enclosed an irregular court planted as a garden, and called the "Privy Garden." In order to make up for the absence of the inner ballium or wall, in this part of the palace, the outer hallum was defended by two extra towers, the "Cradle Tower" and another "tower adjoining the King's Privy Closet." It is singular that no name is given to this tower in the survey of the 23rd of Henry VIII.

There seems to be evidence that some of the buildings composing the palace were partly of wood, because in the survey for repairs made in the 23rd Henry VIII., before alluded to, we find the following items mentioned:—"A great curval window of wood in the Queen's dining-chamber";—wooden buildings existed in other parts of the Tower,—for instance, the seven houses of office which stood near the Bloody Tower, until about a quarter of a century back, and were very interesting examples of timber-work. There is also an account for "a placement of timber on the west side of 'the Wardyn Gate.'" This is undoubtedly the old timber and post-and-pan work existing on the east side of the Byward Gate, which is proved from this to date from the reign of Henry VIII., and deserves to be preserved, as one of the only examples of the kind left at the Tower. These wooden erections were by no means uncommon in ancient castles. The beautiful Horse-shoe Cloister at Windsor is a charming example, and we cannot be too grateful to the late Sir Gilbert Scott for the care with which he preserved and restored this interesting feature of Windsor Castle.

It is not our object to describe the various alterations which have from time to time taken place at the Tower. Every one is willing to acknowledge that the earlier attempts at "restoration" were dismal failures, and did

much to rob the noble old fortress of its genuineness and its historical interest. Two of these works are particularly regrettable,—they are the removal of the picturesque old gabled buildings, called "the Seven houses of office," which stood between the White Tower and the Bloody Tower, erected, as is proved, by the survey of 23rd of Henry VIII., at that date, and thus being amongst the earliest examples of Domestic work in London. Their site is now occupied by a kind of open arcade of the most dismal design,—a sad exchange for the quaint old gables, pretty bow-windows, tiled roof, and red-brick chimneys, which formed such a favourite subject for artists thirty years ago. Another work which we deeply regret is the re-working of the entire surface of the interesting old Chapel of St. John in the White Tower. This chapel was probably the most perfect example of an early Norman building in England, but it had been disfigured by being filled with cases for the records which were kept here, and its walls were covered with whitewash. Now it was undoubtedly right to remove the shelves and other modern obstructions, and the whitewash might very properly have been removed, but, when this was done, the greatest possible care should have been taken not to destroy the ancient surface beneath it, because we have distinct documentary evidence that Henry III. decorated this chapel with colour, and vestiges of that scheme of colouring were absolutely to be traced, and were seen by the writer of this article in the years 1848, 1849, and 1850. That no trace of ancient decoration now exists is not to be wondered at, as the ancient surface of the walls and columns has been scraped away and renewed! nor is this the only case in which ancient decoration has been obliterated at the Tower, for in the embrasure of the easternmost window of the Wakefield Tower which evidently served as an oratory, before the altar of which Henry VI. is traditionally asserted to have been kneeling when he was murdered, the traces of two figures were visible before the restoration. The whole restoration of this apartment, now used as a jewel-chamber, is to be regretted, as there can be little doubt that the east window which lighted the oratory was a large one, and the others were mere slits, but, as now restored, all the windows are the same size. It should be noticed that the arrangement of this prison in the Wakefield Tower, with the chapel or oratory formed in the embrasure of the easternmost window, is identical with that of the crypt of the Chapter-house of Westminster Abbey, with the exception that at Westminster there is a central column.

Although the latter restorations are probably more in accordance with ancient precedent than the earlier ones, yet we cannot help asking the question why restore the Tower at all? Why not leave it to tell its own story in its own way, with all its imperfections, incongruities, and patchings up, but with each portion genuine, and not made to look supernaturally Mediaeval. If we want to see Mediaeval castles we can see them elsewhere, but it is a mistake to carry out conjectural ideas of Mediaeval castellated architecture at the expense of a building so historically interesting as the Tower.

We may, of course, be told that "some kind of restoration is necessary in order to render the building practically useful." In other words, to make it serve as a barrack or a store for arms. But why attempt to find such uses for the venerable structure? To our minds, it has a far higher and far nobler use. We are yearly expending millions upon "educating the masses." Now, we would ask, does the Tower teach nothing? Do not its grim walls contain veritable "sermons in stones"? Sermons which preach to us the shortsightedness of human tyranny, and the dignity and nobility of patient suffering for conscience sake? Upon the walls of the Beauchamp Tower is still to be deciphered, the bold signature of Philip Howard (Earl of Arundell), a victim either to the jealousy of Elizabeth or the suspicious tyranny of her ministers; below that signature, and written in another hand, are the words, "*Gloria et honore coronandi cum.*" The palace of the Tower has passed away and is forgotten. The dynasty which put this man to death has ceased to exist, and is chiefly recollected for its cruelty and tyranny; yet this epitaph, though only scratched with a nail, remains more touching in its dignity and simplicity than any in Westminster Abbey!

* See illustration in the present number.

We who enjoy the blessings of liberty of conscience and freedom are, in our ease and luxury, too apt to forget at what a high price those blessings have been bought for us. In putting away from us the thoughts of ancient tyranny and cruelty, we are too apt to overlook the heroism and fortitude with which they were met. The patience under affliction, the long imprisonment, heavily borne, the endurance of torture, nay, even of death, rather than the abandonment of the truth, are lessons taught by many an inscription, device, or monogram in the Tower; and we would ask whether any school can teach nobler lessons, and whether, therefore, the Tower does not deserve to be preserved as a great public teacher and a preacher of the noblest morality? Surely our countrymen must begin to feel that there are things above mere commercial requirements; that public buildings and monuments may be useful and valuable, although you cannot "turn a penny" out of them, or convert them to suit the practical requirements of the age.

H. W. B.

THE IRON TRADE IN 1884.

In reviewing, in these columns, the state of the English iron trade during 1883 at the beginning of last year, the hope was expressed that the new year might not prove worse than its predecessor. It must now be acknowledged that that feeling was doomed to disappointment, for 1884 will take its place as one of the worst years through which the iron trade of Great Britain has yet passed. In 1883 there was still, if not abundance, at least sufficiency, of work; during the past year the falling-off in exports, to which we shall presently refer, not merely reduced the values of every description of iron and steel to a great extent, but it also seriously curtailed employment, and thus brought with it dead loss to the manufacturer and want to his workman. Shipbuilding especially presents a sorry chapter in the industrial history of 1884, the returns from the chief building centres showing a very large reduction in the tonnage produced. It is estimated that the total output of ships, including ports producing small tonnages, has been about 500,000 tons less in 1884 than in the preceding year. This unexampled depression in trade has proved a general calamity to thousands of willing hands and their families, who have been made to feel the pinch of hard times; whilst the restricted inquiry for ship-building material has reduced prices to their lowest level. The failure of the demand from America and the competition of foreigners in markets hitherto considered our own also helped to render the state of the British metallurgical industry still more critical. As in 1883, railway construction in the United States has been comparatively restricted, whilst the producing capacity of American works has grown steadily. As a result, our iron and steel exports to the States in the eleven months ending November 30th last show a total falling-off of 222,000 tons. In this total the decline in exports of hardware and cutlery, as well as of machinery, are not included. In value the total decrease in the eleven months of our iron and steel exports to the United States was 1,662,207. But while the past year has been one of unexampled severity for all engaged in the iron trade, there is every appearance that the worst time has passed, and there exist some grounds for hoping that the year upon which we have just entered will see an amelioration.

The Board of Trade Returns for the first eleven months of the past year show that we exported of pig-iron 262,531 tons less than in the corresponding period of 1883, and it may be safely predicted that the total exports of crude iron for the whole year will fall short by about 300,000 tons. The total deficit in our iron and steel exports for the eleven months ending November 30, 1884, as compared with the previous year, amounts to 497,702 tons. A decline in the exports means decreased production, and, to some extent, increased stocks. The total estimated production of Scotch pig-iron during the year was 998,000 tons, a falling-off of 141,000 tons as compared with 1883, and of 188,000 tons if a comparison be made with the most productive year, 1851. The output of Cleveland pig is about 830,000 tons less than in 1883, having been in 1884, in round numbers, 1,930,000 tons, against 2,760,740 tons in the preceding year. The production of crude iron in other districts has been reduced to a similar extent. The stocks of pig-iron at the end of

1884 were very considerable, and would probably have been the largest ever known if a reduction in the make had not been resolved upon early in the year. There were, in Conall stores, on December 25, 1884, of Scotch pig-iron, 821,000 tons, as against 835,000 tons at the same date in 1883, while the stocks of Cleveland pig have increased some 50,000 tons, notwithstanding the reduced make. The total shipments of Cleveland pig-iron for the year 1884 amounted to 927,456 tons, against 992,815 tons in 1883; of Scotch pig, they were 534,000 tons, against 617,000 tons in 1883.

If we now turn to the subject of prices obtained in 1884 for the various descriptions of iron, we find that the decline in value has been general. And it may be observed here that, although prices dropped much more in 1883 than in 1884, the depreciation in the former year was felt not nearly so much as in the latter, because that year was, on the whole, a better one. Rates had not then reached their bottom, and as there was a comparative abundance of work, manufacturers had not to face the collapse of consumption which was only too palpable last year. It did not matter what reduction they were willing to submit to in the matter of prices, even the most extensive concessions on their part would not have brought them orders, for there was no demand for their products. In the beginning of 1884, on the shutting down of eighteen blast-furnaces in Cleveland, as agreed on by the makers, prices of Cleveland pig went up about 1s. 6d., whilst Scotch pig rose about 9d. per ton. Cleveland No. 3 thus began the year at 37s. f.o.b., and the fluctuations have since then been very trifling; but, notwithstanding the restriction of make and the resistance of producers to reductions,—a resistance which only gave way in the last quarter of the year, as far as price was concerned,—the general tendency of trade has brought the value of Cleveland pig down to about 36s. Scotch pig iron,—that is to say, warrants,—opened at 43s. 9d. in January; from that month the price began slowly to recede, until in June it had reached 41s., when it again took a turn upwards, and, under the effect of speculative influences, reached 44s. 4d. in November; but at the end of the year it had settled down again to 42s. 3d. cash per ton. Amongst finished products, shipbuilding iron, from causes only too well known, has lost most heavily; but it should be pointed out that the growing use of steel instead of iron for ships has also had a lowering effect on ship material. The depreciation that has taken place will be best understood when it is stated that, whilst in December, 1883, the net average price in the North of England of bars, plates, angles, and rails (iron), was 5s. 7s. 11d. per ton, at the end of October, 1884, it had gone down to 5s. 1s. 8½d. The price of common bars in Scotland has declined from 5l. 12s. 6d. to 5l. The price of marked bars in the Black Country was 7l. 10s. in the beginning of the year; at its close, they are nominally the same, but it is a fact well known to the trade that good orders may now be secured at from 10s. to 20s. less per ton. The prices of plates, girders, and bars in Staffordshire have been much affected throughout the year by the competition of ironmasters from the North of England and South Wales, who have imported them at 20s. below native rates. In Lancashire the absence of activity has forced down the price of bars about 10s. per ton below what they were quoted at the beginning of 1884. Bars fetching in January last 6l. to 6l. 2s. 6d. may now be had at 5l. 10s. to 5l. 11s. 3d.

There was one satisfactory feature with regard to the English iron trade in 1884 which should not be overlooked. The rail makers of Great Britain, seeing the profound dullness in the rail trade, agreed early in the year to maintain prices and restrict production. This agreement, together with the establishment of the international syndicate of the rail manufacturers of England, Belgium, and Germany, having a similar aim, has had the effect of raising the price of steel rails from 4l. 5s. to 4l. 15s. per ton in this country, from 120 fr. to 130 fr. in Belgium, whilst in Germany they have maintained their value. The firmness in the rail market has had a beneficial effect on other steel products; but, on the whole, if we except compound armor-plates, and one or two of the industries turning out light steel manufactures, the business done has been unremunerative. There is very little to add concerning the related branches of the iron trade. Ship-

building has been, as we know, as bad as it could well have been. Engineers, if they have not done quite so well as in 1883, have at least had their fair share of work. The triplate trade, on the whole, has been satisfactory, if not prosperous. Fair prices were realised during the first half of 1884, but the declining demand from the United States latterly has depressed rates very much. The hardware industry, owing to keen competition and underselling, has had a bad year, and prices have ruled which must have entailed loss on the manufacturer. But it is now generally conceded that the new year will be a better one for this branch of trade than its predecessor. There have been a few trifling wages disputes in the iron trade, the men having had to submit to the inevitable.

Briefly stated, although the year as a whole has been one of the worst known for some time, the condition of the English iron trade at its close is not much worse than at its beginning. There has been a serious falling-off in exports, and home consumers have been buying only to meet pressing requirements. But when it is considered that the year began with a heavy weight of stocks on hand, and that there has been an unexampled depression in ship-building, the wonder is that the year just closed has not been of a more calamitous nature. There is really no room for despair; the stability of most of our great iron manufacturing firms proves that, if they have not been able to do a flourishing trade, they have secured at least a sound business. They have weathered the storm, and it is this fact which causes us to look with renewed hope to the future.

A few words respecting the condition of the iron trade of the Continent during the past year will not be out of place here. Notwithstanding prohibitive tariffs and protective syndicates, continental iron manufacturers have suffered quite as much as our own. Whether we look to the most "protected" countries,—Austria, France, and Germany,—or to a country where import duties on iron and steel are of the slightest nature, such as Belgium, there has been a general reduction of values. As hitherto, the iron market of this country still asserts its old influence over those of the Continent, although the metallurgical industries of foreign countries have developed immensely during the last twenty years. In Austria, the good times of previous years have been followed by a period of depression, due to various causes, chief amongst which are the gradual emancipation, industrially, of Hungary from the Silesian portion of the Austrian Empire, a diminution in railway construction, the inability of agriculturists to sell their harvest, and the crisis in the sugar trade. But there are various signs that the Austrian iron trade will soon recover its previous activity. The iron manufacturers of Belgium have had a bad year, one of the worst of recent times; the principal hardship with them being not so much an absence of demand, but the large reduction in the value of all descriptions of iron, excepting steel rails, which, from causes already pointed out, have gained. In France the downward course of prices which was a characteristic feature of 1883 has not been arrested in 1884, and iron and steel are now cheaper than ever they have been before in that country. To quote one example. Steel rails, which were sold at the end of 1883 at 170 fr. at works, have recently been disposed of at 120 fr., which is a reduction in price of nearly 30 per cent. German producers have, perhaps, fared best of all. The output of iron and steel, as far as can be ascertained, has not fallen below that of 1883. The decline of the value of products has also not been what could be called ruinous, between 2 and 5 marks per ton, over-production and consequent competition being chiefly responsible for the reduction in value.

Buildings for Poor-Law Administration.—The Guardians of the Poor of the parish of Lambeth have instructed their architect, Mr. T. W. Aldwinckle, to prepare plans for the extension of the laundry and receiving-wards at the new workhouse, Brook-street, Kennington-road.—The Guardians of St. George-in-the-East had before them, at their last meeting, plans prepared by their architects, Messrs. Wilson, Son, & Aldwinckle, for the extension of the workhouse and infirmary, at an estimated cost of 9,500l. The plans were adopted and ordered to be forwarded to the Local Government Board for approval.

FROM PARIS.

The year 1884 has closed rather gloomily in Paris, and the terrors of an epidemic, which remained otherwise extremely mild in character, dealt a fatal blow at Parisian industry, usually so active during the last quarter. Art is affected by the general dulness. The theatres exhibit an alarming decrease in their receipts; public sales, no longer having for their object the famous Basilewski collection, which Russia has carried off from us by the expenditure of millions, are reduced almost to none; private building, but lately so active, has nearly everywhere ceased; in short, all manufacturers, merchants, sculptors, painters, and architects complain bitterly of the uneasiness produced by this unusual stagnation.

It is, then, to be desired that a little vitality should be given to trade by some large enterprise, and for this reason it is much wished here that the sanction of the State should be promptly given to an important undertaking which the Company of the Western Railway proposes to execute with the financial concurrence of the Parisian Municipality. We allude to the opening out and enlarging of the St. Lazare Station, well known to all travellers entering France via Folkestone and Boulogne, and convenient, from its central situation, to both foreign visitors and Parisians. We propose to give later on a drawing of the new buildings, but will confine ourselves at present to saying that an expense of twenty millions will be involved, that the aspect of a rich and populous quarter will be much modified, and a large workshop be open for some years to artisans now without employment.

It is certainly not for the sake of restoring a commercial value to art that a certain number of artists, calling themselves "Independents," have just opened an exhibition of their works in the Champs Elysées; a collection of pictures void of talent or originality, which cannot even pretend to rank with that of the "Impressionists." The "Independents" are nearly all drawn amongst what may be called the dried-up fruits of painting, excluded for ever from the splendid Petit Gallery, Rue de Sèze, has been warmly received by the public. It contains, besides works by Carl Vernet, Gérault, and Ondry, pictures by the most celebrated modern masters (Grôme, Lewis Brown, Jadin, &c.). No other exhibitions are mentioned. The State and the city are arranging for the reception in a building still to be constructed in the Place d'Jena, of the Oriental Museum, generously offered to Paris by M. Guimet, a rich collector, of Lyons. The Government is also occupied in elaborating the plan for the International Exhibition of 1889, of which the site seems to be definitely fixed. It will occupy the Champs de Mars, the Trocadéro, the Invalides, and all that part of the river between the bridges of Jena and the Invalides. We shall often have occasion to return to this subject, connected as it is with international commerce.

As usual, the municipal administration here is giving the impulse to artistic works. It is actively engaged on the new buildings for the School of Medicine, and preparations are being made to lay the foundation-stone of the Sorbonne, of which, later on, we shall furnish a complete view. At the same time, the old orangery of the Luxembourg Gardens is being enlarged and altered to contain the museum of living artists, which the exigencies of parliamentary life have displaced from the ancient palace of the Medici.

On the other hand, the interior of the Hôtel de Ville is nearly completed, and the reception-rooms will soon be put into the hands of decorators and historical painters. In the square of the Hôtel de Ville (to be opened to the public in a few days) a pedestal is being constructed for the statue of Etienne Marcel, executed by M. Jdrac, after a competition. On the quay, not far from the Institute, Conti is also raising a statue of Voltaire on a beautiful pedestal, designed by M. Formigé, a young architect of great talent.

When we have called attention in this rapid review to the restoration of the admirable window glass of St. Etienne du Mont, the incomparable work of our painters on glass of the fifteenth and sixteenth centuries; when we have mentioned the beautiful decoration of the Salle des Maréchaux just finished, by M. Thirion, at the Ministry for War; and when, lastly, we

have announced that M. Ditts, architect of the Hôtel Dieu, has been elected member of the Academy of Fine Art, and that M. Daumet, to whom we owe the splendid Chateau of Chantilly, has been chosen to continue the works at the Church of the Sacré Cœur at Montmartre, begun by the late M. Abadie, we shall have pointed out the chief events of the month just ended.

We cannot conclude without mentioning the irreparable loss which French art has just sustained in the person of Bastien Lepage, dead in the full force of his youth and talent. This artist, so justly appreciated in London, took a marked place here in the new school of painting, which, leaving on one side the traditions of the Roman school, covets itself earnestly to the reproduction of nature in her simplest and truest forms.

Bastien Lepage was only thirty-nine, and his short life was entirely devoted to art, which contained for him the sum of joy and ambition.

A NOTABLE OLD MANSION.

CALENDAR HOUSE, STIRLINGSHIRE.

SCATTERED over the face of the country, ancient castles and Mediaeval family mansions in ruins are well-nigh as plentiful as modern county seats of all grades are, and certainly more plentiful than those distinctly occupying the first and second ranks; but of specimens well mellowed with age, yet still enjoying a condition of habitable usefulness, there are comparatively few to be encountered. Of strongholds of a really remote date handed down to the nineteenth century through an unbroken succession of living and life-like occupants, there are fewer still. A remarkable and now comparatively little noted specimen of the latter exceedingly rare class is to be found in Calendar House, Stirlingshire, the ancient seat of the noble family of the Livingstones, attained after the abortive rising of 1715, and now in possession (mansion-house and estates as well) of the Forbes family. Calendar House, or Calendar Castle as it was formerly called, stands almost on the brink of the renowned Roman barrier constructed from eastern to western seas A.D. 140 by the Emperor Antoninus Pius. Its spacious park marches with the great north road and the main Edinburgh and Glasgow turnpike, which are here one; and the entire message is in the immediate neighbourhood of the municipal burgh of Falkirk, the chief intermediate seat of population between these two cities. Tradition indirectly assigns an exceptionally remote age to the first occupancy of the site as the central rallying-point of a great territorial domain. According to this rather shadowy authority, Kalynter Castle, under some other name perhaps, was a place of strength at the time the Picts found themselves thrust out of that part of the country, and it is left to be inferred that it had been so a long time before that epoch, since there is no traditional or other mention of any kind respecting the first setting up of this ancient fortress, which afterwards received the name of Kalynter or Calendar and has retained it down through the centuries to our own day. Something slightly less intangible than tradition has it that Kalynter was held by the Romans as the villa or place of residence for certain successive officers of the army of invasion and on the line of the military road which accompanied the barrier at a distance of a few hundred yards more or less to the southward, and it is, therefore, safe to assume that while the occupation lasted it could hardly be in other possession than that of the Romans. The invaders were forced to finally abandon the Forth and Clyde line towards the close of the fifth century, and from that time, for some centuries, there is no mention of Kalynter, or of its fortunes while passing through this the most obscure portion of the Scottish annals. Towards the dawning of Mediaeval or modern authentic history, Calendar emerges as the seat of a powerful thanedom, the only instance of the kind ever existing to the south of the Forth. How long this thanedom of Calentyr flourished prior to the first historical mention of it must be matter of conjecture merely. The Calentyr family of that ilk is on record as in possession of title and property at the beginning of the thirteenth century, with the reputation of an establishment so firm that it may well have dated several centuries to the lack of that, if

not actually to a period following shortly on the Roman evacuation. The family stronghold then stood on the same site as that occupied by the Calendar House of our day, and as the structural record of the building has consisted from the earliest traditional and historical times of repairs, enlargements, and alterations only, and never of anything of the nature of a renewal complete, it is altogether probable that some masonry remnant of the original erection of stone succeeding the log fortress of the remote era of the great Caladonian forest, yet lingers within the casing of the existing edifice. It is this feature which is one of the chief attractions of Calendar House for a certain order of mind. The family found in possession in the dawning light of the earlier part of the thirteenth century was that of the Calentyrs, Kalynters, Callenters, or Callenders, regarding whom it is an open question whether they gave their name to the castle and property, or took it therefrom after consolidating proprietary rights. The name first mentioned is Malcolm, to whom succeeded his son, Alwin, and afterwards his grandson Patrick. The latter, espousing the faded cause of Balliol, in the succession wars, was eventually deprived of title and estates by the victorious Bruce, who bestowed them upon Sir Wm. Livingstone, a scion of the Livingstone family of West Lothian, and a tried benchman of his own. This founder of the noble Livingstone family had the craft to secure in marriage Christiane de Calentyr the only child of the forfeited Patrick, and so confirmed his new possession by right of ancient succession, as well as by royal charter. The castle which thus, along with a vast though comparatively worthless acreage there, fell to Bruce's follower, was a strong fortress, as strength was at that time estimated.

The "keep" was a heavy square structure of considerable elevation and immediately protected by a projecting outwork of massive proportions. A deep moat surrounded the castle beyond, at the distance of two or three hundred yards and enclosing some garden and croftland ground, rose a strongly-fortified wall of stone and lime, called the Barbican and quite encircling the fortress proper, access being obtained by one gate only, pointing to the north and jealously strengthened. In this form, affected only by the casual repairs rendered necessary from time to time, the castle of Calendar existed for about four centuries thereafter.

The Livingstones of Calendar gradually grew in power and fame until they vied with the Douglases themselves for the position of premier family of Scotland. Sir Alexander, early in the fifteenth century, figures as regent of the kingdom and custodian of the person of the infant King James II. Sir James, in 1453, was sworn Privy Councillor, and appointed Master of the Royal Household and Great Chamberlain of Scotland, preferments which in that rude age and unsettled country not usually fell to him who was powerful enough to command them. He was afterwards raised to the peerage under the title of Lord Livingstone, and finally closed his career by the side of his royal master on the fatal field of Flodden. Alexander Lord Livingstone, his son, was co-guardian with Lord Erskine of the infant Queen Mary, with full charge of her education. It was he who thwarted the designs of Henry VIII. with regard to the betrothal of the child princess to the English heir, the deed binding the Scottish confederates to an opposition entrance having been signed at Calendar Castle itself. Lord Alexander accompanied the child queen when she went to France upon her thirteenth years of sojourn there, and it is worth mentioning that his youngest daughter, Lady Mary Livingstone of Calendar, was one of the celebrated four Maries chosen when infants to grow to womanhood in the constant companionship of their royal playmate. Lord Alexander died in France, and to him succeeded his eldest son William, brother to the Mary mentioned. On the return of the widowed queen there ensued frequent royal visits to Calendar Castle, the scene of part of her stay during childhood and the home of her fast friends the Livingstones. She died there August 12th, 1502, while upon one of her northern progresses and some time before the king-consort. She was present again in the following year at the christening of an heir to the noble house of Calendar, and only three weeks after her marriage with Darnley the pair

arrived at Callendar over night in passing from Glasgow to Stirling. In December, 1566, the queen, by that time in open rupture with Darnley, touched at Callendar on her way to the christening of the infant James at Stirling, and four weeks subsequently she and her newly-christened child, the future James VI. of Scotland and I. of England, slept one night there. Only ten days subsequently the queen with retinue once again sought the hospitality of her Callendar friends while speeding to the side of her graceless husband, then stricken with small-pox at Glasgow; within a week thereafter returning that way, *en route* for Edinburgh, with the recovering but now sorely-disfigured patient in a travelling litter, on which occasion a night's halt was called at the same always welcome and welcoming refuge. Less than a fortnight subsequently the poor king-consort met his still mysterious fate at Kirk-of-Field, Edinburgh. Six weeks afterwards Queen Mary while on her way from Stirling to Holyrood visited for the last time the familiar battlements of Callendar. She halted but an hour or so, and her small cavalcade had spurred eastwards little more than another hour, when, at Linlithgow, Botwell with 1,000 men at arms at his back swooped down upon his prey, and carried Mary off to a fatal, though only temporary, captivity.

The Lord of Callendar remained a staunch Queen's man in the troubles that ensued; fought at Langside, and accompanied his unhappy mistress on her flight into England. Being afterwards joined by his wife in this voluntary exile, the faithful pair shared the captivity of their mistress up to the very eve of Fotheringay, returning to Callendar only at last to die. Lord Alexander, the son and heir of these, inherited the well-earned confidence of the Stuart family, and when children came of the marriage of young King James with Princess Anne of Denmark, he and Lady Livingstone were solicited to undertake, within their own household, the tutelage and upbringing of the elder born. Under this arrangement the Princess Elizabeth spent her infancy and youth within the family circle of the Livingstones at Callendar Castle, along with a younger sister, who, however, appears to have died early. This Princess Elizabeth afterwards became by foreign marriage Electress Palatine and Queen of Bohemia, and it is through her the present reigning dynasty of Great Britain and Ireland makes good its title to the throne. For these offices and general faithful service and adherence, James raised the house to the dignity of an earldom under the title of Linlithgow, to be shortly followed by the erection of Callendar itself to the rank of an earldom also. One of the most noted members of this remarkable family was James, second son of Alexander the first earl, and afterwards chief of the stock himself. While quite young he entered the service of the great Gustavus of Sweden with a troop of Falkirk volunteers, and there remained for many years, covering himself and his following with widespread renown. On his return, the fame he had carved out for himself was endorsed by the king raising him to a separate peerage as Lord Livingstone of Almond and Falkirk, the Callendar earldom also subsequently falling to him through the failure of his elder brother's line. In the troubles which ensued between Crown and Parliament Earl James remained faithful to the former, first fighting by the side of Montrose, both in Scotland and in England, and then with his personal following at his back sharing in the Scottish raid upon the English Parliamentarians, known as the "Hamilton engagement." After the execution of Charles at Whitehall and Montrose at Edinburgh, Charles II. thought to retrieve fortune by means of the forces of the Scottish estates. On invitation he came from Paris to Scotland and entered upon a disastrous campaign, during a few days of which himself and suite occupied as head-quarters a part of Callendar Castle. On the approach of Cromwell from the east, Charles and the Scottish army withdrew northwards, leaving Callendar in the keeping of a garrison partly made up of the fighting townsmen of Falkirk. Cromwell carried the castle by storm, after a vigorous resistance during which its defenders were cut down almost to a man, the occurrence forming the first recorded instance of Callendar Castle succumbing to an attack of the enemy, though menaced many scores of times before. Earl James was the while with the king within the Scottish lines barely three miles away; and when it was resolved to shirk an issue with the

victorious Cromwell, and rather make for England by forced marches in the hopes of exciting a royalist rising there, Callendar accompanied the enterprise, shared in the Worcester defeat, which followed, and finally accompanied the king on his flight to the Continent where he remained for ten long years, until the epoch of the Restoration. Monk, as Cromwell's Lieutenant in Scotland, occupied the dismantled fortress of Callendar as a residence during the space of no less than five years, and it was from this quarter that, after the death of Cromwell, he marched southward upon London and took crafty order for a masterful restoration of the monarchy. Earl James returned with his sovereign, and in the comparatively peaceful times which followed set himself to the repair of the old castle. The conditions of assault and defence had entirely changed, and no effort was now made to restore it to the grade of an efficient place of strength. The ruins of the outer wall or barbican were removed; the moat began to be filled up gradually; the inner defending curtains were also fully rooted out; and the ancient massive keep of the disrated fortress eventually stood confessed, in the repairs and trifling additions the restored possessor had seen fit to execute. The famous Earl James died peaceably at home after all his wanderings and adventures, and being without issue, was succeeded by his nephew Alexander, who afterwards strange to note sided with the Covenanters against the king, and shared in the misfortunes which fell upon that cause. Deprived, by way of penance, of the old hereditary powers of bailiery and judiciary, &c., Earl Alexander directed his attention to the further improvement of the family mansion, putting such a general face upon it as was destined to remain practically undisturbed for more than a century thereafter. Alexander was succeeded by his son James, fourth Earl of Callendar, who afterwards, through the decease of his uncle without heirs, became also fourth Earl of Linlithgow. James was the last of this noble line. With the customary genius of the family for espousing the side destined to lose, he threw in his lot with the old Pretender in 1715, and for reward had his family attainted; he himself escaping with bare life to the Continent, where ten years afterwards he died, leaving one daughter only. At the date of the attaint, the three earldoms of Callendar, Linlithgow, and Newburgh, along with numerous baronies and other minor honours. The disinherited daughter of the house, Lady Anne Livingstone, afterwards married Earl Kilmarnock. Callendar House and property passed as a purchase speculation from the Crown into the hands of a London concern, called the York Buildings Company; but this syndicate finding it impossible to draw rents from the tenantry, who clamoured for the re-instatement of the old family, concluded a financial agreement with Lord and Lady Kilmarnock, whereby they entered upon a long lease of occupancy with all the functional rights of proprietorship, an arrangement which worked to mutual satisfaction while it lasted. Earl Kilmarnock became implicated in the rising of 1745. The famous battle of Falkirk was fought on the Callendar estate itself, and Prince Charlie, under the very shortlived glimpse of success which immediately succeeded that event, tasted the hospitality of the mansion so familiarly known to his ancestors. The play ended, however, after Culloden, with misguided Kilmarnock on the scaffold at Tower Hill; the widowed Countess of Kilmarnock continued the leasehold of Callendar a few years longer, and then the place knew the ancient family no more.

Callendar House and estates were, in 1780, purchased by a scion of the Forbes family of Colquhany, Aberdeenshire, and in this possession they still remain. Mr. William Forbes, the present proprietor, being the third of the new dynasty and the grandson of the original purchaser. In 1842 the Queen and Prince Albert, shortly after the royal marriage, honoured Callendar with a visit on their way from Stirling to Edinburgh, and were received by Lady Louise Forbes and her son William, the present proprietor, at that time a lad, the lord of the manor himself forming part of the escorting *cortège*. The first of the new line, who wisely refrained from building on a new site though tempted to do so, added wings to the old-fashioned looking mansion, relieved the ancient baldness of the façade by octagonal towers, and remodelled the roof. The second Mr. Forbes

(who for some years sat in Parliament for the county in the Conservative interest) contrived a projection of the central wall of the façade, and erected a new porch and entrance-hall, all with good effect; but to the present proprietor has been left the main work of addition, renewal, and renovation, covering a series of years and finally completed about five years ago only. Callendar House, though the same building in its foundations and principal masonry as that which Cromwell took by storm, is now vastly transformed in the appearance presented to the eye. It is a handsome and spacious edifice unquestionably, yet with a distinct, unmistakable, and very precious flavour of the unceremonious centuries through whose rudeness and hard knocks it has come down undestroyed to our own day. The style may be called Old Baronial, though it cannot be said that the architectural canons have been rigidly adhered to in details. The evidences of conspicuous antiquity are much more numerous inside the edifice than outside. "Queen Mary's Room" which is still maintained in ordinary habitable occupation, shows walls fully 7 ft. thick, a massiveness which is quite matched, if not exceeded, in other parts of the building. The mansion is surrounded by 500 acres of beautifully-wooded grounds, interspersed with orchard, vinery, and garden patches, and rejoicing in various specimens of water ornamentation. The Callendar estate, in its entirety, extends to about 15,000 acres, now for the most part under remunerative cultivation, while beneath the surface valuable mineral strata are abundant.

CIRCULAR HOSPITAL WARDS.

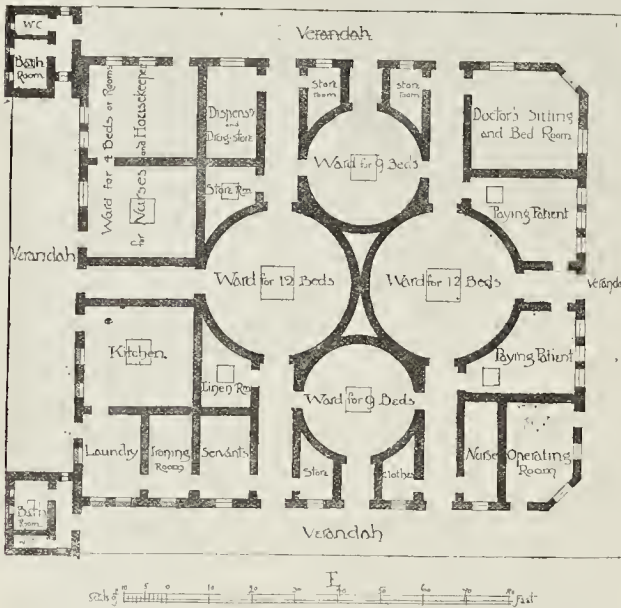
SIR,—In forwarding you, with Lady Strangford's instantly granted and hearty acquiescence, her ladyship's plan for a hospital with circular wards, which is proposed to be built at Fort Said, for our sailors and marines, and is, possibly, to be repeated at Constantinople, I will ask leave to append a few remarks.

Lady Strangford's design is intentionally adapted throughout for an Oriental and hot climate. It is a one-storied building. The four circular wards are placed in the centre of the establishment, so as to be protected from the heat and glare of the sun; with a similar intention, and also to insure quietude, these wards have no windows in their surrounding walls, but they are lighted from above by a lantern-shaped window or opening, which can be completely shuttered on the south; the arrangement by which each ward will admit of three air-currents from the outside is very simple, and most ingeniously carried out; the upward ventilation, characteristic of a domed circular apartment, is here aimed at, and will, I believe, assuredly be effected. The position, size, and mode of appropriation of the several rooms situated around the circular wards have evidently been most carefully thought out. The special sanitary accommodation is judiciously provided for, and the enclosing verandah forms an essential feature of an entirely admirable design, remarkable alike for its symmetry and completeness.

In a letter to me, accompanying her plan, Lady Strangford alludes to the fact that in the East, in Egypt especially, every house "above the peasant's mud cabin has all its rooms domed, except the smallest. The opening above has a lantern-shaped frame for windows, which are seldom put in; the opening is mostly left open to the north, the south being often closed with a board."

But, although Egyptian dwelling-rooms are domed, they are not themselves necessarily or usually circular; and it is the introduction of the circular form for the ward itself, and its completion into the dome above, which constitute the chief element of novelty in Lady Strangford's design. This special adaptation of a "windowless" circle to the requirements of a hospital ward in a hot climate, affords a most interesting example of the application of the circular principle in ward-construction.

Looking at the subject from a purely Oriental standpoint, Lady Strangford remarks that "it must be difficult to render them [circular wards] cheerful" in England. "A windowless room," she observes, "in these climates, and under our terrible skies, is usually very depressing. But in the East, where my practical experience in building has mostly lain, the case is different; and you may like to know that in



HOSPITAL OF ONE STORY, WITH CIRCULAR WARDS, FOR EGYPT,

DESIGNED BY THE VISCOUNTESS STRANGFORD, 1884.

123 ft. by 106 ft. externally.	Walls, 2 ft. thick throughout.
2 circular wards,	12 beds each, equal to 24 beds.
2 " " "	" " 18 "
2 paying-patient wards, 1 or 2 "	" " 2 or 4 beds.
1 ward, if necessary	4 " " 4 "
	41 or 50 beds.

my hospital at Cairo, where we had such an inner domed room, we invariably found, to our surprise, our patients did better there than in any other ward, and were always the most cheerful."

I need hardly point out the emphatic testimony hereby offered against the imputation, or prophecy rather, that a circular ward would be monotonous and depressing. Even when such a ward is "windowless," as in Egypt, this is not found to be the case; and, in England or Belgium, where circular wards are abundantly "windowed," it is quite inconceivable that it should be so, unless, indeed, on the supposition that a very square patient might feel ill at ease in a round place. In relation to this point permit me here to emphasise as strongly as I can the expressions of surprise and delight which I made use of in my address the other evening at the singularly light and cheerful aspect of the interior of one of the large circular wards in the Antwerp Hospital, which I visited last September. Three ladies, members of my family, were equally pleased and astonished.

As to the objection of the possible want of light for the purposes of operation or dressing surgical patients, I may say that it is one which I always thought had no force in it, and it appears to me to be one of those which really have little force except that which every assertion gains by being repeated and repeated. I tested this question at Antwerp. I imagined myself operating, and I placed myself on each side and at the foot of a bed, on which there was a spring-wire mattress, and I found that I could see every wire most distinctly. It seems to me that not only do the numerous cross-lights account for this, but probably, also, there is much light reflected in every direction from the inner smooth and light-coloured surface of the circular walls.

In conclusion, I must thank you for the more than ample justice which you have done to my oral address at the meeting of the Hospital's Association on the 17th inst.;* and I hope that you will allow me on another occasion to communicate to you a few observations on the ventilation of a circular ward.

But I am forgetting Lady Strangford's plan.

* See *Builder* for Dec. 20, 1884.



Lantern of each Room: Windows taken out nearly all the Year.

It is stated in her letter, that it is "drawn for Egypt as the builders there would understand it, and where the construction of domes is extremely cheap and easy."

Lady Strangford tells me that she proposes once a year to strip the circular wards of their destructible contents, to burn these latter outside the building, and to renew them. I suggested that the cremation should take place in the middle of the wards, and by the addition of sulphur or other fumigants, the fire itself would act as a purifier.

I have, indeed, often suggested that circular wards might be built, in sections, of iron, just as large caissons are; and then that they could be lined with wood or other material, which might periodically be burned and renewed.

JOHN MARSHALL, F.R.S.

Royal Institution of Great Britain.

The following are the probable arrangements for the Friday evening meetings before Easter, 1885:—Jan. 10th, Professor Tyndall on Living Contagion; Jan. 23rd, Professor H. N. Mosely, the Fauna of the Sea Shores; Jan. 30th, Professor Ernst Pauer, a short Review of the Works of Living Composers for the Pianoforte (with musical illustrations by Mr. Max Pauer); Feb. 6th, Mr. G. Johnstone Stoney, How Thought presents itself among the Phenomena of Nature; Feb. 13th, Sir John Lubbock, Bart., the Forms of Leaves; Feb. 20th, Mr. William Huggins, the Solar Corona; Feb. 27th, Professor E. Ray Lankester, a Marine Biological Laboratory; March 6th, Charles T. Newton, C.B., the German Discoveries at Pergamun; March 13th, Sir Frederick A. Abel (subject not announced); March 20th, Professor A. W. Bueker, Liquid Films,—a soap bubble; March 27th, Professor Sir Henry E. Roscoe, the Sources of the Coal Tar Colours.

Illustrations.

WINDOW IN SOUTH CHOIR AISLE, SALISBURY.

THE two figures given here form a portion of a window executed by Messrs. Wm. Morris & Co. from the designs of Mr. E. Burne Jones. Colour, alas! is wanting in the representation, but we believe all stained-glass artists will concur with us that attempts to render the glow of translucent glass by means of any sort of colour-printing are little likely to be attended with success. We gave last year a chromolithograph of some decorative design by Mr. Poynter, of which a diaper window formed a part; but in that case the glass was only a subordinate part of the scheme, and only a simple pattern in two or three colours. Mr. Burne Jones's colour is not reducible to the same simple elements, and is, therefore, better not attempted. The other half of the window, containing the two other figures, will follow, and we are enabled, by the kind permission of Mr. Burne Jones and Messrs. Morris, to promise a short series of Mr. Burne Jones's executed designs for stained glass,—a form of art in which his peculiar genius, with its tendency towards simplicity of form combined with richness of colour, seems specially to shine, even more than in his easel paintings.

KEBLE COLLEGE CHAPEL.

ALTHOUGH this chapel has now been in existence for some years, we are not aware that it has been illustrated, and as a specially rich example of modern church architecture, in which an elaborate system of decoration has been carried out, it is a building of which we wish to have a record in our pages. Mr. Butterfield, from whose designs, as is well known, it was erected, sends us the following particulars in regard to the chapel and its decoration.

The principal features of the decoration of the interior are painted glass in the windows, and mosaics in panels on the walls. These illustrate,—as completely as the space will allow, and in some sort after the manner of the Christian year,—the successive dealings of God with His Church; Patriarchal, Jewish, and Christian. They bring out, by means of type and antitype, the relationship of the Old to the New Testament, and show the process of God's gradual revelation of Himself in Christ.

The histories of Noah, Abraham, Joseph, and Moses in twelve of the side panels of the western half or nave of the chapel, with the figures of the twelve minor prophets in the four windows above, and of the four greater prophets with David, Solomon, Samuel, and Elijah in the west window, refer to the earlier dispensations.

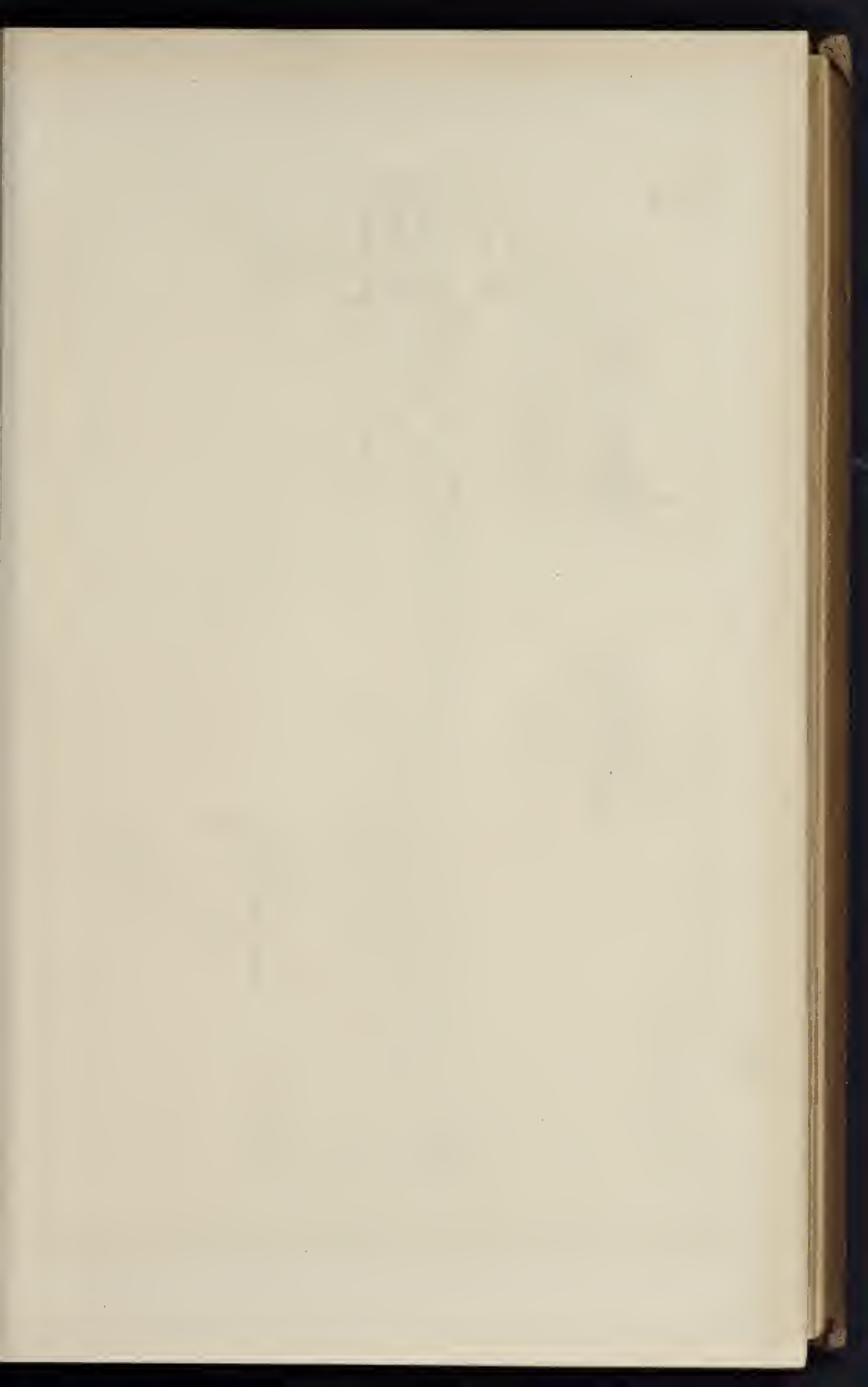
A series of events from the New Testament, viz., the Annunciation, the Nativity, Baptism, Crucifixion, and Resurrection of our Lord, represented in mosaic, are placed in panels in the eastern half or choir of the chapel. The Ascension of our Lord is represented in the glass of the east window.

The series of mosaics is continued and completed in a mosaic quatrefoil panel, above the altar-piece below the east window, which represents our Lord as He finally revealed Himself after His Ascension to St. John, in the Isle of Patmos, "one like unto the Son of Man," present in His Church now and till the end, the Church being symbolised by the seven candlesticks around Him, and her chief ministers by the seven stars in His right hand. It conveys to the eye the promise given of His perpetual presence in her.

Christian saints, in mosaic panels on either side of this centre figure, support it. The Greek and Latin Doctors are represented in the four side windows above, the Latin Doctors being in the two windows on the north side.

In the north and south transept windows are central figures of St. Peter and St. Paul, with one of the four Evangelists on either side of each Apostle.

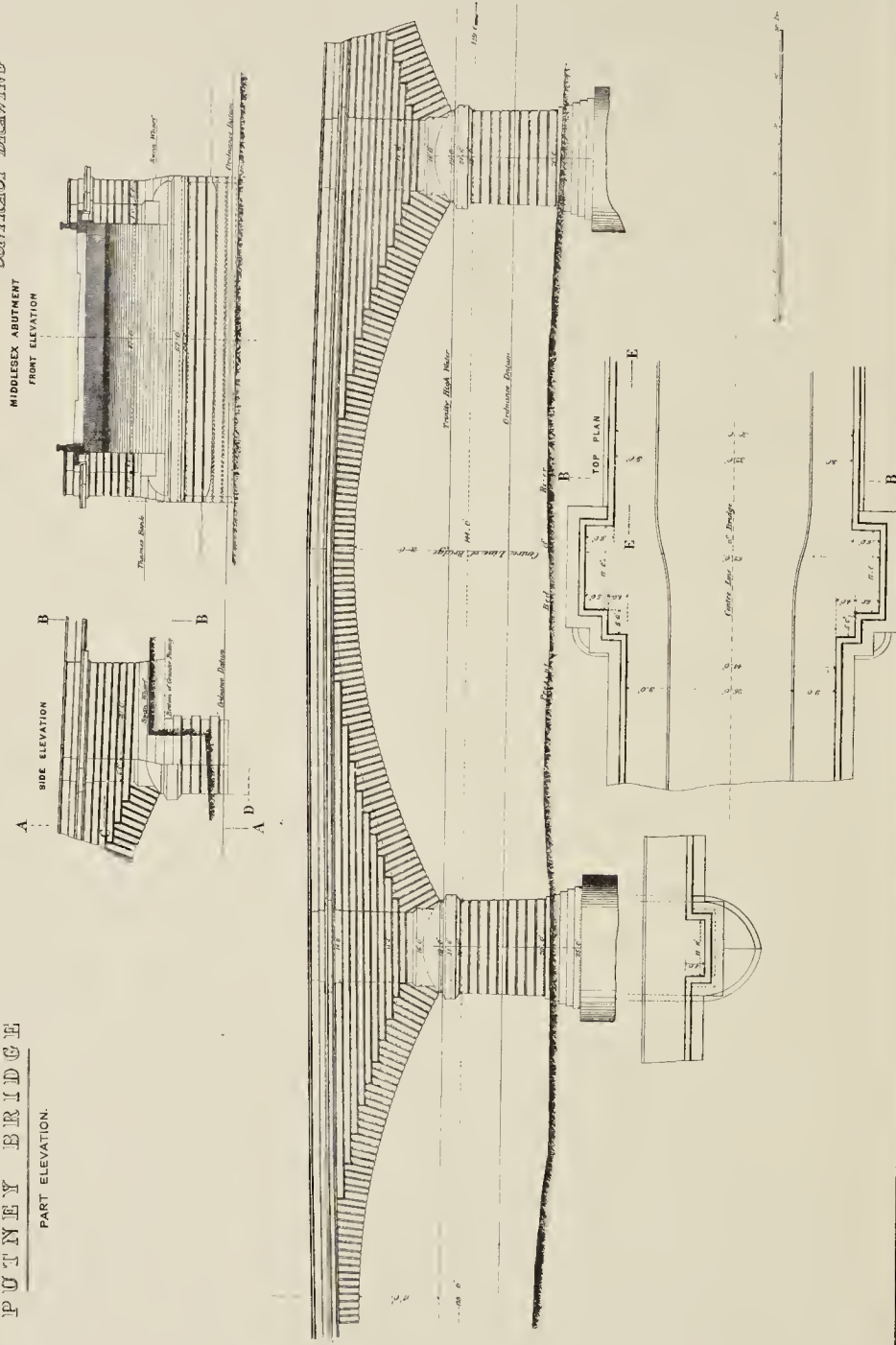
Along the entire west end of the chapel is depicted in three mosaic panels, that future second coming of our Lord to judgment. He is enthroned with the Apostles, and is attended by angels, bearing the instruments of His Passion, the cross, the crown of thorns, the spear, and the nails. The figure of St. Michael the Archangel in the centre of the lower part of this

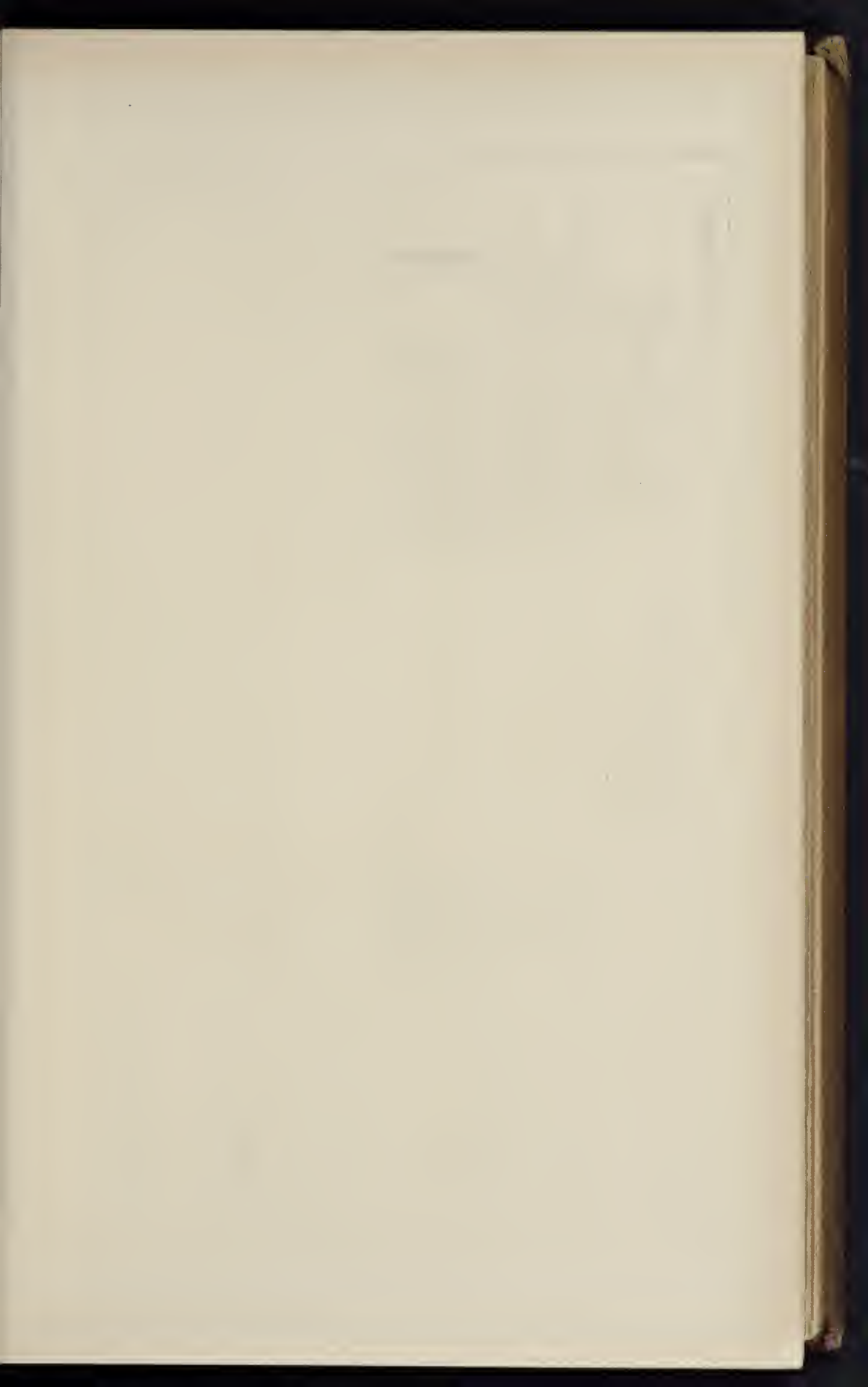


THE BUILDER, JANUARY 3, 1885.

CONTRACT DRAWING

PUNNEY BRIDGE
PART ELEVATION.

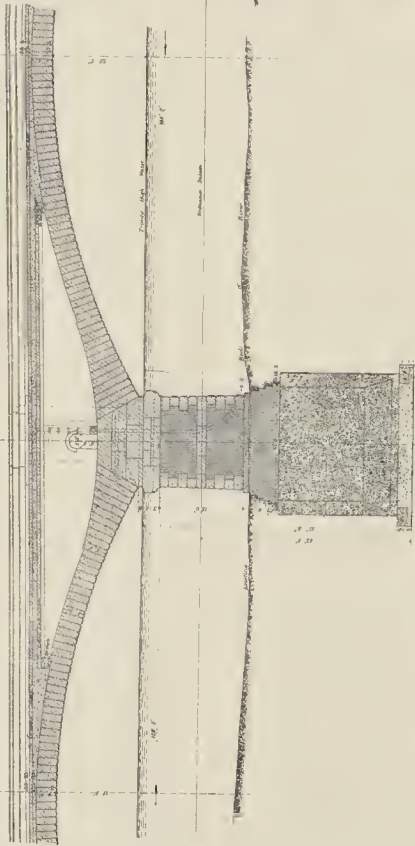




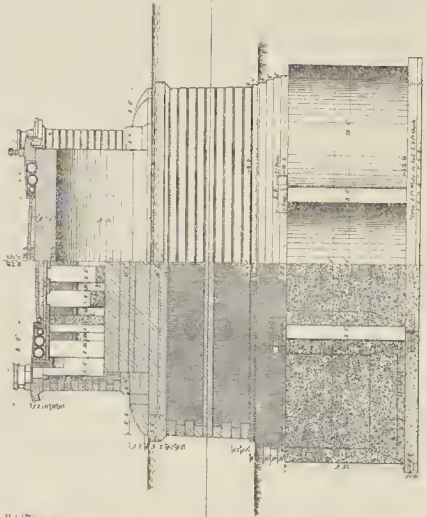
THE BUILDER, JANUARY 3, 1885.

PUNNEY BRIDGE

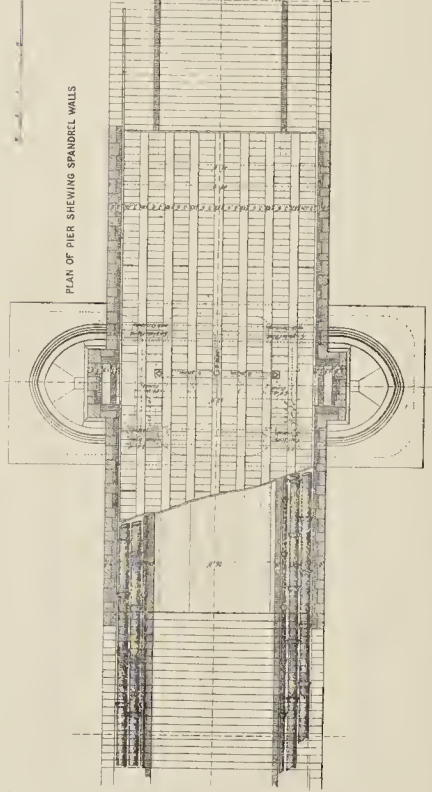
LONGITUDINAL SECTION



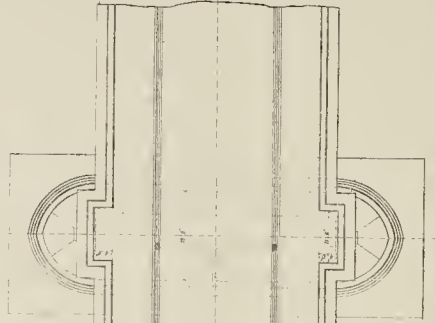
CROSS SECTION

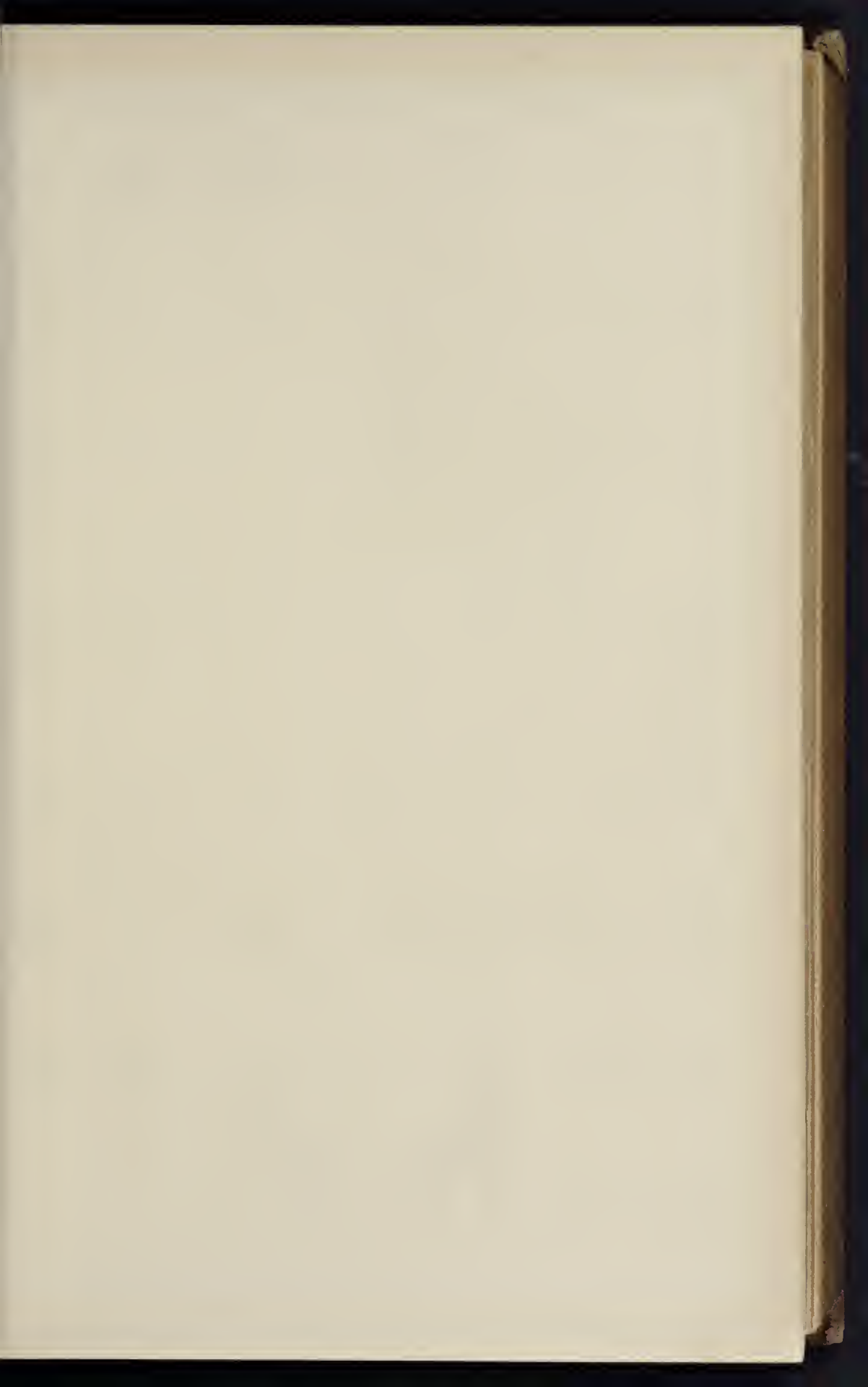


PLAN OF PIER SHEWING SPANDREL WALLS

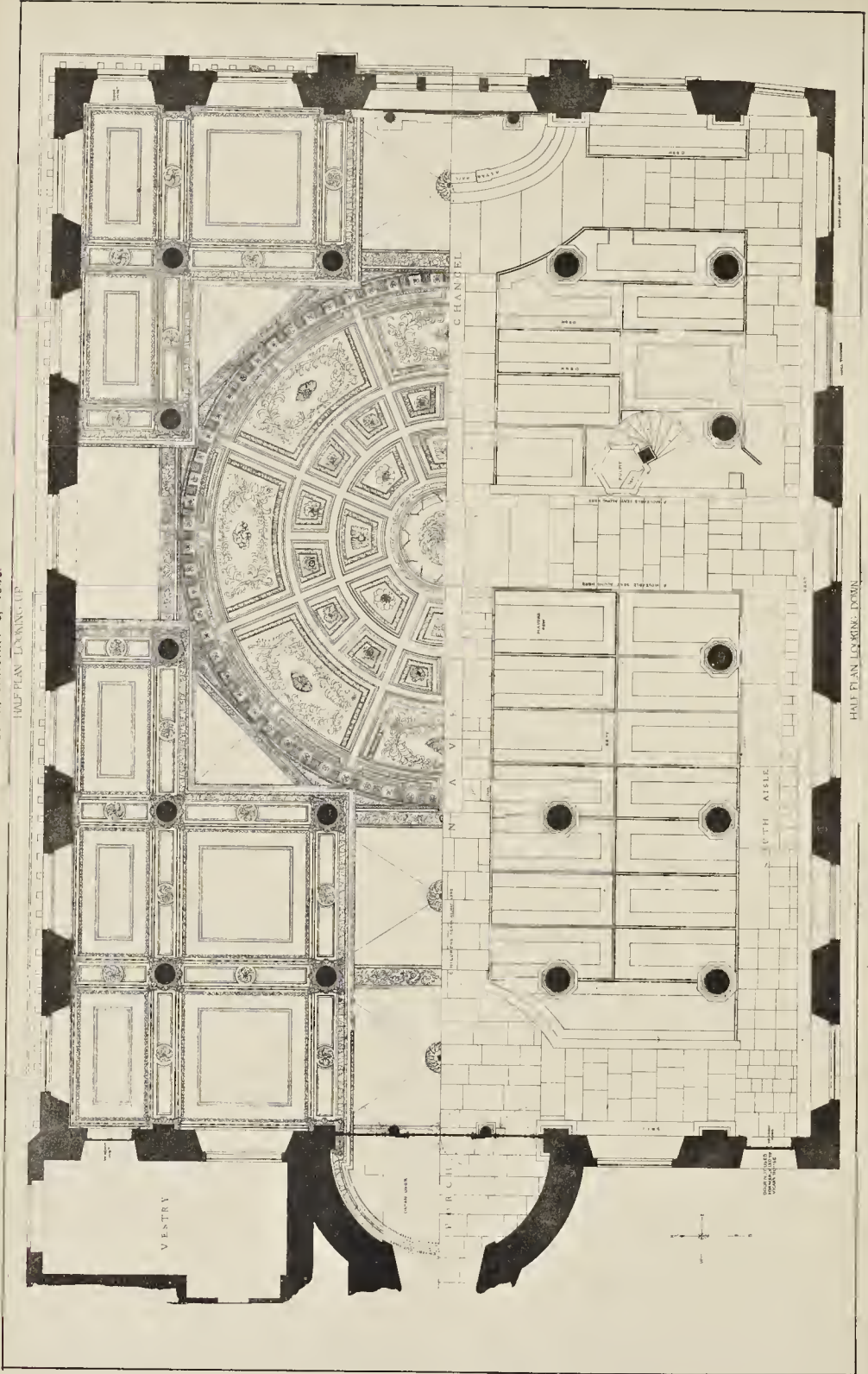


TOP PLAN SHEWING ROADWAY

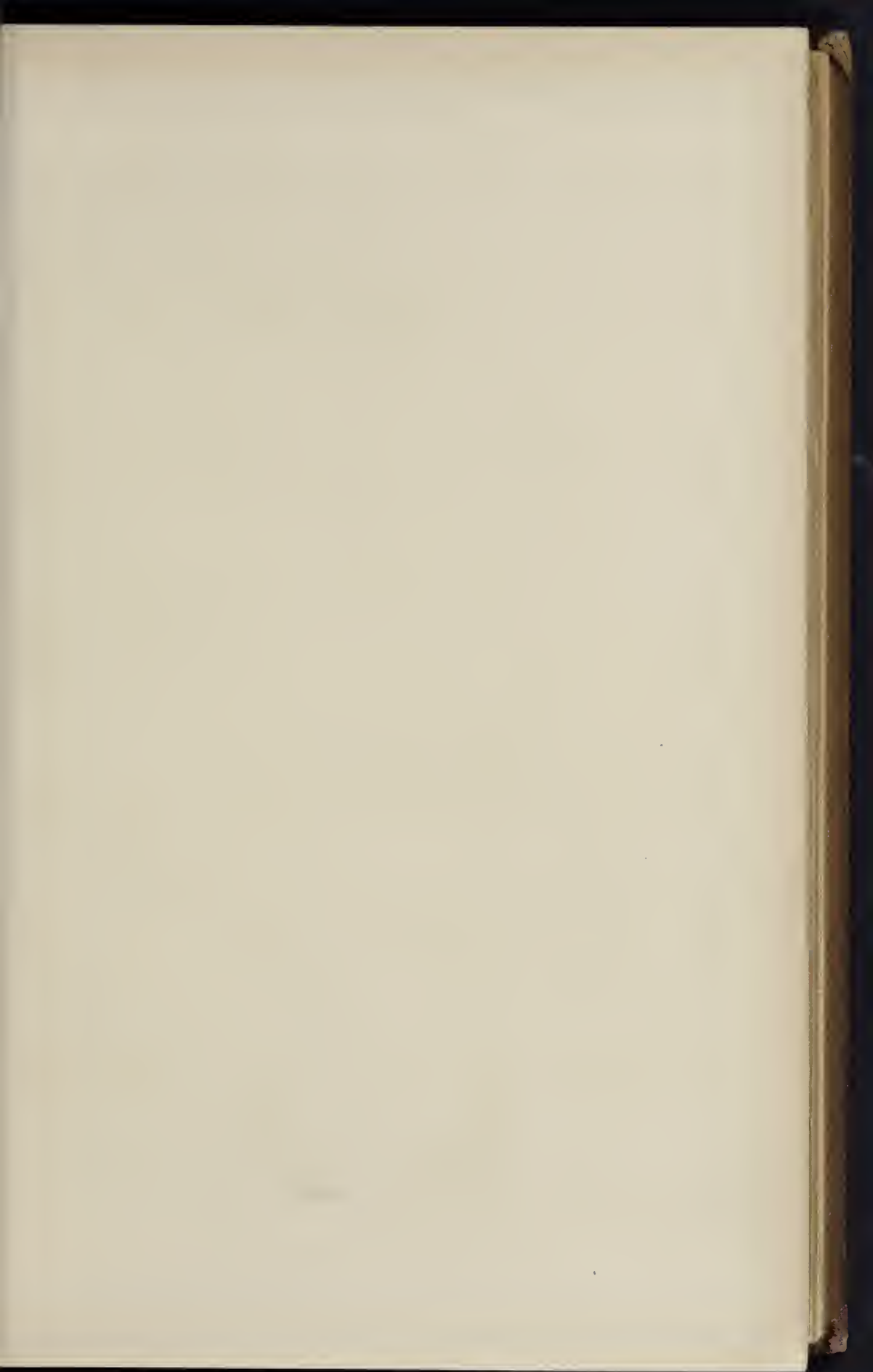




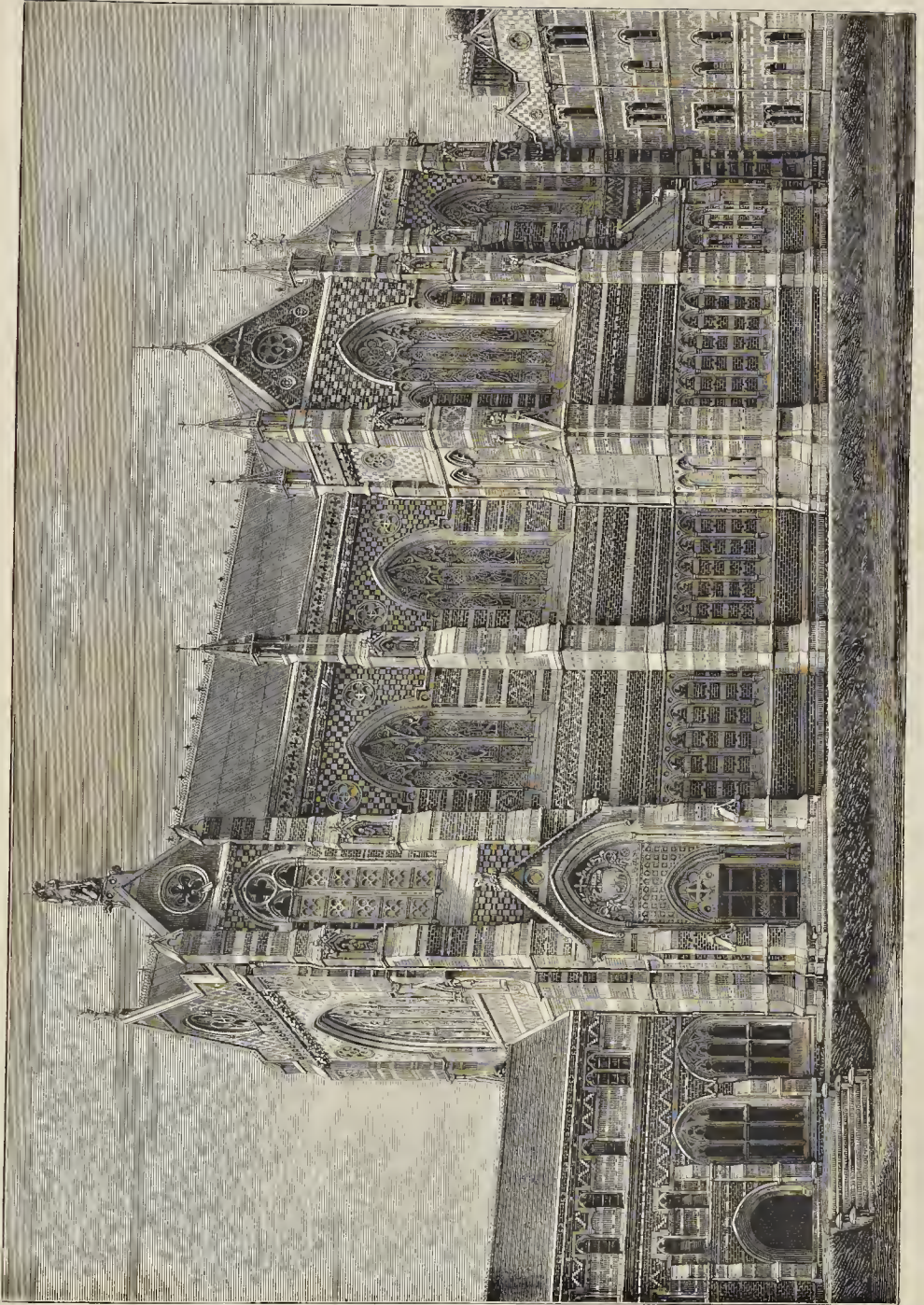
THE BUILDER, JANUARY 3, 1885.
 HALF PLAN LOOKING UP



HALF PLAN LOOKING DOWN
 ST. STEPHEN'S CHURCH, WATERLOOK. PLANS.
 WYLLIAMS & SON'S PHOTO-LITHO CO. GOSWEN ST. LEONARD, W.C.



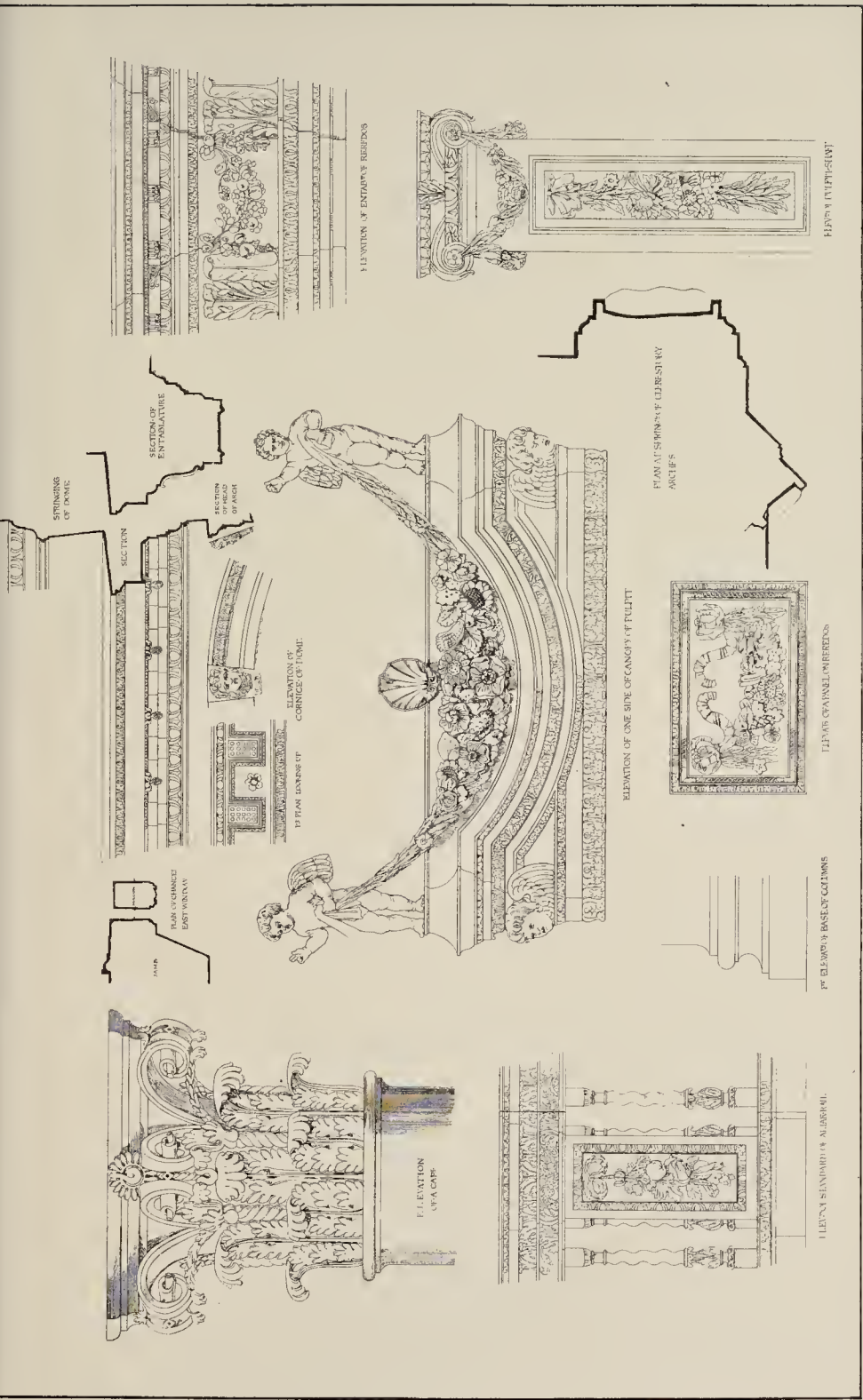
THE BUILDER, JANUARY 3, 1885.



THE CHAPEL KEBLE COLLEGE, OXFORD. — MR. W. BUTTERFIELD, ARCHITECT.



THE CHAPEL, KEBLE COLLEGE, OXFORD.—MR. W. BUTTERFIELD, ARCHITECT.



Wright & Sons, Photo-Litho, 6, Queen St. London, W.C.

ST. STEPHEN'S CHURCH, WALBROOK; DETAILS.
Measured and Drawn by Mr. EDMUND H. SEDDING.

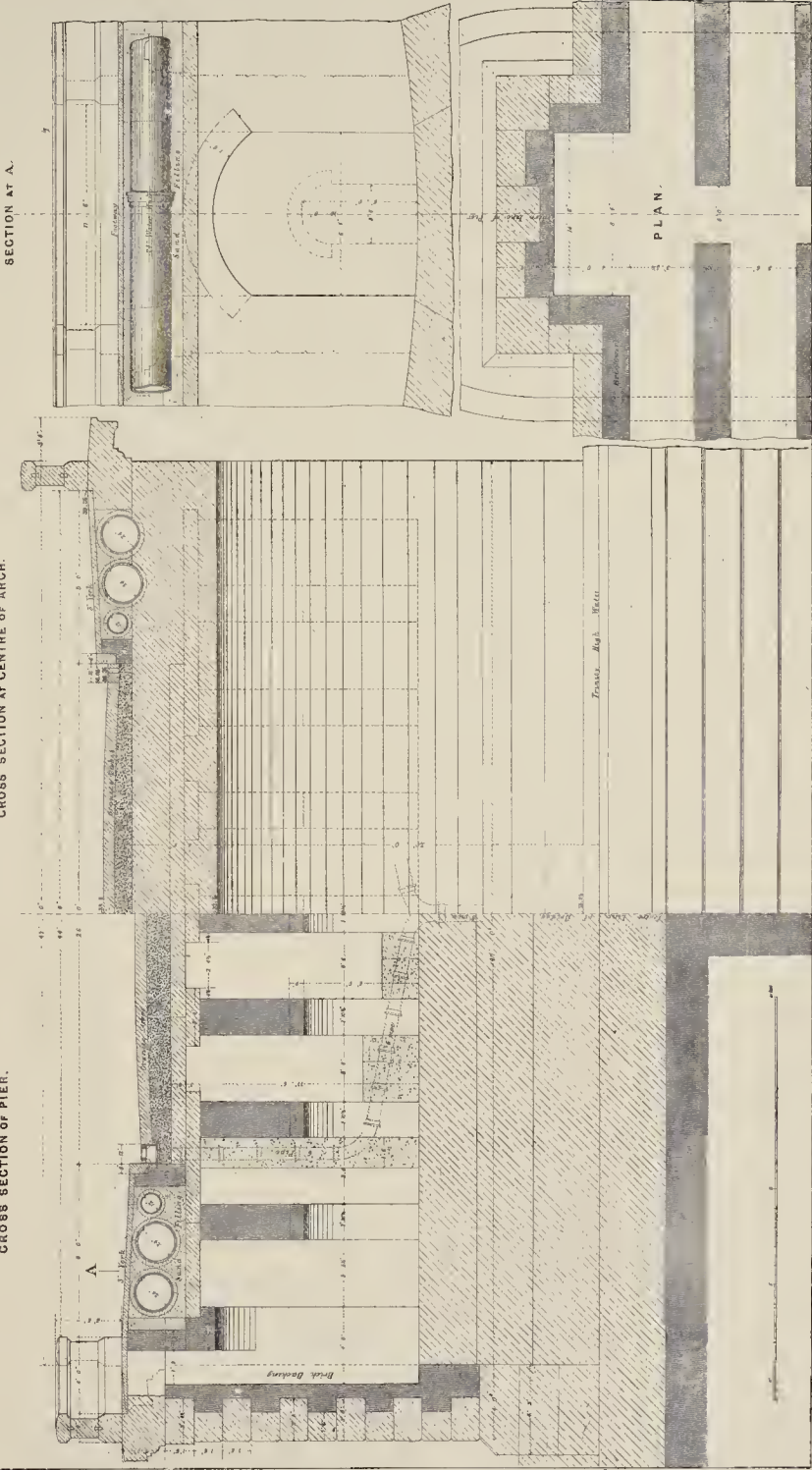
FIRST R. A. MEDAL FOR ARCHITECTURE, 1884.

POTNEY BRIDGE

DETAILS

CROSS SECTION OF PIER.

CROSS SECTION AT CENTRE OF ARCH.

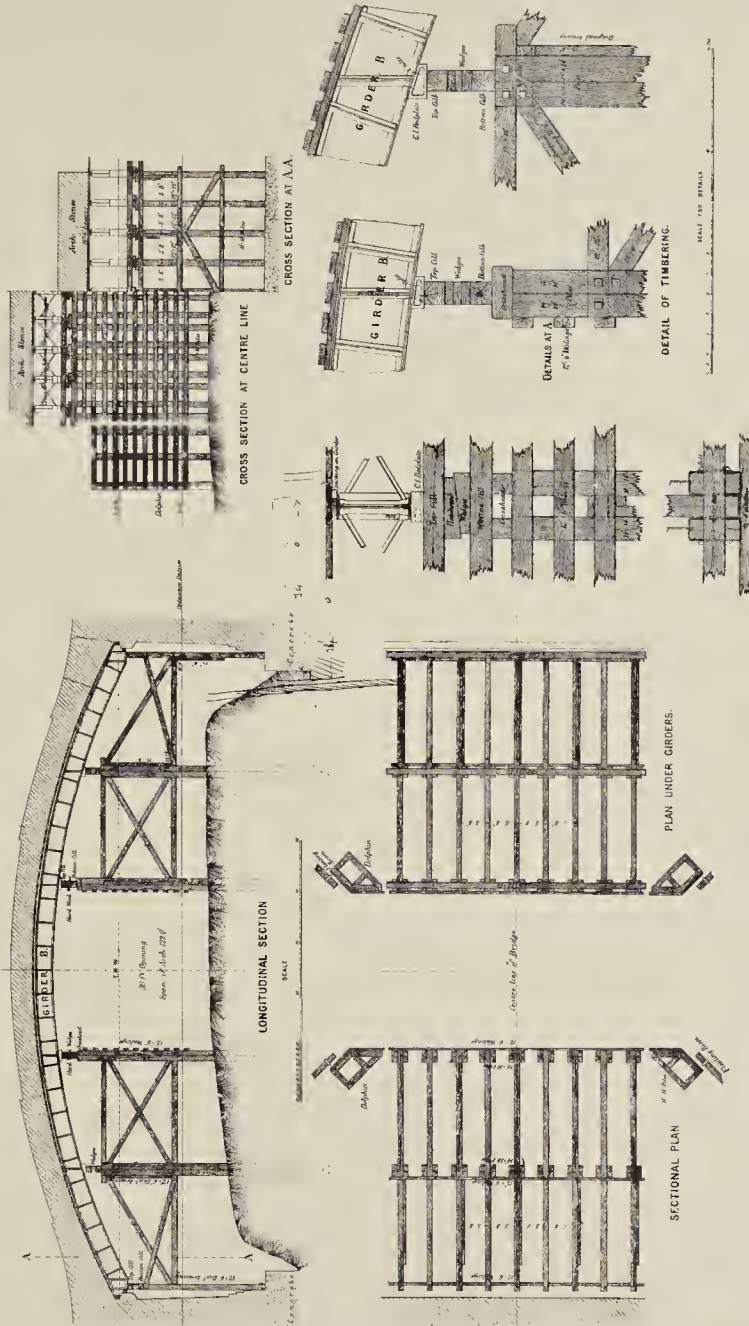


Wyman & Sons Photo-Litho 2 Queen St London, W.C.

SIR J. W. BAZALGETTE, C.B., ENGINEER.

PUTNEY BRIDGE

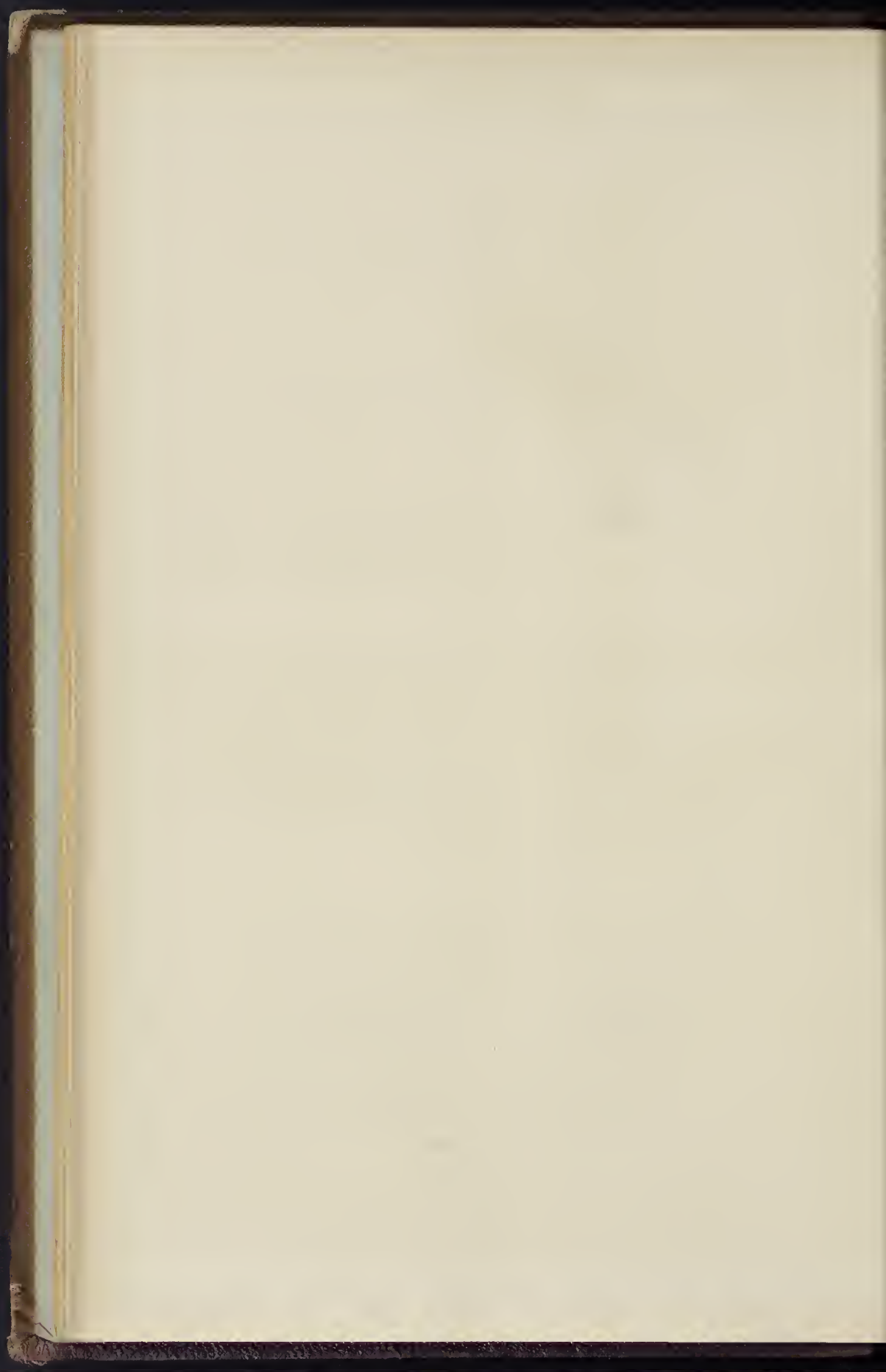
CENTRING FOR INTERMEDIATE ARCHES



Wyman & Sons Photo-Litho. Queen St. London W.C.

BY APPOINTMENT TO HER MAJESTY

Sir J. W. Bazalgette, C.B., ENGINEER.



ture divides the saved on the right hand from a lost upon the left hand of our Lord. Along the foot of the middle panel are the words, Hereafter ye shall see the Son of Man sitting at the right hand of power, and coming in the clouds of heaven."

The outside sculptures are a large figure of St. Michael and the Dragon as a final to the 10th porch; and in the two larger and lower niches at the east end are figures of St. Mary on a buttress and the Archangel Gabriel in a niche to represent the Annunciation.

A figure of Archbishop Longley, the Archbishop of Canterbury, who laid the first stone of the College buildings, which adjoin the chapel, its west end, occurs in the south-west niche that front. A large Agnus Dei in relief surmounts the south entrance doorway.

The chapel was the gift of Mr. W. Gibbs, of Wyntesfield.

The engravings have been executed, from photographs, in the atelier of Mr. J. D. Cooper.

WEST FRONT, TEWKESBURY ABBEY.

This is from a sepia drawing (made some time ago by the present Editor of this Journal) of careful sketches on the spot) of the west front, with its great Norman arch of six orders." It shows the interpolated west window of debased Perpendicular work, about which, and the propriety of taking it out and replacing it by something in keeping with the character of the Norman architecture, there is been much ink shed, and will probably be more. As a matter of fact, the window is either a dilapidated affair, as some people have asserted, nor a fine specimen of late work, as others have still more rashly maintained; it is a bad window in good repair. Such as it is, therefore, it had better be left till it becomes dilapidated, when it will be time to consider how to replace it.

The effect of shadow in the deeply-recessed arch is a reminiscence of the actual effect at a time in the afternoon when the western sun just outlined each arch with a line of rich golden light, emphasising by contrast the overtones recesses of the shadowed portions of the arch, an effect not to be readily forgotten.

DRAWINGS OF ST. STEPHEN'S, WALBROOK.

THESE drawings, by Mr. Edmund H. Sedding, obtained the first Academy Medal for Architectural Drawing this year. As good and careful drawings they merit publication, and may be useful as a trustworthy delineation of the plan and section and main decorative features of Wren's celebrated church, which, as it has been observed, "has given to the narrow lanes of Walbrook a European celebrity," and has received more praise and attention than any building of the same size since the Greek temples,—praise well bestowed on its finely-revised plan and section and spacious appearance, but which must be moderated when we come to consider its decorative detail. However, here is enough in it for modern church-builders to learn a good deal from, when once they will take to planning churches on true architectural and not on archaeological methods.

PUTNEY NEW BRIDGE.

WE give this week reduced fac-similes of a portion of the working drawings for the fine new bridge which is in course of construction at Putney, to replace the old picturesque timber bridge, dear to artists, but for some time past in a shaky state in regard to land traffic (heavy weights, such as steam rollers, have been long since forbidden to cross it), and which has always, from its crowded congeries of piles, and its narrow arches, formed a serious obstruction to the water traffic, more felt as its traffic has been more developed.

Speaking as architects, we may in the first place express our satisfaction that the new bridge is to be of masonry, and not an iron structure. Such a bridge is not only a finer and more monumental-looking object in itself than any form of iron girder bridge can be, but it is in reality far more enduring, and likely to last on the lives of a good many iron bridges. The architectural treatment of the details is particularly striking or original,—if the sole design is not, in its effect, all that some of us think a bridge might be made, even in accordance with the strictest engineering re-

quirements, we may at least feel gratified that the structure is simple, solid, and unpretending, with no false display or striving after effect about it. In this respect it will be the most worthy companion to London and Waterloo bridges which has been erected of late years over the Thames, and is some compensation for the gewgaw sham Gothic of Blackfriars Bridge.

We take from the specification a few notes in regard to the plan and construction of the bridge. The approaches on each side are carried on brick arches with the spandrels filled up solid with concrete. The bridge itself is of granite; the skewbacks of abutments and piers to be composed of blocks of the form and dimensions shown, and not less than 4 ft. on the bed, measuring across the axis of the bridge; the voussoirs are the same minimum width. In setting the stones, vertical strips of lead $\frac{1}{2}$ in. thick, 2 in. wide, and the full depth of the stones in length, are inserted at a distance of 6 in. from each end of each stone, and as each course is completed the joints are filled in between the lead strips with Portland cement and sharp Thames sand (1 and 1).

The whole of the five arches are being carried on simultaneously, so that no arch is at any time more than one course in advance of another. The whole surface of the extrados and skewbacks, on completion, will be covered with Klaridge's asphalt half an inch in thickness, and turned up 6 in. against the inner surface of the outer spandrel walls, the inner spandrel walls being then built of brick. A platform of Bradford landings 9 in. thick will then be laid over the whole. For the carriage-way this will be surmounted by a layer of concrete, and on this the carriage-way will be formed with granite sets. The foot platforms will be formed of 8-in. York stone flagging, and between this and the 6-in. Bradford landings will be laid the water-pipes which are now carried on an aqueduct parallel to the old bridge, allowing room for a future water-main to be laid eventually by the Chelsea waterworks company. The space round the pipes to be filled up with sand, on which the flags will be bedded. This is all clearly shown in the section of the bridge.

The cement used is Portland of the best quality; the briquettes to stand a tensile strain of 170 lb. per square inch twenty-eight days after they are made. All lime is from the lower or hardened beds of blue lias formation. Cement concrete, one of cement to eight of ballast; lime concrete, one of lime to six of ballast. Concrete filling to be in layers of not more than 12 in., each layer to lie at least three days before the next is added.

In making the foundations iron caissons in two lengths, with a detachable but water-tight joint, have been used. The lower caisson, constructed with a cutting edge at the bottom, was principally to facilitate the excavation of soil, the upper one to shield the piers while building. The lower caissons, three to each pier (see smaller section drawing), consist of two skins of rolled wrought-iron plates, the outer skin $\frac{1}{2}$ in., the inner one $\frac{3}{8}$ in., with a space of 3 ft. 6 in. between them. As the caissons were separately lowered by four lowering screws to each caisson, their weight was increased by filling the space between the skins with concrete. When each caisson was on its final foundation level the cutting edges were underpinned with Bramley Fall stones, 4 ft. by 4 ft. by 2 ft. on a bed of 12 in. of concrete between the stones and the river clay, the caissons were gradually filled up internally with successive 12 in. layers of concrete level with their rims, and the brick-footing laid on this basis.

The arches are being turned on nine wrought-iron ribs to each arch, as shown on the drawings, the ironwork being specified to be "of as good and finished a quality as if it were intended for permanent work." The sight of these business-like girders has led some people to suppose the bridge was to be of iron construction; it is so referred to by Mr. Ernest George in the note to his etching of the old Battersea Bridge. He will probably be glad to find he is mistaken. The iron centres are carried, as will be seen, on a series of piled timber piers, which in themselves have formed no slight piece of work, the necessity of keeping an open waterway throwing some extra difficulty in the way. We give *verbatim* a part of the specification referring to this portion of the work:—

"When the eight piles are driven to their proper depth, they are to be securely cramped together with twenty wrought-iron timber dogs to each support, and are then to have their collars removed and the heads sawn off level,

so as to give a perfectly true and even bearing to the cross-head-piece, which is to be set true and carefully on each of four piles, so as to distribute the weight uniformly on each single pile. All piles are to be shod with wrought-iron shoes, not less than 15 lb. each, and strong iron hoops also to the heads, the iron 4 in. broad by 1 in. thick. On the top of these cross heads, of which there are two to each support, is to be set the lower and upper sill, both of elm, and to be carefully-selected timber, as between these sills are to be placed the wedges, and the bearing surfaces between the wedges and that come on the cross heads must be adzed to a true and accurate line so as to allow of the same thickness of wedges throughout, and the parts that are directly under the cast-iron bed-plate to be of one uniform level. When the lower sill is fixed in position and securely fastened with dogs, driven in the sides and to each cross head, the wedges are to be placed longitudinally with it, and care taken to have them fixed across the centre line of the girders. These wedges are to be of oak, selected timber fully seasoned, and are to be carefully sawn to the given form, and a template is to be submitted for the Engineer's approval before they are fixed. When the wedges are fixed the top sill is to be placed in position on the top of them, but care must be taken that the distance between the sills before the girders are fixed is not less than 1 ft., so as to have as little raising of the girders by the wedges as possible, and to have as much lowering space for the girders as can be obtained when the centres are 'struck.' Between the main support and the single pile that carries the end of the girder an intermediate set of piles or supports to be driven under the same conditions as those heretofore described, and in the same line, and to be dugged securely together. The single pile next to the masonry is to be placed upright in position and in the pocket left in the masonry, and the foot of the pile sawn off square, so as to allow of the giving its full bearing on the concrete. When all the piles are fixed in their proper position, the 12 in. by 12 in. 'stringers' are to be fixed, care being taken that the faces or parts of timber that are in contact are to come close together to allow of their being bolted together with 1-in. wrought-iron bolts, with 4-in. square washers $\frac{1}{2}$ in. thick, and in no case any small packing or make-up pieces are to be used. In every alternate bay, or 11 ft. 4 in. apart, is to be fixed crossed single hacing 12 ft. by 6 ft. as shown, bolted securely to the top, and half-way down the piles, and fixed between the 12 ft. by 12 ft. stringers. The entire face of the 60-ft. opening are to be covered with 12 ft. by 6 ft. sling pieces, fixed 12 in. apart, and to be securely spiked to the main piles, and all corners or unsecured openings are to be enabled a smooth evenness is to be adzed off, so as to enable a smooth passage to any craft going through the opening. When all the piles are driven, and all bracing or wallings are fixed complete, the girders A may be fixed or built in their places, namely 5 ft. 8 in. apart from centre to centre, care being taken that the cast-iron bed-plates come over the centre of the supports."

The approaches have been protected, as shown on the drawings, by "dolphins" consisting of five main piles, canting outwards from the 20-ft. waterway left under the centering, and by floating booms rising and falling in guides, with the tide. The ends only of these booms are seen on the drawing.

The contract includes the entire removal of old Putney Bridge, the materials of which are to become the property of the contractor.

It is expected that the new bridge will be completed within a year from this time.

The design of the bridge is by Sir J. Bazalgette, Chief Engineer to the Board of Works, and Mr. E. Bazalgette has had the immediate direction of the works. The contractor is Mr. John Waddell, of Edinburgh, and the amount of the contract is £24,000.

THE TOWER OF LONDON IN THE TIME OF ELIZABETH.

For descriptive article pertaining to this illustration, which has been drawn by Mr. H. W. Brower, see p. 6.

CALENDAR HOUSE, STIRLINGSHIRE.

For a description of this notable old mansion, see p. 8.

Paris International Exhibition, 1885.—

It is the intention of the Minister of Commerce to have exhibited a collection of teaching material and specimens of results from French schools. The Educational Section in Group V. (Classes 33 to 44) will comprise plans, models, &c., of schools and other institutions, teaching appliances, gymnastics, military exercises, and equipments, &c., printing and books, stationery, office furniture, photography, and musical instruments. In the scientific annex will be included geology, ethnography, discoveries, instruments and apparatus for medicine, surgery, astronomy, geography, weights and measures, and money of different nations. The artistic annex is to comprise paintings, sculptures, architectural models and designs, reproduction of ancient and modern monuments, paintings on enamel, porcelain, medals, &c., and the industrial arts. The London offices are at 1, Castle-street, Holborn, where applications for the remaining available space and all communications from British exhibitors should be addressed to Mr. Edmund Johnson, Commissaire Délégué.

THE INSTITUTION OF CIVIL
ENGINEERS.

In conformity with the by-laws, the annual general meeting was held on the 23rd of December, "being the Tuesday previous to Christmas Eve," the President, Sir J. W. Bazalgette, C.B., in the chair.

In the report of the Council it was remarked that it might be convenient to take, as a starting-point, the condition of the Institution when the present by-laws were enacted on the 2nd of December, 1878. Then the strength consisted, irrespective of the students, of 2,815 of all other classes, now that number was 3,782, or an increase of 34 per cent. in six years. During the past session there had been 279 elections, while the deductions from deaths, resignations, and erasures, were 85, leaving a net effective increase of 194, or 5½ per cent. in the twelve months. Out of the elections 100 candidates were resident beyond the sea, a proof that engineers in the Colonies were well satisfied with the way in which the affairs of the Institution were conducted and administered.

The death of Mr. Charles Manby, who was for seventeen years the secretary, and had since 1856 been the honorary secretary, had removed from the books one who had taken for many years a leading part in the conduct of the affairs of the Institution. By his tact and energy at an early and critical period of its history, he had managed to secure the co-operation of the principal members of the profession, and of scientific men generally, and thus laid the foundation for its present reputation and success.

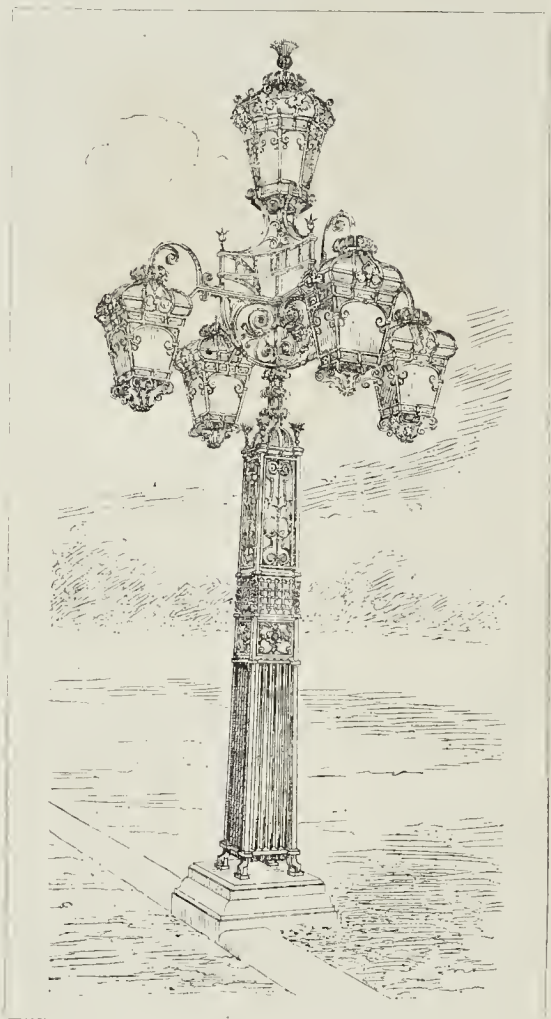
The changes in the class of students had been very numerous; for, although there were 170 admissions, exactly the same number had disappeared from the list, of whom 71 had become Associate Members. The total remained the same, 722, as at the close of last year. Of the 1,984 Students admitted since the creation of the class seventeen years ago, 48 were now Members, 515 Associate Members, and 6 Associates. As greater activity had of late been displayed by the students, the Council had sanctioned, as an experiment, the announcement of twelve meetings for Students only for the Session 1884-85, three before Christmas, and nine afterwards, at fortnightly intervals. No paper would, after the current session, be received from a student, in competition for the Miller Scholarship and the Miller Prizes, when he was qualified by age, viz., twenty-five years, for election into the Corporation.

As there seemed to be a strong desire, among many non-resident members, that the day for holding the Annual General Meeting should be altered, the out-going Council expressed the hope that its successor would see fit to convene a Special General Meeting, at an early and convenient date, for the purpose of considering the propriety, and, if approved, of making the necessary alteration in the By-laws to effect the change.

The statement of receipts and payments, for the year ended the 30th of November, showed that the income proper had amounted to 14,202. 17s. 3d., of which 1,769. 17s. 5d. arose from dividends on Institution investments, aggregating 48,000., and mainly placed in Debenture Stocks of British Railway Companies. There had also been received 3,495. 9s. from life compositions and the admission fees of new members, which were treated as capital, and 432. 11s. 2d. from dividends on Trust investments, the total of which was represented by 14,612. 13s. 10d., almost entirely standing in Government Stocks. On the other side of the account, the general expenditure had been 12,470. 18s. 5d., of which 6,193. 15s. 5d. had been applied in the production of the publications, about 25,000 volumes in all, which were delivered free of charge to all members wherever resident. The capital investments during the year had amounted to 5,322. 3s. 8d., and the premiums under trust had absorbed 516. 11s. 11d.

The Council were directed to arrange for the publication of the papers read at the Ordinary Meetings, and of such other documents as might be calculated to advance professional knowledge, in aid of the public and scientific objects for which the Society was founded.

The ballot for Council for the ensuing year resulted in the election of Sir Frederick Bramwell, F.R.S., as President; of Mr. E. Woods, Mr. G. B. Bruce, Sir John Coode, and Mr. G. Berkeley, as Vice-presidents; and of Mr. B. Baker, Mr. J. W. Barry, Sir Henry Bossemer,



Lamp-Standard. Eaton Hall.

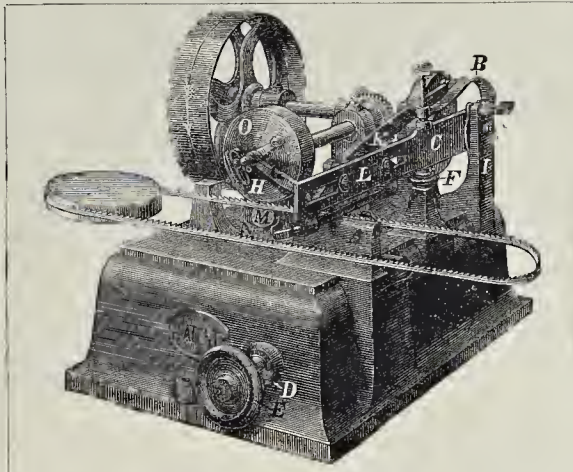
F.R.S., Mr. E. A. Cowper, Sir James N. Douglass, Mr. C. D. Fox, Mr. A. Giles, M.P., Mr. H. Hayter, Dr. W. Pole, F.R.S., Mr. W. H. Preece, F.R.S., Sir Robert Rawlinson, C.B., Sir E. J. Reed, K.C.B., P.R.S., M.P., Mr. F. C. Stileman, Sir William Thomson, F.R.S., and Sir Joseph Whitworth, bart., F.R.S., as other members of Council.

Earthquakes in Spain.—Accounts from the southern provinces represent the earthquake on Christmas Day as much more serious than it was at first reported. In many towns and villages of the provinces of Granada and Malaga buildings were completely razed to the ground, and many more damaged beyond repair. In the town of Albuquerques half the houses are said to be destroyed. The loss of life is considerable. A private letter from Malaga says that seven distinct shocks were felt in the town, the first being very severe and lasting quite fifteen seconds. The Government Commissioners, who have begun their visit to the rural districts, state that 102 houses have been buried at Alhama. At Albuquerques 1,000 dwellings were destroyed. In the Academy of Arts, in Madrid, on Tuesday night, a report was read showing that the earthquake inflicted only slight damage upon the cathedrals at Seville and Granada, and that all other monuments escaped.

WROUGHT-IRON LAMP STANDARD,
EATON HALL.

The standard is 30 ft. high. The panels are symbolical of the arms of the Grosvenor family, the portcullis with the attendant chains forming part of the ornament. The Tudor rose above is skilfully wrought out of sheet-iron enclosed in a frame-work. The column terminates with four arms. The lamps are surmounted by dual strawberry leaves; the top terminates with a thistle, his Grace being a Knight of the Thistle. The lamps are supported by an elaborate spandrel. The weight of the whole fabric is over two tons, and is entirely of wrought-iron, and in no case has cast or malleable iron been introduced. The whole was designed by Mr. Fairfax B. Wade, and is one of a series now being erected on the terrace in front of Eaton Hall, Chester. The work has been carried out by Messrs. Alfred Newman & Co.

Change of Address.—Mr. A. Newman, some of whose work we illustrate in another column, has just removed his forge from Marlborough-mews to Archer-street, Haymarket, as he informs us by means of a characteristically Medieval circular.



A NEW HAND-SAW FILING MACHINE.

AN efficient hand-saw filing machine has long been a want in the building and kindred trades, and this want appears to be fully supplied in the very ingenious machine introduced to the public by Messrs. Selig, Sonenthal, & Co., of Queen Victoria-street. It is an American invention, and it may be stated at once that the machine is not intended to supersede the file, but to use it with better effect, and with a saving in the cost of files, hand-saws, and wages. Amongst its chief advantages, it files with an ordinary $\frac{5}{16}$ in. taper saw file, or with any other file of the same length suitable for the shape of the tooth. It can be worked by hand or steam power. It is easily adjustable to various widths of saw-blades, up to $2\frac{1}{2}$ in., and to different pitches of teeth. It files eighty teeth per minute, doing the work regularly, and saving the tedious process of finishing the blades. The machine only occupies a small space, 16 in. by 22 in. In mounting or fixing for use, it is screwed to a table, or down on an ordinary bench, wooden supports being placed on each side to guide the saw. To the left of the machine, revolving easily upon a fixed vertical spindle, a wooden disc is necessary to the support, the saw-blade running round the disc during the filing, and passing in its circuit transversely through the vice of the machine. The blade being adjusted in the vice, and the motive power applied, the file must commence to cut in the centre of the inclined or sloping part of the tooth, and, as it moves forward, is brought on to the upright or cutting edge. The principle of the cam is effectively applied, and the filing action through which the file is raised and withdrawn after each filing operation, to be again instantly moved forward to its work, is singularly steady and regular.

By means of the accompanying illustration, the chief points of the machine may be clearly seen. Before fixing the blade in the vice, A, and commencing operations, the spring, B, in the movable arm, C, must be raised and turned slightly to the left, when the arm can be raised vertically. The thumbscrew, D, on the spindle of the hand-wheel, E, is next loosened and the hand-wheel turned so as to bring down the adjustable carriers in the vice. The blade is then pressed down between the vice and the spring on to the corners and the hand-wheel turned so that the teeth may be sufficiently protruded to allow the file to clear the vice, after which the thumbscrew is tightened up. The movable arm is rested upon the screw-head, F, which latter must be raised enough to keep the file from touching the saw. On to the blade the feed-pawl, G, is then dropped, its stroke being regulated by the graduated quadrant, H, to the length of about a tooth and a half to one revolution of the pulley. The screw holding the index-head must be securely tightened, and the screw-head, F, lowered sufficiently to give the file the light or heavy cut required; then tighten when adjusted. When the file moves from the centre of the tooth and is brought forward in its action to the upright or cutting edge, the latter cut, if it be too heavy, is remedied by moving up the front spring on Standard I. (If too light the back spring is screwed up), but not so tightly as to prevent the file after the cut from easily leaving the tooth. When the file is worn, or so far used up that it loses its bite, the spring, B, must be replaced on the movable arm and regulated by the screw. If it should occur that the file springs out work easily against the upright edge of the tooth, it may be that the pawl makes too long a stroke, which can easily be shortened. It will be found while the file is sharp the weight of the arm is sufficient, unless the longer teeth of uneven blades are to be filed off quickly, but by

keeping the arm upon the screw-head, F, the cut will be prevented from being irregular. It will be necessary to keep the journals of the machine well lubricated, including both ends of the eccentric rod, K, the sliding pieces, L, the hole in the pawl, the pin in the small disc, M, and the eccentric, O.

In filing uneven blades, the machine should be adjusted for taking off the larger teeth first, passing the blade through several times, until it is found that the teeth are of uniform height; but new blades, or blades finished in the machine, are sharpened by passing through once.

On the whole, we are favourably impressed with the construction and working of the machine.

EDINBURGH.

DR. ROWAND ANDERSON has completed the plans for the building to be erected in Queen-street for the joint accommodation of the National Portrait Gallery and the Museum of Antiquities, and they have been approved of. The design is carried out in the thirteenth-century Gothic style which the architect has adopted by considerations of utility as well as beauty, the style being one which readily adapts itself to the providing of sufficient window openings for such of the galleries as require to be lighted from the sides. The elevation is divided into three stories, the lower two of which are lighted by large pointed windows, the third story presenting a broad unperforated surface, the light of the third floor being entirely derived from the roof. The entrance is in the centre of the north front, and consists of a deeply-recessed pointed doorway, having a row of niches over it, above which appears a triplet window, the whole culminating in a gable. The piers between the windows of the first floor are formed into niches with pinnacled canopies, in which it is proposed to place life-size statues of celebrities. Provision is made in the design for future extensions in the form of wings, and alternative elevations of these proposed additions are shown, one having angle turrets at the four corners and the other without these features. A temporary structure of brick lined with wood is to be placed on part of the ground to be used as a place of exhibition pending the erection of the permanent galleries.

The Scottish admirers of the late Dean Stanley, desirous of showing their sympathy with the liberal and enlightened opinions of the Dean in regard to the civil and ecclesiastical history of Scotland, have arranged that a suitable memorial of him should be placed in St. Giles's Cathedral. This is to take the form of a mural tablet having as its principal feature a replica of the profile in bronze of the Dean which has been placed in St. George's Chapel, Windsor. The site of the memorial is in the south transept, adjoining the royal pew. Three new stained-glass windows are at present being placed in the south transept, and it has been found that the royal pew will obstruct the view of these. This pew originally stood facing the chancel, having at its back the bare, unperforated wall, which cut off the choir from the rest of the interior. It is much too cumbersome

for its present position, and it is proposed to utilise it in forming a screen across the interior of the west doorway. A new pew, of a less ponderous description, will take its place, and this, like the original one, will be of oak, with appropriate carved decoration.

Two new police stations have been sanctioned, both of considerable dimensions. One of these, in the West Port, has been in hand for some time, and the other, in the Causewayside, will be commenced forthwith. They are both designed in Scottish Baronial style, by Mr. Robert Morham, city architect. Objection was made to the design of these buildings by a member of the Town Council, on the ground that they were ornamental, but one of the magistrates, who is himself a practical builder, said that the estimates for the buildings were very moderate, considering the amount of accommodation required; and the Lord Provost remarked that a public building should have some distinguishing mark, and that it would not be appropriate without ornamentation of some kind.

BELL-RINGING.

SIR,—Having received my *Builder* to-day, and during twenty years past, I am greatly astounded at the "Note" about church bells. On a recent occasion, in back issues, several letters appeared, relative to suggestions to "gentlemen ringers" about fifteen years back. It must not be forgotten that changing-ringing is the only recreation for a great many young men, in large and small towns. In the country, the tower is generally in the hands of a set of sulky louts, who will neither learn the elements of the science nor let others more intelligent make the attempt to do so.

With respect to Kensington, the matter is perfectly remedial; as, in fact, everywhere else.

Let the architect provide shutters to the inside of the bell-chamber windows, and during ringing, and heavy storms keep them all shut. During ringing, in this instance the sound will pass up the spire, and fall, not in the nearest windows, but half a mile distant.

Having applied this scheme to my own parish church, where the bells are heavy, and often practised, the residents round the church cannot hear the bells at all in their shops and private dwellings.

This has been also carried into effect at Sir G. Scott's cathedral in Edinburgh, which what effect I cannot say, but am informed that the disagreeable clang due to re-echo against near walls is entirely removed.

Surely it is far better to have a good ring in one place, such as an important parish church, than having bell-lovers like myself erecting light rings in their own dwellings, which result would certainly follow any legislation against church bells. Greater nuisances than changing-ringing require putting down, such as organ grinding and piano-playing all night. The most the Kensington people have to put up with is but two hours in each week,—probably much less. The grand ring of ten at St. Clement Danes was never complained of by the patients in King's College Hospital; nor, as far as I know, any of the well-known bells round other hospitals.

FRANCIS GRAYLING, F.R.C.P.,
Member of the Ancient Society of Church Youths,
Sittingbourne, Dec. 25.

DR. JOHNSON'S HOUSE IN BOLT COURT.

SIR,—There is a slight inaccuracy in your number for Dec. 13 [p. 787] with reference to the Stationers' Company's School in Bolt-court and the house in which Dr. Johnson lived and died. I would point out that the school premises proper and the school-house or residence of the head-master (generally supposed to be Dr. Johnson's old house) are two distinct buildings, and of different dates. The former, which is quite a modern structure, of not more than twenty-five or twenty-six years old, was erected by the Stationers' Company expressly for their school; but the latter,—the school-house,—was purchased by them as it now stands, and is a much older structure altogether. It is a large old-fashioned residential building, and, from the general character of its architecture and its internal fittings, would seem to be of a date contemporary with Dr. Johnson. The house in which the Doctor died you state was completely destroyed by fire in 1819, which I am inclined to doubt, because that would make the present house which stands on its site not much more than thirty years old,—that is, supposing it to have been rebuilt immediately after the fire. But the house in question has all the appearance of being much older than that. From the size and number of the rooms, the thickness of the walls, the old-fashioned doors and window-shutters, &c., I should conclude that the old house was not so completely destroyed by fire as you state, but that, though greatly damaged, it was afterwards restored to much of its original condition, in which case the present school-house may fairly be considered as very nearly identical with the house in which the Doctor breathed his last.

With regard to the numbering of the houses, there has evidently been at some time an alteration in the houses in the court, and a little confusion has been thus introduced into the numbers, which I am not in any way able to elucidate.

F. HOWARD,
Assistant Master, Stationers' School.

** We fail to discover what inaccuracy Mr. Howard would correct. The facts are as stated. As to No. 6, Bolt-court, there is certainly one room,—the class-room on the ground-floor to the left,—which has an eighteenth-century air. We find nothing else to warrant Mr. Howard's conclusion as to the age of the interior, which, however, is substantial and old-fashioned. Then as to No. 8, Bolt-court, contrasting the new house from without with,—

(a) The coloured drawing, signed and dated "C. Tomkins, 1801," in vol. viii., Crowle Pennant, showing a dark brick house with red brick vousoirs over windows;

(b) The view of 1810 (G. Shepherd, delin.; S. Rawles, sculpt.), in the Crace Collection, British Museum;

(c) The view in Soane Museum; and

(d) The view by C. J. Smith in vol. vii., Croker's "Boswell," Bonn, 1848.

It will appear how the front elevation,—like in those,—differs from the present; and strikingly in that the central line windows which light the staircase in the existing house are upon a different level from the other windows, and have deep round-headed reveals.

Moreover, conclusive proof of what we said will be found in *All the Year Round* for the 9th of July, 1859. Therein is quoted a passage supplied to Dickens by Mr. Bensley, son and successor to the Bensley who succeeded Sam. Richardson and Allen, Johnson's friend. Born in Johnson's house, Bensley lived there, and in the house which replaced it after the fire of 1819 until the sale to the Stationer's Company, 1858. He says, *inter alia*, that the fire totally consumed Johnson's residence.

Cassell's "Old and New London" makes a hash of the whole thing, vol. i., pp. 112-13. Thornbury's blunders (for he, we believe, wrote the earlier part of that work) are crowned by the illustration. This, professing "No. 8," is in reality No. 3, a house on the eastern side of the court, which has always belonged to the Medical Society of London (lately removed to Chandos-street, W.), and where until lately their meetings were held. The original rooms are now occupied by Mr. Parker, a surgeon. The house is distinguished by the figured medallion over the door, once gilt. It is a much older house than No. 6, the Stationers' School-house.

It may be added that in the *Builder* for Sept. 12, 1857, there were given views of Dr. Johnson's chambers in Hare-court and Inner Temple-lane.

RATES IN THE INNS OF COURT.

SIR,—In your "Notes" of last week [p. 839] I observe a statement is put forth that the Inns of Court and some other Inns are exempted from any payment of local rates, being themselves extra-parochial. So far as regards one of the places mentioned, *viz.*, Gray's Inn, I for one can speak quite feelingly to the contrary, having myself contributed as lessee and occupier of a set of chambers in this Inn,—year by year for nearly ten years past,—my quota to the Poor, School Board, and other rates, which are duly made and levied by the constituted authorities at least twice a year.

LEONARD F. CLOW.

PROVINCIAL NEWS.

Bristol.—The extensive factory which the well-known firm of Messrs. W. D. and H. O. Wills, tobacco manufacturers, of Redcliff-street, are about to erect in East-street, Bedminster, has been commenced, and the work is now in full operation. The site is that formerly occupied by Rake's tannery, and the building when erected will be one of the largest tobacco factories in the country. It will have a frontage to East-street of 260 ft., and a depth of 295 ft. The front elevation will be Gothic in character, and the materials used will be Cattybrook faced bricks, with freestone dressings. Mr. Frank Wills is the architect, and the general building contract has been let to Mr. A. J. Beaven, of Bedminster, and Mr. Henry Sampson, also of Bedminster, is the contractor for the iron-work and fire-proof floors, the amount of their joint tender being 27,900l.

Boston.—On the 15th ult. a new dock was opened at Boston, Lincolnshire. The dock, which is situate near to the town and close to the people's Park, is 825 ft. long and 450 ft. wide, the water area being upwards of seven acres. The lock is 300 ft. long and 50 ft. wide, having two pairs of gates. The walls of the dock are vertical, 32 ft. 6 in. high from floor to coping, and 15 ft. thick at the base, built of concrete, the upper part, where the ships come in contact with the walls, being lined with

Staffordshire blue bricks. The coping is hard sandstone. The dock is connected with the Great Northern Railway by a swing bridge across the haven of the river Witham, and the quays are provided with sidings in connexion with the railway. There are capacious granaries for storing purposes, travelling cranes, large fixed cranes, &c. A coal hoist, worked by hydraulic power, and capable of filling a ship of a thousand tons during one tide, has been erected on one of the quays. The hoist is capable of discharging either drop, bottom, or end delivery trucks, and is so arranged as to deliver the coal with as little breakage as possible. The foundation of the lock is composed of cement concrete, and rests on a bed of very hard clay. The invert is of sandstone, and the walls of concrete, lined with Staffordshire bricks. The sills and hollow quoins are of granite. The lock gates are of pitch-pine, with greenheart heel-posts, mitre-posts, and bottom ribs. Each gate is 29 ft. 6 in. long, 32 ft. high, and 2 ft. 7 in. thick. The sluices are disposed in the side walls, and so arranged as to scour the mud from the back of the gates and lock pits. A wooden pier extends from the mouth of the lock to the channel with hollards, and there are other conveniences for getting vessels in and out. A jetty extends from the lock wall along the river parallel with the dock, with landing-stages, stops, and sidings to the railway. The swing-bridge is of wrought iron, 126 ft. long and 13 ft. wide. It swings on an oval-shaped cast-iron pier sunk in the middle of the river. It is expected that a large coal transport trade will take place from Boston, which is now by far the nearest port to the collieries of Nottingham and South Yorkshire, and also the nearest port for the great commercial centres of the midland counties. Arrangements have already been made for a large import timber trade from the Baltic, a considerable portion of the dock quays having already been taken for storing. The port will be useful for fishing-smack purposes, and a large fishing trade is anticipated. The cost of the dock, including hydraulic power, warehouses, &c., has been about 120,000l. The plans for the dock were prepared by Mr. W. H. Wheeler, C.E., the borough engineer, and the consulting engineer has been Mr. J. Abernethy, Past-President of the Society of Engineers. The improvement of the outfall has been recently completed at a cost of 100,000l., a new channel having been cut through the clays at the mouth of the Witham. On the following day a new iron railway bridge, 300 ft. long, crossing the Witham near the Grand Sluice at Boston, was tested and opened for traffic. The bridge, which has cost from 12,000l. to 14,000l., has been constructed by Mr. Matthew Pitts, of Leeds, from designs by Mr. Richard Johnson, chief engineer of the Great Northern Railway, and carried out under the supervision of Mr. Charles Kirby, district engineer. It crosses the river in three spans. The central supports are six cylinders, sunk 25 ft. below the bed of the river, and brick abutments resting on piles form the end supports.

Leicester.—A new hosiery factory, which has been taken by Messrs. I. & R. Morley, has just been erected by Mr. Thomas Jones. The builder was Mr. Harry Bland, of Oxford-street, Leicester. The new building, a lofty structure of three storeys, occupies a site opposite the Board schools and chapel, covering an area of about 1,200 yards. The basement is fitted up as a "strong room," 110 ft. by 42 ft., for the storage of yarn and manufactured goods. At the rear of the warehouse stands the ground-floor factory, 110 ft. by 42 ft. and the engine room, containing two 30-h.p. boilers by Hawksley, Wild, & Co., of Sheffield, and a ponderous engine by Mr. T. Bates, of Sowerby Bridge, Lancashire. Connected with the boiler-house is a chimney, the dimensions of which are, height 120 ft., diameter at base 11 ft., and at summit 5 ft. The chimney stands upon a foundation of fifty tons of stone, and is constructed of pressed Coalville bricks, with blue brick angles. The cap is a speciality, being designed in pressed brick relieved with Derbyshire stone; it is altogether devoid of projections. The first floor is divided into warehouse and factory, the former 64 ft. by 32 ft., and the latter 120 ft. by 43 ft. Each department is fitted with separate lavatories, &c., in fact, this remark applies to the whole building. The second and third storeys are also devoted to a factory and warehouse upon each floor. The rooms

are lofty, and ventilation is obtained by means of forty Tobin shafts, in connexion with which are a number of extraction tubes. The rooms are heated by steam apparatus supplied by Mr. F. Ashwell, Leicester. Externally the building is in the Elizabethan style. The following are the sub-contractors:—For plumbing and glazing, Messrs. Norman and Underwood, Frieschool-lane; iron-work, Messrs. Gimson and Co., Vulcan-street; plastering, Mr. T. Nicholls, Crafon-street.—The Walker Memorial Hall, erected on the Highfields by Messrs. Walker, hosiery manufacturers, Rutland-street, in memory of their father, the late Mr. Robert Walker, was opened on the 20th ult. The edifice occupies a commanding site fronting the Melbourne-road, contiguous to the Melbourne Hall. It has been built from designs prepared by Messrs. Goddard & Paget, architects, and is composed of red sand bricks. On the ground-floor is a spacious hall, 45 feet by 44 feet, flanked by two large class-rooms. The class-room adjacent to the front entrance is fitted up as a coffee and reading room. The contractor for the work was Mr. Bentley, and the sub-contractor for the brickwork, Mr. Butteris.

CHURCH BUILDING NEWS.

Alcester.—The chancel of Arrow Church has received an addition in the shape of an elaborate rood in polished alabaster. It is given by the Dowager Marchioness in memory of the late Marquis of Hertford, K.G. It extends the whole width of the east wall. In the centre, under a tracery and crocketed canopy, is the Cross in bold relief, on a diapered background, enclosed by buttresses supporting angels. On either side are double arches containing emblems of the four Evangelists, and at each of the ends are other arches filled with carvings of the wheat and vine, also divided by buttresses carrying angels, between which are gabled canopies enclosing the pelican and young and the Agnus Dei. All the arches are supported by marble columns, affording an agreeable contrast to the alabaster. The work has been executed by Messrs. Earp, Son, & Hobbs, of London and Manchester.

Deane (Lancashire).—The ancient church of St. Mary, in the hamlet and manor of Deane, near the growing town of Bolton, was reopened on the 22nd ult., after having undergone a repair. In 1833, when the late Canon Gridlesome was vicar of the parish, the sermons state of decay into which portions of the edifice had fallen rendered considerable restoration necessary. This work was carried out in such a manner as to cover and completely hide many of the most striking features of the interior. The work of restoration now completed has been, so far as it had gone, of a thorough character. The new roof is an exact reproduction of the original roof, with the exception that the panels, instead of being filled in with plaster, are of oak boarding. The pillars and arches, which had been badly cut and notched in many places for the insertion of the gallery beams, have been repaired so far as was required for stability, without interfering with the ancient appearance of the stonework. The galleries have been removed. The arch in the tower at the west-end has been opened out, and the tower fresh fitted for the bell ringers. The removal of the old stonework leading to the galleries has very much improved the appearance of the interior of the church, besides adding to the accommodation on the ground floor. The chancel has been lengthened some 10 ft., allowing room for the erection of choir stalls. In the extension of the chancel the old work has been carefully copied, old stone having been used, as far as possible, so as to avoid any appearance of patching; and in design the extension harmonises with the rest of the building. In taking down the east end the remains of earlier windows were found embedded in the wall under the late east window, and in the reconstruction the exact lines of the former window have been retained, and the detail enriched in accordance with the portions of the older window found. In removing the plaster on the side walls of the chancel, the old sumary was found, and on both sides were traces of black letter inscriptions and coloured decorations,—about 4 ft. by 3 ft.,—enclosed in ornamental illuminated scroll-work. The fitting of the new roof and other principal work has been executed by Messrs. John Statham & Sons, of Pendleton. The

network has been carried out under the direction of that firm by Mr. James Bowden, of Kent's lane. The oakwork in the Hulton "pew" by Mr. James Hatch, of Lancaster. The sole of the work of restoration has been rigid out under the direction of Mr. R. K. Seaman, architect, of Bolton.

Eastbourne.—Some decorative work is just completed in the apse and sanctuary of its church. The ornamentation is wholly Byzantine in style, the ruling principle throughout being that the architectural structure is everywhere closely followed and emphasised, so as to aim being to decorate the stonework, and reserve its texture, even when coloured, and road spaces of the original stone are purposely left untouched between the decorated portions. The general features of the system of decoration adopted are as follow:—A double background to all colours, either absolute gold or old colour, with white upon the gold before peaving the figures, or *vice versa*. The patterns are chiefly conventional forms of flowers and foliage, wrought into panels, or formed into flowing bands following the architectural lines. The general design is due to Mr. Alfred Strong, architect of the church, and the work has been carried out by Mr. George Howe, of Wigmore-street, Cavendish-square.

Wigan.—A reredos, designed by Mr. A. E. Street, has just been erected in St. Michael's Church, Wigan. It is in three divisions, occupying the whole extent of the east wall. The central portion has a wide crocketed gable of Irish green marble, inclosing three arches, the centre one containing the sculpture of the Crucifixion, with the figures of the Virgin and St. John, and the arches on either side the figures of Saints Michael and Gabriel, all executed in white alabaster on a diapered background, the moulded jambs and multans and slinth dividing them being of Greek red marble, with hands of black marble. Under them and above the super altar is a panelled dado of Irish green marble, pierced by quatrefoils inlaid with coloured marbles, the whole resting on a solid moulded thick slab of Isle of Man black marble on a wall of alabaster. The two end divisions are panelled with a moulded and inlaid framework of polished alabaster, having in its divisions sets of Garrard's embossed and enamelled tiles, the moulded plinths and cappings being of Isle of Man black marble. The wall above and around the east window is richly treated with mural decoration. This work has been executed by Messrs. Earp, Son, & Hobbs.

Hampstead.—The interior of Hampstead Old Church (St. John's) has just been enriched by a marble font, designed and presented by Mr. Alfred Bell, one of the Churchwardens. A cover of appropriate design is about to follow. Mr. Forsyth, of Finchley-road, Hampstead, was the sculptor.

London.—An elaborate wrought-iron chancel screen was added to St. Saviour's Church, St. George's-square, Belgravia, on Christmas Day. The work was executed by Mr. Barford, of Maidenhead, from the designs of Messrs. Romaine-Walker & Tanner, architects, of Buckingham-street, Adelphi.

DISSENTING CHURCH-BUILDING NEWS.

Leek.—A new Primitive Methodist Chapel and Schools have been opened here. On the ground-floor is a schoolroom 34 ft. square, with six convenient class-rooms abutting upon it and divided off by glazed screens, with separate yards for boys and girls. There is an additional classroom in the tower, and there is abundant room for some 350 to 400 scholars. The first floor, which is used as the chapel, is 52 ft. by 35 ft. This has a gallery at the eastern end. The opposite end is occupied by a rostrum. Haden's warm fresh-air apparatus is used for this apartment. There is a vestry, with private stair, which can upon occasion be thrown into the chapel as a kind of small transept. Exclusive of this the total sittings are about 330 in the area, and some 70 more in the gallery. The works have been carried out by Messrs. Sugden & Son, architects. The builders were Mr. Herbert Hall, Mr. William Knowles, and Mr. Isaac Heath.

Water Supply, Andover.—Messrs. C. Isler & Co., of Southwark-street, have received orders to deepen the existing well for the supply of the town of Andover by means of a 15-inch artesian-bored tube well.

SCHOOL-BUILDING NEWS.

Croydon.—Extensive alterations and additions have lately been made to the Brighton-road Board Schools, from plans by Mr. Robert Ridge, the architect and surveyor to the Board. The largest, and perhaps the most complete, addition is to the senior boys' department, approached at the western end by a flight of stone steps, leading to a large lobby, which gives access to the cloak-rooms, lavatories, and also direct to the boys' main schools and class-rooms. The desks in the principal boys' room are Lascelles' dual desks, the back rows being on raised platforms. Generally, Donlon's patent automatic flushing-tanks and stoneware ranges have been adopted for the latrines. The whole of the work has been carried out by Mr. W. Marriage, of the Oval, Croydon.

Bristol.—New Sunday Schools are being erected in connexion with Hebron Chapel, Bedminster, Bristol, from designs prepared by Mr. A. Slaughter, honorary architect, and they will shortly be completed. The work is being carried out by Mr. A. J. Beaven, of Bristol, the cost being 2,500l.

The Student's Column.

LIME, CEMENT, AND THEIR USES.—I.

It will be evident that irrespective of the quality and strength of the stone or bricks to be used in the construction of a building, the mortar which unites them will exert considerable influence in the strength and permanency of the whole structure. Too much importance, therefore, cannot be attached to the selection of the materials, cement or lime and sand, of which the mortar is composed, and to the manner in which the mortar is compounded and used.

To enable a proper and judicious choice of materials being made it is essential that, at all events, a rudimentary knowledge should be possessed of the component parts of each; for it is impossible to make choice of a material of which nothing but its outward appearance is known. The very slight knowledge of weaving, for instance, possessed by the generality of people enables an opinion to be at once formed as to whether a piece of material is of properly woven thread or is what is generally termed "shoddy," so a slight knowledge of the components of a cement or lime, and of their manufacture, may assist in enabling a just opinion to be formed as to whether the sample under consideration is a good honest material, capable of giving good results under proper treatment, or is worthless as a material for construction.

All cements used in building from the earliest ages have lime as a base combined with silica and alumina in varying proportions, or are what, for practical purposes, may be considered pure limes.

The limes have been divided by Vicat into five classes, and as the classification satisfies the distinctive qualities of each in a very perfect manner, there seems no reason why it should be distrubed. Ho classifies them as follows:—

- No. 1. The rich limes.
- No. 2. The poor limes.
- No. 3. The slightly hydraulic limes.
- No. 4. The hydraulic limes.
- No. 5. The eminently hydraulic limes.

The eminently hydraulic, the hydraulic, and the slightly hydraulic limes are those which set more or less freely in water.

These are all produced by the simple calcination of limestones, containing different proportions of lime, silica, and alumina, in a state of chemical or only mechanical combination. Thus, the rich limes, or what are often called fat limes, are produced from the simple calcination of limestone, which, for practical purposes, a pure carbonate of lime, such as a good white chalk. The poor lime is the result of calcining a limestone which contains a larger or smaller proportion of inert material; that is, silica in the form of sand, or other materials, which are only combined mechanically with the base of carbonate of lime. Coming, then, to the hydraulic limes, they are produced from limestones which contain silica and alumina in varying proportions in actual chemical combination with the base; the slightly hydraulic having but a small percentage of silica and alumina, while the eminently hydraulic may have as much as 20 per cent. of the two. For instance, the

slightly hydraulic lime would be produced by the calcination of the grey chalk, and the eminently hydraulic from the limestone in the blue lias formation. In addition to the above, there is the lime produced from the dolomites or magnesian limestones.

The process of manufacture or the burning of lime is simple. The limestone, reduced to pieces of convenient size, is placed in alternate layers with coal in kilns and burned. The chemical action resulting from the calcination is the expulsion of the carbonic acid from the limestone, resulting in the production of quicklime; this, again, has to be converted into a hydrate of lime by the addition of water when required for use. The proper methods of doing this will be described later on.

Cement, or what is known as Portland cement, has also, as has been already said, a base of lime, but contains a considerably larger percentage of silica and alumina in chemical combination with the base than any of the limes, and the calcination is carried out at a much higher temperature. The manufacture of cement is, further, not of such a simple character as that of lime. It is seldom that in nature a limestone is found that possesses the exact proportions of lime, silica, and alumina, for the production of Portland cement. The desired combination has, therefore, to be produced artificially by mixing materials which contain the required ingredients. This is generally attained by incorporating with a limestone a clay which contains the silica and alumina in proper proportions.

Portland cement may be produced from any raw materials which contain the requisite proportion of each ingredient. Some, however, are, of course, more easily treated and manipulated than others; while, for purely commercial reasons, it would be impossible to use some of them.

Chalk and clay are the materials which lend themselves most readily to manipulation. A description of the manner in which they are treated for the production of Portland cement will give a very general idea of some of the difficulties attending its manufacture, and enable just conclusions to be formed as to the causes of peculiarities which may be developed in any samples under consideration, or in any cement that may be used.

The chemical properties of the chalk and clay which the manufacturer uses having been determined, they are mechanically mixed with the addition of water in a wash-mill,—the resulting slip, or, as it is technically called, "sinny," passes through a sieve as it leaves the wash-mill, and is then, according to the most advanced process of manufacture, passed through mill-stones, and ground. From the mill-stones it is either pumped or run by gravitation on to large floors (under which are arranged hoes), and dried. When all the moisture has been expelled, it is loaded into the kilns in alternate layers with coke, and burned. The resulting clinker, which should be dark in colour, and calcined almost to vitrefaction, is then broken into pieces the size of walnuts, and ground in mill-stones to the desired fineness; the result being the Portland cement of commerce. Thus the difficulties of manufacture will be appreciated. An error in the mixture of the due proportion of the raw materials, or in their proper and perfect mechanical admixture, or an error in the calcination, will result in a more or less imperfect cement, which, when used, will give indifferent or absolutely bad results.

The limits within which the chemical analysis of a Portland cement may vary is but small, not more than about five per cent. in the quantity of lime, and even this small difference, though not of itself sufficient to render a cement unsound, will make a cement either slow or quick setting, according to whether it contains the maximum or the minimum quantity. The amount of calcination to which a cement has been subjected will also, within certain limits, render it slow or quick setting, according as it has been hard or light burned.

Though theoretically a cement as it leaves the mill-stones is fit to use, practically it should be warehoused for some time, and allowed to cool before it is used. Theory and practice are often at variance without any assignable cause; but in this case the cause is easy to determine if the action which takes place by calcination is examined. Unlike the limestones, which by calcination are only deprived of their carbonic acid, the calcination of a raw cement effects in addition to the expulsion of the carbonic

acid, the chemical combination of the lime, silica, and alumina, which previously were only in a state of intimate mechanical admixture. If, therefore, this chemical combination has not been absolutely perfected, and except in a laboratory this is practically impossible, there will remain in the cement a small percentage (it may be only one or two per cent.) of lime which, though deprived of its carbonic acid, has not entered into chemical combination with the silica and alumina, and which remains, therefore, in a state of quicklime; and the action of adding water to it in this condition would cause it to expand, which, it is needless to say, would be detrimental to any work in which it was used. The object gained, therefore, by allowing a cement to be warehoused for a considerable time is to allow these small particles of free lime to "air slack,"—that is, to abstract carbonic acid from the atmosphere, and become so many inert particles in the cement. The presence of a small percentage of inert air-slacked lime is not detrimental to a cement; but of necessity the presence of free lime in any large quantity would render it, when fresh, very dangerous to use; and when aged, the presence of this inert lime would become an adulterant, and proportionately reduce its strength.

Given that the cement is properly proportioned and calcinated, the finer it is ground the better will be the result obtained with it in practice. There are, however, certain limits which it is not possible for the manufacturer to exceed economically, i.e., it is more economical to use a larger proportion of cement than pay the manufacturer the extra cost necessitated by finer grinding; the economical point is attained when a cement will, when sifted through a sieve having fifty holes to the linear inch (2,500 to the square inch) leave a residue on the sieve of only 10 per cent. This degree of fineness is sufficient for almost any purpose for which cement is used.

A cement may be slow or quick-setting according to the purpose for which it is required. The quick-setting cements attain great strength in a short time, but afterwards do not improve much, while the slower-setting, though longer in developing their strength, continue to improve for a long period, and ultimately attain greater strength than the quick-setting ones. A cement should carry at least 175 lb. per square inch when three days old, and should show an increase of at least 50 per cent. when seven days old, but the minimum strength at seven days should be 350 lb. A slow-setting cement will generally increase more than this, but at the seven days a quick-setting cement will generally be stronger than a slow-setting one. A cement is quick setting when it sets in less than an hour; a slow-setting cement will take five or more hours to attain the same hardness. Cements that take from one to five hours to set are comparatively more or less quick or slow setting. The time which a cement takes to set is determined by the clamping between the time of gauging it with water and until it will resist the pressure of the thumb-nail.

The quality of a cement is determined by

1. Its fineness.
2. The time it takes to set.
3. Its tensile strength at the expiration of three and seven days from gauging.
4. Its freedom from either expansion or contraction, or, in other words, its soundness.

To carry out a cement test satisfactorily, a considerable amount of skill, and, above all, of experience, is required. It is very easy indeed to obtain false results, more especially in testing the tensile strength; and as a false result means a comparatively bad one,—a test, unless carried out by an experienced person, may mean the condemnation of a really good material, resulting in disputes, references to arbitrators, perhaps to legal proceedings, and, at all events, to much unpleasantness. The general instructions which follow for carrying out a cement test are given, therefore, not for the purpose of enabling the user to carry out his own tests,—which, by the way, he could not do without the necessary plant,—but to enable him to have sufficient knowledge to direct the manner in which a test should be carried out, and to enable him to draw up a specification which shall coincide with his requirements and the capabilities of a cement. It is worse than useless to draw up a specification which cannot be complied with.

On all important works the cement should

be tested before being used, not after it has been put in the work. It is more satisfactory, and fairer to the manufacturer to know that the cement he is supplying is approved of or rejected before the complication of claims for labour expended and for pulling down and loss of time can have arisen; and it is certainly equally satisfactory to the user to know that the cement he is going to use is of the desired quality, and that he is certain of obtaining good work, if only the manipulation is carried out properly.

The fineness, time of setting, and soundness of a cement are absolute properties. The tensile strength is varying within certain limits, according to the skill of the operator in making the test blocks, but it must be understood that in testing the tensile strength, the object is to obtain the very best results possible.

The sample for testing should not be taken from one sack, but from at least half a dozen, and well mixed before commencing the test. The fineness should be first ascertained by weighing out a certain quantity, say 25 ounces, or 12½ ounces. It is best to reckon by ounces, and to take either of these quantities, because, in the first instance, 1 ounce, and in the latter case, 1 ounce, is equal to 1 per cent. Having weighed out the cement, and placed it in the sieve of the proper mesh (50 by 50), it must be sifted through until nothing more will pass, when what is left in the sieve must be weighed, and the percentage at once determined. This experiment should be carried out twice, with different portions of cement, in order to ensure accuracy, and to be certain that a fair sample of the cement has been taken, and if there is any serious discrepancy in the results, a third experiment must be made.

Books.

Russian Art. By ALFRED MASSELL.
London: Chapman & Hall.

THE above work, published for the Committee and Council on Education, forms one of an excellent series of handbooks to the art treasures preserved in the South Kensington Museum. Its main object is to supply a guide to the reproductions of Russian objects of art belonging to the Museum; but it includes a general survey of Russian art. The writer has a competent personal knowledge of the subject, and a wide acquaintance with its literature in the several European languages, and in his acknowledgment of obligations to other writers makes special mention of the *Art Russe*, of that prolific author and incomparable artist, the late M. Viollet-le-Duc. The first part of the book is devoted to a description,—with appropriate commentaries,—of the numerous art objects in the Russian Collections at St. Petersburg and Moscow, with interesting accounts of the circumstances attending the various "finds" at Kertell, Novo-Teberka, and elsewhere. The second part takes up the subject of religious art in Russia, and enters at length into the architecture and sacred vessels, ornaments, and decorations of Russian churches. A separate section of the work deals with arms and armour, and another on the collections of English and other plate in the Russian Imperial palaces. The whole is copiously and carefully illustrated. We have rarely met with a more interesting handbook. It is written with a full acquaintance with the subject, and in style is both concise and lucid; and it is a pleasure to be able to congratulate the author, without reserve, upon the accomplishment of what has evidently been to him a congenial task.

The Oriental character of Early Russian art is brought prominently forward, and the art of Russia, though possessing an unmistakable character of its own, is shown to be the result of the influence of every nation on earth. "We know for certain that in the earliest days of Russian art foreign artists and workmen abounded. They came from India, Persia, Byzantium. Lombard architects came to build churches, and not only Germans, Poles, and Hungarians poured in, but also French and English." Although the bulk of the art objects found in the various tombs are undoubtedly of high antiquity, their exact or even approximate date is almost always more or less problematical. Inscriptions are extremely rare indeed, almost unknown, and thus one valuable aid in the determination of age is wanting. In the very few cases in which any inscribed words are forthcoming,

they unfortunately add perplexity to what was sufficiently doubtful before. A remarkable instance of this is given in the case of a cup in the collection of Count Onvroroff, at Moscow. It was discovered in 1864, by a mere accident, and on its lip, amongst a series of dotted letters, the well-known Christian symbol occurs. The question of date was submitted to the Vatican, and Cardinal Pitra laid it before the Academy at Rome. Opinion were varied, and the cup was severally referred to a period three or four centuries before Christ, and to the fourth or fifth century of the Christian era. The Moscow savants were of opinion that the symbols simply declared the weight of the cup, and the balance of opinion was on their side. The conservative nature of the Christian art of the Russian Church is noteworthy. For eight hundred years it has maintained the same character in the disposition of its churches and their decoration, and in its ritual and symbolism. "There is but one school and one epoch. The artist does not create, but reproduces; and the painter knows but one costume for all times and places." Everything is fixed by tradition. The remarks upon Russian iconography are of the deepest interest, and this branch of his subject is treated by Mr. Maskell at considerable length. Those whose business it was to make works of art for religious purposes were enjoined to be "godly, steady, and not given to laughing,—not a thief, nor a slanderer." He was to be pure in body and soul, to fast and pray, and then he might hope to find the grace of God, and the clover in his work. "If a disciple paint badly, the master is to be reprimanded" and the pupil is not to meddle any more with what is above his reach. If a teacher hide his art from his disciples "he shall be tortured in hell-fire, as was done to him who hid the talent." If, moreover, a painter paint badly or not according to the given model, or if he shall live impurely, he must be made to give up icon-painting, as there are other trades for such as he. The precision with which the given model was fixed is very singular,—some saints having always white faces, others green, and so on. The Black Madonnas of the Greek Church are known to everybody. But notwithstanding the efforts which have been made to preserve the ecclesiastical art of Russia from innovation, Western progress and Western ideas have made their mark. Stained glass from Munich has found its way into the modern churches, and even sculptured figures and groups are tolerated. We have only one suggestion to make by way of improving this manual,—the marginal addition of dates. The work is supposed to have been framed as a guide to the curious public as well as for students who have a more or less close acquaintance with Russian art. Much of the interest of the objects exhibited hinges upon their remote antiquity, and to the ordinary visitor it is not of much use to be told that a silver bowl is "of the epoch of the Persian dynasty of the Sassanians." With this hint at a possible improvement we have nothing but praise for Mr. Maskell's "Russian Art."

A Treatise on Steam Boiler Incrustation, &c.
By CHARLES THOMAS DAVIS. London: Sampson Low, Marston, & Co.

THE necessity for preventing corrosion in steam-boilers has long been one of the consideration of engineers, and we can hardly agree with Mr. Davis in his view that it is a subject which has received but little attention in comparison with its importance, for, in his present work, he has taken great pains to describe several inventions for which patents have been taken out; and enumerates no less than ninety compositions for preventing and loosening incrustation, besides 150 mechanical appliances for removing the same. But Mr. Davis's present contribution conveys additional and valuable hints on the subject, and, as he truly observes, many boiler accidents which are often described in the newspapers as "mysterious" could often be fully explained in the two words "natural results." Corrosion, which is the most common agent in promoting explosions, is frequently hastened by culpable negligence or ignorance in exposing the boiler plate unnecessarily to action which causes a wasting away of the iron; and, what is frequently charged to "wear and tear" is really due to external corrosion, pure and simple, resulting from sheer carelessness either in

final construction or in subsequent super-
 on. The author dwells rightly on the great
 importance of "flue-cleaning" to both engineer
 proprietor, giving an instance within his
 wledge where the time of raising steam in
 morning was 50 per cent. longer when the
 es were unswept for one week than when
 were swept three times a week. The
 cyclone flue-cleaner," of which an engraving
 given, and which is manufactured by the
 rescent Company, Cleveland, Ohio," is repre-
 sented to be an effective machine, "adapted to
 rine, stationary, portable, upright, and loco-
 tive boilers." The vast amount of earthy
 ter and impurities which are deposited
 locomotive boilers, is not generally realised
 by those who are supposed to be
 versant with the subject. By way of
 stration, the instance is quoted of the
 omotive on the New York Central Rail-
 y, which runs forty miles and takes in 1,800
 tons of water, or 45 gallons per mile, con-
 taining 1½ ounce of earthy matter per gallon,
 which, consequently, during its run of
 only 2,000 miles per month, receives no less
 than 2,904 lb. of incrusting matter annually.
 The observations on the effect of water on
 sam boilers are very instructive, and amongst
 materials used to prevent corrosion, Mr. Davis
 states that zinc has proved the most efficacious,
 and that it is used by some of the most pro-
 moted of Liverpool engineers in their steel
 boilers. The mode of applying zinc patented
 by Mr. Hannay, of Glasgow, is spoken of as a
 very effective adaptation of the material. The
 apters allotted to a description of the various
 achines invented for purifying water for
 silers, are well worthy of study, as also the
 marks on anti-incrustation compounds, as well
 as those on the mistake which is commonly
 ad in drawing the fires at the end of the
 eek's work, and at once blowing off water and
 eam instead of only closing the damper and
 eep-it doors, and allowing everything to remain
 until morning, when the water can be let off, and
 e inside of the boiler be got at and thoroughly
 eaned out. In cases where hand cleaning is
 ot practicable, Hotchkiss's mechanical boiler-
 esner is declared to be the most effective in-
 strument yet manufactured. We cannot doubt
 that Mr. Davis's work will be appreciated as
 a valuable contribution to the special subject
 of which it treats.

London and Provincial Water Supplies. By
 ARTHUR SILVERTHORNE, A.M.I.C.E. London:
 Crosby Lockwood & Co.
 We have lately had before us several pamphlets
 relating to the water supply of London in its
 various aspects, and in so far as statistical in-
 formation is concerned no new facts are brought
 forward by Mr. SilvertHORNE which call for par-
 ticular notice; but by combining the statements
 of the provincial water supplies in the same
 volume, he renders possible a comparison of the
 results of the London Water Companies with
 those of other private undertakings, and of the
 schemes which have been carried out by various
 corporations. One result of such a comparison
 is to show that most of the provincial towns,
 though charging higher rates, furnish in no
 cases rentals even approaching a corresponding
 extent to those yielded by the London districts.
 The large discrepancy observable would, it is
 said, on careful inquiry, be found to result from
 the existence in the metropolis of a multiplicity
 of charges, beyond the mere rate per cent.
 on annual value, which are made on consumers
 but have no existence elsewhere, but which
 contribute materially in the aggregate to swell
 the rental to undue proportions.

Seeing that the metropolitan companies in
 1882-83 divided no less than 8.75 per cent.
 amongst their shareholders, and that there is a
 large annual increase to their business, the com-
 panies may fairly look for material concessions
 from them; and to this end might submit their
 representations to the Legislature, who, though
 not likely at present to alter the statutory rates
 originally settled, may yet, at no distant date,
 see the way to insisting on a reduction.

The principal interest of this publication lies
 in the particulars afforded of the provincial
 supplies. It appears that neither the old-estab-
 lished companies nor the corporations pay
 larger dividends than five or six per cent.
 This is accounted for by their having to meet
 two requirements from which the London
 companies are exempt, viz., the redemption of
 capital, and the compensation clauses which
 Parliament compels the towns to submit to in

cases where large extensions have had to be
 made to such schemes as, originally insufficient
 in their own resources, have been bought up
 by municipalities at a high premium, thereby
 greatly enhancing their cost. The compensation
 frequently far exceeds the supply applicable to
 the district, notably so in the town of Bolton,
 where it amounts to nearly double the volume
 delivered to the town itself for all purposes. In
 the course of his remarks, Mr. SilvertHORNE
 reproduces a part of the address given a few
 years ago by the late Sir W. Ferguson to the
 British Medical Association at King's College,
 on the subject of an efficient water supply, the
 perusal of which we would commend to the
 attention of all those consumers who may have
 become alarmed by the forebodings which have
 recently been so thoughtlessly advanced on the
 question of water purity. A fund of useful in-
 formation will be found in the carefully-
 tabulated statements relating to the provincial
 supplies which make up the greater portion of
 the volume.

VARIORUM.

The miniature memorandum-book noticed by
 us with approval a fortnight ago is entitled:
 "Smith's Tables, Memoranda, and Calculated
 Results," selected and arranged by Francis
 Smith. The publishers are Messrs. Crosby
 Lockwood & Co.—Sprague's Pocket Diary
 (Sprague & Co., Martin's-lane, Cannon-street)
 is a combination of the ordinary pocket
 diary in leather case, with a number of tables
 of formulæ and memoranda such as are
 useful to architects and surveyors. A great
 deal is got into a small compass, and the
 book is a very handy and convenient one.

Messrs. T. J. & J. Smith (Queen-street, Cheap-
 side), send us a parcel of their useful diaries,
 of which there is a good variety. Their "Scrib-
 bling Diary," No. 7, interleaved with blotting-
 paper, and their small ditto, No. 6, each of
 which is sold for a shilling, are among the
 cheapest and best of their kind. Their "Tablet
 Diary," which can be hung up, is so arranged
 as to show a whole week's engagements at a
 glance, and is exceedingly useful.—"The
 Prince of Palms," by W. P. Treloar (Sampson
 Low & Co.), is a description of the cocoa-nut
 palm-tree, with some account of its industrial
 applications, in the development of which
 Messrs. Treloar & Sons have taken a lead-
 ing part. The book contains some well-
 executed illustrations.—Messrs. Cassell &
 Company (Limited) send us a packet of their
 monthly publications. The "Technical
 Educator" contains lessons in object-drawing
 and perspective, freehand drawing for stone-
 masons, and papers by Dr. Dresser on the prin-
 ciples of design.—"The Practical Dictionary of
 Mechanics," by Edward H. Knight, G.F.S., is a
 very useful but very voluminous work of refer-
 ence; for, although the part now to hand is the
 97th, the work has not yet gone beyond the
 letter D. It is fully illustrated, and authorities
 and references are given apparently with great
 care.

The work is of American origin, and
 this will account for some eccentricities of
 spelling. Cassell's "Universal History" has
 reached its 40th part, and "Picturesque
 America," its 40th part,—the latter including
 illustrations of scenes in Chicago, which afford
 glimpses of the street architecture of that
 newly-built city.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

2,374, Improvements in Zinc Roofing. J. &
 J. Mould.

In this adaptation of corrugated roofing to flat
 surfaces, simplicity and ease of construction have
 been considered as well as the desirability of making
 a roof which shall be water-tight. The edge of
 each sheet is turned upwards into a double curve
 and corrugated flange, the edge itself finishing with an
 outward curve from the rafter ridge or other pro-
 jections, as the case may be. Over the upper curls
 or corrugations formed by the flanges of two such
 sheets coming together on each side of a rafter or
 other projection, two or more saddles are made with
 a slight curve at the top, and the sides returning
 inwards, so as to spring under the upper curl of each
 plate, the edges of the saddles then spreading out-
 wards, and lying smoothly upon the roof of the
 smoothness of action is allowed to the sheets.
 These saddles are secured in their position by means
 of zinc intermediate blocks, which rest on the
 rafters or other projections, and support the saddles
 under the upper part, screws passing through both

the saddle and zinc block into the rafters or ridges
 or other projections secure the saddle down at
 the top, but leave the sides perfectly free.
 Lateral movement is prevented by securing the ribs,
 and a cover plate is provided at the junctions.

2,907, Improvements in Bricks. H. W. Hart.

This is an extension of a somewhat similar inven-
 tion of the same patentee, wherein the bedding and
 butting faces of bricks used for building are formed
 alternately with broad grooves or recesses tapered
 at the sides and with projecting pieces or joggles to
 fit into these recesses. To reduce the quantity of
 mortar or cement required in laying such bricks and
 to cheapen their cost, and increase their strength,
 two square pockets, the sides of which are tapered,
 are formed, and two corresponding projections or
 joggles are also formed on the opposite side. These
 projections and recesses being made in each brick,
 a great saving of mortar or cement is effected, and
 the bricks being laid much closer, their strength is
 greatly increased.

3,329, Improvements in Fixing Rainwater
 Gutters, &c. G. Kay.

The ordinary half-round gutters are laid loosely
 into the hooks, which are fixed to the roof, but in
 this invention a hoop-iron circular clasp, sprung on
 the same bolt as the spigot and faucet, hangs down
 the guttering and prevents its removal by storms or
 pressure from rains or wind.

4,725, Flushing Sowers. P. Burke.

Relates to flushing, cleaning, and purifying sewers.
 Piles of waste material usually accumulate on level
 parts of sewer; a pipe runs along the roof of sewer,
 from the underside of which short curved nozzles,
 which direct the water jets in the direction of flow
 of the liquid in the sewer. Manholes are provided
 for clearing out the solid waste, and short sections
 of flushing pipes are provided into which water is
 successively turned.

APPLICATIONS FOR LETTERS PATENT.

Dec. 19, 1884.—16,670, J. C. Webb and F. D.
 Smith, Screw Collar Joint for Sewer and Drain
 Pipes.—16,672, E. G. Wright, Chimney Cowl and
 Ventilator.—16,673, G. Collins, Improved Sash
 Fastener.—16,687, H. C. Bridge, Apparatus for
 Facilitating the Sharpening of Plane Irons, Chisels,
 and other Edge Tools.—16,696, F. H. Moore, Im-
 provements in Fire Crates, Stoves, &c.—16,709,
 J. White, Chimney Cows and Ventilators.—16,712,
 H. H. Lake, Improvements in Flooring Cramps.

Dec. 20.—16,740, J. C. Bloomfield, Method and
 Material for Joining Earthenware Pipes.—16,745,
 C. F. Veit, Improvements in Locks.—16,754, A. A.
 King, Fastening Water-closet Doors.

Dec. 22.—16,771, T. Brounball and J. Brounball,
 Sash Fastener, also applicable to other purposes.—
 16,772, J. Walker, Box Slides for Door Chains.—
 16,774, H. Sutcliffe, Machine for the Manufacture
 of Lavatory Basins or Cabinet Stands.—16,775, H.
 Smith, Fireproof Passage, &c.—16,781, J. Walker,
 Window Sash Fastener.—16,790, U. A. Williams, Im-
 proved Window Sash Fastener.—16,791, P. R. Shill,
 Apparatus for Cutting or Planing Wood.—16,792, G.
 Ross, Laying and Securing Slates.—16,812, J. L.
 Lobley, Ventilation.—16,817, R. Adams, Opening
 and Closing Fanlights, Skylights, Ventilators, &c.—
 16,818, M. P. Ismay, Automatic Closing of Doors.

Dec. 23.—16,821, J. H. Hubert and T. Colley,
 Sash Bar Cramps for Carpenters, Joiners, &c.—
 16,831, A. Emley, Improvements in Cooking Ranges.—
 16,850, H. N. Marks, Self-soaking Water Closet.—
 16,862, G. Pepper, Improvements in Lavatory or
 Washhand Basins.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,405, W. H. Luther, Sash-bars or Astragals. —
 15,161, W. Scott Morton, Embossed Canvas for
 Decorating Walls or other Surfaces.—15,450, E. C.
 Murray, Room-to-room Communicator.—15,520,
 H. J. Hadden, Limestone and Cement Kilt-
 15,825, J. Walker, Manufacture of Turn Buttons
 and Plates for Fastening Doors and Windows.—
 15,928, G. Heward, Improvements in Cooking and
 other Kitchen Ranges.—15,945, J. J. Talman,
 Attaching Door-lock Handles to their Spindles.—
 15,955, W. H. Willett and T. C. Wakeling, Im-
 provements in Fire-grates.—15,976, E. R. Hollands,
 Open Stoves or Fire-grates.—16,075, J. B. Better,
 Improvements in Chimney-tops.—16,187,
 Williams and W. C. Horne, Luminous Letters and
 Signs.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

296, J. Walsh, Improved Ventilator.—3,521, C.
 Schlickelsohn, Improvements in Roofing Tiles.—
 4,164, H. Toth and S. Preston, Opening and Closing
 Window-sashes and Fanlights.—4,533, J. King,
 Chimney Cows and Ventilators.—4,523, W.
 Reynolds, Combination Tool.—7,620, T. Abbott
 and M. Hawthorthwaite, Flushing Apparatus for
 Water-closets and Sewers.—13,341, J. Ennals,
 Combination Water-closet and Dust-hin.

Re-Valuation for Assessment.—The
 Assessment Committee of the Bean Union
 (Kent) have selected Mr. Chas. F. Jones, F.S.J.,
 to re-value the railways, and gas and water
 works companies throughout their Union.

MEETINGS.

FRIDAY, JANUARY 2.

Architectural Association.—Discussion on "The Best System of Professional Education for Architectural Students, and How the Work of the Association might be Rendered More Efficient." 7:30 p.m.

SATURDAY, JANUARY 3.

Association of Public Sanitary Inspectors (1, Adm. street, Adelphi).—Mr. Edward C. Robins, F.R.I.B.A., will read a paper entitled "The Growing Importance and Responsibility of Public Sanitary Inspectors explained, and their relative Improvement in Education, Position, and Emoluments considered." 6 p.m.

MONDAY, JAN. 5.

Royal Institute of British Architects.—Business Meeting. The Report of a Visit to Vienna and Buda-Pesth by Mr. F. R. Farrow, holder of the Godwin Bursary, will be presented. 8 p.m.

WEDNESDAY, JAN. 7.

British Museum.—Mr. W. St. Chad Beeswain on "Assyrian and Babylonian Antiquities." 2:30 p.m.
British Archaeological Association.—Mr. C. Lysons on "Recent Excavations at Hulton Abbey." 8 p.m.

THURSDAY, JAN. 8.

Society of Antiquaries.—Ballot for Election of Fellows. 8:30 p.m.

Miscellaneous.

Building on Disused Burial-Grounds.

Taken in conjunction with the ravages and recent decline of cholera in Paris and on the Continent generally, and with our own immunity so far from that justly dreaded disease, the recent judgment by Mr. Hannay, since confirmed by a superior court, with reference to the opening up of the Old Peel Burial-ground in Bechnal-green must appear to be one of very questionable propriety. In opposition to the Metropolitan Board of Works, he has maintained that the area in dispute does not come within the operation of a by-law of the Board, which forbids the use for building purposes of land impregnated with animal or vegetable matter before the removal of the soil so affected, and he has accordingly sanctioned the erection of buildings upon it. Now, the Old Peel Burial-ground was during the cholera epidemic of 1849 literally packed with the remains of the victims of this malady. There is nothing to show to what extent the contagion then entombed has been starved out of existence during the subsequent period in which the ground has been unused. It may very well be that, under the favouring conditions of sufficient heat and moisture which the earth of cemeteries is known to furnish, the germs of disease are still preserving a subterranean life. There is no slight risk in such a case that the drainage and water-supply of the houses to be built at this spot will become the conduits of infection. It were therefore better, in our view, that a soil once so impure should be left altogether undisturbed; but if the time for this possibility is past, there only remains the greater necessity for the removal of all contaminating matters and the thorough disinfection of the sites to be occupied. These observations, which apply in a special degree to the case before us, have, moreover, a practical significance which should not be forgotten in dealing with the same subject in all its aspects.—*Lancet*.

New Artisans' Dwellings in Lambeth.

A block of buildings for the industrial classes has just been erected in Walnut Tree Walk, off Kennington-road, Lambeth. The buildings, which are in two blocks, have a frontage to Walnut Tree Walk 40 ft. in length, and extend to a depth of 100 ft. They contain four floors, and are 50 ft. in height. The elevation is faced with white Suffolk brick, and the frontage is ornamented with moulded and cut brick panels by Mr. James Brown, of Finchbury. The keystones, copings, and finials are in Portland stone. Each floor contains four sets of apartments, in suites of three rooms each, consisting of living-room, bedroom, and kitchen, with separate water-closets to each suite. The living-rooms are fitted with two cupboards, and there is one in each of the bedrooms, whilst the kitchens, in addition to dressers and cupboards, are supplied with coppers, sink, and coal bunker. There are stone staircases from the ground to the upper floor. The open flat roof, which is intended for both drying and recreation purposes, is constructed of concrete slabs and cement, and enclosed by a parapet wall 4 ft. in height. Messrs. Stock, Page, & Stock, of Duke-street, London Bridge, are the architects, and Messrs. J. Ford & Sons, of Denmark-hill, are the contractors. The cost of the buildings, which have been erected for Mr. Mackenzie, is 4,000l.

Civil and Mechanical Engineers' Society.

—An Ordinary Meeting of this Society was held on the 31st ult., the President, Mr. Thomas Cole, in the chair, when a paper was read by Mr. J. Tertius Wood, C.E., entitled "Criticisms on the Storage of Towns Water."

The author said that the introduction of subsidiary ponds to catch what would otherwise be flood or waste water, was a feature introduced by him to equalise as far as possible the unequal distribution of rainfall during the year, and assist in employing the utmost available yield from a surface-drainage catchment-area, and remarked that of course an open reservoir can be constructed to hold a volume of water calculated to expend itself during a considerable period of abnormally dry weather; but such a reservoir might, for many months, be in a low and somewhat stagnant condition; so similar results may be obtained by having covered ponds adjacent to the reservoirs, and connected therewith by culverts, having floor-levels on the same horizontal plane as the sill of the overflow; that, when the reservoir had reached its limit of capacity, the ponds therein contained would be removed from the separate rays, and kept cool and wholesome. The author further remarked that it has now become necessary that steps should be taken to institute a thorough inquiry into the whole question of water supply, and, as a sanitary unit, he kept parallel with the use to which it has to be applied; and he said that this past year has been fruitful in causes and effects, and has practically illustrated the dangers likely to arise from a forgetfulness of its importance as a social and mercantile commodity.

Armenian Architecture.—A typical Armenian church has a character of its own which it is impossible to mistake. As a rule, a square tower at the west end and an octagonal tower in the middle suggest to an English eye a faint analogy to Ely or Wymondham. Very faint, indeed, the analogy is to either; still the square and the octagon are there, however much their proportions may differ from the proportions of the square and the octagon in the only two English churches with which we can compare them. The Armenian central octagon has a strange look in the way in which it rises, not immediately from the four limbs of the church, but from a kind of oblong base which it is not easy to describe, but which is one of the most marked characteristics of the style, within and without. The truth is that the innermost bay, so to speak, of each transept, those which in the ground-plan range with the aisles of the eastern and western limb, are carried up to the full height of the lantern. Outside, this gives the tower this broad base to spring from; if the tower was away, it would have a good deal of the effect of the high choirs of the Cistercian churches in Sicily. Inside, it increases the effect of height, and it further supplies a new pair of lofty arches to increase the complication of grouping, and of arches crossing one another, some measure of which is necessarily found in every cross church. The effect of this very singular arrangement is, to our taste, certainly much better inside than it is without.—"E. A. F." in the *Guardian*.

Lowe's Wood-block Flooring.—The excellent wood-block flooring patented by Mr. R. L. Lowe, of Faruworth, near Bolton, has been used for the following, among many other new buildings, viz.,—corridors and council-chamber at Hyde Town-hall, Messrs. J. W. & F. R. Beaumont, architects, Manchester; Hanley Town-hall, Mr. J. Lobley, surveyor; Girls' High School, Exeter, Messrs. Maynard & Son, architects, Exeter; dispensing-room, Beckett's Hospital, Barnsley, Messrs. Dixon & Moxon, architects, Barnsley; floor of chapel in oak, also kitchen in red pine, Memorial Home, Liverpool, Mr. A. Waterhouse, architect, London; restaurant, Hatchett's Hotel, Piccadilly, Messrs. Weatherley & Jones, architects; waiting-room, Leamington Avenue Station, Leamington, for the London and North-Western Railway Company, Mr. H. Woodhouse, C.E., Stafford. It has been largely used for school floors, and has given great satisfaction.

Obituary.—It is with regret that we have to announce the death of Mr. John Fraser, jun., which took place on Monday last, after a lingering illness, at his residence, Don Cottage, Woodside, Aberdeen. He was thirty-five years of age and was one of the firm of John Fraser & Son, Granite Quarry owners and workers of that city.

New Buildings in Queen Victoria-street.

A lofty block of new buildings is at present in course of erection at the junction of Queen Victoria-street and Upper Thames-street, on the site of Muggersidge's granaries. With the view of widening Upper Thames-street at its western entrance, the Corporation some time ago purchased the old buildings, which were taken down, and the greater part of the site has been let on a building lease. Upper Thames-street at its western entrance will be widened to the extent of 4 ft. The new building will have three lofty frontages, one facing Queen Victoria-street, another on the west side, and the third on the south side, in Upper Thames-street. The Queen Victoria-street and west frontages will be 68 ft. in height from the street line, and will contain five lofty floors in addition to the basement, whilst the Upper Thames-street frontage will (owing to difference of level) be 78 ft. high, containing six floors and basement. The Queen Victoria-street frontage is 60 ft. in length, and is faced with Portland stone. The west frontage, 40 ft. in length, is strictly uniform with the Queen Victoria-street elevation. The Upper Thames-street frontage is faced with white Suffolk brick and Portland stone dressings. The lower part of this frontage contains what is termed the lower ground-floor,—the Thames-street level being much lower than that in Queen Victoria-street,—and that in Queen Victoria-street the upper ground-floor. Mr. W. Wible is the architect, and Mr. W. Brass, of Old-street, is the contractor. Mr. Hayes is clerk of the works, and Mr. Eyo the foreman. The cost of the building will be about 15,000l.

The Destruction of Bricks through the Action of Bacteria.—The *Riga Industrielle Zeitung* has lately commented upon the statement on the above subject (quoted in the *Builder* of May 31, 1884, p. 802), which has been circulated by the technical press of the Continent. Herr Glasenapp considers that in the assertion referred to cause and effect have been confounded, as such germs can only be developed where they find nourishing-grounds containing organic substances in abundance, and how a brick which has been burned in the normal manner should contain germs it is hard to understand. If, however, the brick has been injured by the weather, becoming soft and porous, it is easily penetrated by dust (which may be partly organic), and if damp then supervenes the necessary conditions are present for the development of bacteria, which by their action hasten the process of the destruction. It has even been proposed to disinfect bricks, but this, it is remarked, would be as devoid of efficacy as the proposed disinfection of coins. In fact, any object exposed to the air for a short time would be found on microscopic examination to contain bacteria, many of which are perfectly harmless. It is considered probable that the germ in question is the *Bacterium termo* (Cohn), which is found on most articles of food, and is the germ of decomposition *par excellence*.

Dry-Rot in Wood.—The official *Zeitschrift für Bauwesen* contains a treatise on the above subject by Professor Sorokin, of Kajan, dealing with the various parasitical destroyers of wood, and particularly the dry-rot (*Merulius lacrymans*). The anatomical structure and other details as to this parasite are described with clearness, and a series of twenty-seven illustrations gives views of infected wood and representations of the parasite in various stages of its development. The remedies proposed are described as follows.—1. A current of air destroys the parasite in twenty-four hours. 2. Light is also an obstacle to its growth. When exposed to the simultaneous action of light and a draught of air, drying up ensues within a few hours. 3. The sprinkling of wood with a solution of common salt prevents the appearance of dry-rot. The greater the concentration, the more durable is the protective effect. 4. A solution of sulphate of copper (particularly if concentrated) is preferable to the solution of common salt. 5. Carbolic acid destroys the *merulius* very rapidly. 6. Ordinary birch-tar is a very efficacious agent against dry-rot. The beams and interior surface of the boards should be coated with it. Its economy and the simplicity of its application render birch-tar one of the most convenient and practical means of obviating the entire necessity of the other remedies.

Lectern for Aston Church.—A polished-brass eck lectern has just been presented to the ancient parish church of Aston, near Birmingham. It has been manufactured by Messrs. Jones & Willis, of Birmingham and London.

locks.—The locks at Hatchett's Hotel were let by Messrs. Hobbs, Hart, & Co., for special key to pass each floor separately, with a special key for each lock, all distinct throughout building, and a principal master-key to pass all as throughout the hotel, which is a similar arrangement to those carried out by the same firm to the Grand Hotel, Claring-cross (over 4000 locks), and the First Avenue Hotel, in Holborn (over 500 locks). Messrs. Hobbs, Hart, & Co. are now making a similar arrangement for the Metropolitan, in Northumberland Avenue (over 750 locks), consisting of eight distinct special master-keys for the various floors, and special keys to differ to each lock throughout, and principal master-key to pass all, proprietors' use in case of fire, or otherwise obtain access to all doors throughout the hotel.

Kenby Winter Garden.—A short time since the town of Tenby, in South Wales, decided to set sufficient funds to erect a winter palace, den, concert-hall, salt-water swimming-baths, &c. The matter was warmly taken up by the inhabitants, and an influential committee is formed to carry out the project. The first

step to enable the committee to carry out the undertaking was to obtain designs for the scheme. This they decided should be by open competition among engineers and architects, and several designs were sent in. The committee charged with the selection of a design has chosen the one sent in by Messrs. Whitmore & Reeves, architects, Devonshire-square, Bishopsgate, London, and Chelmsford, who have been instructed to prepare working plans, and complete the designs of the undertaking to place before the Board of Trade.

Covers for Manholes, &c.—Mr. T. Durrans, architect, sends us the specification and drawing of his patent cover for manholes and other openings to cesspools, sewers, &c., which is, in fact, a screw cover, with either truly turned bevelled edge and seat, or with an elastic compressible medium to secure tightness of the joint.

Erratum.—The premiated design for the Newcastle Infectious Hospital, illustrated last week, was by "Messrs. Bradshaw & Gass," architects, of Bolton, and not by "Mr. J. Bradshaw Gass."

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.
Epitome of Advertisements in this Number.

COMPETITIONS.				
Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Manufacturing Premises.....	Not stated.....	{ 100 guineas, first 30 " " second 20 " " third }	Jan. 15th	ii.
Street Improvements.....	Croydon Corporation.....	100l., 50l., and 25l.	March 25th	ii.

CONTRACTS.				
Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Section of Business Premises, &c., Canterbury Building Yards, &c.....	Cox & Elyet.....	J. Cowell.....	Jan. 3rd	xxiii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Vestry of St. Mary Abbots, Kensington.....	W. Weaver.....	Jan. 6th	xxiii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Great Western Railway.....	do.....	do.	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Fulham Road of Works.....	The Surveyor.....	Jan. 7th	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Mile End Vestry.....	H. M. Knight.....	do.	xxviii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Liverpool Corporation.....	Official.....	Jan. 10th	xxvii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Lewisham Brd. of Wks.....	do.....	Jan. 13th	xxviii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Crown Est. Pav. Com. Blackpool Corporation.....	T. Sunderland.....	Jan. 14th	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Midland Railway Co.....	A. A. Langley.....	Jan. 15th	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	do.....	do.....	do.	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Met. Asylums Board.....	M. Wyatt.....	do.	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	Barrowley British Co-operative Society.....	W. Senior.....	Jan. 16th	xxi.
Section of House and eight Cottages, Rogiet Mill, &c.....	Claines Local Board.....	A. H. Parker.....	Jan. 21st	xxi.
Section of House and eight Cottages, Rogiet Mill, &c.....	do.....	do.....	do.	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	North Eastern Railway.....	W. Bell.....	do.	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	do.....	do.....	do.	ii.
Section of House and eight Cottages, Rogiet Mill, &c.....	East Norfolk U.S.A.....	J. D. Kennedy.....	Jan. 23rd	xxxi.
Section of House and eight Cottages, Rogiet Mill, &c.....	Barnet Local Board.....	T. Reid.....	do.	xxxi.

PUBLIC APPOINTMENTS.				
Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
orough Surveyor.....	Corporation of Bolton.....	Not stated.....	Jan. 6th	xxvii.
Inspector of Drainage Works.....	Taigmouth Local Brd.....	Not stated.....	Jan. 10th	xxvii.

TENDERS.
For constructing a 3ft. 6in. by 2ft. 4in. brick sewer, Larkfield-road, to junction of Larkfield-lane with High-road, for the Tottenham Local Board of Health. Mr. V. A. H. de Pape, engineer and surveyor. Quantities by Messrs. J. A. Lee & Son, Craven-street, Strand.—
Frouse & Lee, Broad-street-buildings, E.C. £10,288 0 0
J. McKenzie & Co., Finsbury..... 8,955 0 0
J. Bottenfield (Internal), Cannon-street..... 8,791 0 0
J. Pizzev, Hornsey..... 8,747 0 0
Bottoms Bros., Lavender-Hill..... 8,681 0 0
Geo. Cowdery, Newcut, Gloucestershire..... 8,315 0 0
J. Stone, Tottenham..... 8,129 11 0
C. Taylor, Holloway..... 7,945 10 0
W. Shurbutt, Bucklebury, Wiltshire..... 7,940 0 0
Geo. Bell, Tottenham..... 6,776 0 0
B. Cooke & Co., Battersea..... 6,682 0 0
Nowell & Robson, Kensington..... 6,273 0 0
J. Bloomfield, Tottenham (accepted)..... 5,778 15 0
[Engineer's estimate, 46,876.]

For treading, channels, and brick paving, for the Enfield Local Board.—					
	Norway Kerb.	Aberdeen Kerb.	Granite Channels.	Bio-brick Paving.	† Per yard super.
Parker, Nottingham.....	s. d.	s. d.	s. d.	s. d.	
Almery, Ponders End.....	2 10	3 0	4 10	4 10	
Hirst, London.....	2 21	2 6	6 6	2 6	
Nowell & Robson, Kensington.....	2 5	2 6	6 3		
Fairhead, Enfield.....	2 6	2 10	6 10	3 9	
A. Catley, London.....	1 11	2 11	5 2	3 7	
Nicholls, Wood Green.....	2 4	2 6	5 6	3 7	
G. Bell, Tottenham.....	—	2 3	5 0	4 4	
Patman, Enfield.....	2 11	3 2	6 6	4 3	
Mowlem & Co., Westminster.....	2 1	2 4	6 3	3 10	
J. Gabriel, Lambeth.....	1 11	—	4 5	5 0	
Jackson, Enfield (accepted).....	2 0	2 2	4 6	2 10	

For road and sewer on Southborough Park Estate, Sutton. Mr. Pinei, surveyor:—
Seare & Son..... £5,277 0 0
Nowell & Robson..... 4,136 0 0
Chafen..... 4,000 0 0
Jarvis..... 3,895 0 0
Pellen..... 3,830 0 0
Bath & Blackmore..... 3,830 0 0
R. & G. Neal..... 3,786 0 0
J. Neal..... 3,700 0 0
Mayo..... 3,692 0 0
Kavanagh..... 3,568 0 0
Folton..... 3,583 0 0
Rigby..... 3,650 0 0
Hare..... 3,530 0 0
Nichols..... 3,525 18 0
Ball..... 3,400 0 0

For the erection of the church situate in the Holmes, Doncaster, from designs by Sir Edmund Beckett, Bart.—
Meadows Stockport..... £4,699 0 0
Barnby, Sheffield..... 4,640 0 0
Rodley & Sons, Sheffield..... 4,612 8 0
Wilson, Rufford..... 4,554 0 0
Harrison, Sheffield..... 4,312 0 0
Snell, Masbrough..... 4,170 0 0
Ropley, Rotherham..... 3,449 0 0
W. Andley, Doncaster..... 3,379 0 0
Wortley, Doncaster..... 3,184 5 0
Athron Bros. & Gill (accepted)..... 3,169 0 0

For the erection of a villa, for Mr. H. Taylor. Mr. F. T. Mercer, architect. Quantities supplied:—
Warton & Walker..... £1,189 0 0
Leighton..... 1,165 0 0
Foster..... 1,100 0 0
White..... 1,063 0 0
Harrison..... 1,049 0 0
George..... 675 0 0
Sharrett..... 925 0 0

For the erection of sheds in the parish yard, Richmond, Surrey. Mr. Walter Brooke, C.E., town surveyor:—
Contract No. 1.
Steers, Richmond..... £203 0 0
Carless & Co., Richmond..... 166 0 0
Sweet & Loder, Richmond (accepted)..... 137 17 0
Carman, Richmond..... 139 10 0

Contract No. 2.
Fireproof. Galvanised Roof.
Sweet & Loder, Richmond..... £37 0 0
Pierce (Carless & Co.), Richmond..... 37 0 0
Sims, Richmond..... 35 10 0

Contract No. 3.
E. Hawkins, Richmond..... £235 0 0
Collings & Son, Richmond..... 312 15 0
C. Eldridge, Richmond..... 285 0 0
T. Sims, Richmond..... 270 0 0
C. H. Pennington, Richmond..... 259 0 0
Sweet & Loder, Richmond..... 245 0 0
C. Maton, Kew..... 249 0 0
Carless & Co., Richmond (accepted)..... 243 0 0
* Accepted.

For alterations to the premises lately known as the Beckwith Brewery, situate in King-road, Reading, for Messrs. J. Salmon & Son, tea merchants. Messrs. Brown & Albury, architects:—

W. Woodroffe..... £1,757 0 0
T. H. Kinglerie..... 1,640 0 0
George Wernham..... 1,500 0 0
H. Higgs..... 1,477 0 0
J. Bottrell..... 1,450 0 0
George Storie..... 1,444 0 0
S. Denton (accepted)..... 1,333 0 0
Engineer's Work, Lift, Hot Water Service, and Machinery.
S. Deacon (accepted)..... £450 0 0

For new billiard-room at Balmore, Caversham, Oxon, for General Landrieux. Messrs. Brown & Albury, architects:—
Henry Higgs, Reading..... £216 0 0
W. Woodroffe, Reading..... 815 0 0
Geo. Wernham, Reading..... 783 0 0
A. W. Dodd, Caversham..... 623 10 0
* Accepted, subject to alterations, reducing amount to £757.

For alterations and additions to No. 1 School, Chigwell, Essex, for the Chigwell school Board. Mr. Edmund Egan, architect, Loughton. Quantities by the architect:—
R. & W. Foster..... £1,333 16 9
E. G. Walter..... 1,242 1 2
C. H. Stuart..... 1,146 13 4
W. Watson..... 1,141 13 0
G. F. Mansman..... 1,137 0 0
Scharon & Williams..... 1,089 0 0
Henry Wells..... 1,038 0 0
J. J. Robson (too late)..... 1,016 0 0
999 0 0
W. Knight..... 966 0 0
J. Baxter (too late)..... 939 0 0
John Ngan..... 939 0 0
S. Scott..... 82 2 0
C. Barne..... 813 0 0
George Parker (accepted)..... 949 0 0

For additions to Sunnymead House, Colchester, for Mr. Bart. Rous. Mr. Stark Wilkinson, architect, Farnival's Inn, London:—
A. Chambers..... £299 0 0
J. Malster..... 299 0 0
E. Eade..... 239 0 0
F. Dupont..... 215 0 0
C. H. Gidridge (accepted)..... 212 0 0

For proposed extension of the Jews' Infant School, Commercial-street, Whitechapel, E., for the Jews' Infant School Committee. Messrs. Davis & Emanuel, architects, No. 5, Vineyard-circus, City, E.C. Quantities supplied by Mr. P. F. Foster, 5, John-street, Adelphi, W.C.:—
Clark & Brosey..... £3,816 0 0
Colls & Sons..... 3,680 0 0
G. S. S. Williams & Sons..... 3,667 0 0
Mark Gentry..... 3,699 0 0
J. Grover..... 3,548 0 0
S. J. Jerrard..... 3,494 0 0
E. Condar..... 3,439 0 0
Lawrance & Sons..... 3,325 0 0
Harris & Wardrop (accepted)..... 3,303 0 0

For roads and sewers on portion of Southborough Park estate, Sutton. Mr. C. J. Bentley, surveyor:—
Chafen..... £2,600 0 0
Kavanagh..... 1,963 0 0
Hampford..... 1,910 0 0
Pellen..... 1,838 0 0
R. & G. Neal..... 1,833 0 0
Rigby..... 1,851 11 6
Nichols..... 1,577 0 0
Nowell & Co..... 1,621 0 0
Hare..... 1,577 0 0
Mayo..... 1,574 11 6
Felton..... 1,467 0 0
Ball..... 1,400 0 0

For the erection of new District Church, Windmill-hill, Redmister, Bristol, exclusive of the upper part of the Tower. Mr. C. Henry Edwards, architect, Bristol) and Weston-super-Mare —

Stephens & Bastow	£6,100 0 0
E. O. Howell & Sons	6,600 0 0
A. J. Beaven (accepted)	6,900 0 0

For cleaning and stacking all old bricks and clearing site of the late fire at the Gaiety Theatre, French-street, Southampton, for Messrs. Forder & Co. Mr. W. B. Hill, architect:—

Martin	£121 0 0
Rear	100 0 0
Cryok	73 19 0
Bull, Sons, & Co., Limited (accepted) ..	40 0 0

For making new roads and sewers on the Shelley Estate, Boscombe, Bournemouth, for the Boscombe Conservative Co-operative Land and Building Society, Limited. Mr. Reginald G. Pinder, M.S.A., surveyor to the Society:—

S. O. Lorne, Bristol	£716 7 4
J. Kingswell, Colbourne, L.W.	429 5 0
W. Sherwood, Bournemouth	6 6 7 6
E. G. Perkins & Co. (contractors) ..	6 0 0 0
Swauge (Surveyors)	597 5 0
W. H. Saunders, Bournemouth	575 9 6
G. Trolie, Bournemouth	575 9 6

(Surveyor's estimate, 11/6/84, 91.)
* Accepted.

For fitting up the new wing of the Infirmary, Cale-street, Chelsea, for warming and supply apparatus, for the Guardians of St. Luke's, Chelsea. Messrs. A. & C. Harston, architects, 15, Leadenhall street, E.C. Quantities not supplied:—

Amended Tenders.

Shidder & Co.	£575 0 0
G. W. Pratt	482 0 0
W. J. Fraser & Co.	375 0 0
May Bros.	447 0 0
Stride & Co.	430 0 0
H. Crane	427 0 0
Clements, Jankes & Co.	326 18 6
Bradford & Co.	422 0 0
Kinnell & Co.	361 0 0
J. Knight, Westminster (accepted) ..	267 0 0

For Aberystwyth Police station. Messrs. James Seward & Thomas, architects, Cardiff. Quantities by the architect:—

D. C. Jones, Gloucester	£1,650 0 0
T. Foster, Aberystwyth	1,610 0 0
P. Davis, Cardiff	1,481 0 0
J. Burgoyne, Blaenavon	1,410 0 0
H. Parfitt, Pontnewydd (accepted) ..	1,391 0 0

SPECIAL NOTICE—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 48, Catherine-street, W.C., not later than *four p.m.* on **THURSDAYS**.

TO CORRESPONDENTS.

E. C. R. - W. M. - G. S. A. - Baron H. de G. - E. - C. A. C. W. - W. H. - D. and J. - following respectively - E. C. L. - W. P. - O. - P. (banks) - E. B. - J. - T. C. S. (shall appear) - A. Mason (should send name as well as address) - H. H.

All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

NOTE—The responsibility of stored articles, and papers read at public meetings, tests, of course, with the authors.

We cannot undertake to return rejected communications. Letters or communications beyond mere news-items which have been duplicated for other journals, are NOT DESIRED.

All communications respecting 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.

Fest Bath Stone.
WESTWOOD GROUND,
Box Ground, Combe Down,
Corsham Down,
And Farleigh Down.
BANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts. [Adv.]

Dry Corsham Stone.
150,000 FEET CUBE.
PICTOR & SONS,
BOX, WILTS. [Adv.]

Doubling Freestone.
The stone from these quarries is known as the "Weather Beds," and is of a very fine-grained nature, and is quite the best of the most durable stones in England.

THE CHELYNCH STONE.
It is of the same crystalline nature as the "holyach Stone," but finer in texture, and more suitable for architectural work.

THE BRAMBLEDITCH STONE.
It is of the same crystalline nature as the "holyach Stone," but finer in texture, and more suitable for architectural work.

HAM HILL STONE.
Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to **CHARLES TRASK & SONS,** Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—Mr. E. WILLIAMS, 16, Craven-street, Strand, W.C. [Adv.]

Doubling Free Stone For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, Ilminster. [Adv.]

BLUE LIAS LIME (Ground or Lump), Ilminster. [Adv.]

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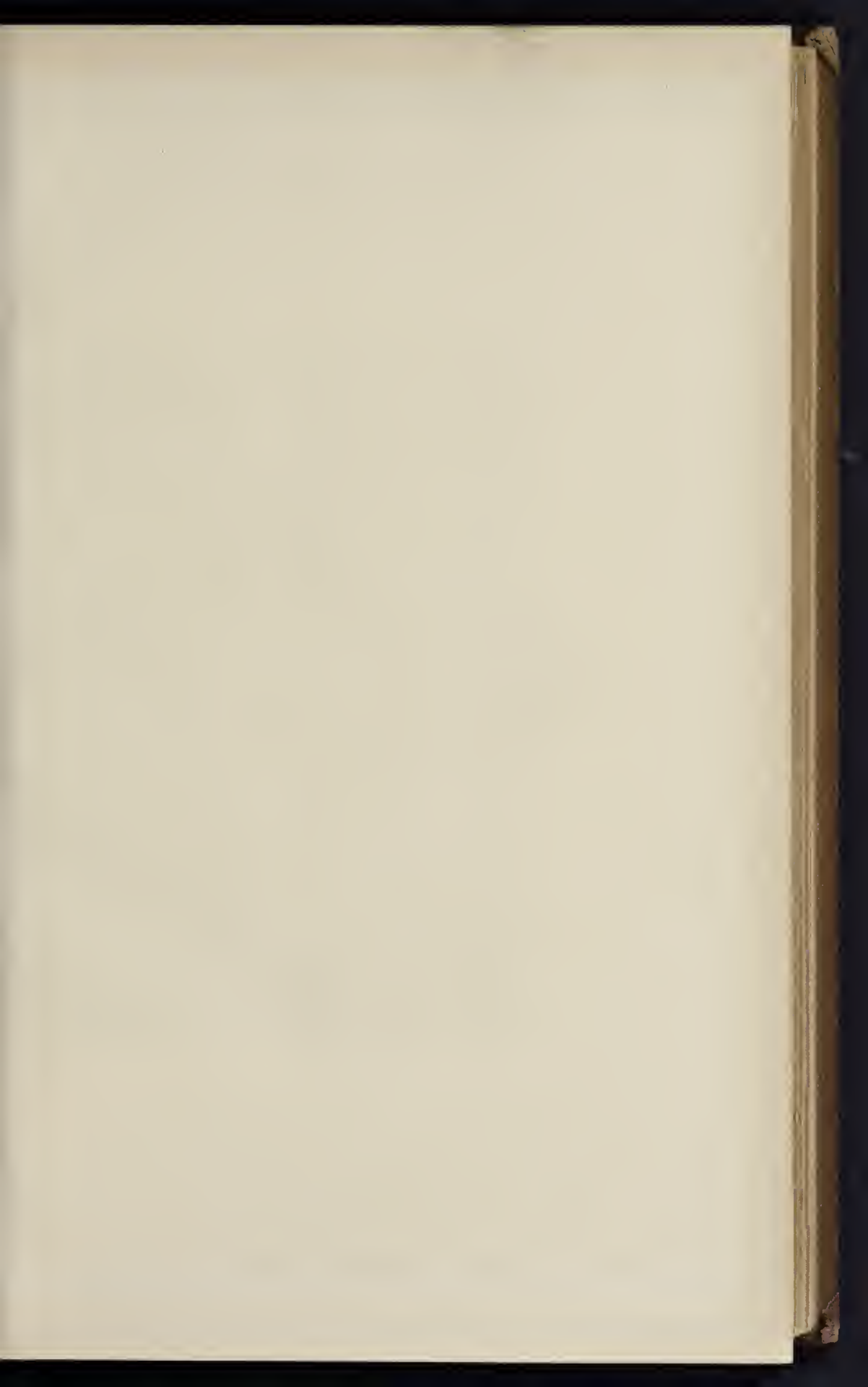
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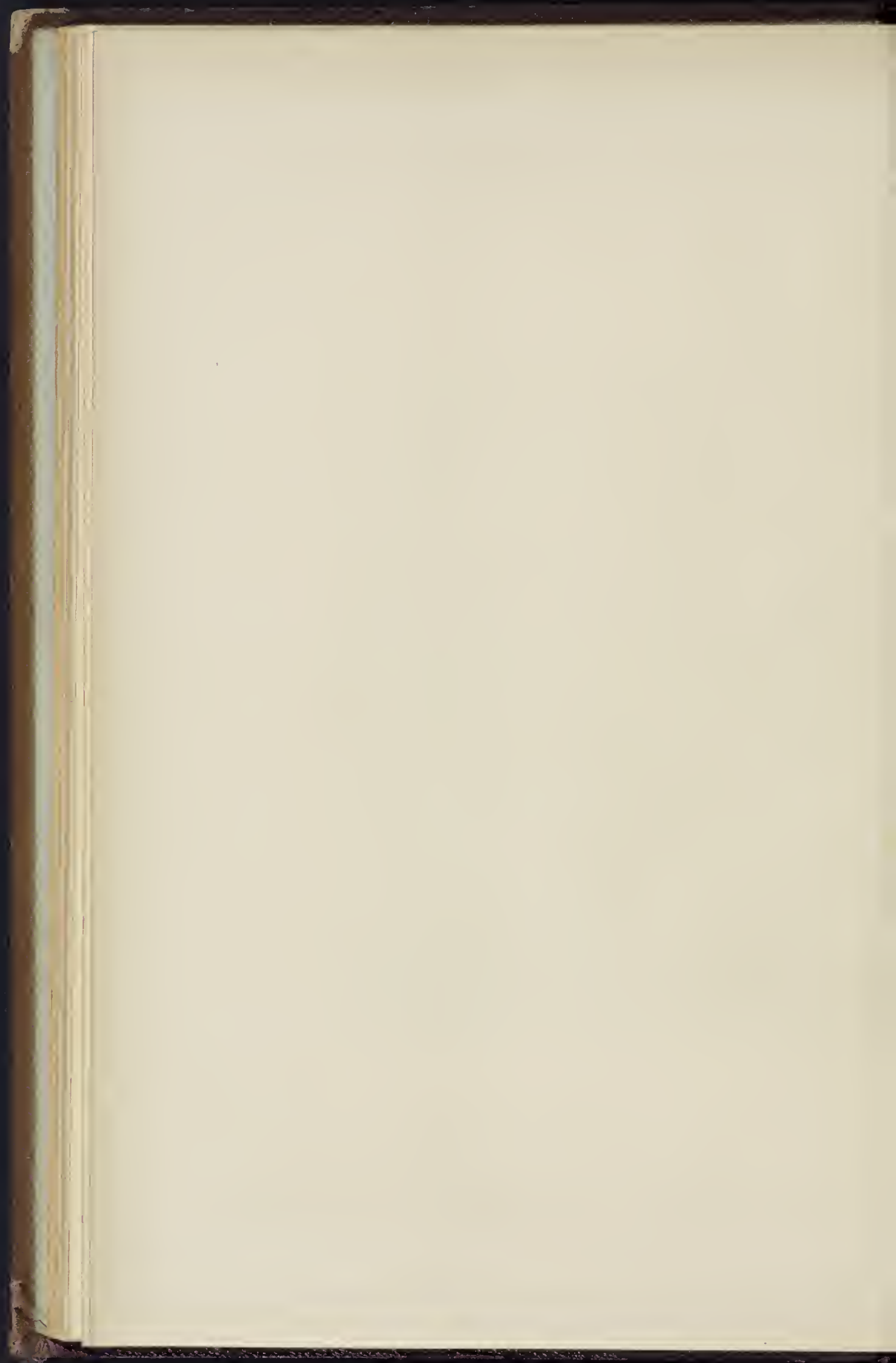


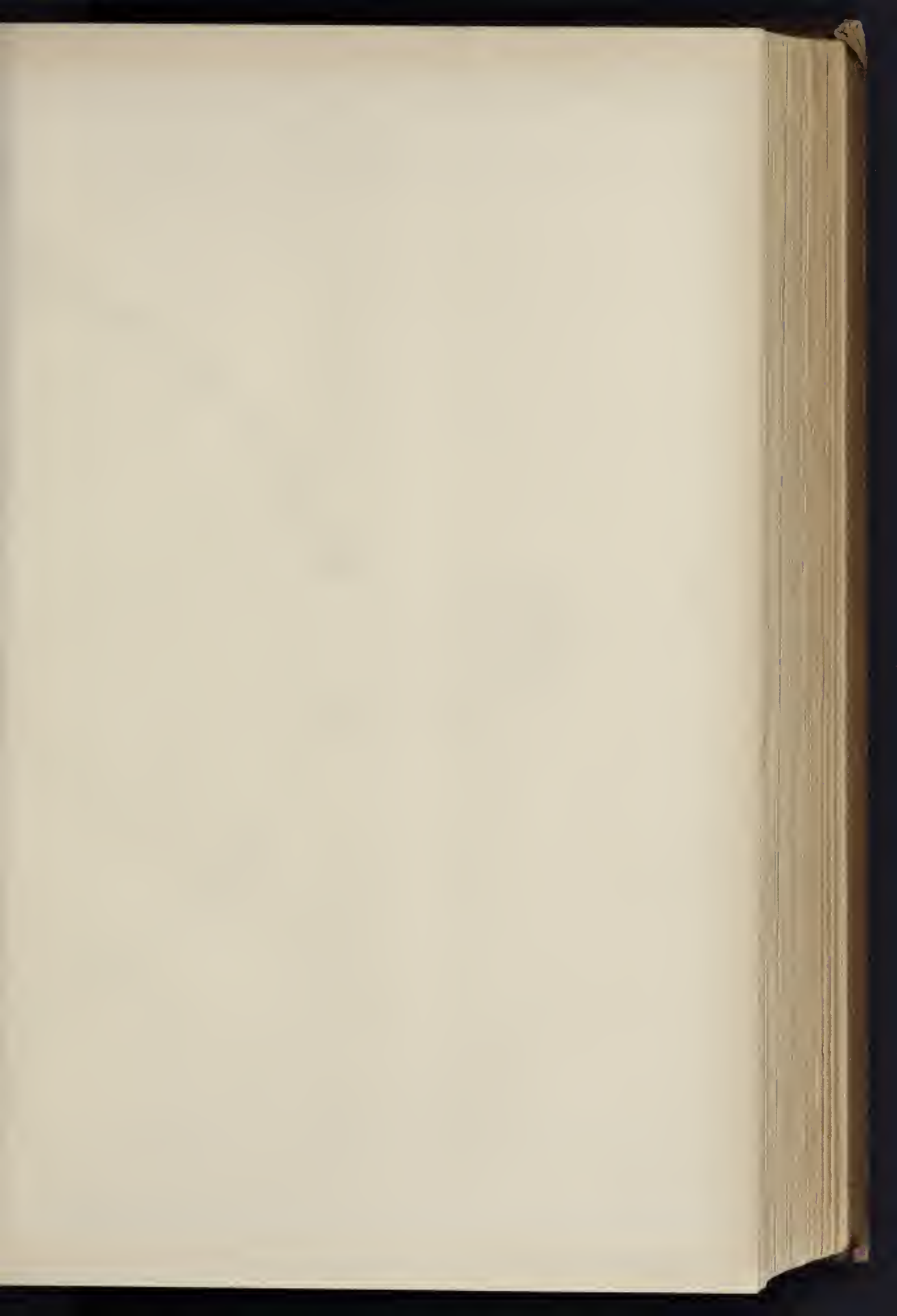
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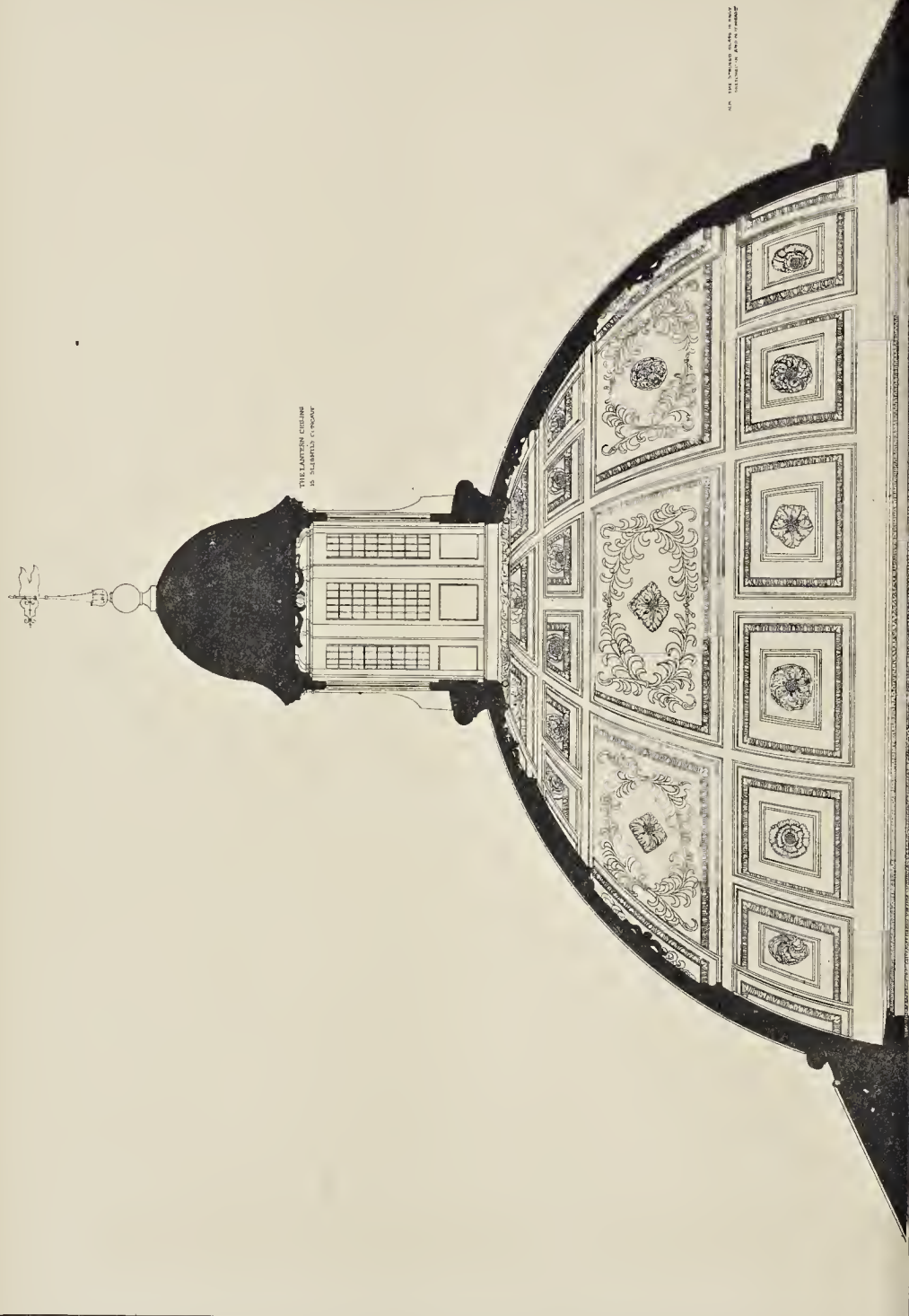


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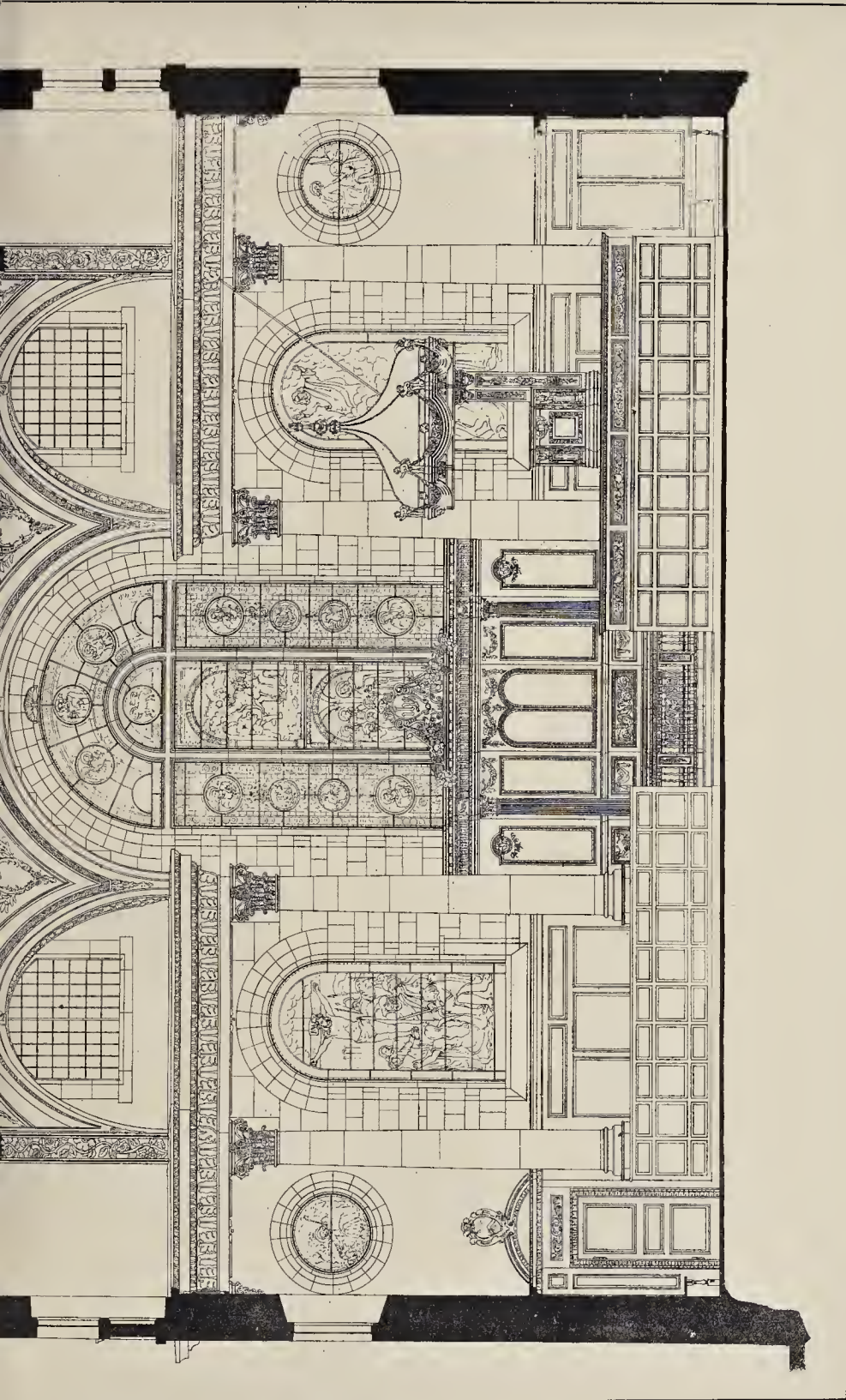


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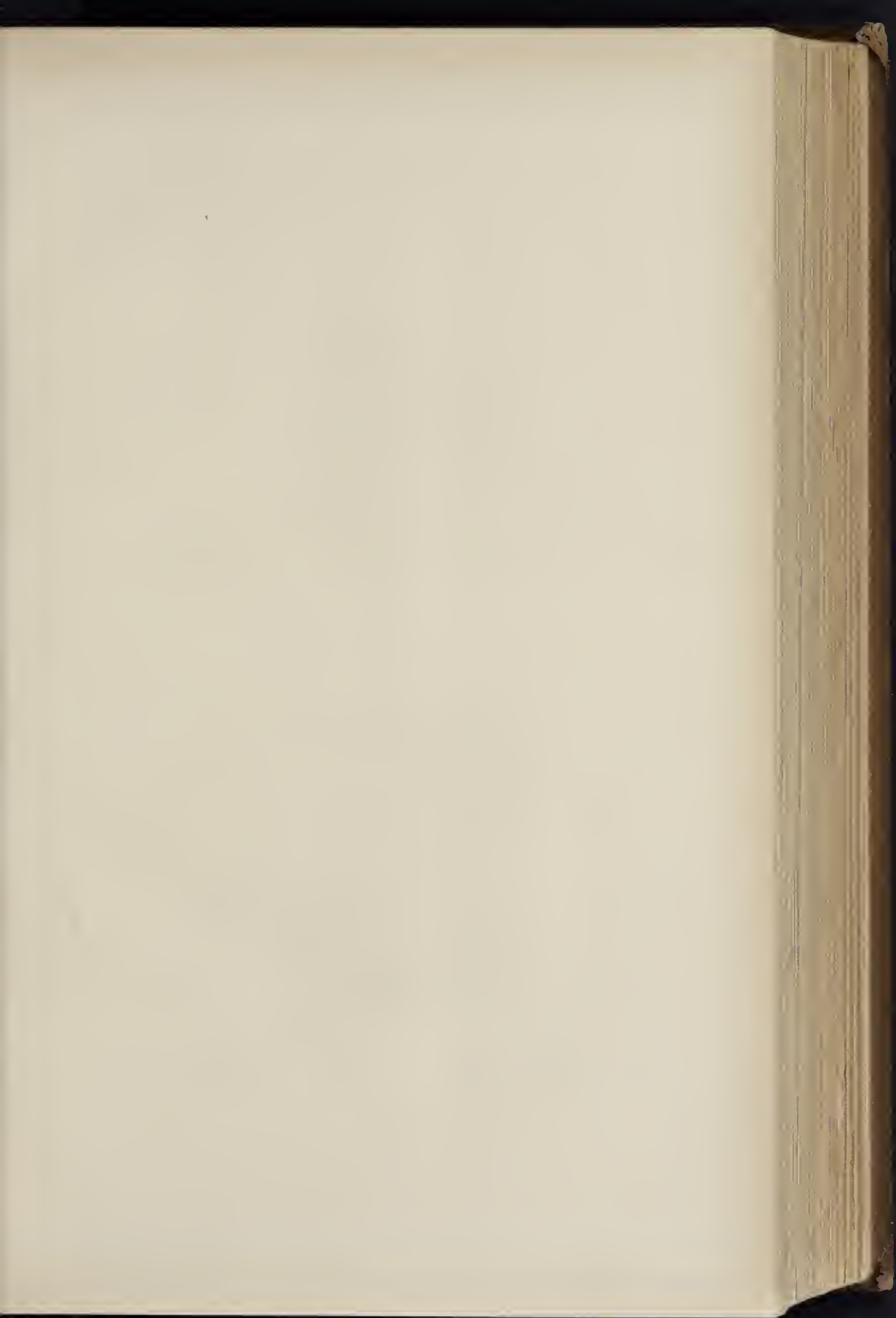


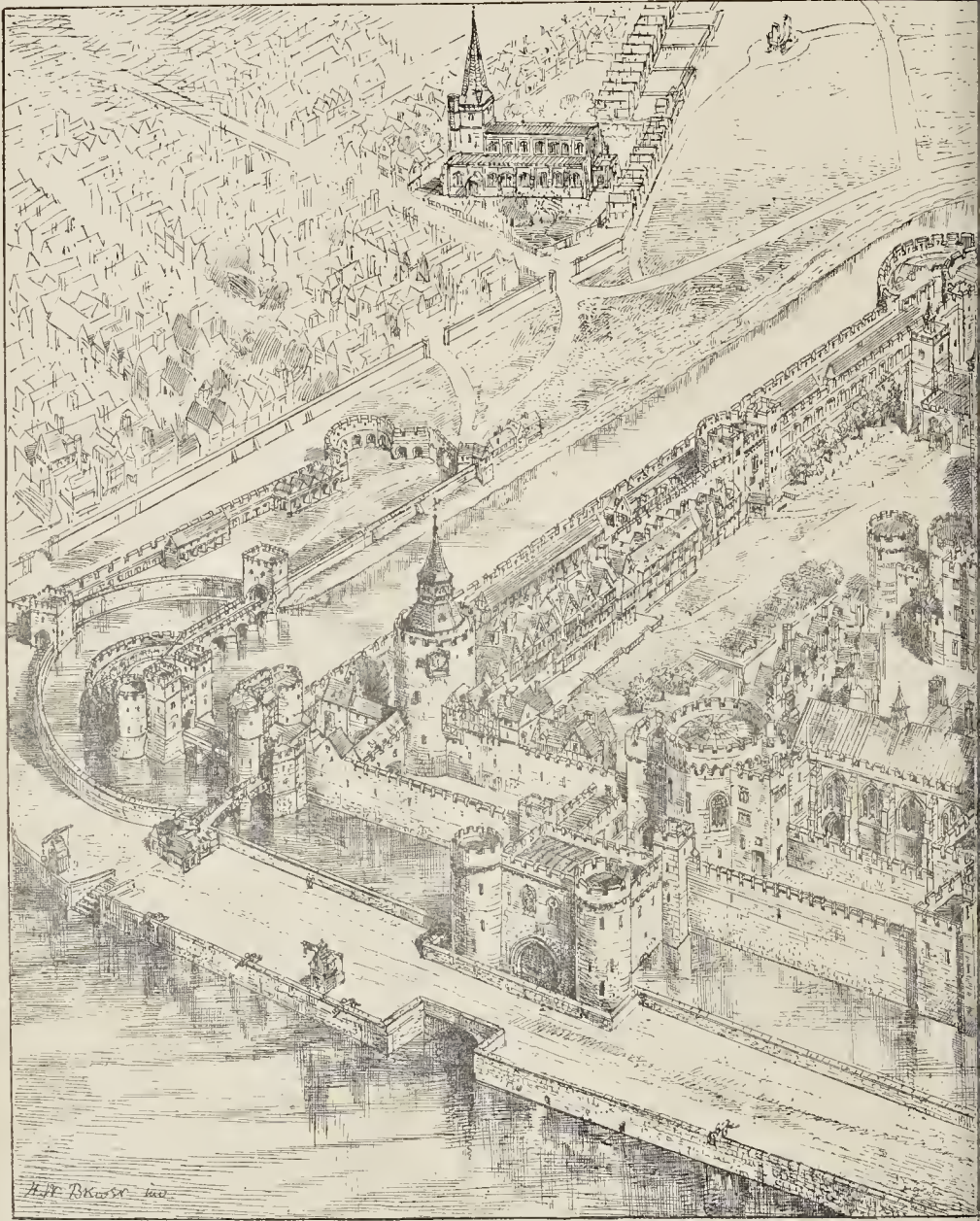
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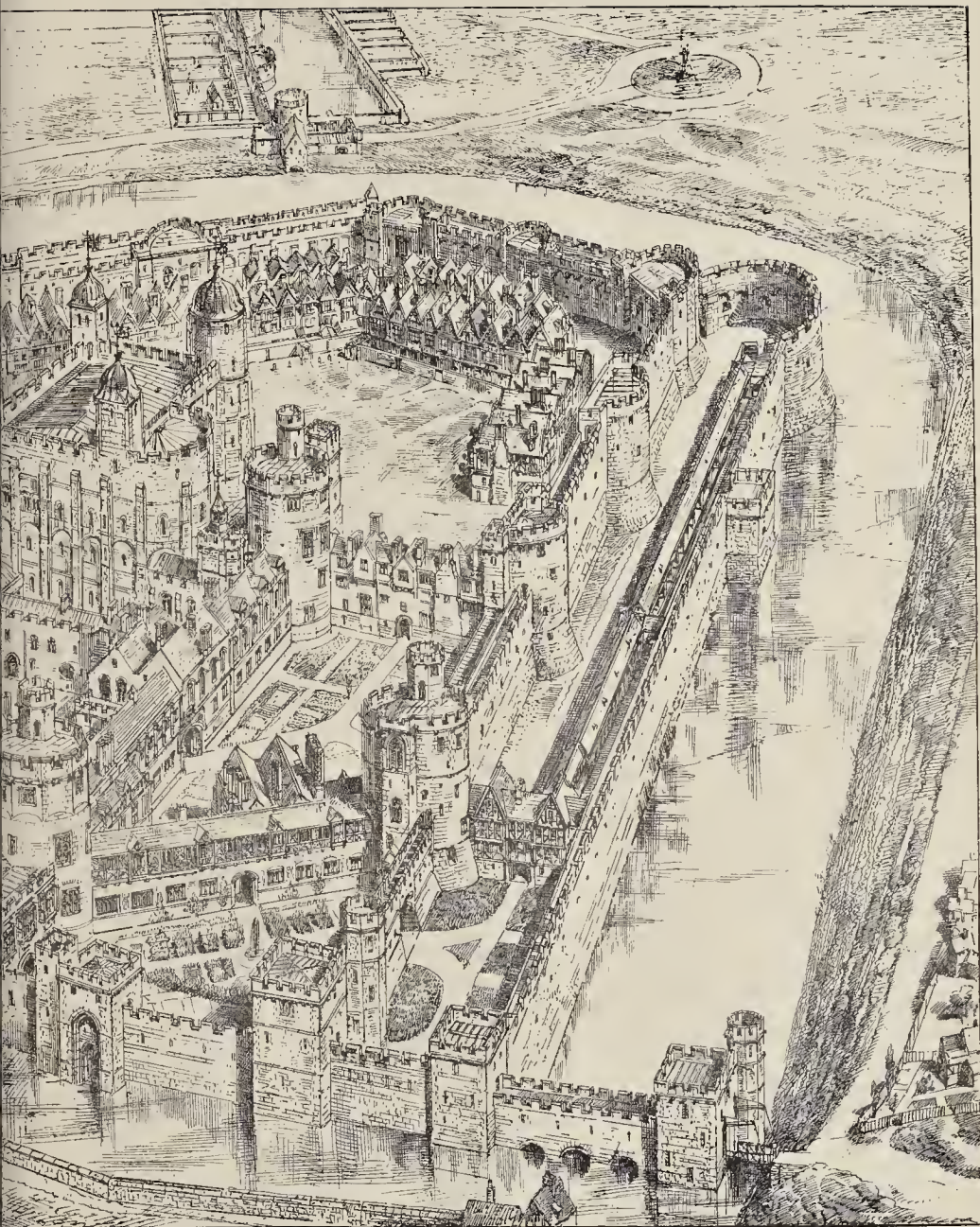
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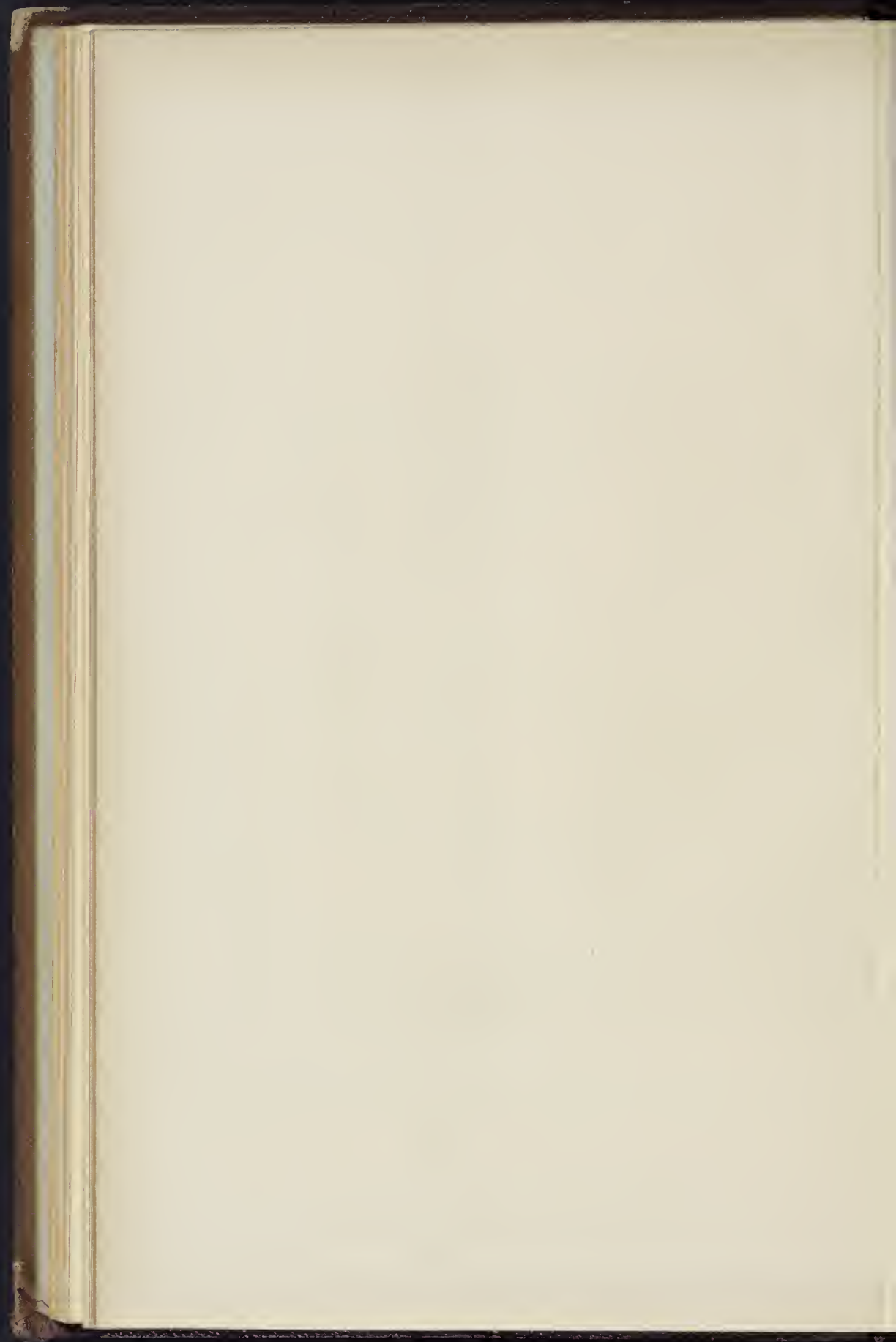
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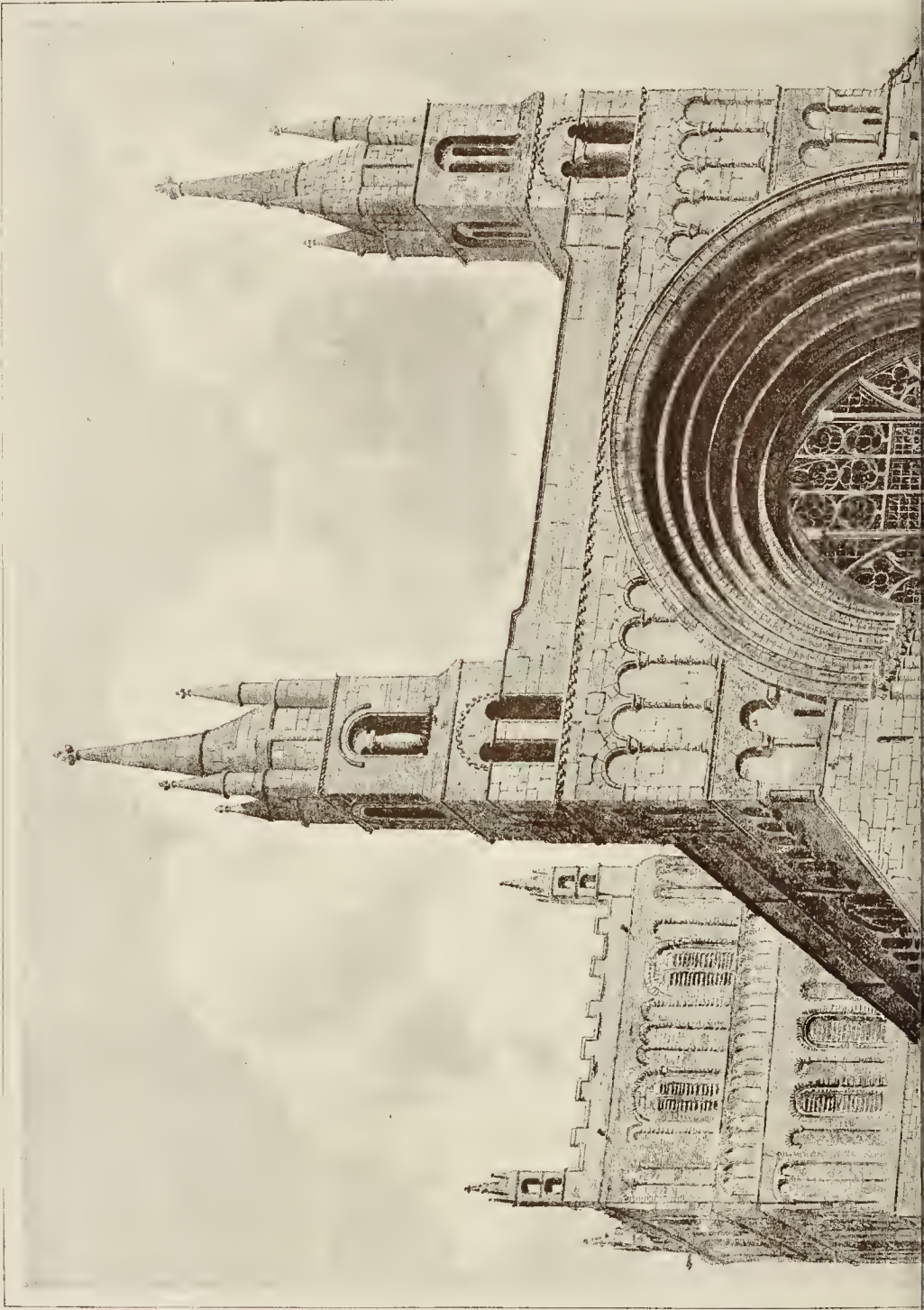
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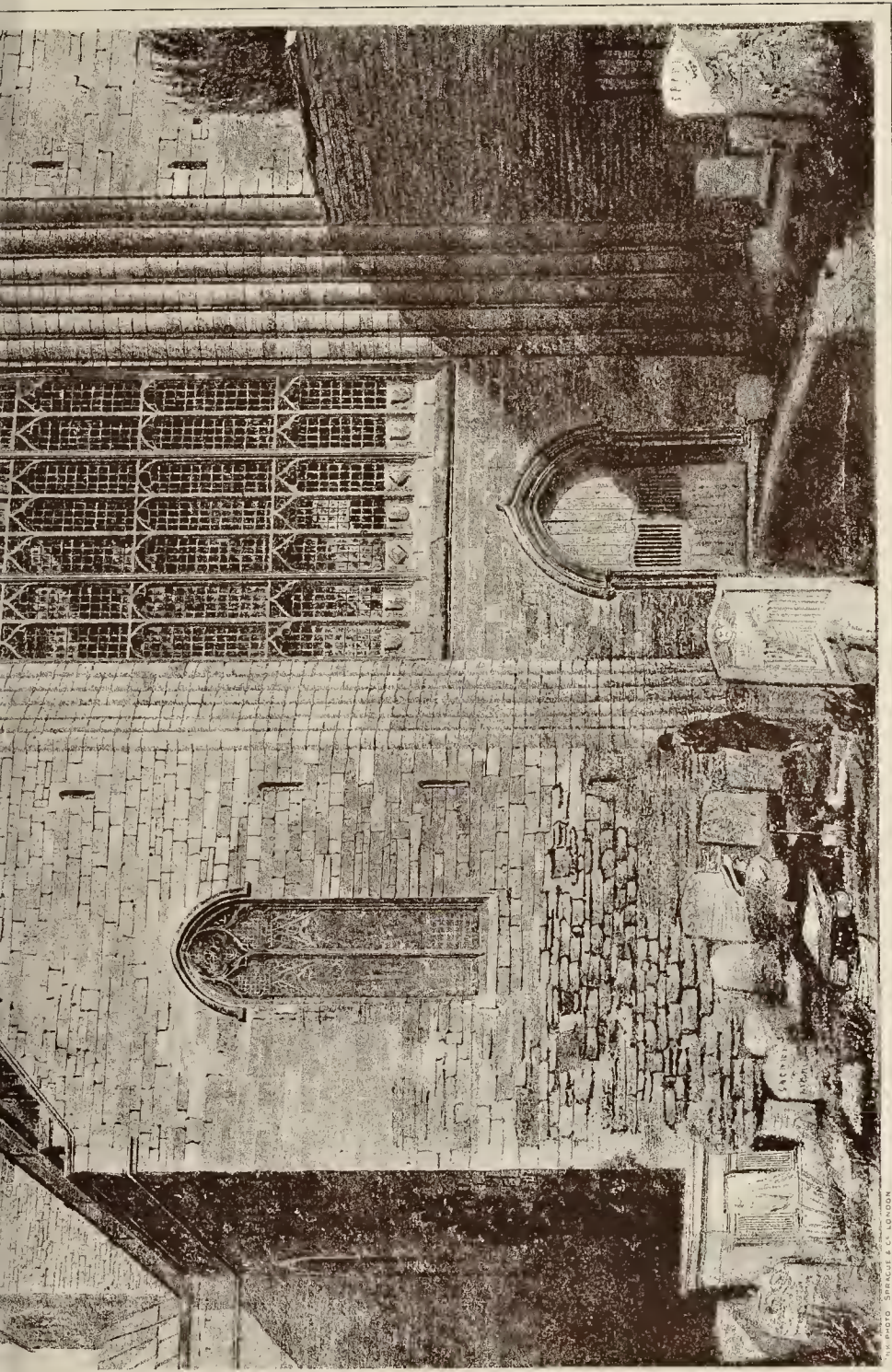
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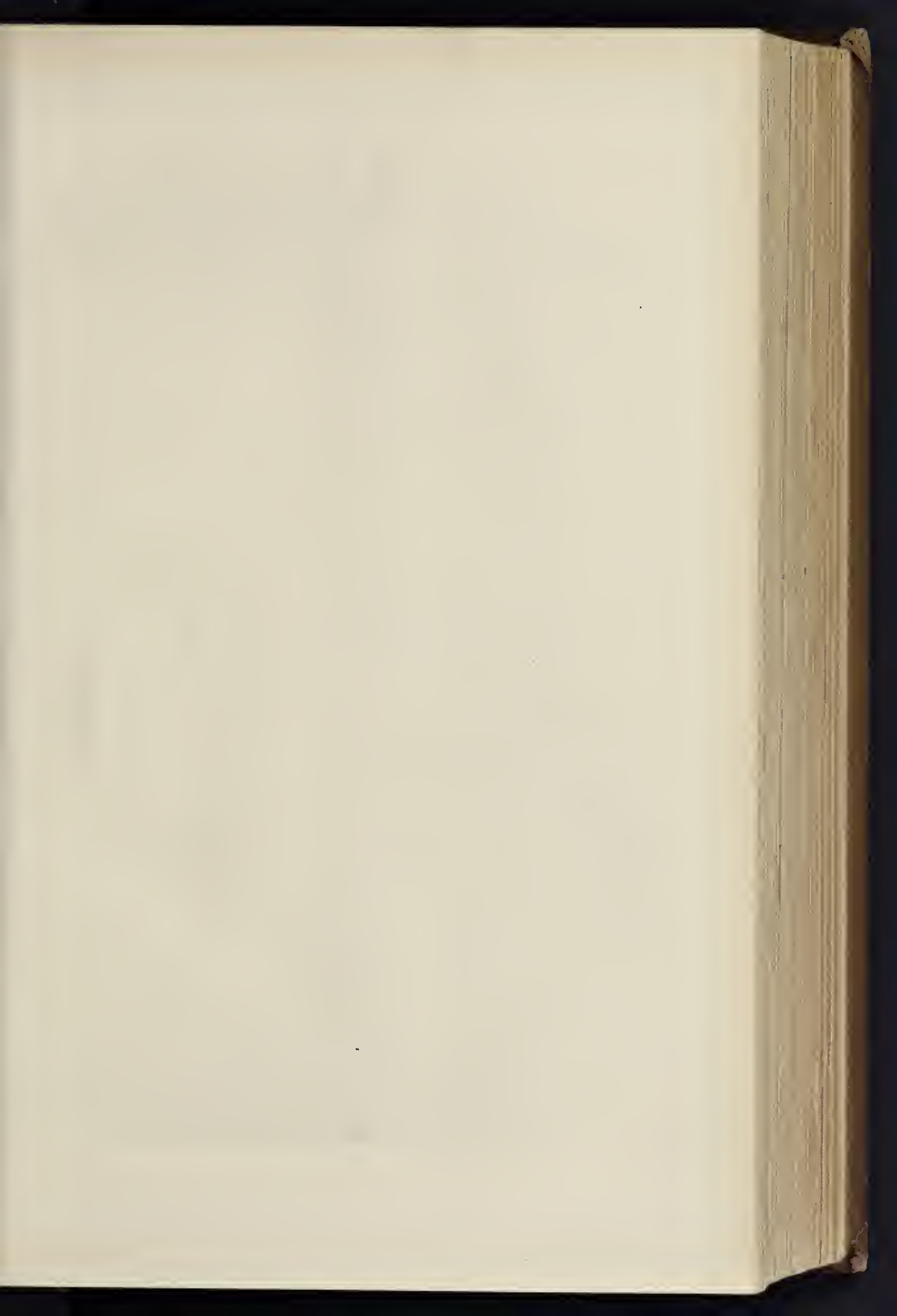
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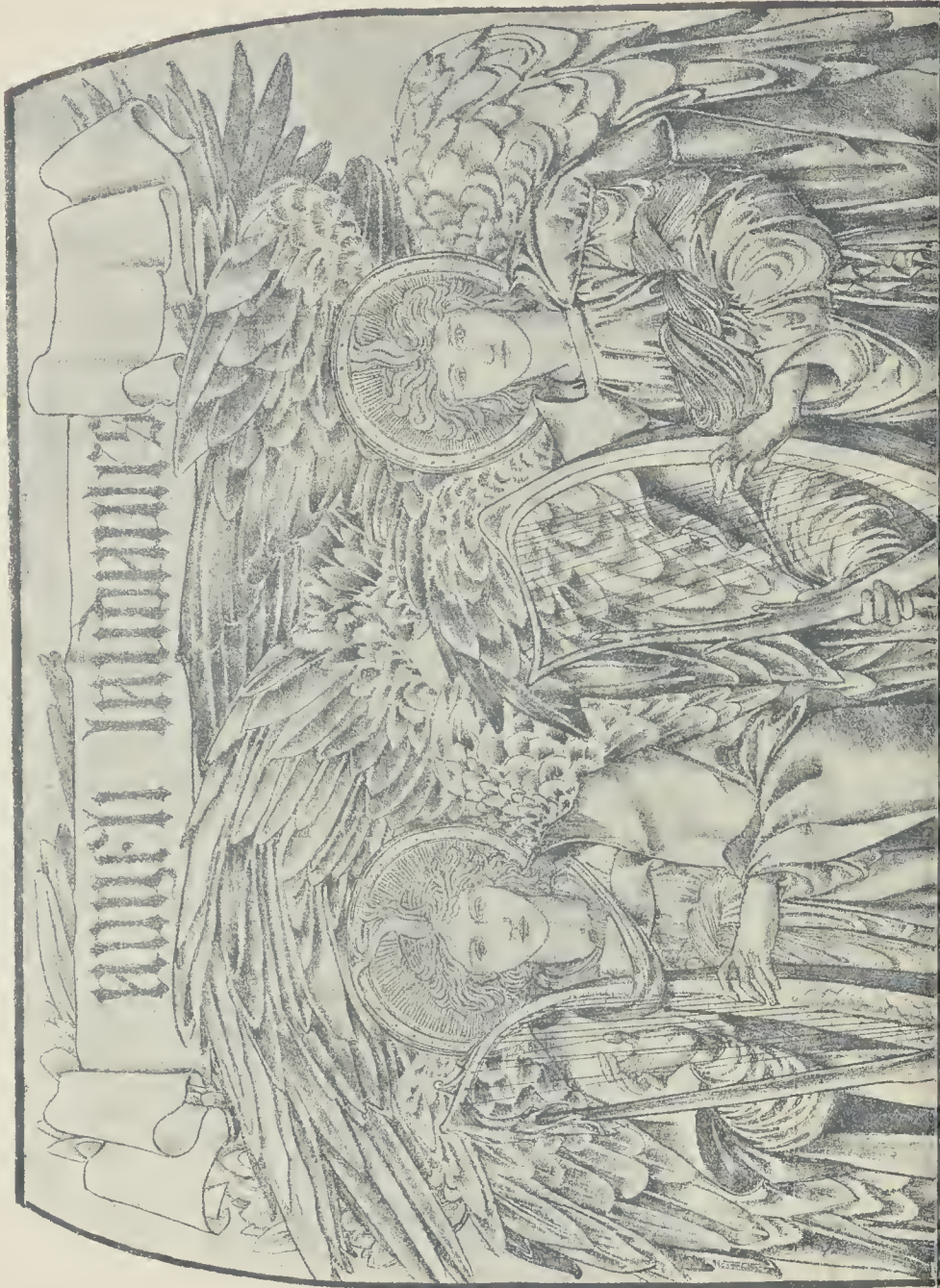


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Vol. XLVIII. No. 2188.

SATURDAY, JANUARY 10, 1888.

ILLUSTRATIONS.

The Annunciation.—Painted for the Church of "Our Lady," St. John's Wood, by Mr. N. H. J. Westlake, F.S.A.	68-69
Design for an Internal Staircase: Royal Academy First Prize.—By Mr. John Atwood Slater	72-73
Sketches in Tunis: Street and Doorway.—From Drawings by Mr. Alexander Graham	76, 77
Shops, Oldham.—Messrs. Mangnall & Littlewoods, Architects	80
Residence, Nottingham Park Estate, Nottingham.—Messrs. T. C. Hine & Son, Architects	81

CONTENTS.

Peterborough Cathedral Restoration	57	Shops, &c., Oldham	83	A Caution	8
Communications: By Lieut.-Gen. F. H. Rumball, C.S.I., R.E., &c.	58	House, Nottingham Park	83	Avenue of Boroughs	25
Inspector-General of Canals for the Government of India	59	Sketches in Tunis	83	Non-Conductors of Sound	86
Peterborough at the Grosvenor Gallery	60	Staple Inn	83	Church-Building News	85
Notes	61	Architectural Association	83	Stained Glass	96
Notes on Tunis	63	Ulster Reform Club, Belfast	84	The Student's Column: Lime, Cement, and their Uses.—II.	96
Projected Railways, Tramways, Docks, and other Public Works	64	Obituary	85	Recent Patents	97
Architectural Education and the Examination in Architecture	65	The Acton Drainage Scheme	85	Meetings	88
Decorative Paintings: "The Annunciation"	65	Royal Academy: List of Admissions	85	Kenilworth New Waterworks	88
Increase Design	63	Records of Changes in London	85	Miscellaneous	88

Peterborough Cathedral Restoration.



THE collision of various opposing minds in regard to the proper moral and architectural manner of carrying on the rebuilding at the crossing of Peterborough Cathedral has, like

the collision of opposing bodies in physics, generated heat, in sufficient degree to cause a boiling over, or, at least, a very pretty simmering, of which the outward and visible signs have manifested themselves during the last few years in the chullion of letters in that particular daily journal which a wise and merciful Providence has devised as a safety-valve for overcharged human vessels. Except religion itself, there seems to be no subject about which people are so ready to fall foul of each other as the treatment of religious buildings, and the series of letters which have appeared in the *Times* afford an odd exemplification of the apparently constitutional incapacity of restorers and anti-restorers to see two sides of the subject, or to believe that any one who differs from themselves can possibly have any sense or right on his side, or any claim to a hearing. The projected building of towers has been a cause of confusion of tongues from an early period of recorded human history; and the case of Peterborough seems to indicate that we have made little improvement in that respect since that mismanaged affair at Babel which led to the sudden stoppage of the contractor's operations.

The foundation of this quarrel was laid about seven centuries ago; or rather, to speak more exactly, the foundation was not laid, since that is "the very defect of the matter." Some little time ago we gave an illustration* of the extraordinary and scandalous construction of the Norman crossing-piers, mere skins of stone filled up with rubble, which, assisted by the want of any properly-prepared foundation, led to that failure of the tower which has rendered the present operations necessary. As early as the fourteenth century the results of this way of building had shown themselves. At that period the eastern and western arches of the crossing had to be rebuilt, and were of course rebuilt by the fourteenth-century builders in the style of their own time, as pointed arches, and with the mouldings that were in fashion at that period. The pointed arch originated in the practical effort to render the arch stronger at the crown, and no doubt

the adoption of this form rendered the task of the fourteenth-century repairers easier, but they would have adopted the form in any case: it would never have occurred to them that it was necessary to depart from their habit of building all arches pointed, in order to preserve the unity of design at the crossing. Of this more anon. At the same time the tower, having been partially taken down, was reinstated without the arcaded stage which formerly supervened over the great arches, and was proportionally lowered and lightened, from considerations of safety. Dean Kipling, at the beginning of the present century, made a well-intended effort to give more finish and outline to the tower by the four lean, lanky turrets which were such an eyesore to the beholder, and which, from any point of view in which they were prominent, gave an air of gimcrack to the whole centre portion of the building.* Two years ago ensued the hurried taking down of the tower, in the fear of an imminent catastrophe, and the revelation of that style of execution in the substructure which really rendered it matter for wonder how the tower had contrived to stand on its tottering legs for so long. The eastern piers alone were at first condemned, but further examination led to the condemnation of the western piers also. It was then considered the simplest matter to take down the whole tower; though, of course, modern engineering would have been equal to the support of the tower while the piers were rebuilt. Whether there was any architectural *arrière pensée* in this getting rid of the tower we cannot, of course, pretend to know. The accounts which got into the papers, directly or indirectly (for there has been a mysterious secrecy in the carrying on of the deliberations on the subject till this recent outbreak of letter writing), conveyed the impression that every stone was to be numbered and replaced as before. The numbering, we believe, has been duly carried out. However, the demolition was extended beyond what was at first thought necessary, and the contract was enlarged accordingly. The original contract provided simply for a restoration of the tower as it stood (all but Kipling's turrets), and the incongruity of two round and two pointed arches in close partnership was to be reproduced. But there were found, in the course of the demolition, carelessly stowed inside the fourteenth-century skin as mere packing, many of the moulded stones which had composed the two Norman

arches, and portions of the arcading condemned at the period of that old restoration. These discoveries formed the subject of much informal conversation between members of the Chapter and the Cathedral architect, Mr. J. L. Pearson. Mr. Pearson became most strongly of opinion that, in view of these discoveries, and on all accounts indeed, the opportunity should not be missed of restoring the twelfth-century design in its integrity. Accordingly, in August last, he submitted to the Chapter and the Restoration Committee a plan showing the tower restored on the four Norman arches, with the restored arcading stage inserted immediately above the arches, the lantern itself rising over this, and the whole surmounted by a lofty spire. By this time the work of rebuilding had so far progressed as to make it impossible to go a step further without being fully pledged to the one plan or the other, and accordingly operations ceased. At a meeting on September 24th, the Dean and Chapter considered Mr. Pearson's new plan. It was understood that in view of the scarcity of finances, and the amount of necessary repair work on other parts of the Minster, which work was still unestimated and uncontracted for, the Chapter could not adopt the architect's proposals. The Restoration Committee, on the other hand, met on October 13th, and after discussion, resolved to recommend the adoption of Mr. Pearson's views to the extent of restoring the two round Norman arches and the Norman arcading stage formerly resting on it; the lantern, as recently in position, to rise from the restored stage, and the architect's spire to be meanwhile held in abeyance. The Chapter met again on October 27th, and (the Dean dissenting) disallowed the above recommendation, formally contending that the still unestimated work, viz., "the underpinning of the transepts and repairs of the roofs, the restoration of the choir, and the securing and strengthening of the west front," was more urgent in character than any mere central tower amplification. The controversy thus took definite form: the Restoration Committee, with an important ally from the Chapter in the Dean himself, favouring the architect's views, while the Canons, who formed the bulk of the Chapter, adhered firmly to the rebuilding plan as originally settled and contracted for. Bishop Magee sided with the Canons (although on no footing of authority, not being a member of the Chapter), and so strongly as to threaten the withdrawal of his subscription to the restoration fund unless the existing contract were carried out unchanged. Hereupon ensued a general *émeute*.

The Chapter met again on the 10th of December, adhering more firmly than ever to

* *Builder*, May 17, 1884.

* We gave a drawing of the tower, by Mr. Brewer, in the *Builder* for January 27, 1883. Mr. Brewer, however, unconsciously improved the effect of the turrets a little, as compared with a recent photograph shown.

their former resolution, the Dean alone dissenting. The Restoration Committee met a few days subsequently, and reiterated its partiality for Mr. Pearson's proposals in a modified form. A further meeting of the Chapter was held on the 22nd of December, at which the canons agreed to the insertion of the single stage of the Norman arcading, provided the necessary funds be forthcoming; but still refusing consent to the substitution of Norman for Pointed arches. The Chapter is nominally the responsible body, but as the money has to come from the general public and through the Restoration Committee, the autonomy of the minister executive is more a matter of theory than practice, and hence the stoppage of building proceedings all these weeks, in direct opposition to the wishes of the Chapter.

The recent boiling over on the subject has been specially stirred up by Sir E. Beckett, who appears to have received a commission from the Dean of Peterborough to demolish the views of the Chapter. Here was an opportunity for abusing a number of respectable people and calling them "lunatics," and so forth, which was not to be let slip. In some former expression of ill-temper (it cannot be called opinion) Sir E. Beckett represented an architect, who had extended the restoring operations on a church, as a person who had been making a job for himself. We have no doubt he would have represented Mr. Pearson in the same light, had he been retained on the other side. As it is, he supports the architect for once, as there are more people to quarrel with on the other side. A few weeks back, in another letter in the *Times*, Sir E. Beckett referred with contempt to the doings of Scott as a restorer; but in the present letter he cites in favour of his views the evidence of "the very able clerk of works at Peterborough, who has restored cathedrals under Scott," and who has "discovered," according to Sir E. Beckett, that the "two intruding pointed arches were nothing but an *ex post facto* makeshift of the fourteenth-century builders." It needed neither the clerk of works nor Sir E. Beckett to tell us that. Without following out, however, Sir E. Beckett's ebullitions against everything and everybody who is opposed to his view at the moment, it is sufficient to say that he supports entirely the most extensive scheme, spire and all. To him follows Mr. Freeman, who hoists with equal pertinacity the "historic" standard, and objects to having any tampering with the Peterborough Cathedral which he has known all his life. Architecture is history to Mr. Freeman, history before anything else. Then comes Canon Davys, of St. Alban's, who is for rebuilding, not for restoration; but who being also, it appears, an amateur architect, has designs of his own, and accordingly calls Mr. Pearson's spires "monstrosities," a remark which is little less than impertinent as well as ill-mannered. The amateur doctors do not agree, however, for Canon Davys, though recommending an octagonal lantern, appears to have made a design for a spire on the top of the lantern, which Sir E. Beckett told him had the slight defect that it could not stand; and very likely Sir Edmund was right.

Into the morality of the question, whether the legal custodians of the cathedral have a right to use, for a new design, money which was subscribed for mere rebuilding of the numbered stones after strengthening the piers, we do not here enter, especially since satisfactory evidence is not forthcoming as to whether such an understanding really existed. Between the Canons and Sir E. Beckett the matter seems to be rather like the arguments of children,—"Did!" "Didn't!" and so on. They must settle that among their own collective consciences. But as to the case between what may be called the historical and the architectural view, the matter seems to stand thus. The tower which was recently taken down was a very poor concern; too low, because it had been deprived of its former arcade story against which the roofs should have abutted, in order to diminish the weight on the old weak piers. The belfry stage was accordingly crowded on the roof, which cuts across

the window lines. The turrets, which Mr. Freeman praises as good in outline,—a judgment which says little for his sense of architectural design,—we have no hesitation in saying were wretched affairs, and no architect in his senses would want to see them up again: like the child's doll, "for old sake's sake they are dear" to some people, and that is all that can be said for them. As they and their tower are down, we should hold that as a fortunate excuse for getting rid of them and doing something better. The question of the pointed arches is a more difficult one. They are not "good-for-nothing" arches, as Sir E. Beckett calls them; they represent good fourteenth-century building, and there are their moulded voussours lying ready to be put up again. We quite understand the feeling of many persons against leaving them "to spoil." The insertion of these arches was undoubtedly, as Mr. Freeman views it, an interesting piece of architectural history, and they should certainly not have been removed for merely architectural reasons. But the case is a good deal altered when they have actually been taken down; and here comes in the architectural side of the question. It has been urged that we have no right to interpolate our ideas of building, in the same way in which fourteenth-century architects interpolated theirs amid the works of their predecessors, because we have no characteristic nineteenth-century style. But we have one quality which the fourteenth-century builders had not, but which we imagine the Greek builders had, viz., the sense of artistic fitness and congruity of design. Architecture is not *only* history, *pace* Mr. Freeman; it is also art. From this point of view there is no doubt that when the fourteenth-century builders interpolated their work in the complete Norman design of the crossing; they committed what an American would call an "almighty blunder." They spoiled the architectural unity of the crossing; and, after turning the matter over every way, our conclusion is that we should regard the demolition of the whole centre of the Cathedral as an opportunity for correcting this blunder, and for restoring on the new sound and solidly founded piers the complete homogeneous design of the crossing, and let that be the contribution of this generation to the history of Peterborough. The rebuilding of the arcaded stage of the lantern, which would complete this part of the design, and which furnishes the intermediate or triforium stage against which the roof should abut externally, follows equally on the same grounds. It is doubtful if it could be logically urged, if the pointed arches were rebuilt. To rebuild them and then restore the Norman triforium (which seems now to be the compromise proposed), into which the pointed arches would cut, seems to us a foolish and irrational proceeding, good neither as history nor as architecture; a jumble of both in the attempt to make two ends meet which will not meet.

The rebuilding of the lantern stage should then be continued, using the old millions, window jambs, and tracery, &c., so far as they are complete for the purpose. Mr. Pearson's new tower and spire design, we believe, does not allow of this, this stage having been modified so far as to render a new spacing of the windows necessary. On the face of it this appears to us to be unnecessary and undesirable. As to what should be further done with the central feature of the cathedral is another difficult question. Mr. Freeman's argument, that the great west front is really the predominant feature of the building,—that it is the Greek portico translated into Gothic (a perfectly rational and comprehensible way of putting it, which Sir E. Beckett does not seem to understand),—appears to us to be sound in so far as this, that a lofty spire,—and it must be a very lofty one to be an adequate centre to Peterborough Cathedral,—would be out of keeping with the grave and severe lines of the building generally. Mr. T. G. Jackson, who contributes a note to the discussion, goes further and says he does not know or care whether the new design would be an improve-

ment or not. If it made the cathedral doubly beautiful, he says, it ought not to be done (or historical grounds). Is this the way for an architect to write? But our feeling is that a square central tower, with, perhaps, an octagonal lantern, would harmonise best with the cathedral. We utterly repudiate the argument that a superior central feature would injure the effect of the west front, or that because the cathedral has an exceptionally grand west front, it should have no central feature. That appears to us to be little short of nonsense. But we doubt whether a spire would add anything to the cathedral worth its cost, and whether it would not even detract from it. But there is a more practical reason for leaving the spire at present in abeyance. There are more important things to be thought of. It is probable that the west front itself is in a precarious condition. The examination and strengthening of that should be the next business, and the next thing for which subscriptions are asked. In the meantime, the building of the Norman arches and the arcade story should be proceeded with; and the committee would, perhaps, do wisely to ask Mr. Pearson for a design for completing the tower with the lantern stage and new angle turrets only, and another for superimposing an octagonal lantern without a spire. We imagine general opinion would be in favour of the latter. But it ought, of course, to be decided on before the lantern stage is rebuilt, as the style of final completion would undoubtedly affect the treatment of the lantern stage.

The Restoration Committee, we may add, would probably receive more support, pecuniary and otherwise, and perhaps receive more suggestions that would be worth considering if, in what is really a work of national interest, they took the public more into their confidence, instead of leaving the matter to be fought out according to the prejudices of opposing cliques and the *animus* of lawyers, clergymen, and other *dilettanti*.

COMMUNICATIONS.

BY LIEUT.-GEN. F. H. RUNDALL, C.S.I., R.E.,
LATE INSPECTOR-GENERAL OF CANALS
FOR THE GOVERNMENT OF INDIA.



NE of the first symptoms of an un-civilised country emerging from a state of barbarism is an attempt to open out lines of communication first within its own borders, and then with its neighbours, and just in proportion as its civilisation progresses, so does the desire grow for increased facilities of intercourse with the rest of the world, cause and effect thus reacting one on the other till it becomes difficult to discriminate between them. That which distinguished the invasions of the Roman Empire from the incursions of those barbaric hordes from the East, which over-ran the greater part of Europe in the fifth century, was, that wherever Rome carried her conquering legions she left behind at least one unmistakable trace of civilisation in the shape of magnificent roads, whereas the tracks of Attila and his Huns were marked only by devastation and ruin. That, in Europe, at all events, the Romans were pre-eminently the constructor of communications is attested by the excellent preservation in which the remains of many of their roads in various countries have been found. In China, which is said to have enjoyed a high degree of civilisation centuries before the Western nations emerged from barbarism, there existed a ramification of internal lines in the shape of navigable rivers and canals, the geographical features of the country in its case determining the character of the communications. In India the Mahomedan conquerors signalled their rule by the construction of both land and water ways, but in America the pioneers of civilisation found but few traces of any artificially-made lines, though the magnificent series of navigable rivers and lakes were speedily made use of and constitute to the present day, notwithstanding the extensive network of railways, the chief routes and means of transport for the produce of the countries which they respectively drain.

The object of this paper being to draw attention to the important subject of communications general, rather than to technical details of construction, I purpose to refer principally to their fiscal and political aspects, and to the principles which ought to govern the development of communications in countries in proportion to their different degrees of civilisation. There is perhaps, no subject on which greater misconceptions exist, and greater mistakes are made, than that of designing internal communications, the chief misapprehension being one that is continually recurring, viz., that traffic makes the communication, whereas it is perfectly certain, and is being continually demonstrated, that the exact opposite is the case, and that the traffic follows the communications. A curious instance of the inability of men, even in high positions, to appreciate this fact occurred in years gone by in one of the districts in South India, where the chief English official, on being directed by the Government to forward a list of the roads which were needed in the province under his control, replied that it would be a mere waste of money to incur any outlay on roads, for that one at all were wanted was evidenced by the fact that there was not a cart in his district to go upon them! But another instance, though in an opposite direction, is to be found nearer home, in the petition made less than 150 years ago to Parliament by some of the counties in the neighbourhood of London, to the effect that the turnpike-roads might not be extended into the remote counties for fear that the produce raised by the cheaper labour in the latter might undersell their own in the London markets!

Obviously, however, there exists a necessity for the exercise of discretion in the first election and construction, as well as in the after-development, of lines of communication. The first consideration should be the existing circumstances of the locality to be served, its poverty or its wealth, the scantiness or the redundancy of its population, as well as of their respective industries, the nature of its resources,—agricultural or mineral,—the chief object to be obtained, political or commercial, or both, and the general geographical position and features of the country, the proportional extent to which they must govern the character of the communications, such as proximity or remoteness from the coast, and the relative distances which produce would have to be carried for shipment.

It is clear why, in the first place, the wealth or otherwise of a country must determine the kind of communication to be provided; for a poor country would not be able to stand the capital outlay attendant on costly works, and the high rate of charges which must necessarily be levied in order to meet the interest and working expenses; and if, in addition, its population be scanty, there will be still less ability to meet a high rate. It is evident, also, how the main products must govern, in a great measure, the transit arrangements; for what would be suitable for light and valuable raw products would be wholly the reverse for bulky articles of small value; while a mineral district would require entirely different provision from a purely agricultural tract. But one element which bears more or less essentially on every description of goods to be carried is that of distance: for where, as in the case of America and India, the distances are very great, even a moderate charge is sufficient to make the difference between the ability of delivering goods with an available margin for profit, or of preventing their being moved at all. Indeed, there is a certain low class of goods which at present is rarely moved at all, except along very short distances, owing to the cost of transport not being sufficiently low; but were it capable of being reduced to little more than a nominal rate the enormous quantities that would be set in motion would require such extensive provision for their carriage that, great as the traffic in many countries already is, it would exceed our present ideas as much as the existing traffic in the closing years of this century exceeds what it was at its beginning.

When, however, a nation has to provide for its political necessities as well as for its com-

mercial interests, a new factor is introduced which must override all others; and the element of economy, indispensable for its commercial aspects, must then give way to the higher interests of imperial safety, otherwise a neglect to secure the latter may tend to the destruction of the entire resources of the kingdom's wealth, and consequently disable it to offer a successful resistance to the aggression of its foes.

The means of internal transit at present existing may be briefly stated as the River, the Road, and the Rail; but that great encircling international highway, the Ocean, which enables all the countries in the world to carry on a friendly interchange of commercial requirements must ever remain the principal and the most efficient, because the cheapest means of communication. Whether, as science advances, the air may be laid under contribution to meet the locomotive convenience or necessities of mankind, it is at present useless to speculate. It will be sufficient for present purposes to make the most of the means at disposal, and it is to the interest, not only of England, but of every nation, to see that there is not a misapplication of those means, but that they are in every instance adapted respectively to the end desired to be gained,—an end which should not be allowed to fall short of effecting the greatest good to the greatest number of the people directly interested.

A review of the several extensions and improvements in communications which have been made during the current century in the four quarters of the globe would far exceed the limits of this paper, and therefore it will be possible only to glance at a few of the more prominent instances. First of all, the wonderful stride which has been made in ocean navigation would be scarcely credible were it not presented to us so tangibly. The venture some commander of the first cockle-shell that put to sea, whose hardihood has been immortalised by Horace, would scarcely trust his senses could he be suddenly recalled to life and placed on the deck of one of our armoured war-ships; much less would he have believed any prophet who could have foretold the dimensions of some of our mercantile fleet which now ply to east and west and north and south of the inhabited world. Half a century has scarcely passed since the possibility of steaming across the Atlantic was stigmatised as a dream by some of our men of science, but now the advancement of the age will not be satisfied until the voyage from Liverpool to New York is performed within the week. The great Ocean Highway remains the same that it ever was and ever will be. It is merely the means of traversing it that have been improved, and the remarkable part of the improvement is, that in spite of the law that increased speed entails more than a proportional increase of cost, the actual charges both for passengers and goods have been reduced in an inverse ratio to the increase in speed. Science has taught us how, while we enlarge the carrying capacity of vessels we can simultaneously reduce their resistance, the limits of which, moreover, have not even yet been reached, for it is a comparatively recent discovery which has shown us that by far the greater part of a vessel's resistance is due not to the midship section but to surface, or, as it is termed, "skin friction." Year by year some improvement is being made in steam machinery by which the consumption of fuel is diminished, while the application of the calorific engine to sundry purposes, and of compressed air to the propulsion of vehicles, not to mention the daily discoveries in electricity, indicate the possibility of a complete revolution in motive powers in the not very distant future. Every shilling expended in the improvement of Ocean transit is a shilling gained, inasmuch as it is infallibly accompanied by a reduction in cost and charges, and is, therefore, a benefit conferred, not only on the shareholders of Steam Companies only, but on every inhabitant of the world, inasmuch as whatever tends to lower the cost of transport, cheapens the price of every article carried to the consumer without at the same time lessening the profit of the manufacturer or producer.

Competition must and will always regulate freights. Combination such as has been effected in the railway companies, can never take place in ocean navigation, and thus the public are safeguarded from ever being left at the mercy of a great carrying monopoly. As the great carrier of the world, England has an especial interest in the improvement of Ocean transit, with regard to which she has most markedly performed her duty, having had the chief share in originating and perfecting the improvements as yet effected therein. She has thus not only added to the wealth of her own children, but has been the means of conferring inestimable boons on the rest of the civilised world. The question naturally suggests itself at the present time, will she continue to lead the van on that great highway, of which, up till now, she has been permitted to retain the command? The rest of the maritime nations, if report be true, are making rapid strides to come up with her, if they have not already overtaken her so far as war-ships are concerned; but with the great reserve of power in her as yet unrivalled mercantile fleet, many of the finest vessels in which have been specially built with a view of being utilised as armed cruisers, and with the old naval spirit reanimating her sons, there need be little fear, if sufficient war vessels are provided, but that she will continue to retain the supremacy on the great line of sea-communication.

Passing on now from the ocean to the land, from steam propulsion on water to steam traction on the rail, we arrive at the most important and the most extraordinary development of communications in the world's history. The encircling the globe with iron roads has attracted greater attention and more of the world's admiration than the progress which has been made in ocean navigation; probably because railways have been brought under the individual cognizance and personal experience of so much larger a proportion of the world's inhabitants, but in reality the actual facts accomplished, if measured by the results, are really not more, if so wonderful, as those attained by a single ocean steamer which traverses far greater distances than any individual line of railway yet constructed. Nevertheless the first discovery and the subsequent growth of the railway system is deservedly classed as the wonder of the age. The total revolution which it has created in the locomotive habits of mankind, and the desire which it has first implanted and then gratified for a continual running to and fro of the inhabitants of every country in which railways have been constructed, has far exceeded the most sanguine anticipations that could ever have been formed. The enormous reduction in the cost of internal transport of goods and in the conveyance of passengers of which it has effected over the old methods of locomotion naturally led the world to consider that the limit of economy had at length been reached, and to sit down contented with the result which had been achieved, while all classes of the community, producers, carriers, and consumers congratulated each other on the prosperity which they were one and all to reap without the least interference with each other's individual interests.

Experience, however, has begun to demonstrate that there is a limit, and a very sensible limit, to the reduction in the cost of carriage by railways; that there are not the same possibilities for reducing the rates as in ocean transit; that increase of speed in their case necessitates increased charges to meet the additional outlay; while the essential difference in capital cost for the item of permanent way alone presents an insuperable obstacle to a diminution of charges, and the wear and tear to which it is exposed, rendering obligatory a large outlay for its efficient maintenance, is so directly proportioned to the increase in traffic as to effectually prevent any material reduction in working expenses. Hence, with a minimum mileage rate, below which it is impossible to carry except at a loss, the element of distance materially affects the practicability of carrying articles of low value; for it is obvious that when the expense of moving a ton of goods such as cotton worth 50L., and a ton of

road material worth 5s., is the same, as long as they must both travel at the same speed, the distance to which the latter can be conveyed at even the minimum rate must be very limited. Hence railway carriage cannot be applicable under all circumstances, more especially in those countries, or those localities in the same country, where a cheaper mode of conveyance is possible and practicable. The aphorism, that "the iron horse is the pioneer of civilisation," has been and is still so often repeated that it has come to be considered as an indisputable axiom; but, nevertheless, it is misleading, and it would be more accurate to say that "the iron horse is the rear-guard of civilisation"; for railways are a product of highly-civilised communities, and the outcome of advanced scientific refinements. Before, therefore, determining on the introduction of railways as the best means of communication in new or only partially civilised States, there are, it will be seen, a number of points to be carefully considered, and, amongst others, that of the existing modes of conveyance, their suitability to prevailing circumstances and surroundings, and their possible improvement.

These considerations lead to the subject of water-carriage in those countries which are furnished with navigable rivers. Where such magnificent arterial highways exist as in the great continents of America, India, China, and Africa, and even in some parts of Europe, it will be found that they still convey the bulk of the traffic, especially that class of goods that can only bear transportation at the lowest possible rates; for, since the perfecting of the various modes of carriage has brought all parts of the globe into close intercommunication, the value, both intrinsic and relative, of every article of consumption has become so much equalised as to leave but a very small margin of profit to the producer and manufacturer; so much so, that the trifling extra charge for conveyance over long distances is now sufficient to turn the scale. A notable instance in point is the article of wheat, which is now almost entirely kept in the hands of the Americans, because the rate of internal transport in India is still too high to admit of its carriage over the long distance between the place of its production and the ports of shipment. Undoubtedly the railways have enormously reduced the cost of carriage below that which formerly obtained, and, when fairly high prices rule in the London market, render the sale of Indian wheat possible; but it is beyond dispute that had one-tenth part of the 143 millions expended on them been devoted to connecting and perfecting the existing water lines between the interior and the ports, so as to have rendered them available as first-class

Navigations, the cost of carriage could have been reduced to a level with the American markets being supplied with Indian wheat, and so ensured the circulation of our capital amongst, and not away, as at present, from our own possessions, besides preserving the enormous additional advantage of independence of foreign countries in a time of war. For this calling out capital for railway extension in India, to the prejudice and exclusion of water-carriage, is, in the opinion of many who are well qualified to judge of the commercial interests of our Indian Empire, a most unfortunate and mistaken policy, to which may be most appropriately applied the injunction, "This ought ye to have done, and not to leave the other undone."

The relative economies of rail and water carriage in different countries have been so plainly and exhaustively set forth in the evidence given before the Parliamentary Committee on Canals in 1853, that those readers of the *Builder* who may be desirous of information on the subject will find all the particulars in the Blue Book. It would exceed the limits assigned to this paper to enter into such details, and therefore I would only add, that in England even, there are not wanting symptoms of dissatisfaction with the result of the railway system of combination, the most recent action of which, so far from bringing relief to the trading community, seems likely to tighten the screw

as regards rates, and unless manufacturers and producers co-operate to "enfranchise" and to "reconstruct," on the most efficient system possible, the Water-lines which first wrought such prosperity for England, they will inevitably be brought under the thralldom of a gigantic monopoly, from which extrication hereafter will be almost impossible. Hence the miscarriage of such an enterprise as the Manchester Ship Canal is much to be deplored, while it is a decided blot upon our modes of procedure that a fine of 100,000*l.* should have been inflicted on the public-spirited promoters of so valuable an enterprise by what was seemingly little more than opposition of self-interested parties.

The subject of Communications embraces so wide a scope that it is impossible to deal with it exhaustively in a single article. I will, therefore, not enter now upon any remarks on the relative merits of Road, River, and Canal transit, but leave that portion of the question to be dealt with on some future occasion.

GAINSBOROUGH AT THE GROSVENOR GALLERY.

THE proprietors of the Grosvenor Gallery have added largely to the debt of gratitude the public already owe them. The collection of the works of Sir Joshua Reynolds brought together last year was one of the most important and instructive exhibitions of pictures ever shown in London. Followed, as it now is, after an interval of nine months, and whilst it is still fresh in our memories, by a similar collection of the works of Reynolds's great contemporary, we have the materials before us for the formation of a sound and lasting judgment on the merits of the two great leaders of English art. Reynolds we have learned to know as a master in the rendering of character. He was essentially a man of insight,—many-sided himself, and capable, therefore, of understanding men of different sorts and kinds. The feature that was most striking to a visitor entering last year's exhibition was the varied character of his work, the different styles which in some cases succeeded one another, and in other cases were employed simultaneously by him. The present collection of Gainsborough's works, though not quite so numerous (the catalogue contains 216 numbers), is large enough for all purposes of comparison. In contrast with Reynolds, Gainsborough impresses us by the uniformity of his style. From childhood to age he developed along one line of advance; and, were the pictures hung chronologically, or were facilities given to the visitor to pass in chronological sequence from group to group, as by numbering, or in many other ways, might have been done, the steady and even progress of the artist would be visible to the least experienced. Holding, as we know, that the only way an artist can really be known, is by learning how he grew on from stage to stage, how he learned and how he forgot; and, considering how seldom it is possible for the public (the pictures of each artist being in the nature of things scattered about) to see such a development for themselves from beginning to end, it can be regarded as nothing less than a calamity that these two great exhibitions have not been used to produce the educational effect upon the public understanding which they might have been made to produce.

The contrast between Gainsborough and Reynolds can be readily seen by comparing the portrait of Johnson (No. 119) here with Reynolds's Johnson in the National Gallery, pictured in words. He visibly expressed upon the canvas the struggling, overburdened, yet victorious intellect, penetrating through the gloom of his fleshly incubation. Gainsborough, on the contrary, altogether fails to grip the character of his subject. He produces a flabby likeness of him at his worst. He takes him at a moment when the flesh had won the upper hand and when the mind was sluggish or asleep. The tyrant of conversation here looks miserable beyond words, for all the

world as though some one had just poured a little cold water down his back. Doubtless he often did look like this, but a portrait-painter's business is to show his subject not at his worst, but when his mind is awake, and we can see what manner of man he was and what capabilities he had within him. As a contrast to this picture, in which Gainsborough failed, the portrait of Tenducci, the cunuch singer, may be quoted as a great success. It is the best, indeed almost the only satisfactory representation of a person singing we anywhere remember. The man holds his music before him and is lightly beating time to his own singing, his face suffused with a rather feeble and apparently habitual smile. The transitory aspect of the man is caught as though he had been photographed by lightning, and herein lies Gainsborough's peculiar gift. If he fails to render depths of character he succeeds in catching the fleeting traces of expression. That amount of a person's nature which is manifested in a fleeting glance, a passing smile, a hurried gesture, is always seen and shown by this artist.

It is an unavoidable misfortune that the first edition of the catalogue should present a great many gaps and imperfections, especially in the wholesale omission of accurate or even approximate dates. It is excellent as far as it goes, and even in its least complete portions it is superior to the best parts of the Burlington House catalogues. At present, therefore, a student will find it rather hard to trace the origin and development of Gainsborough's style. We shall, therefore, endeavour to save him time and annoyance by pointing out a few guide-posts of the way. Gainsborough was born at Sudbury, in Suffolk, in 1727. The earliest of his exhibited pictures (c. 1735-40) is the "Head of a Man looking over a Wall" (No. 395). Its story is fully told in the catalogue. It is painted on panel, and the wood is cut away, round the edge of the hat, face, and shoulders, like a silhouette. The paint is laid on heavily and quickly, the colours being thick, and the touch determined. The posture of the figure is caught with skill. Passing to the portrait of Mrs. Hingston (No. 89), which was painted about 1744, after the young artist had returned from his studies in London, and during his residence at Ipswich, here we see him working in the ordinary style of the day, the same style as that employed by men of the Peter Vandeyck stamp. The upright and precise lady is uprightly and precisely painted, and her expression is well caught. The embryo powers of the young artist can be traced in the work, but at present they do little more than inspire with something of brightness and life, the otherwise dead lump of school imitation. Far freer, as was but natural, is the portrait of Gainsborough's destined wife, Miss Margaret Burr, which was painted about the same time. She is placed in the same position, and the light falls upon her from the same point as in the preceding picture, but already in the arrangement and treatment of her costume and in the landscape background there is a distinct forecast of what was to come. The young lady is stout and good-humoured, but by no means beautiful of aspect. She is one of those people whose character year by year moulded her countenance to a continually ripening beauty as a comparison with her other portraits (Nos. 80 and 175, the latter not included in the index) will show. Passing to 1761, the year after Gainsborough had made the important move of his life to Bath, we must pause before the whole-length seated portrait of Earl Nugent (No. 204). It was this picture, exhibited at the Gallery of the Society of Artists of Great Britain in the thirty-fourth year of Gainsborough's life, which established his fame for him on a permanent basis. Compared to his later productions, it does not possess the attractive charm which was afterwards to be his prerogative, but as a sound and solid piece of likeness-making it is as good as anything he ever did. The stout and smiling old country gentleman, seated substantially in his chair in a corner of his room by the window, well at ease with all the

world, is a wholly satisfactory creation. The visitor may be advised at this point to go aside for a moment to the picture of Sir Benjamin Truman (No. 12). By a comparison of these two works Gainsborough's method of showing character by means of momentary expression will become perfectly clear. The picture of David Garrick (No. 7), painted in 1766, about the same time as that of Sir Harbord Harbord (No. 37), marks Gainsborough's attainment of the final development of his powers. Henceforward he progressed steadily and unflinchingly, but his pictures are always of this kind, and possess the qualities here definitely manifested. Garrick is out of doors in a park. He is leaning against a pedestal, and has his arm thrown round the foot of a bust of Shakspeare. His head is bare, and he looks upwards with a bright expression of countenance. The face is visibly of a mobile kind, changeful, but momentarily fixed by the painter's art. Overhead there is a rapidly-painted mass of foliage, and the landscape background and turbid sky are likewise thrown in rather than painted. Gainsborough did not wish you to look at his backgrounds, but to concentrate your attention upon the persons. The artist shows remarkable skill in directing the spectator's glance away from what he is not to look at and towards the point of chief importance. In the portrait of George III. (No. 34), for example, it is to the clever management of the lights that the figure owes a dignity which in real life it can never have possessed. It requires a distinct effort of will to look at the face. The eye is naturally attracted to the broad, sunlit expanse of the waistcoat, and what delight it receives is from the colouring and texture of the fine costume and the brilliancy of the illumination; the man within and behind it all is of no account whatever.

As a rule, Gainsborough's full-length portraits of men are not his finest works. Some of them, such as that of Fisher, the composer (112), are spoiled by the kind of affectation which only adds another charm to the portraits of ladies. A conspicuous exception is a picture, which on reference to the catalogue turns out to represent a parson of the old school, to wit, Sir Henry Bate Dudley, known as "Fighting Parson Bate" (171). He was a remarkable person, famous for his gallantry and his enterprise. He started successful journalistic enterprises in London, fought duels, and was the friend of the wits of the day. He afterwards became a country rector, in which capacity he reclaimed land from the sea, improved agriculture in his neighbourhood, and made himself generally useful in the world. He was created a baronet as a mark of recognition for his public services. He lived in a day when a country parson might dress as he liked, and being a man of handsome appearance, he did not fail to make the best of himself. The portrait exhibits just the kind of man we should expect,—a strong, capable person, full of vigour of body and mind, healthy and human, and well fitted to play a useful part upon the stage of life. The picture was exhibited at Burlington House last year, and attracted considerable attention.

Gainsborough's pictures of children, though in some cases excellent, do not rival the work of Sir Joshua in this line. The little three-quarter length (No. 184) of Georgiana Spencer, afterwards the famous Duchess of Devonshire, was painted about the year 1763. The child, dressed in a white frock with pink ribbons, looks a bright intelligent little soul, but the picture has no technical charm, and the subject is stiffly though conscientiously treated. The portrait of Juliet Mott (No. 162) is more advanced, and possesses promise, of which the little oval of Edward Gardiner (No. 132) is a charming fulfilment, the sweetness of the face and the softness of the hair being beautifully rendered. The best child's picture, however, is the "Cottage Girl" (No. 173), of which Leslie said that it is "unequaled by anything of the kind in the world." It represents a little bare-footed, ragged clothed child, walking to the well with a chipped brown pinner in the right hand, and a pet dog carried, in resigned discomfort, under the left arm. The child's face tells of care: she is early wise and

wistful, though still a perfect child. We are told that she is really a portrait in character, but unlike the ordinary run of such productions, Gainsborough has made her look honestly a beggar, and has removed every trace of the young lady far from her.

But the class of pictures here exhibited, which will attract the largest share of observation and praise, is that including the larger, and especially the full-length, portraits of ladies in beautiful attire. All the best of these were painted just a century ago during the last decade of Gainsborough's life (1780 to 1788). It is not easy to select, out of some half-dozen, which is absolutely the finest. The Lady Sheffield (No. 47), dressed in a costume of glossy blues and whites, such as Gainsborough loved, is standing in the foreground of a landscape. Her face is set beneath a mass of powdered ringlets crowned by a large blue hat with a conspicuous blue bow. The charm of the picture is not the personality or beauty of the lady, but the skill with which the artist has treated her dress and the lights and dusky colours about her. In almost all his fine portraits he makes the textures of the dress glossy and the background dusky, and the contrast is always very effective, though, of course, when a multitude of such pictures are brought together a certain lack of variety becomes evident. As fine if not finer than the preceding is the portrait of "Parson Bate's" Wife (No. 75), which is familiar to all who visited the "old masters" exhibition last year. The chord of colour and the combination of textures in both these pictures is the same. They are both remarkable for dignity and grace of posture and a flow of line which the beautiful drawing of the arms and hands does much to emphasise. The same flow and rhythm of line is likewise one of the chief characteristics of the portrait of Georgiana, Duchess of Devonshire. She was a lady often painted and much written about. Sir Joshua undoubtedly has left us the best record of her, but this picture possesses qualities of grace and sweetness of expression that Sir Joshua did not aim at rendering. As a piece of painting the portrait of Mrs. Basset (No. 59) is one of the finest things in the collection. The choice and rendering of accessories is superb. The feathers and the pearls and the silk form a combination in which the eye of the beholder revels without weariness or surfeit. The full-length portrait of the painter's daughters (91) is a good proof of how much he could do with costume. The ladies are of little beauty, but standing affectionately together in the open air, as they do, on a wooded hill-side, though they look fanciful in their low-necked beautifully coloured dresses and bare heads, they produce upon the beholder an effect which he does not at first perceive to be due, not to their personal attractions, but to the painter's art.

Gainsborough felt the influence of Vandyck even more than Sir Joshua did. His last words spoken to his great rival mark the tendency of his art as well as the happiness of his disposition,—“We are all going to heaven, and Vandyck is of the party.” All his life long he looked up to and strove to imitate the great Netherlander, and two or more copies made by Gainsborough from his work are evidences of this study, if, indeed, such a picture as the "Blue Boy" (62) were not evidence enough. When that picture was exhibited at the Royal Academy in 1870, it gave rise to an ardent discussion, from which no general agreement resulted. It has been commonly stated that Gainsborough painted the portrait in this peculiar chord of colour, with cold blue lights, and a dark, warm massive background of lurid sky, in order to refute a dictum of Sir Joshua's, laid down in his eighth Discourse. This story is of the usual kind of amateur gossip about art and artists, and probably has but slight foundation in fact. At any rate, this picture is of the style of Gainsborough's workmanship about 1770, and is even traditionally asserted to have been at the Academy Exhibition that year. The discourse in question was not delivered till the end of 1778. Sir Joshua's dictum may have been suggested by the picture, but certainly the picture was

not prompted by antagonism against the Discourse.

In the history of English art Gainsborough is even more important as a landscape-painter than as a portraitist. Certain examples of his work here exhibited cast much light upon the development of his style. A sketch of a rough road through a wooded country (109), and still more "A Woodland Scene" (24), show the influence of Du Jardin. The woody landscape (15), on the contrary, is strongly reminiscent of Hobbema; the foreground is very brown, the distance grey, the sky a grey-blue, with threatening clouds. In such more advanced pictures as the "Landscape with Figures and Cattle" (54) the influence of Claude is unmistakable, though by that time Gainsborough's own style was formed, and his vigorous touch and rapid handling smite a unity into the whole. Throughout his life he never forgot Suffolk, and whatever view is before him, it is really Suffolk that he paints. The special quality of his landscape work is its suggestiveness. He does not endeavour accurately and truly to reproduce a scene, he strives alone, to convey to a beholder the impression which a scene made upon himself. Thus, in his best landscapes, such as the "Harvest Waggon" (No. 33; No. 174 is the sketch for it) or the "Cottage Door" (Nos. 45, 98, 192), every object introduced works together towards the single idea, and colour and *chiaroscuro* are handled solely to the same end. The persistence with which this unity is always kept in view,—the unswerving directness with which the goal is aimed at,—are the secrets of Gainsborough's success. The painter to whom he comes nearest in spirit as a landscapist is Rubens.

The "Coast Scene" (No. 152) is an example of the application of the same method to the sea. The rollers come tumbling in with a kind of frolicsomeness racing after the joyous breeze. Likely enough this is the picture Walpole referred to, in which, he said, the sea was "so free and natural that one steps back for fear of being splashed." People were so little accustomed to that kind of thing in Walpole's day that the language of appreciation for it had not been invented, and even an art critic had to fall back upon the statement that the picture looked real!

We have not space here to treat of the 170 frames containing drawings in water-colour or pencil by Richard Doyle. They form a most fascinating collection, and ought to be hung round a large room at a low level for the delight of all the children of London. Every one of them is full of true, genuine, and wholesome fun and frolic, and many of the assemblages of fairies and children are of real artistic merit. As a colourist Doyle did not excel; he was essentially a delineator, and was at his best when designing for the wood-cutter. Visitors will be interested to see the several designs for the title-page of *Punch* (Nos. 220 and 221). Almost everything shown is charming, but the charm is one that must be felt and cannot be translated into words.

NOTES.

THE undecided and undecisive Report on the disposal of the sewage of London has called forth a cloud of letters in the daily press, each explaining, to the full satisfaction of the writer, how the particular process in which he happens to be interested affords the one only solution of this portentous question. That a certain amount of chemical value attaches to sewage is of course true. This, however, has long been known, not only as a fact, but as to the outside value attainable per unit of the contributory population. And that the cost of extracting this maximum value is, as a rule, higher than the value itself, is also so true, that we have been accustomed to attribute the backward state of the general question as being mainly due to the repeated attempts to make a profit, instead of to destroy a nuisance. It is, of course, possible that this view may have to be modified. But we cannot but think that if one unimpeachable case of success under circumstances of ordinary

o casion had taken place, it would have afforded an illustration of the proverb that "Good wine needs no bush." Be that so or not, of what use, we may ask is the Local Government Board as to this main portion of its functions? If, after authorising and reporting on an annual outlay of ten millions a year on sanitation the Board is not in a position to say, "Such and such a process is so good that we recommend its adoption, such and such a process is a failure," we cannot but think that the verdict of the majority of plain-dealing people will be that the Board itself is as great a failure as any of the plans as to which it has nothing to say.

FROM correspondence in some daily papers which has been sent to us, we are glad to find that the subject of the enfranchisement of leaseholders is attracting more and more attention. We have already commented upon it in several of our past volumes, and have pointed out the great difficulties which exist in regard to it. To turn tenurable leaseholds into perpetual leaseholds, as in Scotland, is distinctly a more practical scheme than to turn them into freeholds by compulsion of law. The crucial point of difficulty is the point at which the law is to be brought into operation, for if a tenant for seven years, for example, is given the right of becoming a perpetual leaseholder, it puts an end to short leases altogether, which are often a convenience. We have always expressed our opinion that the first and most urgent reform is to give tenants compensation for permanent improvements to their houses. This would at once very greatly improve the sanitary condition of the country, since landlords often will not, and tenants cannot afford to, make sanitary improvements when they cannot be sure that the landlord will not reap three-fourths of the benefit without putting his hand into his pocket.

THERE seems no doubt that the breakage of the axle which caused the lamentable Penistone accident was owing to one of those flaws which nothing but breakage detects; but it would be very important that we should know how long the axle had been running. There will probably be some difficulty if not impossibility in ascertaining this, as the wagon was a private one, and presumably had not its history kept as it would have had as part of a railway company's rolling stock. It is known that iron tends to deteriorate in fibre, or even develop absolute flaws, through the process of continued shaking and jarring on a railway; and if the average life of an axle under these circumstances is known, it becomes a matter of absolute duty to the public that wagons which have exceeded the safe conjectural limit of running-time should be removed from the road or have new axles. Under the circumstances, no other verdict than accidental death could well have been returned; but in an article on the former Penistone accident (*Builder*, 26th July last) we suggested the possibility of Hughes's "magnetic balance" being used to detect hidden flaws. Some effort ought to be made to provide against a danger the results of which are so terrible.

THE central hall of the New Stock Exchange Building, which has been built from the designs of Mr. J. J. Cole, was open to inspection by invitation on Tuesday last. The central hall is an octagonal room, 75 ft. in diameter, covered by a dome with iron ribs. The drum beneath the springing of the dome is also a segment of an arch and falls in, to some extent, within the line of springing of the dome, thus assisting in neutralising or balancing the thrust of the dome, which is further provided against by a system of massive iron ties round the base. The piers are of red granite, and the walls are faced with blocks of Pavonazza marble, the rest of the interior being constructed of Portland and Aubigny stone. The staircases are all faced with marble also. The large hall is lighted by seventy-six incandescent electric lamps of fifty candle-power, the majority of the light coming from standards on the cornice round the springing of the dome. Beneath the main hall is a settling room, and on the same floor are the engine-rooms for driving the

ventilating and heating machinery and the electric apparatus. The air is heated in winter and cooled in summer, and delivered through vertical tubes, the vitiated air being removed by an exhaust-fan. The central hall is a fine apartment, and the whole of the details have been carried out in a remarkably thorough and workmanlike manner; the joinery is admirable, the doors being formed at the hanging stile with a vertical roll moulding working in a concave moulding on the door frame, so that in any position of the door there is no air-space between the door and the frame, and the outer edge of each door, is worked into an ogee moulding closing against a similar inverted moulding on the casing, so that the door shuts almost air-tight. The whole building is the work of a thoroughly practical architect. The contractor is Mr. Shaw; the ventilating apparatus has been put in by Messrs. Rosser & Russell; the electric lighting arrangements have been carried out by Messrs. Woodhouse and Rawson; and the plaster work has been done on Hitchin's patent fire-proof system.

IT is satisfactory to learn from the annual report lately issued by the Rector of Whitechapel that the sinister prophecies of the probable collapse of his parish church owing to the railway running under it have proved to be false; they originated in the fact that there is some settlement, which the rector says, is being carefully attended to, and adds "there is no danger." St. Mary Matfion has successively given her name to four Whitechapel parish churches, two of which have come to untimely ends, one being removed in 1872 on account of insecurity, and another being destroyed by fire in 1880. We sincerely trust that Mr. Ernest C. Lee's very fine church may be spared the addition of another tragic chapter to her history.

THE new Turkish Bath on Savoy-hill, Strand, of which Mr. Phipps is the architect, was open for inspection by visitors on Thursday afternoon. It occupies the lower floor of Lancaster House, and is entirely on one level within. The warm rooms have the walls lined with glazed bricks of various colours, floors of marble mosaic, and white marble seats. The ceilings are well treated in plaster design in raised moulded ribs. The large first room of the Caledarium, 48 ft. long, is a very pleasant-looking apartment for the purpose; this will have a temperature of 120° to 130°, leading to three rooms beyond, rising to 160°, 180°, and 220°. The bath is lighted for dark days and at night by incandescent electric lamps. The electric light installation is carried out by Mr. Taylor Smith, and other employed on the work have been Messrs. Patman & Potheringham, for the general builders' work; Messrs. Geo. Jackson & Sons, for the plaster ceilings; Messrs. Strode & Co., for the gas work; Messrs. Shoobred & Co., for the furnishing; Messrs. Clements, Jeakes, & Co., for the coffee-maker's stove; Messrs. Doulton & Co., for the sanitary fittings; Mr. R. Davison, for the marble floors, marble lavatories, and fountain; Mr. Constantine (of Manchester), for the convoluted heating-stoves and the hot-water supply. Mr. Max Clarke, the architect's assistant, has acted as superintendent of the works.

BY the early and sudden death of Philip Westlake his family and a large circle of artistic friends lose a very talented and most amiable artist. He died on Monday, the 29th of December, in his fortieth year, after a few hours' illness. His funeral took place at St. Mary's, Kensal Green, on Thursday, January 1, and a number of old friends who had been fellow students attended, amongst whom were members of the Royal Academies of Art and Music, the Society of Antiquaries, the Institute of British Architects, the Royal Institute of Painters, the Society of British Artists, &c. He was a Latin Prize boy of the City of London School, and obtained a premium for antique drawing at the Royal Academy. His practice in painting and designing was confined generally to ecclesiastical art. At some future date we propose to give a short account of his principal works.

He was a brother of Mr. N. H. J. Westlake, some of whose work is represented in this week's issue.

THE building materials of Nos. 17, 18, and 19, Greville-street, Hatton-garden, were sold by auction by Messrs. Home, Son, & Eversfield on Friday, the 2nd inst. The house No. 19 was a fine house of the Queen Anne period, with the usual lofty story or *piano nobile* on the first floor, which had an elaborate ceiling in worked plaster, a carved mantelpiece of considerable merit, and panelled walls. The rooms on the ground-floor were also handsomely decorated, and there was a fine carved oak staircase. This house is erroneously described in the auctioneers' catalogue as having been formerly the residence of Lord Greville. The street in which the house is situated certainly derives its name from Fulke Greville, Lord Brooke, "servant to Queen Elizabeth, counsellor to King James, and friend to Sir Philip Sidney," as he is described in his epitaph; but his London house, which has been long since destroyed, was in Brooke-street hard by, and it was there that he was murdered by his attendant, Ralph Haywood, Sept. 1st, 1628. An extensive addition in the rear of Wood's Hotel, Furnival's Inn, for Mr. J. Whaley, on the site of Nos. 20 and 21, Greville-street, Hatton-garden, consisting of a large smoking-room on the ground-floor, with a range of bed-chambers over, is in progress. The architects are Messrs. Isaacs & Florence.

FROM Newark, New Jersey, we receive a description of "a new system of transportation," by means of which it is proposed "to carry overland freight of certain kinds and sufficient quantity" for the cost of half a crown per ton per thousand miles. The author of the scheme, Mr. J. S. Baldwin, does not undervalue the resources of civilisation, as he proposes to carry a stream of freight flowing at the rate of 111 tons per minute, or twenty times the volume of that borne on the most active English railway. This he intends to effect by inverting all the appliances which the experience of the last fifty years has evolved. He recommends "stationary power instead of locomotive, one vehicle instead of a train, fixed shelter and fixed running gear instead of movable, and a solid road bed instead of one that is adjustable." A series of endless chains, running on rollers of which there are to be 54,000 to the mile, and propelled by stationary engines half a mile distant from each other, are to give motion to a flexible trough, 3,000 ft. long, in which the freight is to be packed according to its nature. The cost is "assumed" as 25,000l. per mile, and the "cost of operation and maintaining one mile for one day is 98'85 dolrs." What is wanted is a number of sealed proposals for the demonstration of the practicability of the plan, the accepted one out of which is to be rewarded by the executive committee which is to be formed, with the sum of 500,000 dolrs. For the benefit of those of our readers who may be disposed to compete we may add that the pamphlet describing the whole plan is published by Storms & Co., Market-street, Newark, N.S.

THE turn of architectural feeling in regard to the Westminster Hall restoration appears to be now setting in favour of a one-storied cloister, leaving the carved corbels and flying buttresses exposed to view. This, whether the west side is ultimately left exposed or not, will certainly be a great improvement on Mr. Pearson's original proposition of a double storied cloister cutting through the flying buttresses and blocking up the whole perspective of the buttresses, with rooms in it which would be practically nearly useless. The buttresses, if they are really doing any work, want something between them on practical or constructive grounds, to assist their stability. On this head we hope we shall not shock any one very much if we ask, what work are those buttresses really doing in supporting or resisting the thrust of the roof? Theoretically they are supposed to do so no doubt, and were built with that notion, but we very much doubt whether they have much to do with it now.

NOTES ON TUNIS.

TUNIS has been called, somewhat inaptly, a second Constantinople. To those who have steamed up the Sea of Marmora, and watched the domes and minarets rise, one by one, above the surface of the blue waters, there will be a feeling of disappointment at the first glimpse of the whitened walls of the great Berber City, rounding the headland of old Carthage. And this disappointment will not be lessened even after a closer acquaintance. The rank accorded to Tunis among the chief cities of antiquity, the progress of its commercial relations with other cities of modern growth, and the retention of its manners and customs during many hundreds of years, entitle it to a position that no other cities can claim. Twice during its long history Tunis has stood with scarcely a rival among the cities of Northern Africa. When the Arabs overran the country in the seventh century, they carried with them new arts and fresh industries. Agriculture, that had been raised to a science during the five centuries of Roman occupation, and had been long suspended, then received fresh impetus, and Tunis became for a long series of years the greatest commercial outlet for the produce of a vast territory. Again in the thirteenth century, after the overthrow of the Moors in Sicily and their expulsion from various parts of Spain brought to the shores of Africa a people renowned in art, and possessing a culture far in advance of other nations on the shores of the Mediterranean, Tunis took rank not only as a centre of industrial art, but as the chief city of a kingdom that extended from Tripoli as far westward as Cherchel, the ancient capital of Mauritania. With such a history, and so long a record of continuous though varied prosperity, it is surprising that Tunis does not possess within the city walls more monuments of interest to the traveller as well as to the antiquary. But it must be borne in mind that all the cities peopled by those enterprising Phœnician navigators were strictly commercial. And although Carthage, the most important of their settlements, reached the envious position of being one of the most renowned cities of antiquity, it must not be forgotten that it was coveted, not for its magnificence, but for its situation as a stronghold, its command of the waters, and the fabulous wealth of its merchant inhabitants.

It is not within the compass of these few notes to investigate those points in history that relate either to the decay of Carthage or the rise of Tunis; but the history of one is almost inseparable from that of the other. If one may judge from the scattered remains of the greater city that are to be seen in the labyrinth of streets of modern Tunis, it was only the remnant that fell to the lot of its commercial neighbour. The history of a town is generally written on its stones. It would be difficult, indeed, to write a history of Tunis on the bare records of stone or marble. Here and there, in seeming incongruity with the whitened walls, are shafts of marble or porphyry; and magnificent slabs from those Numidian quarries that are still worked in the present day may be found in many a mosque and on many a palace wall. With the wealth of Tunis grew the number of religious edifices; but out of the 150 mosques that were in existence two centuries ago, there are but few left to arrest attention. None of these are remarkable externally for that delicacy of workmanship and grace of outline that characterised the edifices of the Moors in other parts of their dominions. Of the interiors it is impossible to speak, except from hearsay. The unbeliever is not only rigidly excluded from all parts of the mosques, but the very steps are forbidden to his unholy tread. Prompted by curiosity to obtain a glimpse within an outer doorway, I placed a foot incautiously on the bottom step. The gentle hand of a slipped Moor, passing by with a light tread, was placed on my arm, with a polite indication that I was committing a trespass on holy ground. This reverence for the sanctuary and all its surroundings is mixed up with a good deal of superstition that may be found here in a greater degree than in most Mohammedan cities. Tunis is to-day one of the most Oriental of Oriental towns, and its traditions, many of them the remnant of superstitions of its primitive inhabitants, are upheld with becoming reverence. The most noticeable among these is the sign of "the hand," with four fingers extended. You find it everywhere, generally daubed on the

wall with some crude pigment of red or black. It is on the house of the humblest Mussulman, the rude tenement of the Jew, and the palace of the Bey. You find it on the vanishing of an arcade, on the keystone of an arch; and in the every-day jewellery of the peasant it forms a pendant to the girdle or necklet in silver filigree or in stamped metal. "It is the hand of fate," we are accustomed to say, when speaking of any act beyond the control of human agency. "It is the hand of Fatima," says the devout Mussulman, "the mother of all true prophets,—one of the three wise and good women to whom the prophet commanded that homage should be rendered to all time." "It is the hand of Tanith," said the Phœnician, and many a votive tablet unearthed from the hill of Carthage bears testimony to the prevalence of this ancient cult. And so we may trace this symbol of power, this averter of the evil eye, this "marî béniâsant," till we are landed in the mysteries of the heathen Ashtaroth, of the Roman Astarte, and of those sensual rites under which the goddess was worshipped as Venus Calectis.

Intimately connected with this superstition is the employment of black stone or marble in the voussiers of arch construction. They tell you that the black stone, especially when it occurs as the keystone of an arch, the one black spot where all else is dazzling whiteness, is symbolical of sin. No human work is perfect. To attempt perfection would be an act of defiance to the spirit of evil, whose powers of destruction are illimitable. The black stone, emblem of imperfection, becomes a homage or sign of concession to this power, and thus secures the protection of all the other stones of the fabric, the white stones without spot or blemish. Passing from this pretty legend there is yet another form of superstition, unmistakably Oriental in its origin. It is the reverence for serpents. "Blessed is the habitation," say they, "where the serpent dwells." Neither hunger nor thirst is ever known to this member of a family. His food is prepared and his presence expected before the commencement of the daily meal. No one eats till the serpent has finished and has crept back satisfied to his hole. If he is not the ruler of the house, he possesses an importance the owner himself does not even attempt to share.

All Oriental cities have a charm and a colouring of their own differing essentially from what is commonly termed "the picturesque" when speaking of European towns. In spite of its dearth of architectural monuments, Tunis, with its labyrinth of streets, its flying arches from house to house across the narrow thoroughfares, its doorways with their delicate carvings in stone or marble,* its wilderness of shops, their wooden columns painted with spiral bands in gaudy colours of blue and red and green, has much to charm the eye, and colouring enough to balance the wearying monotony of whitewash. Very curious, too, and characteristic, are the wooden doors of ordinary Moorish houses, with their quaint patterns formed with round-headed nails. Crescents and crosses, graceful curves, and crude imitations of symbols of deities of long-forgotten Phœnician origin, are mixed together in endless variety. Like the horse-shoe hung on the cottage wall in our own country, these nails, a remnant of a still older superstition, are regarded as a protection to the abode and a charm to keep off the evil eye.

It is not to be expected that a city so strictly commercial in its origin and progress should have attained great pre-eminence in art-industries during any period of its long career. The arts of Tunis, as they exist in the present day, were derived principally from the Moors of Spain and Sicily. The beautiful plaster vaulting and arabesque tracery, the carved wood ceilings and gilded decorations that reached such perfection in Seville and Granada, and that found their way across the Mediterranean, received but little encouragement here, if one may judge from the few specimens to be found in Tunis. That they flourished in the country at one period there is ample evidence in the decorations of the numerous mosques in the holy city of Kerouan; and in the town palace of the Bey of Tunis are some gems of architectural decoration unsurpassed in elegance and richness by anything in the more-famed Alhambra or the Alcazar at Seville. Amidst the constant fluctuations of fashion and the tide of European civilisation ever advancing eastward, more

rapidly now than at any period in the world's history, it is sad to think of the gradual extinction of the beautiful handicrafts taught us by the Moors, soon likely to be numbered among the lost arts. The persistency with which the Moor and the Arab cling to their antiquated methods of workmanship, their simple hand-looms, their latbes, and other implements, and their utter disregard of all mechanical appliances that shorten labour and cheapen work, is a curious phase of Orientalism that seems almost incomprehensible. In the souks or bazaars of Tunis, which will bear comparison in variety, if not in extent, with those of Stamboul, the fabricator and the shopkeeper sit side by side on the same matting. The workers in embroidery and in leather, the weaver of carpets, and the worker in silver carry on their antiquated trades amid the hum and bustle of an active ever-moving population. Here are swarthy Moors with their gay girdles and waistcoats of silk embroidered with gold; stately Arabs in striped berboones; negroes from the Soudan; Holy Marabouts, picturesque in their rags and tatters; dignified Jews; black-veiled Moorish women; and comely Jewesses, innocent of skirts, and with their limbs swathed in gaiters of silk resplendent with gold. How far this picturesque population and their gay surroundings are likely to be affected by closer contact with Europeans and their ways is an unsolved problem. The café and the drummer-boy, those precursors of French civilisation, have already taken possession of the outskirts of the city; markets and factories are springing up in the business quarters, and courtyards of Moorish houses are being converted into stores for goods from Lyons and Manchester. Tunis has had a long past. It bids fair to have a long and prosperous future, and an importance, as a commercial centre, equal to that which it enjoyed centuries ago. Whether the whole Regency of Tunis will reap the benefit of an extended colonisation over the vast tracts of land that are now the shifting abode of roaming Arabs. What this territory was during the long period of Roman occupation is not difficult to conjecture. The Roman watered, and the Roman planted, and great was the increase upon this wonderfully fertile soil. The Arab to-day neither planteth nor watereth. He scratches the soil with his rude implements of husbandry; he gathers his crop, and passes on with his flocks and his herds. Long centuries of ignorance and neglect have done their worst. Vast plains that are now sweet with rosemary and wild thyme, and over which caravans still thread their way, were once a main source of grain supply to a great empire. It remains for European nations, with their more advanced agriculture, to make this corner of Northern Africa once more a granary of Europe.

Among the nations of antiquity perhaps none have left so many records of their power and the extent of their dominion as the Romans. Wherever the Roman set his foot, there he left an enduring mark. For this reason the whole Regency of Tunis offers to the architect and the antiquary a vast field for research. The monuments still left to us attest not only the wealth and magnificence of this fertile colony, but they show the unity of the empire and the authority of Rome; and how each city and each town, however remote, was only a miniature of the great metropolis of the Caesars.

The archaeology of North Africa, and a more faithful and comprehensive record of its monumental remains, have yet to be written. It is to be hoped that English travellers, who have already done much to throw light on the subject, will be induced to add many more pages to the history of this interesting country.

ALEX. GRAHAM.

New Congregational Hall at Wandsworth.—A new hall, in connexion with the Congregational Church at East Hill, Wandsworth, has just been erected in Earlsfield-road, Garrett-lane. The building is of red brick, with a roof of red tiles. The interior is faced with yellow and red brick, and has an open-timbered roof in stained pitch pine. It is fitted with Tohn's ventilators. The foundation walls are built of sufficient strength to carry an additional story should it be required. The building will hold a congregation of 600 persons. Mr. E. W. Monntford, of Buckingham-street, Strand, is the architect, and Mr. Smith, of Kensington, is the contractor.

* See Illustrations in this number.

PROJECTED RAILWAYS, TRAMWAYS,
DOCKS, AND OTHER PUBLIC WORKS.

The Parliamentary Committee on Private Bills, during the session of 1885, will have to deal with a large number of projected public works of a varied character, several of which involve an unusually heavy expenditure. The total number of undertakings, as represented by copies of Bills and plans deposited at the Private Bill Office on the 20th of December (the last day allowed by the Standing Orders for such Bills to be filed), is 252. This shows that seventeen undertakings have already been withdrawn after passing through the initial stage only, the number of notices deposited on the 29th of November being 269. Of the entire number of those 252 undertakings which remain, 121, or nearly one-half of the whole, are connected with railway projects. Of this class of Bills fifty-six are promoted by existing companies, and sixty-five by new companies. There are twenty-one tramway Bills; twenty-three connected with gas and water supply, four only being gas projects, while nineteen in respect of water supply; seven subway Bills; twenty-one town improvement Bills; twenty-five Bills in respect of docks, harbours, and piers; and thirty-four Bills of a miscellaneous character. It should be added that as respects tramways and gas and water supply, there are several undertakings promoted by Board of Trade applications for provisional orders.

An unusually large proportion of the Bills have reference to undertakings directly connected with the metropolis. Nine of these Bills seek powers for the construction of new railways in north, south, and west London, and include projected new lines between Latimer-road and Acton; Ealing, Harrow, and Edgware; Notting-hill and Shepherd's-bush; Charing-cross and Euston (the estimated cost of this line being 1,600,000*l.*); Croydon Direct; a new line from London, Chatham, and Dover line to the Crystal Palace; the Crystal Palace and South-Eastern and Metropolitan; Nantwich, Shortlands, and Beckenham; and the Charing-cross and Waterloo Electric Extension. The additional power Bills of seven of the leading companies likewise contain clauses authorising the construction of new and extended works in the Metropolis. The London and South-Western Company's Bill empowers the Company to make large purchases of houses and land in the neighbourhoods of York-street, Griffin-street, and Westminster Bridge-road for the still further enlargement of the Waterloo Station, which already contains an area of upwards of twenty acres. Also powers to purchase houses, lands, and premises at Nine Elms, Wandsworth-road, Battersea, Clapham Junction, and Earl's-field, for similar enlargement purposes. The Great Eastern Company's Bill empowers the Company to widen their main line at Mile End and Old Town, and also from Longhoughton to Epping, with powers to purchase lands and property at Canning Town, West Ham, and Leyton, for additional works and station enlargement purposes. The London and North-Western Company's Bill seeks powers to purchase property in Shoreditch and Bishopsgate, and also property in St. Pancras belonging to the Duke of Bedford, for the purpose of enlarging their Broad-street and Euston Stations. The Midland Company's Bill seeks similar powers of purchase in Islington and Hampstead-road for extension works in those localities. The South-Eastern Company's Bill empowers the Company to purchase lands and premises for the widening of their lines and constructing new branch lines in Lewisham, Dentford, Caterham, and Croydon. The London and Blackwall Company seek powers for the widening and improving of their line between Fenchurch-street and Stepney Junction. The North London Company powers to widen the line, with sidings, into Columbia Market; whilst the London, Tilbury, and Southend Company promote a Bill empowering them to purchase the German Church and site in Whitechapel, with powers to remove the bodies, and to erect warehouses and offices on the site. Eleven of the tramway Bills seek powers for the construction of tramways in different parts of the metropolis. The North Metropolitan Company are the promoters of three Bills, which seek powers for laying down lines in the districts of Clerkenwell, Gray's Inn-road, Theobald's-road, Goswell-road, Hackney, Clapton, and Bethnal-green. The other Bills promoted are those designated the Metropolitan Central, the North-West Metropolitan, the Clerkenwell and Isling-

ton, the Highgate, Finchley, and Barnet, the Peckham and East Dulwich, the London-street, the Crystal Palace and Gipsy-hill, and the Brentford and District Tramways. A novel feature in the Bills consists of the large number of projects—six in number,—for the construction of subways in the metropolis. Amongst them is a Bill seeking powers for a subway from the Angel at Islington to Moorgate-street, passing in a south-easterly and south direction under and parallel with the City-road, from a point in front of the Angel at the junction of the City-road and Belvidere-road, to its proposed terminus in Moorgate-street, near Lothbury and the Bank. The rails proposed to be laid down are the standard railway gauge line now in general use on all the railways. Locomotive engines are not to be used, the proposal being to work the traffic with stationary engines, on the cable traction system. Subways on a similar principle are also proposed to be constructed between the Marble Arch and Cornhill, and between King's-cross and Charing-cross. There is likewise a fourth Bill for the construction of a subway between King's-cross, Charing-cross, and Waterloo railway station, by means of which the railways south of the Thames would be brought into close communication with the Midland and Great Northern lines. The estimated cost of this proposed subway, which would pass under the Thames, is set down at between 750,000*l.* and 800,000*l.* A fifth Bill seeks powers to construct a subway between High-street, Clapham, near Clapham-common, and the Elephant and Castle, where it would form a junction with the Southwark and City of London subway, terminating in King William-street, Parliamentary powers for which were obtained last session. This proposed subway would be nearly two miles and a half in length, and its estimated cost is set down at 650,000*l.*, or about 232,000*l.* per mile. The aggregate estimated cost of these several subways is little short of 3,500,000*l.*, that of the three first-named being 2,100,000*l.* In addition to the above there is also a Bill for the construction of a subway between Millwall and Greenwich. There are likewise twelve Bills of a miscellaneous character relating to undertakings connected with the metropolis, one of which is the Various Powers Bill promoted by the Metropolitan Board of Works. This Bill, amongst other powers sought, contains clauses empowering the Board to construct a new street between Gray's Inn-road and St. John's-street-road; * also powers for maintaining steam ferries between Greenwich and Poplar and Woolwich; likewise powers as to the construction of a new park at Dulwich, and the control of open spaces at Highbury-fields and Inacey Downs. The Board also promote a second Bill authorising them and the two Vestries of St. Martin's and St. George's, Hanover-square, to maintain the Hyde Park Corner improvement works. The Corporation promote two Bills, one sanctioning the construction of a bridge across the Thames between the Tower and Horsely-down; and the other empowering the Corporation to purchase land to erect a City of London School for Girls, out of Ward's bequest. There are also Bills for the construction of the Thames Duplex Bridge and the Thames Floating Bridge. Another Bill seeks extensive powers of purchase for the widening and improvement of Parliament-street by a company proposed to be incorporated, whilst the Post-office authorities also apply for large powers of purchase to carry out post-office extensions.† The Southwark and Vauxhall Water Company promote a Bill for the construction of new service reservoirs at Camberwell and Lewisham, covering an area of three acres and a half; also powers to lay down lines of pipes from the reservoir at Forest-hill; likewise powers to lay down further lines of pipes from Hampton to Streatham, Merton, and Totterdown-road, Twickenham. There is also a Bill promoted by the Albert Palace Company in reference to working arrangements; another Bill for electric lighting in Chelsea; and one by the River-side Fish Market Company at Shadwell. There are thus no less than thirty-four Bills in respect of works directly connected with the metropolis.

A special feature in the railway bills is that nine of the great companies having their termini in the metropolis, and also the North-Eastern Company, all promote bills for the consolidation of rates and charges, as well as those for additional powers in respect of new works, and

as there are fourteen Bills in reference to the abandonment of authorised works, extension of time, sale, and arbitration, the number of Bills promoted by existing companies in respect of actual works, is reduced to thirty-two. The bills promoted by the London and North-Western and Lancashire and Yorkshire Companies seek powers for extensive works at different points on their system, more particularly in the neighbourhoods of Liverpool, Manchester, and other parts of Lancashire and Yorkshire; and the same remarks apply to the bills of the Great Western, Midland, and South-Western Companies.

The Bills in respect of docks, harbours, and piers contain several projects of a formidable and costly character, involving a heavy amount of engineering work. The Cheshire Deep Water Docks Company, proposed to be incorporated, are the promoters of a Bill for the construction of a comprehensive series of dock and river works on the banks of the Dee, in the parishes of West Kirby, Moreton, and Bidston. These works embrace two sea walls and embankments in West Kirby, on the foreshore of the river and the Irish Sea, 4,000 yards in length; also dredging for a distance of 700 yards to a depth of 30 ft. below the low-water level of the bed of the channel known as the Rock Channel; also the dredging and excavation of a new channel, 1,450 yards in length and 270 yards in width, to a depth of 30 ft. below low-water mark. The Bill likewise seeks powers for the construction of extensive dock works, one of which, in the parish of West Kirby, is to be 600 yards in length and 270 yards in width; and another dock, with locks and entrances, partly in the parish of West Kirby and partly in the parish of Moreton, 1,615 yards in length and 225 yards in width, the two docks covering an area of 75 acres. The undertaking also includes a graving-dock in the parish of Moreton, 295 yards in length and 25 yards in width, together with the construction of quays, wharfs, and piers, with hydraulic and other machinery, and the erection of warehouses and sheds. In connexion with the Bill for the construction of a railway commencing in the parish of Bidston by a junction with the Hoylake Railway, and terminating by a junction with the authorised Wirral Railway. Another Bill is promoted by a company proposed to be incorporated, with powers to construct docks and other works at Northfleet. The undertaking embraces the construction of a main dock 417 yards long, and 200 yards wide, with two main branch docks, each 400 yards in length, and 83 yards in width, with lock and tidal basin, and an entrance from the river Thames at Northfleet; also a river wall or embankment, three furlongs and five chains in length, with an opening into the tidal basin; also two piers or jetties, one 134 yards and the other 150 yards in length. The Bill likewise provides for the construction of graving docks, slip docks, lift docks, telescope and other bridges, wharfs, quays, landing-places, warehouses, sheds, and other buildings, and hydraulic lifts. The undertaking also includes the construction of three railways in connexion with the works, two of which are to be in communication with the South Eastern and London, Chatham, and Dover Railways, and the third with the authorised Tilbury and Gravesend Tunnel Railway. Powers are also sought in the Bill for hiring steam tugs for towing purposes.—A Bill is promoted for the construction of a pier, jetty, and landing and shipping stages, at St. Leonard's, together with sea walls, groynes, and other buildings and works for the accommodation of steam and other vessels, and the embarking and landing of passengers, goods, and merchandise. The Bill also takes powers for the construction of a promenade, commencing near the Marina, and extending 1,000 ft. eastward.—A Bill for the improvement of Christchurch harbour seeks powers to construct training walls, breakwaters, and landing-stages; also powers to construct piers, and to dredge. There are four Bills in connexion with the deepening and improvement of the river Dee, with powers to deepen the river, by the construction of training-walls and dredging, to the mouth of the sea. One of the Bills also provides for the construction of new docks near Chester.—The London and North-Western Company's General Powers Bill contains clauses authorising the company to construct new docks and other works at Garston; while the South-Eastern Company's

* Fully described in the *Builder*, Dec. 13, pp. 789, 790.
† See *Builder*, Nov. 23, 1884, p. 680.

Bill also contains clauses authorising the company to construct a new pier and other works at Folkestone.—There are also Bills in connexion with the Butte Docks, and the improvement of the docks, and other works, at Southampton and Port Glasgow.—The Manchester Ship Canal project will, no doubt, again undergo a prolonged investigation before the Parliamentary Committees.

The Town Improvement Bills are both numerous and comprehensive in their character, involving the erection of several public buildings. Amongst others the new Borough of Eastbourne promotes a Bill in which powers are sought for the widening of ten streets, and the construction of a sea-wall on the east side of the circular Redoubt. Powers are likewise included in the Bill for the Corporation to enclose and convert to agricultural or building purposes all or any portion of the land and foreshore which may be enclosed by the sea-wall. The Bill also provides extensive powers with regard to the erection of houses and other premises, with control as to the frontages, foundations, and materials of all houses to be built. Similar powers are likewise sought for in sanitary arrangements.

The Bill also contains clauses empowering the Corporation to erect new markets, a public library, museum, picture gallery, and school of science and art; also public baths and washhouses; with powers to lay out parks and pleasure-grounds, gymnasiums, bowling-greens, and to give other facilities for recreation.—The Corporation of the neighbouring town of Hastings also promotes a similar Bill, in which stringent control over buildings and sanitary matters is applied for. Powers for the regulation of bicycles, tricycles, and other vehicles are sought; likewise powers over street musicians, and the exhibition of advertisements in public thoroughfares, and also powers to regulate the use of the foreshore and Parade. The Bill also authorises the Corporation to purchase land for the erection of a public library and museum, new municipal offices, a new market, public baths and washhouses, and slaughter-houses; also powers to acquire East and West Hill for the purposes of a public park.—The Corporation of Bradford promote a Bill which, amongst other powers, contains clauses authorising the construction of extensive additions to the existing waterworks, including several new reservoirs. The widening of streets and the construction of new streets is a prominent feature of the Bill, which contains clauses for widening twenty-two streets, and constructing five new streets. The Bill also authorises the construction of a new park on Bradford Moor; powers as to the facilities for ingress and egress to and from places of entertainment; powers to extend and enlarge the present municipal buildings, including the council-chamber, justices' room, coroner's court, and court of quarter sessions offices. Largely increased powers over buildings and sanitary arrangements are also provided in the Bill.—The Corporation of Southport promote a Bill which contains clauses authorising them to make very extensive purchases of land for the improvement of the borough. The Bill empowers the corporation to acquire 4,739 acres of land on the foreshore of the sea and estuary of the river Ribbles; also to construct a cut or channel, with training walls and embankment, three miles in length, for sewage purposes, and in connexion the construction of sluices, culverts, and arches. Powers are also sought for the formation of a new recreation ground on land conveyed to the corporation by the Southport and Cheshire lines extension Railway Company; likewise powers to erect a new building to be used as a Museum and School of Science and Art, on lands bequeathed to the corporation by the executors of the late Charles and W. Frederick Scarisbrick, Mr. Naylor Leyland and Dr. Wood. Powers are also sought in the Bill to purchase the frontages of houses and premises whenever such houses are converted into shops or business premises.

The Liverpool Corporation promote a Bill which contains clauses for the construction of several new streets, including one in continuation of a street at present in course of construction by the Lancashire and Yorkshire Railway Company; a new street from Paradise-street southward, in constructing which the bodies in St. Thomas's Churchyard will have to be removed. The Bill likewise contains powers relating to alterations in the boundaries of the wards; and also powers over shooting-galleries, swing-boats, and whirl-grounds.—A Bill,

promoted by the Corporation of Bury, contains powers for the purchase of lands for parks and recreation-grounds; and also stringent powers over buildings, drainage, and ventilation.—Similar Bills, with greatly increased powers over buildings, and sanitary works, are promoted by the municipal authorities of Sunderland, Whitehaven, Longton, Hull, Oxford, Kemsate, Southampton, Wakefield, Wigan, and other towns.

Amongst the Bills of a miscellaneous character is one promoted on behalf of the ecclesiastical authorities, containing clauses empowering the Bishop of Liverpool and others to enter into negotiations with the corporation for the purpose of acquiring St. John's Church and churchyard, with the view of erecting a new cathedral on the site. The Bill also contains powers to the ecclesiastical authorities to erect a new church of St. John's in place of the existing church to be taken down.

ARCHITECTURAL EDUCATION AND THE EXAMINATION IN ARCHITECTURE.*

The subject of education is one which in all civilised society has excited the greatest interest with those who are interested in the progress of mankind, and especially in these latter days has this been the case. The schoolmaster is abroad, and busy in his work with the lowest to the highest strata of society. The introduction of the subject for our discussion this evening needs, therefore, no excuse or apology. We must be content, however, to confine ourselves to that branch of education to which we prefix the title "professional"; all else we must pass over, or the subject will be too wide a one to compass in the short time at our disposal. I will ask you, however, to bear in mind that the influence of the Board schools, of the Oxford and Cambridge Local Examinations, the institution of High Schools, and the multiplication of others of all grades, have so raised the standard of scholastic attainments, that to succeed, or even to hold a place, in any rank of life, needs, and increasingly calls for, those qualifications which only a good education can give. Here and there we find men who, with very little scholastic attainments, have gained distinction in the various walks of life: men who can do little more than sign their names to a cheque or document; but such instances are nowadays rare, and are the exceptions which prove the rule.

If we glance at what the different learned professions are doing for the education of their members, we may see on all hands a tendency upwards, and that admission to their ranks is through study and examinations which only the most diligent attention will suffice to succeed in. In divinity, law, physic, science, the army, navy, or a commission in the volunteers, special qualifications are demanded, and though examinations are not compulsory in all the branches of civil engineering, no man can hope to succeed in rising to high distinction in that profession who has not devoted his best energies to acquiring his education and study that theoretical and technical knowledge, which, perhaps, is the greatest of the practical science of our days demands from those who practise it.

In architecture, I think, we have been too content to follow on the old lines, and have not recognised the fact that such enormous progress has been made in education. The establishment of the Architectural Association some quarter of a century ago is an index of the want felt at that time for the better education of architects in the art and science of their profession. The establishment in 1855 of a compulsory examination for district surveyors, and the recent establishment of an examination for admission to the Royal Institute of British Architects, together with the discussion on education at the last Conference, and the important contributions previously made to that subject, are proofs that, as a body, we are waking up to the fact that if we are to hold any place at all in society as a learned profession we must do as others are doing: throw aside our lethargy and endeavour by all means in our power to qualify ourselves so as to be armed at all points for the conflict with the difficulties which beset modern practice. Warnings have not been wanting; specialists have sprung up, outside our ranks, to do the

* A paper read before the Architectural Association by Mr. Cole A. Adams, President, on the 2nd inst., as elsewhere mentioned.

work which we have neglected; work which formerly was comprehended under the practice of architects has drifted into other channels. The engineer, with a keener insight into modern requirements, has taken up work which formerly was done by the architect. Ironwork, which now so largely enters into use in the science of building construction, is looked upon, and rightly, for we have neglected to study and make use of the material scientifically,—as the special province of the engineer. Bridge architecture forms now no part of our work, and much else, where the science of construction on a large scale is concerned, has drifted away. In sanitary science a large class of practitioners have arisen to do the work which we ought to be the best qualified to undertake. Decoration is in the hands of specialists who are not architects, or is carried out by advertising tradespeople; and so little by little the field of architecture has been invaded.

The blame for all this lies mainly with ourselves, and the remedy also. If we are to win back what legitimately belongs to us and gain that respect which should be our aim, we must be able to conclusively prove to our masters, the public, that we are competent to execute such work as legitimately belongs to the profession of architecture.

It is a favourite argument with those men who, to their credit be it said, have, with untiring energy, zeal, and natural ability, succeeded in any walk of life, to say that any systematic course of education partaking of an academical character is, in their opinion, unnecessary, and too often they throw their weight into the scale against those who are in favour of it. Especially is this the case in our own profession. Formerly this line of argument found more supporters than it is likely to now, but a glance at what the other professions are doing in shutting their doors against only those who will enter them with the golden key of knowledge should be, I think, sufficient evidence that the day for such an argument is past and gone, and that nothing short of special and exact training will enable the members of any profession nowadays to maintain its position and to resist the encroachments of outsiders. In art and literature it is easy to point to men who, solely by their own efforts, have won a foremost place without any passing of enforced examinations, and it may be easy to prove that in these special walks of life the man who succeeds must be born and cannot be made. This is, in a great measure, perfectly true, but the profession of architecture embraces science as a perfectly necessary part of it, and science can and must be taught by system. Even if we take the men, no matter in what walk of life, who have gained eminence, is there one who could not say that his work would have been more thorough, his range much wider, if he had had the advantage of a better and more systematic course of education placed at his disposal when a youth? I think the fact that so many have succeeded in spite of the greatest drawbacks goes no way to prove that a systematic training is unnecessary. The tendency of all modern thought here and abroad is against such an assumption, and the action taken by men in other professions proves the value which is placed upon special education for their varied pursuits. Take for instance the army and navy. Formerly admission was an easy thing, position, interest, money, pluck, and daring were the only passports necessary; now to obtain admission and to succeed a man must have a special and scientific acquaintance with military and naval tactics, so largely has science become a part of warfare. The marvellous success of the Germans in their war with France has effected a revolution in the art of warfare all over the civilised world. Our brethren in the medical and legal professions are, happily for us, now compelled to pass the strictest examinations before they can practise, and it would be easy to multiply similar instances. Why, then, should it be left to those who enter the field of architecture,—a profession dealing with the health, well-being, and prosperity of the nation,—to pick up their knowledge in a haphazard way, without any recognised system?

The effect of education upon society generally is to make men more thoughtful, to open their eyes, cause them to inquire into the why and wherefore of things, and not to be content with taking everything for granted, and the fierce light of criticism is cast in all directions. The great attention given to health, arising from

the dangers which beset modern civilisation and the gathering of large masses of people together, necessitate special provision in modern architecture which are the natural outcome of these conditions and the knowledge of sanitation and its importance, which the medical profession has brought to light. Can these conditions be met by natural instinct in those who adopt the profession of architecture, or by a slipshod system? There can be but one answer. Architects must be qualified to meet the difficulties daily presented to them in this aspect of their work alone. The public demands that special knowledge should be brought to bear, and, as I have before remarked in this room, from our neglect of sanitary science, specialists have arisen to do it. I know it will be said that too much stress is laid upon this subject of sanitation, and that architects do now attend to such matters. I grant that many do, but I doubt if the profession at large is sufficiently in earnest about it, or recognises the vast and far-reaching importance of this subject, and I instance it as one of many others requiring study to master, and what a necessity it is to bring this before our students in a practical and scientific form.

Now the question, as I understand it, before us this evening is,—Can the education of the architect be raised; and, if so, how?

In the few suggestions and ideas which I have to offer, I shall endeavour to point out how, in my opinion, this is possible; and I doubt not that the remarks and observations of many of those who are here this evening,—who are far better able to speak upon the subject than I,—will add much to the solution of the question, and I trust make this new year we have just entered upon memorable as a fresh starting-point in the furtherance of the professional education of architects.

We shall one day, I hope, have in this country something of the system adopted in France and other countries, and members of the Association who have not yet read the important contributions on the subject made by Mr. William H. White, Mr. R. Phémé Spiers, Mr. Arthur Cates, and others, I would strongly advise, if they have the matter at heart, to do so.

For a profession to hold a high place in the estimation of the public, it is necessary that the standard of general excellence should be a high one. It is not enough that here and there should be found distinguished men. What we want, therefore, is some system which will enable our architectural students to so qualify themselves as to be able to undertake and carry out with credit the work which in the ordinary course of business falls to them, and that the standard of requirements shall be such that no man without special study and training shall be able to compete for work. It should not be possible for any man, in a properly qualified, to set up a brass plate, call himself architect or surveyor, and bring disrepute upon our profession; perhaps some day legitimate practitioners may have the protection granted to other professions.

We, as members of the Architectural Association, may feel justly proud of the work which it has accomplished, and which it was established to do, but since its establishment the world has been moving on with rapid strides, and we are now considering how our system may be improved and made more effective. You are aware that within the last three years or so we have instituted two courses of lectures on the history of architecture and the science of construction. The gentlemen who have undertaken these courses receive some small remuneration, in no way commensurate with the skill and time, the preparation and delivery of their lectures demand. These lectures were started almost, it may be said, for the sole purpose of preparing candidates for the obligatory examination for admission to the Institute. Observe, that the basis upon which these lectures are established is a departure from the voluntary and honorary basis upon which all other instruction in the Association rests. It need be no surprise to any one that this is so, and I think no regret; it was the natural outcome of the examination set on foot by the Institute, and has been of the greatest service to our members. From a careful consideration of the whole matter, and a perusal of the answers given to the questions issued to some of the members, I feel persuaded that the time has come for extending this basis. Our classes, presided over and conducted by voluntary and honorary teachers, have done excellent work, but it must necessarily fall somewhat in producing any

uniform standard of excellence. Teaching and conveying to others the knowledge which is to be imparted, is a gift which few possess; it is, in fact, a gift which requires special cultivation, hardly likely to be found in a purely voluntary system. Here and there we find it, but still as another necessity of this voluntary system, we change our teachers constantly, for men can hardly be expected to give their services year after year for the benefit of others. This being so, and I think you will agree with me that it is true, comes the question how are you going to supplement our work, and make the instruction given in the Architectural Association more thorough? I believe there is only one answer, and however much it may go against the grain of those who would adhere entirely to the present voluntary system, it must be given. It is by securing the services of men, qualified professors of the subjects they teach. By all means let us keep our classes, careful only in the selection of those who preside over them, but let us go further and try and obtain lecturers to deal with those special subjects, which can only be properly taught by men trained to speak with the authority of experience, and qualified to impart their knowledge to our students. We are at once met with the question, Where is the money to come from that will make it worth while for men capable of teaching to give up their time to undertake the post of lecturers? I think, if we are in earnest about it, the thing may be done. The Royal Institute of British Architects was founded for the promotion of the art of architecture; but beyond establishing an examination for admission to its ranks, it has done, as far as I can gather, nothing for education. Mr. Christian, the President, in his admirable address in November last, remarked, "And I would ask,—Is it certain that we have done all that in us lay [quoting from the Charter] for the general advancement of civil architecture, and for promoting and facilitating the acquirement of the knowledge of the various arts and sciences connected therewith?" To which I venture to answer, a hundred times, No. Is not the present time, when such great changes in its constitution are under discussion, one for meeting this question of education? To what better use could the Institute funds be put? How better can it raise itself in the eyes of the profession, gather men into its body, and make itself great, powerful, and respected, than in extending by its funds the opportunities for acquiring knowledge? The fact that an examination for admission to the Institute is compulsory surely demands that the Institute should place before students some of the means for passing that examination.

I believe that an educational scheme would commend itself to the members of both bodies, and that if a committee of the Institute and the Association were formed, and ways and means discussed, the two bodies would be drawn together, on a footing which would not in any way interfere with the constitution and independence of either, but only result in good for both, and a closer alliance for strength and resistance against those who have made and are busy making inroads upon us. Hear, again, what Mr. Christian says, speaking of the work done in the Architectural Association,—“And if by any means the work of that valuable institution could be supplemented and aided by our elder body, in liberally sharing with them any advantages which our more material status may enable us to supply, I think it would be advisable for both, and should by us be ungrudgingly given.” That the autonomy, so to speak, of each body should be preserved, all of us will, I think, agree.

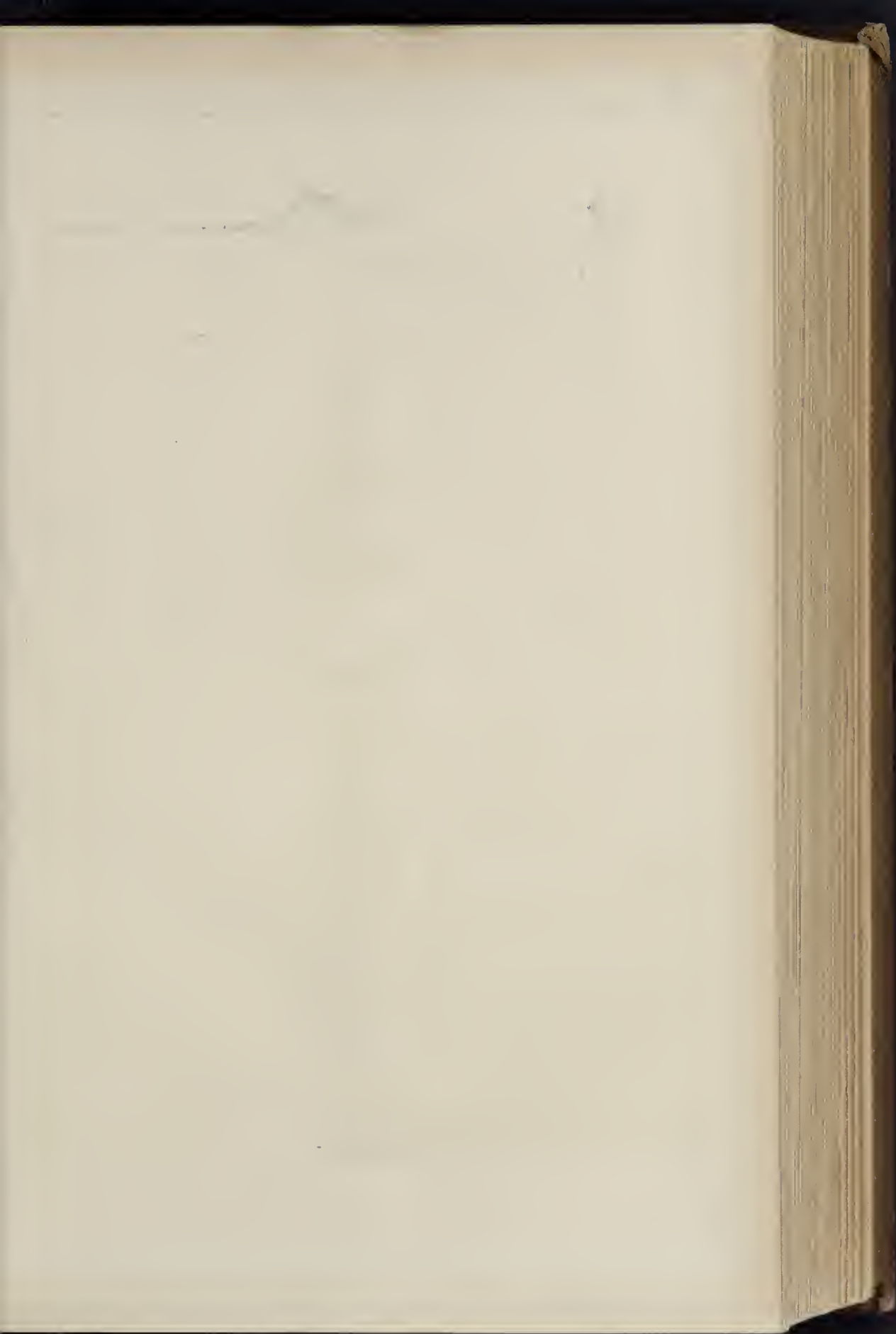
The proposition I have made, one not made for the first time, will be met with the old arguments, and those who are in favour of a closer alliance for the objects I have sketched had better be prepared to hear that the Association had better keep to its old lines, work apart from the Institute, and not suffer any interference from it, or that the Institute should stand clear, and leave the Association to do its own work, and continue to spend its funds mainly on conversation and printing. I hope sincerely the day has gone by for listening to such counsel. A new departure has been made in both institutions. Time has softened down any asperity that may have existed in days gone by. There is no rivalry between the two sisters, if I may use the expression; and, to follow out the simile, the younger has now grown to woman's estate, and may fairly demand some

help from her elder sister in the education of her sons, without loss of dignity or pleading *in forma pauperis*. I am sanguine that the Institute would gain in popularity, would commend itself more to the sympathy and support of its members and the profession, and gather students to its meetings and lectures; while the Association would be more valued for the increased advantages that it could offer, and admission to its ranks would be even more sought after than it is at present. If this be so, the standard of education would be raised, and the men who came under the influence of it, would in their turn make it felt abroad, and so little by little the public would come to recognise the great fact, that to be an architect, properly qualified to carry out the work entrusted to him, requires that a man shall be properly and systematically educated in the various branches of his profession; and that only those who possess this knowledge will stand a fair chance of employment.

I do not suppose that if we succeeded in establishing a course of instruction, with the aid of the Institute, everything would be accomplished that we seek for; but it would be a large measure towards it, and the influence of this would permeate. There is no reason why in the large centres of industry in the provinces, a modified system, such as I have sketched, should not be established, and ways of doing this world, I think, be suggested were architects to set themselves to work to do it. One thing is clear, if we do not, no one else will. If it is a question of funds, and the providing of the sinews of war generally resolves itself into that, why should not, without any great hardship, the subscription membership in our own body be doubled? We doubled the entrance fee not long ago, but it has not deterred fresh members from joining. A guinea a year for the advantages to be gained by students joining the Association is really a very small sum, and I do not think that it would be objected to. Some might resign, a few be deterred from joining; but if you decreed that it should become a by-law, a large increase of revenue would result, and means thus be found for extending the advantages of education, not only to those resident in London, but to those in the provinces also.

It will be advanced, that at King's College and University College courses of lectures in the art and science of architecture are given, and that to multiply lecturers and lectures will be to run in excess of the demand. I believe there is room for all, and that, by a careful selection of times and subjects for instruction, students will be found to avail themselves of the opportunities offered. Let the experiment, at all events, have a fair trial: no harm can result from doing so, and if it be instituted and carried out with energy and vigour, without which failure is a foregone conclusion, success will follow. The special subjects which might be taken up and taught will take too long for me to touch on now. Doubtless those who follow me will do so. No doubt need be felt but what men will be forthcoming to teach if a demand exists, and some adequate remuneration is provided.

The Royal Academy has enlarged its borders, but, after all, cares but little to encourage and foster the mother art of architecture. South Kensington is busy, but its system of teaching architecture finds but little favour, I think, with the profession. Still, it has a marvellous store-house of art, which is at our service, and which we may make better use of than we do now. Technical education is an established fact, may not our own professors take a more leading part in furthering it? I fear it must be conceded that, as a profession, there is an absence of culture among the members of it, and of that refinement which is found in other learned callings. This is not much to be wondered at under a system which allows the most illiterate person to adopt the name of architect, and, "Heaven save the mark," to practise the art. It is this state of things which "makes us traduced, and tax'd of other nations." But the entrance to our profession, as has been done to others, by the test of skill and attainments, and I believe good would result, benefiting the public and profession alike. A diploma may one day become as accomplished a fact, to institute and promote greater facilities for education is a step towards it, and combination to effect this is required. Call this combination, trade unionism, if you will; nothing is to be done without it. We live in an era of "big concerns," and as long as men seek to gain



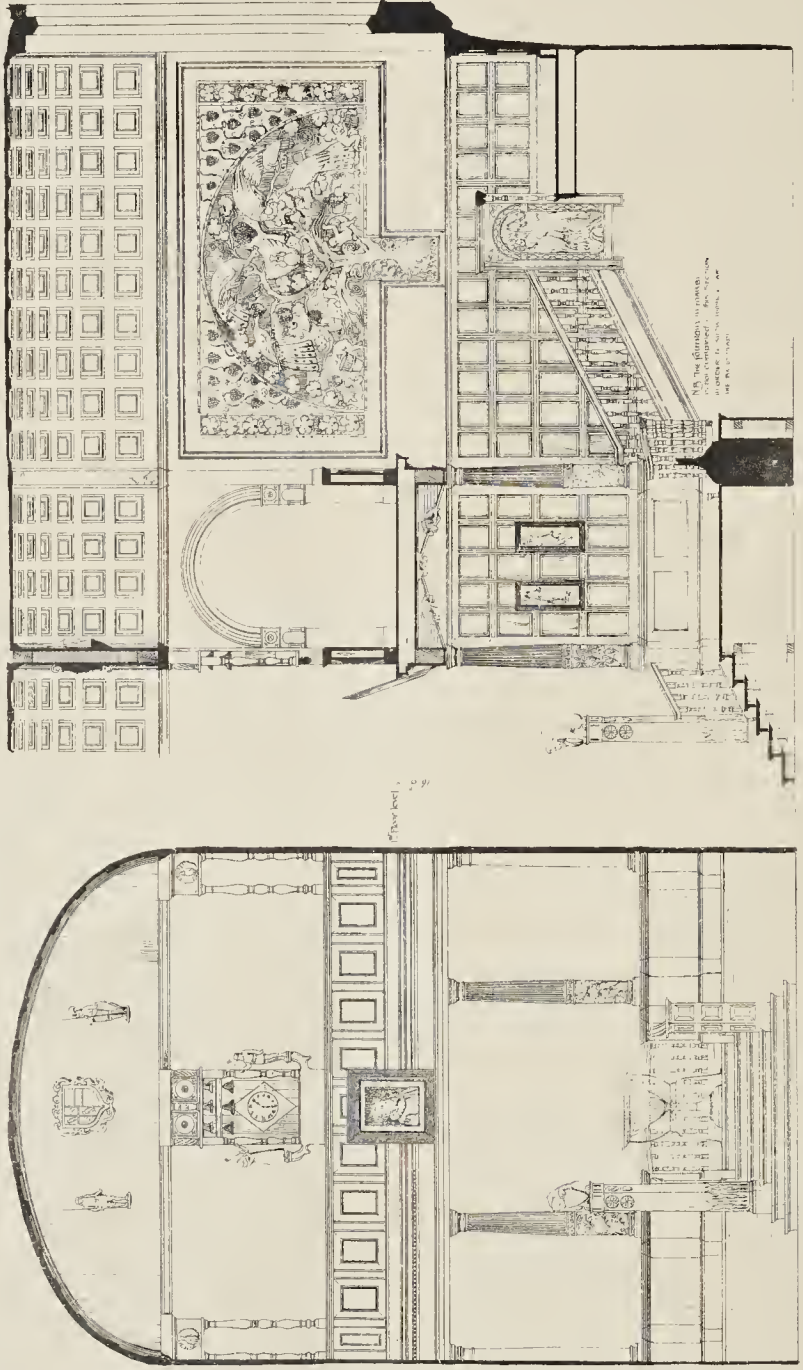
ROYAL ACADEMY OF ARTS

ARCHITECTURAL SCHOOL - LONDON

DESIGNED BY AN INDEPENDENT SWEDISH ARCHITECT

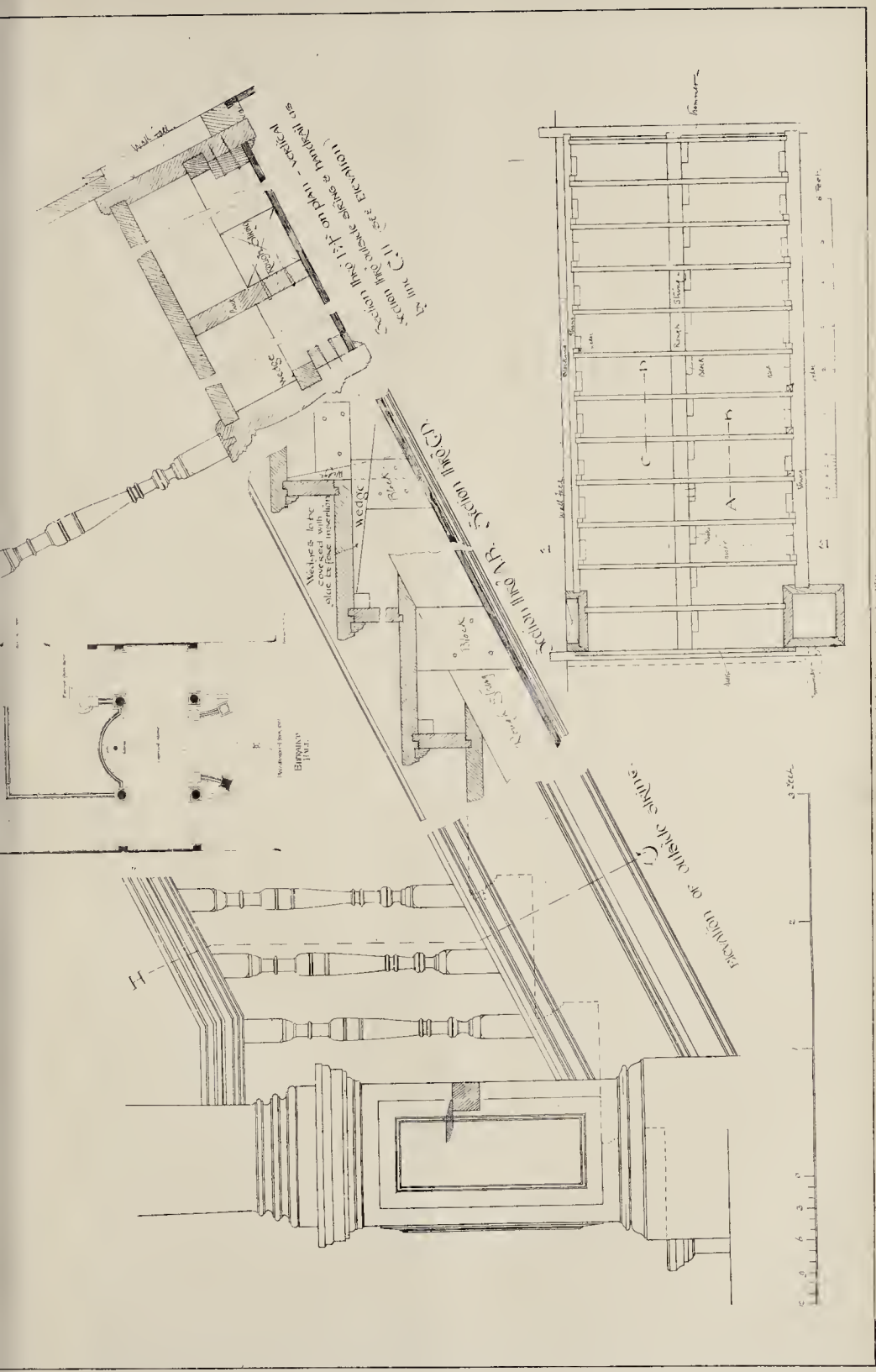
HOUSE - IN WOOD - COMPLETED IN 1600

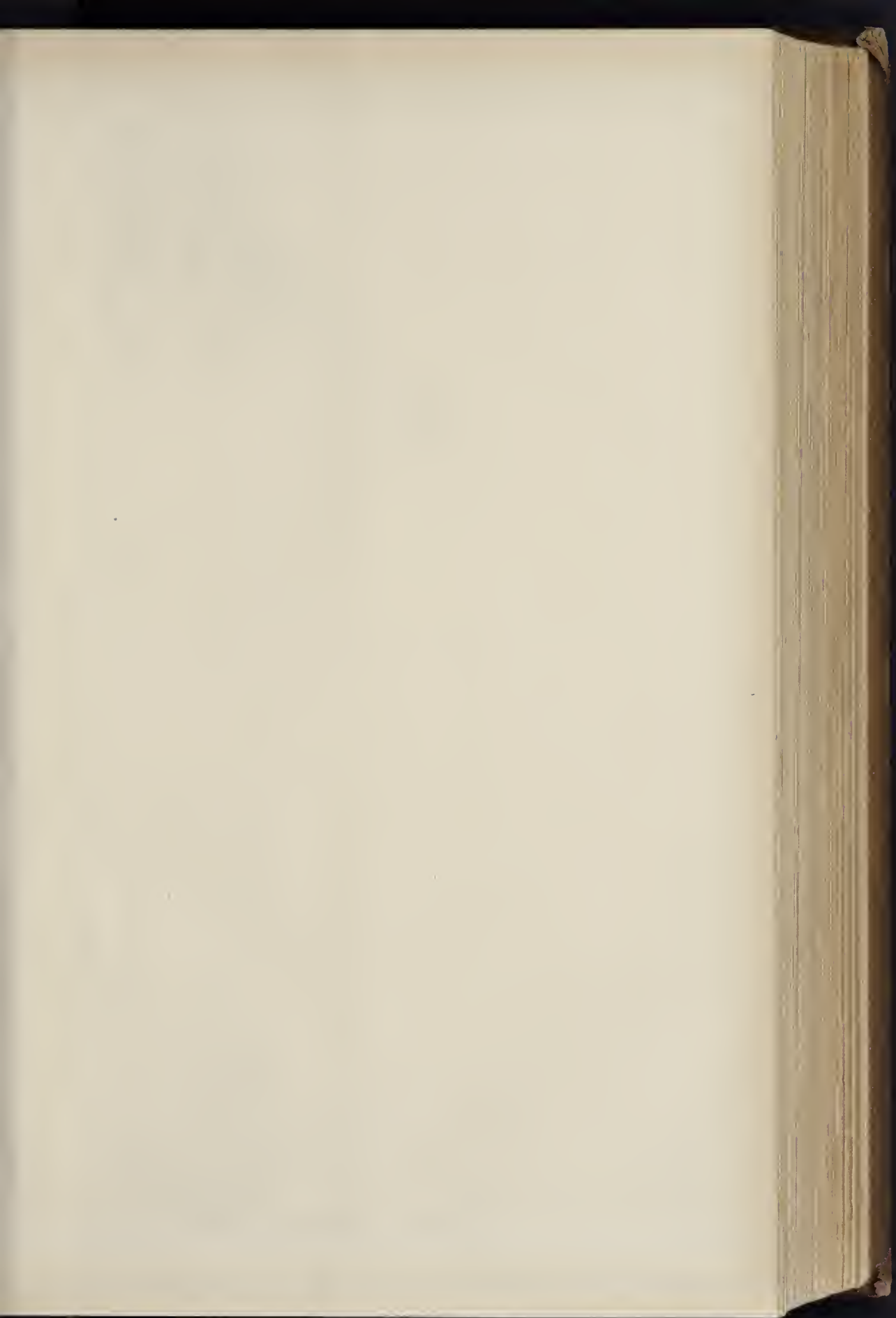
1st prize of 25 premium awarded to John Thwode Slater.



Section and Plan showing Floor Construction in detail.

Section showing Staircase and Wall Construction.





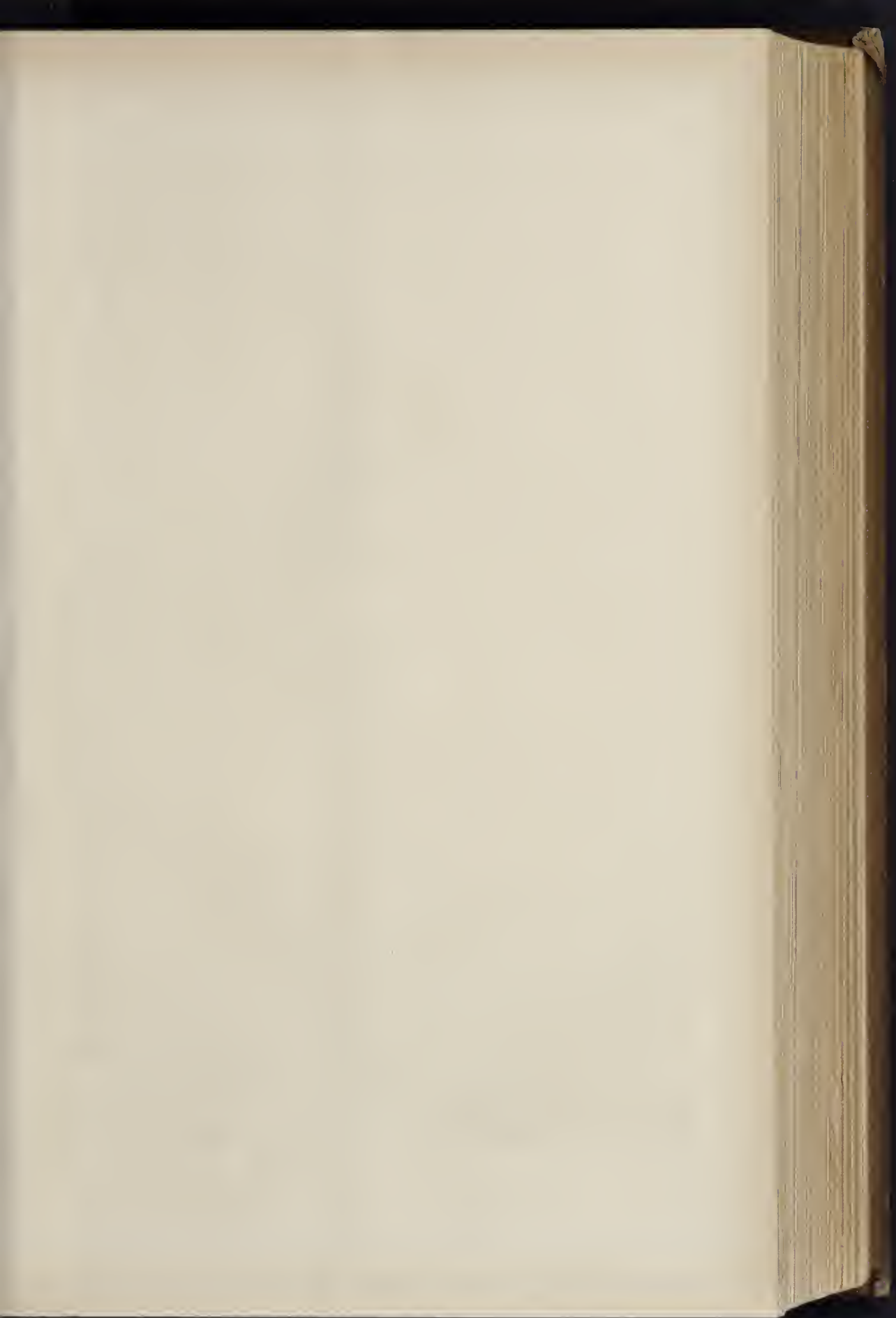
THE BUILDER, JANUARY 10, 1895.



Wyman & Sons Photo Litho

SHOP'S, OLDHAM.—MESSRS. MANGRAM & LITTLEWOODS, ARCHITECTS.

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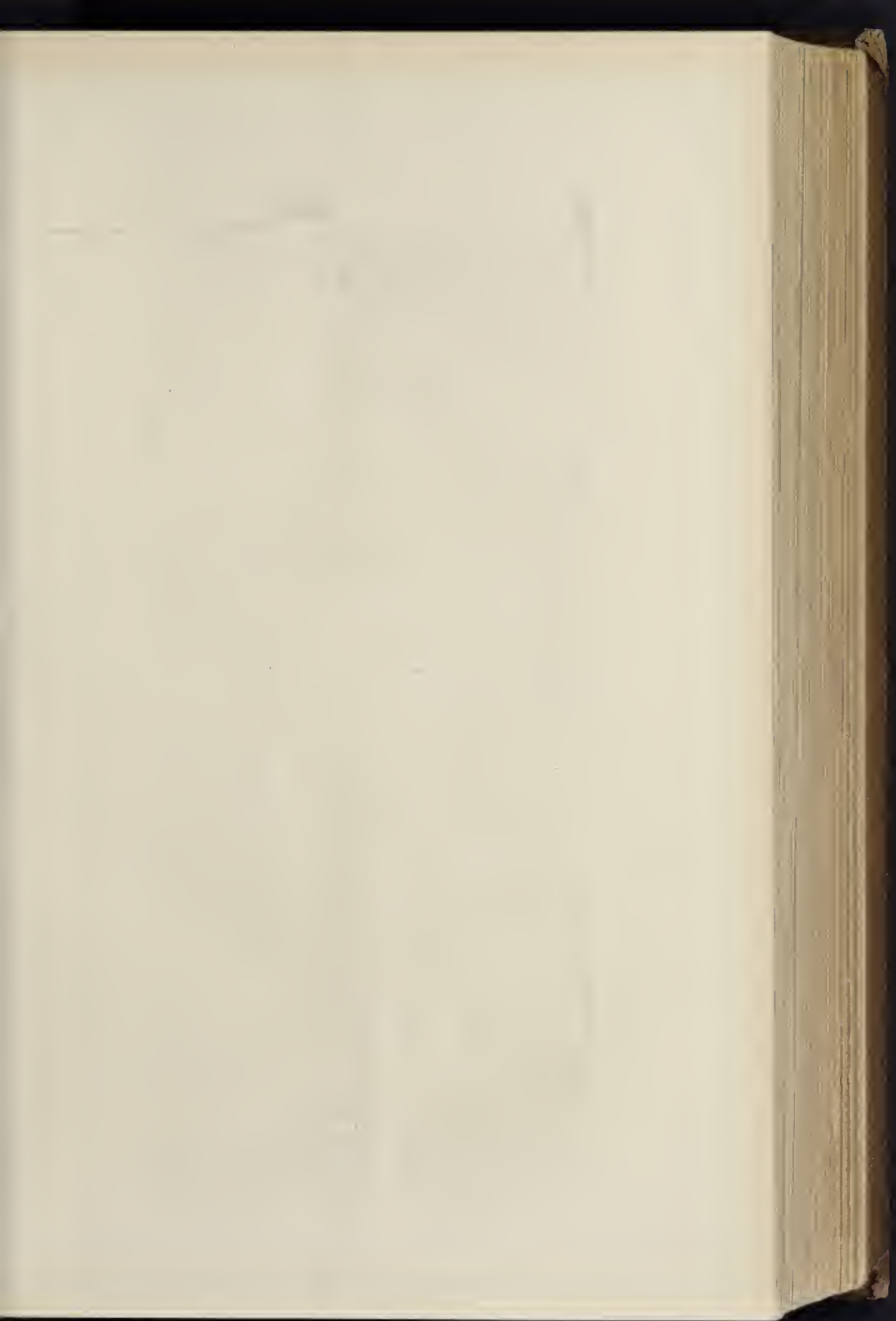




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A STREET IN TUNIS.—FROM A DRAWING BY MR. ALEXANDER GRAHAM.





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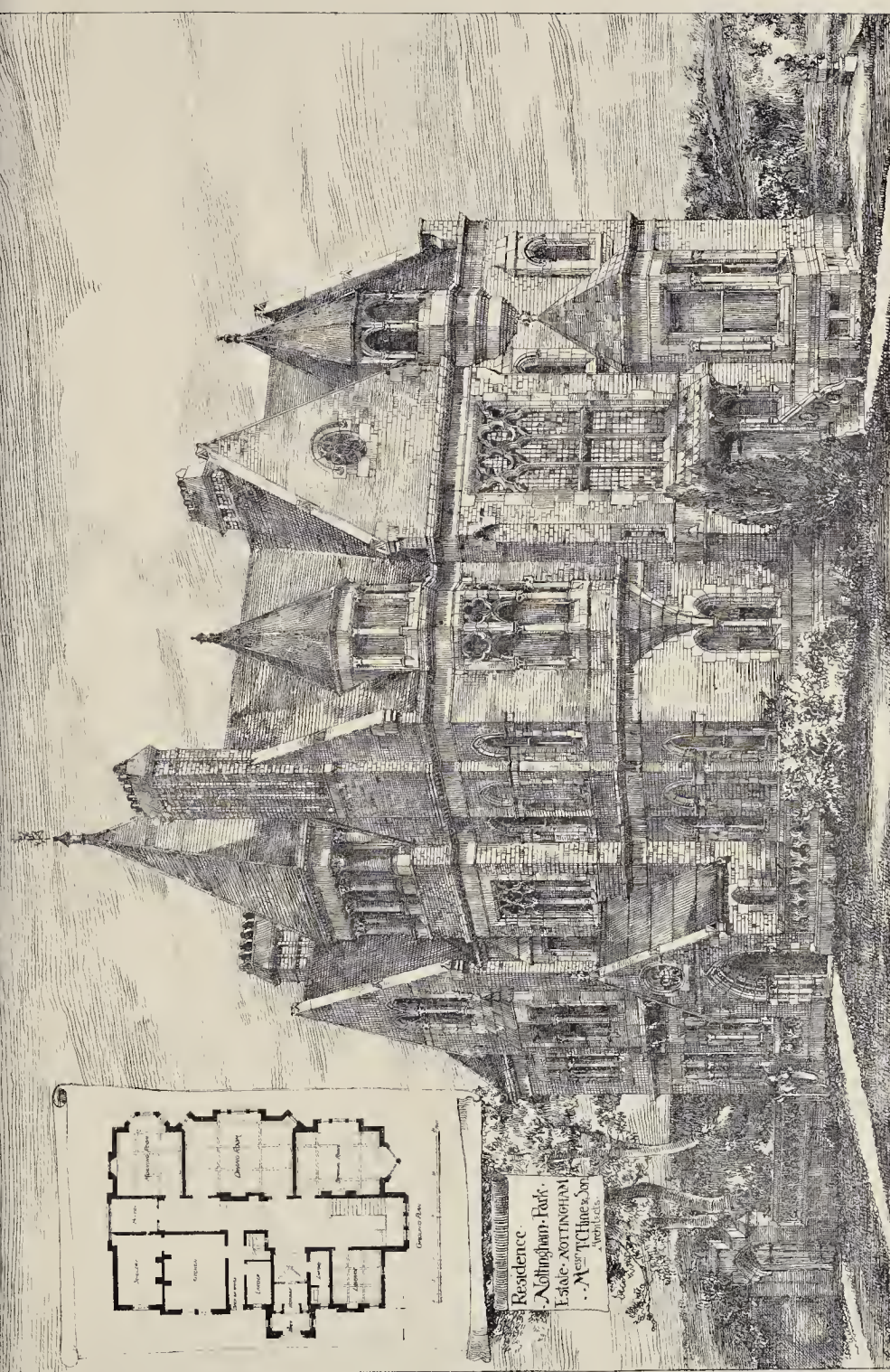
S WOOD, BY N. H. J. WESTLAKE, F.S.A.



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A DOORWAY IN TUNIS.—FROM A DRAWING BY MR. ALEXANDER GRAHAM.



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Residence
Abingdon Park
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Architects

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their legitimate aims in a law-abiding way, they can afford to smile at the charge of adopting trade nomenclature as the means to that end. And the tone of the individual, make admission to a profession an honour and a distinction, and we shall tempt better men to join it, and deter the inferior ones. Reform, with or without the diploma, must be a matter of time, but it does not let that difficulty deter us.

Are we in this age of restless activity to remain simply looking on, or to be up and doing? This is the question which, as a profession, we must endeavour to answer, and then, as best we may, carry the reform into execution. It is possible now to put our house in order, and, though to many who have passed their youth, the personal advantage can be gained by losing the standard of professional education, those who are to take our places have a claim upon us, and we must be careful how we neglect it. But I have trespassed a great deal on your time, and though conscious of many shortcomings, I have ventured to offer with boldness my own imperfect views of an important subject in the hope that we may this evening see the inauguration, perhaps, of an improved professional education for architects.

A report of the discussion which followed will be found in another column.

Illustrations.

DECORATIVE PAINTINGS: "THE ANNUNCIATION."

THE two figures which we give this week, and which collectively illustrate the story of "The Annunciation," are produced from two paintings executed by Mr. N. H. J. Westlake for the Church of Our Lady, St. John's Wood. One figure is placed on each side of the large window. They are rather over life-size, and with the accessory ornament, which is not given in the plate, occupy about 12 ft. by 3 ft.

STAIRCASE DESIGN.

This design, by Mr. J. Atwood Slater, received the first premium of 25*l.* given by the Royal Academy for the treatment of the subject specified,—an internal staircase for a dwelling-house. We commented on it at the time we announced the prizes. We may add that the author is to be commended for having given so much attention to constructive detail, sometimes urged over in designs made for prizes and not for execution.

SHOPS, &c., OLDHAM.

THESE premises are situated in Union-street, Oldham, and have been erected from designs by Messrs. Mangnall & Littlewoods, architects, of Manchester and Oldham. The front elevation above the shop windows are faced with red terra cotta made by Mr. Thompson, of Northwich, the plain surfaces being built with blocks of iron, deep, bonded and backed up with brickwork, dormers and pediments being built of solid terra cotta without any lacing.

The necessity for providing a large open glass out-ledge has confined the effect mainly to the upper part of the building, the ground-floor being glass, with cast-iron ornamental pilasters at intervals supporting the Bressummer beams. The internal arrangements provide for lofty show-rooms on the ground, first, and second floors, all of which are well lighted; the upper part of the first-floor window and the staircase are tinted glass lead lights, effective and subdued in tone of colour.

The contractors for the works were Messrs. Robert Neill & Sons, of Manchester.

HOUSE, NOTTINGHAM PARK.

THIS house forms one of the numerous residences which have been built in Chamber-essent, in the admirably laid-out residential suburb called the "Nottingham Park Estate," which skirts a considerable portion of the town, and for the general laying out of which, as well as for the design of a large proportion of the houses erected on it, Mr. T. C. Hine, of Nottingham (now T. C. Hine & Son), has been responsible. The house is built with red brick and eryshing stone dressings. There are two series of bed-rooms above the ground-floor, one being partly in the roof, and the accommodation includes library, smoking-room, and the

usual offices. The house is one of the more recent additions to the neighbourhood, having been very long completed.

SKETCHES IN TUNIS.

For descriptive article see p. 63.

STAPLE INN.

"... I have this (as) mored my things, and you are now to direct me at Staple Inn, London. . . . I am going to publish a little story-book, which I will send you when it is out."—Sam. Johnson to Lucy Porter, March 23rd, 1759.

THE south-eastern corner of Southampton-buildings opens by a footway on to one of the prettiest little gardens in London. With well-stocked flower-beds and one or two fine trees, and adjoining St. Andrew's Holborn parish, it lies between the hall and the new buildings of Staple Inn, one of the two Inns of Chancery,—Barnard's Inn, its neighbour, being the other,—that belonged to Gray's Inn. Stow says he is ignorant why it should be so called. Some would derive the name from the two staples with a cross bar, which John Breton, custos of London, temp. Edward I., put across the then Chancellor's-lane, for the greater security of those who should attempt what Strype terms its foul and miry way.* But this would hardly seem to be the case; whilst the fact remains that the Inn arose in or just before King Henry V.'s reign, upon Staple Hall, an exchange or bourse for the wool merchants or staplers whom King Richard II. had transferred hither from their settlement by his New Palace Yard, Westminster. The society (who have ever retained their device or emblem of the woolpack) at that time held the property by lease. The first grant of the inheritance to the ancients of Gray's Inn is by an indenture of bargain and sale, dated the 10th of November, 29 Henry VIII., from one John Keighton and Alice his wife, to other benefactors followed. For on the 4th of June, 1623, Sir Francis Bacon, Knight, then Lord Verulam and Viscount St. Alban, confests the college by the style of "all the messuage or inn of Chancery commonly called Staple Inn, and one garden thereunto adjoining . . . to the only use and behoof" of Sir Edward Moseley, knight, attorney of the Lancaster Duchy, with others the ancients of Gray's Inn, their heirs and assigns for ever. Bacon had been co-feeoffee under a deed dated the 18th of May, 32 Elizabeth. Like to that of Barnard's Inn, the hall is a relic from the Great Fire. Some of the window glass dates from 1500. Sir George Buc mentions the new building of the existing hall, against which the fig-trees yet stand, and of parts of the two courts, besides other lodgings,—the gentlemen of the House thereby making it "the fayrest Inn of Chancery in this universitic." The second, or garden, court and much of the first court were rebuilt about one hundred and sixty years ago. But the northern side of the latter is considerably older, being conspicuous for its charming Holborn front, whose picturesque and unique elevation is fully displayed by the demolition of Middle Row (once famous for its wig-makers) some twenty-five years since.

Staple Inn is associated with a tender episode in the life of Dr. Johnson. Having broken up his solitary home in Gough-square, where his wife had died in 1752 (just three days after the issue of the last "Rambler"), on finding, as Hawkins tells us, the balance of the account for his Dictionary against him, he retired to Gray's Inn, where he lived in all the indigent pride and dignity of literature, and thence on the 23rd of March, 1759, removed to Staple Inn.† In January of this year his aged mother died at Lichfield. Johnson had, as he himself writes, been unable to visit her, his disability arising doubtless from his narrow circumstances, since "The Idler" then formed his sole source of an income in which to the last his mother largely shared. His letters to her and to Miss Porter at this juncture are pathetically expressive of his filial solicitude and grief for the rending of the most sacred of human ties. Settled at Staple Inn he set to work upon, and, as he told Sir Joshua Reynolds, wrote in the evenings of one week what he mentions as his little story-book, the allegory of Rasselas, wherewith to

defray the funeral and testamentary expenses, with some debts his mother owed. For this essay, once as popular as was "Clarissa" throughout Europe, he received 100*l.* from R. and J. Dodsley and W. Johnston, the booksellers, who gave him 25*l.* more for the second edition. A reprint of the original edition has just been published by Mr. Elliot Stock. In Staple Inn, too, resided Isaac Reed, in whose chambers Stevens used to correct in the early morning hours the proof sheets for his edition of Shakspeare. We may here, upon good authority, contradict a statement circulated by the press to the effect that the Inn, as purchased by Messrs. Geo. Trollope & Sons, is about to be transformed into a carrier's yard.

Ranging with the southern side of the inner court, and separated therefrom by an elegant terrace, are Nos. 12 and 13, built in 1843, from the designs of Messrs. Wigg & Pownall, architects. Though altogether out of harmony with its surroundings this block is a tasteful and pure example, in white Suffolk brick with stone dressings, of domestic Jacobean architecture. The two stone doorways, each with an oriel above, and the gables, are highly effective. Until lately the rooms were occupied by the Taxing Masters in Chancery and the Land Registry. This building is being gradually acquired for the accommodation of the Patent Office, which now forms a department of the Board of Trade. Consequently upon the radical changes introduced by Mr. Chamberlain's new Patent Act, large and costly additions have been made to the examining branch, for whom quarters are found in the spacious and well-constructed rooms formerly occupied by the Chancery Registrars, immediately underneath the Patent Office library.

ARCHITECTURAL ASSOCIATION.

THE usual meeting was held at the rooms in Conduit-street, Regent-street, on Friday, Jan. 2. Mr. Cole A. Adams, President, in the chair.

Mr. John Slater, architect, F.R.I.B.A., was elected a member by acclamation.

The Honorary Secretary announced that in the unavoidable absence of the author of the paper intended to have been read that evening, the President had prepared a paper bearing on the subject of "The Best System of Education for Young Architects, and how the Work of the Architectural Association may be rendered more efficient."

The President then read the paper, which will be found on p. 65.

In the discussion which followed,—

Mr. A. B. Pite said he had some difficulty in opening the discussion, as he had been requested, to do, because he did not see completely in what special points English architects wanted education. Architecture was an art, and buildings erected were judged by their artistic or non-artistic qualities. The law of the survival of the fittest was seen in architecture by the survival of the most beautiful. Doubtless during the period of the classic architecture of Greece, and during the thirteenth century, ugly buildings had been erected, but they naturally had disappeared, because had architecture was bound to die within a short period. Art was a living power, and all lovers of it regarded only the beautiful and eliminated all that was disagreeable. This explained why all the Mediaeval architecture now existing was so beautiful. He thought the public wanted education more than the architects, and was glad to see the public awaking to the fact that there was a style in art. This feeling was now fostered in our schools of art. The systems of educating architects in France and Germany did not appear to him to have shown by their results any superiority to the English method. Having had opportunities of inspecting the architecture of France, Germany, and Italy, he did not fear a comparison between it and that of the English school. In fact, English architecture was infinitely the best. In methods of education those countries might excel, but the expected results in the better quality of the art were not produced. Our greatest architects had had a sort of haphazard training, but had done better probably than if they had been put into a sort of mill and turned out on hard-and-fast lines, which every one with an appreciation of art would abhor. A student might well enough be trained in certain branches of science connected with the profession, but that would not make him an architect, because his art was a gift which must be born with him, and could

* Chancery-lane was not paved in its whole length until 1549.

† The writer failed on inquiry to identify Johnson's chambers here.

not be crammed into him by any system of training. They might educate a man to be a builder, but they could not make him an artist, and to find out whether a student had art in him was a most difficult thing; and although at the Royal Academy they had a method which they supposed would do that, yet it was utterly futile. The Architectural Association was, in his opinion, already in a happy and satisfactory state, and he advised that things should be allowed to continue as they are. If any change were made, he would suggest some stimulus to competition by enhancing the value of the prizes. In conclusion, he desired to propose a vote of thanks to the President for his paper.

Mr. Millard, in seconding the vote of thanks, referred to the waste of time now involved in the training of an architect. More time than was necessary was taken to learn what was required to be learned in an architect's office. The pupillage system might be advantageously altered, and he would suggest that pupils be taken by the year instead of for periods of five years. There was no doubt much to be learned in an office, but it might be done more quickly by taking the subjects in some methodical manner than by engaging in a number of subjects simultaneously. He would advocate the sending of the student to a School of Art before articling him to an architect; and that would result in ascertaining his artistic abilities, which, under the present system, were swamped by the practical questions that came before him. When the artistic feeling of the student had been aroused, he would soon acquire the practical parts of his business, because he would then see the necessity of doing so. Then, before an article pupil left the office of his master, some arrangement should be made for his having an experience in carrying out completely one work, however small, from beginning to end, under his sole control; but, of course, under the eye of the master. The Association might help a student if it could arrange for placing him in a thoroughly good office with a leader in the profession, and this might probably be done by founding scholarships with that object, and such scholarships would be more useful perhaps than travelling studentships. There was, he believed, plenty of enthusiasm among students, but they wanted a guide to tell them how to go to work,—a sort of man like Arnold, Newman, or Gordon,—and to whom they could look as their leader. When once the curiosity, enthusiasm, and ambition of a student had been roused, such a leader could do anything with him.

Mr. Farrow could not agree with Mr. Pite that beauty was the test of lasting buildings, because in all ages good building and artistic designing had been concurrent; and so in our days the speculative building would be swept away whilst buildings like the Law Courts would exist for many generations. As to haphazard education, men like Street and Burges had had to undergo incessant and arduous study while pursuing their daily work as architects; but if their education had been systematic he believed their lives would have been prolonged, because their work would have been easier to them. It was natural for Mr. Pite to exalt the artistic side of the profession of an architect, but the profession not only involved art, but science also. Art was, no doubt, born with a man, but he had to acquire a knowledge of science, which should, therefore, be taught systematically and carefully. In other professions both theory and practice were studied,—separately as in the Army, Navy, the Church, and in Medicine,—but combined as in Law. In architecture they should be taken separately. That was done in the training of architectural students in Vienna. It was argued by some persons that such a training would bring all students to a dead level, but that was not found to be the case, as each student soon discovered the particular branch of the profession for which he was best adapted, and the number of specialists in Austria appeared to an Englishman extraordinary. In Vienna the student passed five years in a technical school, and then went for three years to the Academy of Fine Arts, afterwards working as a practical bricklayer and carpenter for one year. Then he went into the office of an architect for three or four years before commencing practice for himself. As to the work to be done by this Association, its chief object, he believed, should be to prepare members for the examination required by the Institute of British Architects; and to do that they would require to remodel

the Association and sketch out a definite course of instruction, which should extend, perhaps, over seven years, and by means of study and lectures should be made to cover the whole programme set forth by the Institute. The question of payment of lecturers might not be a difficult one if the subscription to the Association were raised, and if some of the lecturers gave their gratuitous services as they had done already.

Mr. Blashill (who sent a letter which was read by the Honorary Secretary) was of opinion that the only way to educate a student was to bring him face to face with the work in an architect's office, as no books, pictures, lectures, or associations were of any value in comparison with practical work. The student was trained rather by overcoming obstacles than by having facilities put before him.

Mr. Henry Lovegrove advocated an academic training, such as had been described as existing on the Continent, because if the English architect received full instruction in all branches of the profession, he would come to the front, as he did now, whenever he happened to possess artistic talent. A man who wrote poetry was no worse poet because he happened to be an M.A. as well. He would especially like to see every student of architecture taught the principles of design, apart from style; and the student would also do well to pay great attention to colour decoration. The Association should aim at helping towards a more thorough and complete training of the student, so that he might find himself more in harmony with the general culture around him.

Mr. J. Slater said, as regarded the preliminary education of the student, he believed that they now left school much too early, with their minds not sufficiently trained for the work they had afterwards to learn. For instance, one candidate for the Institute examination had served his articles before he was twenty-one years of age. The study of languages was not sufficiently attended to by students, and he had endeavoured to get the Institute to allow some marks for foreign languages, but his suggestion was not adopted. Valuable works on architecture existed in French, German, and Italian, but these were sealed books to most of the students of architecture in England. In regard to the classes of the Architectural Association, the reason why more students did not attend them was that many young students did not know what to do to get the knowledge to be obtained in those classes. The career of the student was usually the choice of his parents, and not of the young man himself. He hoped the Association would do all it could to give such young men information about the classes. To be a good draughtsman was not everything in an architect, because when he was in practice that work was usually delegated to some one else. Professor Roger Smith had said that the first, second, and third essential for an architect was drawing; but there were some other essentials he (Mr. Slater) thought, inasmuch as architects ought to be trained to do the work which engineers and others had taken from the profession. He had been a witness to the good result of the introduction of practical questions in the classes, and some other matters might with advantage be initiated in the scheme the President had foreshadowed.

Professor Roger Smith said he had always taken great interest in the professional education of the students of architecture. He agreed that it was of the utmost importance that everything possible should be done to advance the standard of knowledge, because no doubt competition would be even more severe in the future than in the present. No one should think of entering the profession without a large amount of education and culture. It would not be too much to demand that every student should be able to pass one of the matriculation examinations before taking up the profession of an architect. But after that, the best education for an architect was in the office of an architect under articles, when he would be brought into contact with practical work. That was the only way he knew of to acquire practical knowledge. It would be a good thing, before entering an office, to attend a school of art and learn drawing. He had known that done with great advantage. He would also advise that six months should be spent at the beach to learn how to make doors and windows, so that the working-drawings might be well understood afterwards. One advantage of the course pursued by him at University College was that the

teaching was tolerably systematic and continuous. And so the classes of the Association would be the more valuable the more they could systematise them and make them continuous. The students, no doubt, wanted guidance as to which classes to join first, and to this end some one might be appointed who might be called "The Student's Friend." As to the essential of drawing, he regarded it as such because they could only fix their ideas with the pencil and communicate them to the workman; and, moreover, the student would not learn freehand drawing in an architect's office, but must acquire it elsewhere. He would suggest that the Association should, if possible, arrange for the practice of students in a joiner's shop. He agreed in what had been said as to the value of foreign languages, as there was most valuable information in French, German, and Italian books and publications.

Mr. Tarver agreed fully with the last observation of Professor Roger Smith; also in the suggestion made by another speaker that pupils should be articled by the year. He pointed out that to the student every house he passed should have some interest, and from some of them over fifty years old he might learn much. He would advise students to study as much as possible, but to imitate as little as possible.

Mr. L. Harvey urged that before students entered an office they should be grounded in all the sciences applicable to building and construction. He remarked that many parents put their sons to the profession of an architect because they thought it a good paying business, but he could assure them it was quite a mistake to think so.

The vote of thanks having been passed by acclamation,

The President said some valuable remarks had been made. He quite agreed that an artist was born, not made; but at the same time it was essential that at the present time any one proposing to enter the architectural profession should be cultured and well grounded in the scientific portion of his work.

The proceedings then ended.

THE ULSTER REFORM CLUB, BELFAST.

THIS new club-house was opened to the use of the members on New Year's Day, although the formal opening ceremony will not take place until about Easter. The major part of the ground-floor is intended to be used for business chambers. The entrance to the Club is by the stone porch under the cupola, and thence through a vestibule into the staircase-hall. The principal rooms of the Club are on the first floor. The morning-room adjoins the dining-room, and is connected thereto by broad swing doors, and having the advantage of a southern aspect and of the large bow window, commanding fine views of Royal-avenue, High-street, and Donegal-place, it will always be a cheerful and pleasant room. The other rooms on this floor are the strangers' room and the private dining and drawing rooms. The billiard-room, upon the third floor, is the largest apartment in the building. It has been designed to hold four tables. The roof is of open timber, carried on elaborate iron principals. The walls are covered for some height with a panelled and polished pitch-pine diado; the upper parts of the windows are filled in with coloured glass; and the tables are by Messrs. Barraghes & Watts of London. Every room has an open fireplace, but in addition to this, there is an extensive system of hot-water pipes, carried under every window in such a way as to warm the outside fresh air as it is admitted to the building. The heating apparatus has been supplied by Mr. Wagstaffe, of Duckfield. The kitchens are situated on the topmost floor of the house, and have been fitted up by Messrs. Elliott, Edminson, & Olney, of Manchester. Messrs. Gillow, of Lancaster, have provided the furniture throughout, and Messrs. Robertson, Ferguson, Ledlie, & Co., of Belfast, the carpets and linoleum. Messrs. Patterson carried out the internal plumbing, bellhanging, &c. Messrs. Kiddel supplied and fixed the grates and much of the internal ironmongery. The stained glass is by Messrs. Edmundson, the tiling and parquetry floors by Mr. Oppenheimer, both of Manchester; and the hoists are by Messrs. Stephen, of Glasgow. The contract for the building and most of the interior finishing has been carried out by Mr. James Henry, of

elfast, from the plans and under the superintendence of the architects, Messrs. Maxwell & Peke, of Manchester, who have also superintended the furnishing of the club throughout.

OBITUARY.

Mr. R. M. Phipson, F.S.A.—We record with great regret the sudden death of Mr. Richard (Laklwa) Phipson, architect, and County Surveyor for Norfolk, which took place on the 9th ult. at his residence, Surrey-street, Norwich, from heart disease. Mr. Phipson, who was in his fifty-eighth year, commenced his practice as an architect at an early age in London, and in the following year (1849) took an office at Ipswich, where he obtained considerable professional employment in Suffolk and also in Norfolk, among other works being the restoration of the interior of St. Peter Mancroft Church, Norwich. In 1850, on the post of Surveyor for the County of Norfolk becoming vacant, he was successful in being appointed in competition with nineteen others. He was also one of the Diocesan Surveyors under the Ecclesiastical Dilapidations Act of 1871. A great deal of the work of church restoration in Norfolk and Suffolk, which has been done during the last quarter of a century, was entrusted to him. He was the architect of the Norwich City Asylum, but whether the misapprehensions that have befallen that building were due to his plans, or to the fact that he had to modify his original designs to suit the economical demands of the committee, is a matter in which (says the *Norfolk Chronicle*) probably there will be different opinions. Mr. Phipson was a Fellow of the Society of Antiquaries, and also took great interest in the local Archaeological Association, to whose journal he was an occasional contributor, his last paper being an interesting one on "Carrow Abbey." He was elected an Associate of the Royal Institute of British Architects in 1850, and a Fellow in 1859. In private life he was highly esteemed.

Mr. Alfred Tylor.—Mr. Alfred Tylor, F.G.S., S.A., who died on the 31st of December, at his home, Shepley House, Carshalton, aged sixty-one, was well known in commercial circles as a metal manufacturer (he was a member of the firm of Tylor & Son, Warwick-lane) and as a colliery-owner in South Wales. He was also well known for his efforts on behalf of technical education, which he was induced to advocate from his experience as a juror at the Paris Exhibition of 1855 and the London Exhibition of 1862. Mr. Tylor was connected with many institutions for the promotion of knowledge, and in particular took an important part in raising the London Institution to its present state of public usefulness. His papers are to be found in the *Journal of the Geological Society*, the *Geological Magazine*, the *Journal of the Anthropological Institute*, &c. One of his latest publications is his description in the *Archæologia*, vol. xviii., of the remarkable Roman remains excavated on land in Warwick-square, and now deposited in the British Museum. On the fourth page of our last volume we briefly commented on some of Mr. Tylor's archaeological researches, and frequent notices of his lectures have appeared in our columns.

THE ACTON DRAINAGE SCHEME.

The principal contract for the construction of the Acton Drainage Scheme, described in our columns some time ago, has been placed in the hands of Messrs. Nowell & Robson, and amounts to £35,938l. About 10,000l. of this sum will be spent in laying an effluent-water sewer from the precipitating works in the parish, through Bishopwick to the river. About 15,000l. has been paid for the land which has been acquired in connection with the scheme, which has been assigned by Sir Joseph Bazalgette, assisted by the local surveyor, Mr. Wm. Nicholson Sibley. Pressure has been brought to bear so strongly upon the Acton Local Board from all sides that it has been compelled at the last moment to accept tenders for a distinct and separate scheme of its own, even in the face of the conclusions or recommendations contained in the report issued in connexion with the Kingston inquiry, that the sewage conduit of any combined system should, if possible, be of sufficient capacity to carry the sewage of all the towns round the west of London.

As it is stated in the report that Sir Joseph Bazalgette confirms this conclusion or view, some warm discussion naturally arose at the meeting of the Acton Board on Tuesday night last as to the apparent contradiction, or want of harmony between his evidence at the Kingston Inquiry and the principles which he is carrying out in connexion with the Acton drainage scheme, which includes a new and independent outfall to the river Thames, and which, as stated, is to cost 16,000l. A motion to consult again Sir Joseph Bazalgette to ascertain whether he is of the same opinion as when he designed the Acton scheme, and to make application to the Metropolitan Board of Works for a drainage outlet into the central system, was lost by a large majority.

ROYAL ACADEMY.

LIST OF ADMISSIONS, JANUARY, 1885.

Upper School.—F. S. Capon, H. Cresswell, E. J. G. Dawber, G. Horsley, A. B. Pite, A. D. Smith, and H. J. Westell.
Lower School.—P. Anderson, N. W. Allen, R. S. Ayling, W. H. Boevey, W. A. Burr, W. L. Buxton, F. M. Day, H. P. B. Downing, L. Dennis, H. Drury, L. R. Ford, C. Gill, G. Harvey, T. H. Hitchin, W. H. Howie, H. Hutchings, A. H. Jemmett, A. J. Lancaster, W. Leck, H. G. Manning, F. W. Marks, F. Mascy, C. L. Moadway, W. Newton, R. O. B. North, W. R. Schultz, A. Steadhal, Van Straaten, A. Sykes, A. S. Taylor, G. B. Thorpe, and F. G. Webb.
Probationers.—W. Alford, A. E. Barnsley, F. D. Bedford, W. T. Cave, F. Davison, C. D. Fitzroy, P. N. Ginham, J. E. Inglis, F. J. James, G. L. Jones, G. T. McCombie, and R. F. McDonald.

RECORDS OF CHANGES IN LONDON.

Sir,—It has often occurred to me, in reviewing the numerous and rapid changes that are daily taking place in the streets of the metropolis, where one day we see a row of tumble-down houses, and, in passing the same locality a few months later, we find instead a row of palatial-looking shops, that it would be advantageous if some means could be taken for recording those changes, and it is with this object that I now venture to ask you to allow me to trespass on your valuable space.

What is proposed is that a committee or society be formed for the purpose of making drawings of, or photographing to a small but uniform scale, the elevations of all buildings as they stand in relation to each other in the important thoroughfares of London, and of those streets likely to be demolished or affected by metropolitan improvements, so that each street could be seen at a glance.

This idea may seem to some to be chimerical, and the labour of such a work almost superhuman, but I venture to think that, if done systematically, and taken in hand by a few architects, who would work at it with zeal and energy, that in the course of a few years an invaluable record would be obtained, such as would be interesting to the artist and antiquary, and useful to the architect, lawyer, and surveyor, in dealing with cases of light and air, or in settling many of the numerous disputes which arise out of town property.

It would probably be in the City and the main West-end thoroughfares that this system of streetography (if I may be allowed to coin a word for want of a better) would be most useful; but, if the system were once started, I think its future development would be an easy task.

Whether the drawings should be published or only issued to members of the society, on payment of a subscription, or whether architects assisting in the formation of the record should be entitled to rank as members without payment, are matters which might hereafter be discussed, if the idea should find favour with the profession; suffice it to say that I have already found architects who would be willing to assist in the furtherance of the scheme.

Only imagine the interest which would now be taken in a record such as this if it had been commenced three or four hundred years ago; in those days such a work would have been almost impossible, but modern science has made the task easy.

It has been said that Augustus found Rome built of brick and left it in marble, and future

generations will say that Victoria found London in brick and left it in stone, and if we neglect to preserve the records of brick-built London we shall be neglecting a duty which posterity will lament, even if it does not convict us of culpable negligence. W. HILTON NASH, No. 5, Adelaide-place, E.C., Jan. 6th, 1885.

A CAUTION.

Sir,—It was with some considerable pain that I listened to the remarks which fell from Professor Kerr, at the business meeting of the Institute on the 5th inst., suggesting the advisability of converting some of the rooms at 9, Conduit-street, to the uses and privileges of a "club."

Fortunately his remarks were submitted only as a "suggestion" and by that discretion may, perhaps, be overlooked.

It need not be contended how injuriously such an innovation might operate, and I sincerely hope that Professor Kerr's suggestion will be as barren in effect as it deserves.

Had this pernicious suggestion come from one not of established reputation, it might have been excused; but coming, as it does, from an eminent, learned professor, to whom juniors are accustomed to look for advice and wisdom, its birth is of too much importance to ignore the possibility of danger. Not!

AREAS OF BOROUGHES.

Sir,—Will any of your readers kindly inform me, either personally or through your paper, which borough in England has the largest area?

Sheffield is 19,650 a. 1 r., and I am informed that there is a borough with a larger area, but as yet I have been unable to find out which.

I am desirous of ascertaining this as I require the information to prepare some statistics; hence my reason for troubling you.

FREDERICK A. KEMP, Assistant Borough Surveyor.

Sheffield.

NON-CONDUCTORS OF SOUND.

Sir,—Can any of your numerous readers say from experience what is the best non-conductor of sound through party-walls?

I have a 14-inch wall dividing a printing-office from surgeons' consulting-rooms. I have isolated floor-bearings, also erected wooden partition 9 in. from wall, filled in with sawdust, which does not keep back the sound. B. & C.

CHURCH-BUILDING NEWS.

Winslow (Bucks).—The parish church, dedicated to St. Laurence, and possessing many interesting architectural features, dating from the end of the thirteenth century downwards, was re-opened on the 30th ult. It has been closed since February last; and during the interval has been carefully restored under the direction of Mr. John Oldrid Scott, M.A., architect, London. During the progress of the work Mr. Scott has been represented on the spot by one of his late father's trusty clerks of works, Mr. George Hannaford; and Mr. George Cooper, of Aylesbury, was the contractor who undertook the general renovation of the fabric. The masonry has all been well cared for. The ancient chancel oak roof has been opened out, and new roofs, also of oak, have been placed over the nave and south aisles. The floors in the nave and aisles are laid with wood blocks, in geometrical designs, and the space is temporarily seated by chairs. The avenues are paved with Godwin's red and black tiles, and the chancel and the space under the western tower are laid with encaustic tiles by the same firm, and therein stands a new Caen stone font on Purbeck columns. The altar is raised five steps above the nave line. The reredos and double set of stalls are of oak, and so are all the doors. The ironwork on the latter are by Mr. W. Skidmore, of Coventry. The reredos is decorated by Messrs. Burlison & Grylls, of London. The brass standards are by Messrs. Barratt, of Birmingham. There is a statue of St. Laurence in the south porch; this is by Mr. Harry Hems, of Exeter, who has also executed the stone and wood-carving generally. The total cost of the work is 3,500l.

Hulme (Manchester).—Great improvements have been made in the chancel of St. Mary's Church, Hulme. A reredos has just been erected, and a new altar and foot-piece of oak have replaced the old ones. The reredos is in the form of a triptych, with wings. There are three recessed panels, which will shortly be filled with paintings by Messrs. Clayton & Bell.

Above these are carved and perforated gables, the centre one rising to a height of more than 20 ft. The whole has been executed in oak by Messrs. Earp, Son, & Hobbs, of London and Manchester, from designs by Mr. J. S. Crowther, of Manchester. A frontal has also been presented for the new altar. It is of cream silk damask, embroidered all over with a rich trailing pattern. It has been entirely the work of three ladies (sisters).

Lewisham.—A further addition to the parish church here is the new pulpit designed by A. W. Blomfield, M.A. It rises to a height of 12 ft. (this being necessitated by the galleries) and rests on a plinth of Portland and red Mansfield stones. Four columns of Shap granite with carved capitals support the arched and corbelled consoles which carry the body of the pulpit, which on its three wider faces contain semicircular arches subdivided into smaller open arches with marble columns, the three narrower faces being niches filled with the angels Michael, Gabriel, and that of the Everlasting Gospel, the whole composition being terminated with a moulded carved and polished alabaster cornice. It has been executed by Messrs. Earp, Son, & Hobbs; the open iron staircase being the work of Messrs. Hart, Son, Peard, & Co.

STAINED GLASS.

Louth.—A stained-glass window has been placed in St. Michael's Church, the subject of which is "To Thee all Angels cry Aloud." The whole of the lights are filled with adoring angels, except the top, which contains the Agnus Dei. The window has been given by the congregation in memory of one who was an active worker in the parish, and the design has been carried out by Messrs. Mayer & Co., of Munich and New Bond-street.

Trefnant.—Three windows, by Messrs. Burdison & Grylls, have been placed in the parish church of Trefnant, diocese of St. Asaph, as a memorial of Mr. Townshend Mainwaring, for many years M.P. for the Denbigh Boroughs, who died on Christmas Day, 1883. The church was built by the Mainwaring family from designs by the late Sir Gilbert Scott. One of the windows has been contributed by Mr. Mainwaring's family, and the other two by his numerous friends.

Scarning.—A window, by Wailes, of Newcastle, has been placed in the chancel at Scarning, Norfolk, by Miss Warcup, former inhabitant of the parish, in memory of her father, a physician of large local practice, who was one of the landowners there. This is the fourth window which members of this family have at various times presented to the church.

Sewage as Food for Fishes.—Sir John Lawes, whose distinguished services to agriculture and agricultural chemistry entitle his words to the most respectful hearing, suggests that it may, after all, be more profitable to throw the sewage into the sea than to apply it to land. To the broad line of Sir John Lawes's argument no exception can be taken. Enormous quantities of fish are removed from the sea near our shores, and in them enormous quantities of phosphate of lime, potash, and nitrogen. Now, phosphate of lime exists in sea-water in very minute quantity, and yet it is as essential an article of food to fishes as to mammals. If, then, as Sir John Lawes contends, the sewage of large towns gives back to the sea enough, or more than enough, to compensate for the food material annually taken from it, it may well be that continued and even increased prosperity may accrue to the fisheries. Of course, there would be no need to continue the present disgusting system of throwing the sewage in a raw state into a river used as the highway of nations. Even after defecation the sewage would still retain nearly all the nitrogen and much of the mineral constituents. In one respect, indeed, such a defecation would be a great advantage to the fishes; for it was proved in evidence before the late Royal Commission that the sewage throughout a largo area of the Thames absorbs, practically, the whole of the dissolved oxygen, on which the respiration of fishes depends. This evil would be diminished by defecation, but would only be cured entirely by a much greater dilution. The speculation is a very interesting and important one, but a great deal of further inquiry will be necessary before it can be adopted as a basis for action.—*Lancet.*

The Student's Column.

LIME, CEMENT, AND THEIR USES.—II.

HAVING determined the fineness, the next thing to do is to find out if the cement is quick or slow setting, and how much water it requires to gauge it to a proper consistency, i.e., a stiff mass, that will remain in any form into which it is worked. To do this, weigh out 10 ounces of cement, and put it on the gauging table, measure out 3 ounces of water in a measuring glass, add the water gradually to the cement, working it with the trowel the whole time till it is evenly gauged throughout, and of the desired consistency; divide it into three parts, and make a neat pat of each; put each on a separate piece of glass, and number them 1, 2, and 3, and note the amount of water used, which will probably be from 1.75 to 2.25 ounces. Pat No. 1 is to be left in the air, pat No. 2 is to be put into water as soon as it is set. The object of pat No. 3 will be referred to later on. Having made this little experiment with the cement, whether it is quick or slow setting, the general character of the cement are ascertained, and the experimenter is in a position to make his test-pieces, or briquettes, as they are generally called, so as to obtain the best results. The briquettes are now always made with an area of 1 square inch at the smallest section, which is, of course, the point of fracture; but it will be readily understood that different forms will give different results,—the one which is now generally adopted is according to the annexed sketch, the clips or jaws of the testing



machine holding it at the points marked A A A A,—the section of smallest area being on the line B C.

No test for tensile strength should be determined by the result obtained from only one briquette, as air-bubbles, inequality in gauging, and other circumstances may render an individual briquette imperfect, and the result obtained would consequently not be just. Ten briquettes at least should be made,—five to be broken at the expiration of each of the dates named (three and seven days from gauging), and the average of each five taken as representing the strength of the sample at each date. It is convenient to have five moulds put together in one nest, and enough cement gauged to fill the five moulds at once; five moulds of the form given require rather less than 30 ounces of cement to fill them. As 10 ounces of cement were used for making the pats, if 30 ounces are taken for the briquettes, then, by multiplying the amount of water used in making the pats by three, the exact quantity required for gauging the briquettes is known, and the measure must be filled with exactly that quantity. The cement is then to be gauged in the same manner as already described for gauging, the pats and put into the moulds; it should then be lightly rammed and shaken so as to get rid of all air-bubbles, smoothed off on the surface, put on one side, and not again touched or shaken in any way for twenty-four hours. The briquettes should then be taken out of the moulds and put into water, where they must remain until they are to be broken. It is almost needless to add that the water both for gauging and that in the tank should be perfectly clean and fresh.

The operation of gauging the cement and putting it in the moulds should not exceed five or six minutes, and with some quick-setting cements it should not occupy more than three or four. The difficulty of getting the thirty ounces to an even and proper consistency with the minimum of water in this short time is great, and the knack can only be acquired after

considerable practice and experience, and different results will often be obtained even by two expert gaugers. To obviate this a small machine has lately been brought out for gauging the cement. It consists of a small pan, into which the cement and water are placed, and by merely turning a handle, the stirrers in the machine, which revolve on their own axes, as well as round the pan, thoroughly gauge the cement in one or two minutes.

When the briquettes are to be tested, they are taken out of the water, wiped dry, and put into the testing-machine, and broken at once. The testing-machine should be so regulated that the strain is put on to the briquettes evenly and without jerks, and at the uniform speed of 100 lb. every 15 seconds; for it has been proved that very different results, amounting to as much as 25 per cent., may be obtained by applying the strain at different speeds.

The fineness, time of setting, and the strength of the cement are now known, but the pats have still to be examined to know if the cement is sound. Cement does not, as a rule, show signs of "blowing," i.e., disintegrating, for a considerable time when allowed to remain in the air. It shows it quicker when put into water as soon as it is set, and, quickest of all, when subjected to moisture and heat combined. A good sound cement will not blow under any of these conditions. Many cements will blow simply because they are too fresh, and, if kept for a short time, would be found to be perfectly sound. The reason of this has already been explained.

Pats No. 1 and No. 2 should be examined every day. The first indication of the cement being unsound is detected by the appearance of small cracks, commencing on the edges next to the glass. It would, however, be a very bad cement indeed that would blow under these conditions in a week. Pat No. 3 may, therefore, be subjected to the moisture and heat combined, as by this means an absolute result may be obtained in twenty-four hours. This test, however, can only be carried out in special apparatus, and requires to be very judiciously and carefully manipulated. The operation consists in subjecting the pat directly to the steam of vapour rising from water of 100° temperature Fahr., where it is left for three or four hours. It is then put into a bath of water which is maintained at an even temperature of 110°, and the pat examined twenty-four hours after gauging; if the pat then shows no signs of blowing the cement may be relied upon as being perfectly sound. Great accuracy is required in maintaining even temperatures, for, if lower temperatures are used, the test is not so decided, while almost any cement will blow if the temperature has been much exceeded. The great value of this test is that it enables an opinion to be formed in a few hours as to whether the sample under consideration is sound or unsound; and, disregarding strength, if it is a safe cement to use.

The principal difference to be observed between limo and cement, is that whereas lime has strong adhesive powers and small cohesive powers, cement possesses the reverse properties. Lime, therefore, is improved in strength by the addition of a suitable sand, while the strength of cement is greatest when it is used by itself. To determine the constructive value of a sample of limo by means of laboratory or testing-room experiments, is much more difficult than the carrying out of an ordinary cement test. In fact, such tests are seldom adopted, for from a knowledge of the components of the limestone from which the limo is burned, and from its general appearance, a very just opinion can be formed as to its suitability for the work for which it is intended to be used, and it is only necessary to ensure that it is worked in a proper manner.

When, however, a test is made, it is simply the hardness which the sample attains after gauging that is determined, and this is done by what is known as a Vicat needle. A Vicat needle is an instrument consisting of a needle with a flat point fixed to a light rod, which slides in the framework of the machine; the needle, being weighted to the required amount, is allowed to fall from a certain height on to the pat of limo, and the indentation measured by means of a Vernier scale on the guide-rod. It is usual to make the pat to be tested of one part limo to three parts of clean sharp sand, about 3 in. square and at least 1½ in. thick; the needle should have a diameter at the point of 0.1 inch and should weigh with the rod and

chments 4 oz.; the fall should be 6 in., and experiment carried out seven days after setting the pat.

The knowledge of the analysis of the lime (or even generally its geological position) in which the lime under consideration has been burned, will at once decide whether it is a hydraulic lime, and an examination will decide if it is well burned and fresh. The order of burning can be, in the matter of rich limes, easily determined by taking a small quantity of it, dipping it into water, and then putting on one side for a short time. If it all falls to a white impalpable powder it is a sure indication that the lime is properly burned. If, on the other hand, hard lumps remain, this is an indication that it is not well burned, and a few more tests should be taken from different parts of the bulk and the same experiment carried out. In the foregoing, it need not be forgotten, refers to rich limes only; the hydraulic and eminently hydraulic limes take a much longer time to "burn," some of them as much as a week or more, or even longer; in fact, from the experience of "slacking them" they are generally ground to facilitate the operation. The freshness of the lime is essential, because lime that has become "killed" by absorption of carbonic acid from the atmosphere will not make good mortar. If all the lumps of lime are clean sharp edges without cracks or any indication of powdering it is in a perfect condition for use. Lime is supplied from the manufacturer as "lump" lime or ground. The rich limes are generally supplied as lump lime, and the hydraulic limes are generally ground; but, less it is to be used at once, it is preferable to have it in lumps, as in that condition it will keep longer time in good condition.

Roman cement, plaster of Paris, parian and Keene's cement, though not used for purely constructive purposes as are lime and Portland cement, are still of the same category. Roman cement is the immediate forerunner of Portland cement. It was no doubt called Roman because it was thought that in it had been rediscovered the cement used by the Romans, and to which it has given such a high reputation; it is, however, needless to say that the Romans were ignorant of Roman cement. It is an essentially hydraulic cement, containing considerably less silica than Portland cement, and a correspondingly increased quantity of silica and alumina, and it is burned at a much lower temperature. It is produced by the simple calcination of an argillaceous limestone, which is found in many parts along the English coast. The principal seat of the industry was in the Isle of Sheppey, where large quantities of the stone were found; it has been entirely superseded by Portland cement, and very little is now made. It is of a dark brown colour, and sets very quickly, whether left in air or put in water. It attains its maximum strength in a very short time, and when tested for tensile strength in the same way as Portland cement, breaks at about 200 lb. per square inch when seven days old, and it never increases much more. Medina, lias, and other cements are simply variations of it.

Plaster of Paris is calcined alabaster or gypsum, and is sulphate of lime, containing not one-third part of water. The object of calcination is, therefore, only to expel the combined moisture. The calcination is carried out at a very low temperature, and it is then ground to the desired fineness. In some districts the gypsum is first ground to powder, and the moisture evaporated from it by placing it on hot plates. Plaster of Paris sets very quickly when water is added to it. It is used only for internal work, as it never attains any very great strength or hardness. For ornamental carvings, &c., in rooms it is often mixed with lime-patty to make it slower setting. Keene's, Martin's, and parian cement are all manufactured from plaster of Paris by the addition thereto of alum, sulphate of potash, or borax. By these additions in the proper proportion the plaster is rendered extremely hard on the surface, and is capable of taking a certain amount of polish. Many of the artificial marbles are made with one or another of them as a base, with colouring matter added to give the vein of the stone or marble it is intended to imitate.

Having now become acquainted with the qualities and properties of the cements and plasters in general use, the study of their manipulation and treatment in practical constructional work next deserves attention, but before describing the manner in which the different

matrices are used to the best advantage, the following general rules and instructions should be carefully studied and invariably adhered to.

As to the choice of materials. It is often impossible to obtain the particular lime or cement that is desired. In that case experiments should be made with those that are available, the result of each noted, and the advantages and disadvantages of each carefully considered before a determination to use either one or another is arrived at. In carrying out such experiments it must not be forgotten that they are essentially comparative, and that therefore each material must be tested in such a manner as will enable the best result to be obtained from it. Every detail of each experiment must in itself be an experiment. Never jump at a conclusion; but, no matter how good or how bad a result seems likely to come out of the experiment, follow it to the end, and be sure that the true value of the material has been arrived at. If a certain result is wished for, nobody is easier to deceive than oneself, and a certain result is always wished for if a preconceived opinion is formed; begin the experiments, therefore, without an opinion, and finish them by having a strong and a true one.

Having decided the proper and best manner in which a material is to be used, give instructions and directions in a clear and practical manner, and, above all, see that those instructions are carried out. Good materials are of no value if they are spoiled in the handling. The cement or lime is to give strength and adherence to the whole structure,—and it is, with the addition of sand or other material, formed into a compound material, the strength of which and its power of adhesion to the materials it is intended to unite, depends on every detail of its make and use being carried out in accordance with the instruction given. It should never be forgotten that the manufacture of a cement or lime is a chemical and not merely mechanical operation; that as soon as water is added to either for the purpose of reduction to the form required for use, a further chemical action is commenced, which must be carried out and completed in as careful and perfect a manner as was the former of manufacture. The completion and perfection of any chemical action is much more difficult of attainment than where a merely mechanical mixture is desired. It is, therefore, all the more necessary that the greatest care, supervision, and common sense should be used in the manufacture of a chemical compound.

No amount of supervision and care will ensure the making of a good mortar unless the necessary appliances are at hand. Makeshifts may answer in many instances, but they are not desirable: always, therefore, see that the plant is sufficient for the purpose. A man cannot do more than a day's work, and if his time is taken up in unnecessary labour, he does not do so much of the necessary work, and, further, that work is not done so well. By all means substitute machinery for manual labour if it does as good work; for it is more certain and reliable in its result, and requires less supervision. Again, be careful in the manipulation of every detail in the making of mortar, and discard the idea that the oldest man and the youngest boy in the builder's employ are the two most eligible persons to perform that duty.

Mortar is a combination of one of the limes or cements,—the properties of which have already been considered,—and sand; if to this stones of varying size and shape are added, the result is concrete. The lime or cement is called the matrix, and the sand, or sand and stones, the aggregate. Mortars and concretes may be made with varying proportions of matrix and aggregate, according to the structural strength required, the strength of the matrix, and the properties and power of the aggregates to receive the adhesion of the cement.

The sand just merits attention because it enters into the composition of both mortars and concretes. In a few words, the sand should be clean, sharp, and neither too large nor too small in grain, nor should the grains be of equal size.

The sand should be clean, because in that condition it has been deprived of all loam and organic or greasy matters, which, by their nature, act detrimentally in all limes and concretes, depriving them of their power of setting, reducing their strength, and rendering them more or less friable. A clean sand is, so far as its use in building is concerned, an insoluble

and unchanging material, which does not absorb moisture. It is, in fact, a purely inert material, acting in no way either chemically or otherwise in the matrix, merely allowing itself to be made into a concrete mass when combined with the lime or cement, the strength of which depends, independently of the strength of the cement, on the favourable or unfavourable shape and size of the grains to receive the adhesion of the lime or cement, and it will be readily understood that the more angular or "sharper" the grains of sand are the better they will key with each other, when made into a mortar, as well as offer a larger surface for the adhesion of the cement, than if the grains are rounded.

SIR,—Having read with much interest the lessons on perspective in the "Student's Column" of the *Builder*, I venture to suggest that another lesson on bird's-eye views and also one on the projection of shadows would be most acceptable to a large number of your readers.

HISKETH BARLOW.

** The bird's-eye perspective subject shall be treated when space serves. The subject of projection in drawing (including shadow) will be specially dealt with at some length shortly.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,434, Improvements in Domestic Fireplaces. G. H. and A. Brown.

It is usual in domestic fireplaces to fasten the range to the long front and short front by means of bolts and nuts, which is inconvenient, as parts of the grate are then difficult of access, and expensive to repair. Fire space is also generally reduced by using false bottoms, or by raising the bottom bars. This invention is designed to provide a grate which is easy of access, and also capable of having the fire-space readily reduced. On the long and short fronts a vertical groove or slide is cast, into which a movable sliding range is easily moved up or down so as to reduce the size of the fire-space, or it may be lifted out bodily, so as to obtain access to the other parts of the fireplace. Some improvements are also made in the fastening together of the parts of the range by means of long pins or screws, which pass through the movable slide, and fix the range in the proper position.

2,777, Improvements in Wall Ties. W. Monney.

The improvements consist mainly in forming serrations or corrugations upon the branches or arms of wall-ties, whereby the holding power is greatly increased. The serrations are so formed that any contraction of the tie tends to draw the two sections of the wall closer together, by reason of the vertical faces being directed towards the centre. Any expansion of the tie does not separate the two walls, as only the inclined surface of the serrations comes into contact with the surrounding material. Shoulders are also formed to prevent the wall collapsing under external pressure.

3,214, Improvements in Soil and Waste Pipes. F. W. Hagen.

The branch soil or waste pipe is made longitudinally to rise towards the vertical soil-pipe, and thus it becomes self-ventilating, and is accessible from the outside of the building. A screw cap is placed in such a position opposite the junction with the main pipe, that it may be readily got at. The opposite end of the branch pipe is below the water seal of the fittings.

1,465, Trellis Work, D. Karritschoner.

The trellis-work is made of wrought iron in bent or straight bars jointed together by a lazy tongs arrangement and furnished with gilded rosettes at the joints and elsewhere if desired. It can be extended or contracted.

5,002, Metallising and Polishing Wooden Articles. C. W. Rees.

The surface of the article is prepared as for French polishing, and sized with white lead or plaster of Paris. It is then French polished with a ground-colour suitable to the metallised appearance required, as, for instance, using ground turmeric for brass, &c. A glaze is then applied and allowed to stand until hard, when the surface is rubbed over with a transparent polish, dabbing the rubber in bronze or other powder. A slight coat of transparent polish is then applied to the surface which is next spirited up.

6,127, Connecting Water-closets, &c., with Ventilated Soil-pipes.

The objects are to avoid the use of syphon or similar traps between a water-closet and the soil-pipe, and to provide a connexion which will prevent the return of sewer-gases from the soil-pipe into the closet, and to avoid the necessity for the use of a separate pipe or pipes other than the soil-pipe for carrying away waste water from a house. The closets on the various floors are connected, two or more together, to a cast-iron, lead, or other receiver, covered by a grating. These receivers communicate with the soil-pipe through a flap-valve opening outwards, over which there is a cover to allow of easy

access to the valve. The receiver being closed from the soil-pipe and open at the top, bath, sink, and other water-pipes may be led into it without liability of sewer-gas escaping up them.

APPLICATIONS FOR LETTERS PATENT.

Dec. 24.—16,866, J. Craven, Improvements in Cases or Holts.—16,872, T. Lythgoe, Improved Sanitary Slop Stone.—16,873, J. Smith, Composition for producing Imitations of Carved and Moulded Woodwork.—16,876, C. C. Brodie and J. D. Prior, Improvements in Cooking-ranges.—16,882, H. Hasall, Furnaces for Pottery or Brick Kilns.—16,883, J. Gillespie, Internal Walls of Furnaces.—16,884, J. Gillespie, Improvements in Brick Garden Walls.

Dec. 27.—16,922, P. Corcoran, Machinery for Dressing Stone.—16,943, S. Willett, Securing the Meeting-bar of Sash-fasteners and holding same.—16,950, W. Smith, Manufacture of Portland Cement.—16,951, S. S. Hazeland, Machinery for Planing Wood.—16,952, J. Watts, Testing Draught-pipes.—16,968, J. Griffin, Construction of Wrought-iron Window-frames.

Dec. 29.—16,999, T. R. Shillito, Improvements in Locks.

Dec. 30.—17,018, J. J. Jones, Manufacture of Hinges.—17,024, F. E. Bond, Pervious Fire-bricks.—17,031, W. P. Thompson, Apparatus for Drawing Ellipses.

Dec. 31.—17,066, W. Parr, Apparatus for Preventing the Passage of Air, Dust, and Water past Doors.—17,076, E. Verity and J. M. Verity, Improved Terminal for Preventing Down-draught and Inducing Up-draught in Chimneys, Ventilators, &c.—17,085, R. C. Jones and J. W. Cunningham, Locks or Fastenings.—17,103, A. Muljord, Venetian Window-blind Laths.

Jan. 1.—3, James Hill, Improvements in Rim Locks, Drawback Locks, and Latches.—21, J. W. Mathews, Improvements in Hydrants.—23, D. Aubert, Ventilating Apparatus for Opening, Holding, and Closing Sashes, Ventilators, &c.—39, S. R. Hooper, Manufacture of Paints.—43, V. Bitzenhofer, Joining Inlaid Floors by Steel Pins.—60, H. W. Robinson, Improvements in Roofing Tiles.

PROVISIONAL SPECIFICATIONS ACCEPTED.

15,166, C. Wiltshire and J. Wiltshire, Glazing Skylights, Windows, &c.—15,203, J. Matthews, Electric Horse Belts.—15,232, R. H. Heyhurst, Gully for Sanitary Purposes.—15,275, J. T. Welch, Manufacture of Bricks, Tiles, &c.—15,375, J. Gilchrist, Water-closet Cisterns.—15,441, T. M. Bear and H. Ransom, Combined Circular Saw, Fret Saw, and Drill.—15,468, J. Rettie, Cutting and Dressing Stone.—15,469, E. Edwards, Slow-combustion Stoves.—15,586, E. Y. Carriner, Manufacture of White Lead.—15,603, J. B. Robinson, Improvements in Window Sashes.—16,257 and 16,258, H. Wainwright, Supplying Water to Water-closets, Urinals, &c.—15,468, H. J. Hadden, Machinery for Sawing or Dressing Stone.—15,730, W. G. Margetts, Manufacture of Portland Cement.—16,214, T. G. Downing, Apparatus for Heating and Ventilating Apartments.—16,348, D. J. Jones, Improvements in Window Frames.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

578, M. Williams, Wood Staining and Varnishing.—2,816, E. Taylor, Improvements in Fireplaces.—3,737, C. Cooper and W. Cooper, Manufacture of Bricks.—3,763, C. Allen and W. Allen, Glazing Horticultural Buildings.—4,051, W. Thompson, Moulds for Concrete Foundations, Walls, and Blocks.—7,055, M. Syer, Pneumatic Flushing Apparatus.—9,607, W. A. Leppner, Electric Bell Pushes, &c.—304, W. Parry, Bricks for Preventing Wet from Permeating Walls.—6,506, T. Wood, Device for Facilitating the Cleansing of Cisterns.—15,353, R. Murray, Joint for Lead or other Soft Metal Pipes.

MEETINGS.

MONDAY, JAN. 12.

London and Middlesex Archaeological Society (King's College, Strand).—(1) Professor J. W. Hales, M.A., on "Two Anglo-Saxon Charters relating to Hampstead." (2) Mr. Charles Beach Smith, F.S.A., "On the late Discoveries in the Wall of London." 8 p.m. Society of Arts (Cantor Lectures).—Dr. G. V. Poore on "Climate and its Relation to Health."—I. 8 p.m. Inventors' Institute. 8 p.m. Leeds and Yorkshire Architectural Society.—Mr. J. A. Gitch on "English Homes in the Seventeenth Century." Edinburgh Architectural Association.—Mr. John Kinross on "The Study and Progress of Architecture." 8.30 p.m.

TUESDAY, JAN. 13.

Institution of Civil Engineers.—Inaugural Address by the President, Sir Frederick I. Bramwell, F.R.S. 6 p.m. St. Paul's Ecclesiological Society.—Mr. J. C. L. Stahlshmidt on "Church Bells." 7.30 p.m. Society of Biblical Archaeology.—Paper by Mr. Theo. G. Pinches. 8 p.m. Anthropological Institute.—Papers by Mr. Oldfield Thomas and Mr. A. L. Cameron. 8 p.m.

WEDNESDAY, JAN. 14.

Civil and Mechanical Engineers' Society.—Mr. G. Richards Julian, A.R.I.B.A., on "The Appropriate Ornamentation of Works in Iron." 7.30 p.m.

British Museum.—Mr. W. St. Chad Boscawen on "Assyrian and Babylonian Antiquities." 2.30 p.m. Society of Arts.—Mr. R. H. Tweddell on "The Employment of Hydraulic Machinery in Engineering Workshops." (Sir Frederick Bramwell in the chair.) 8 p.m.

THURSDAY, JAN. 15.

Society for the Encouragement of the Fine Arts.—Conversations at the Galleries of the Royal Institute of Painters in Oil Colours, Piccadilly. 8 p.m. Society of Antiquaries.—8.30 p.m. Institution of Civil Engineers.—Mr. John Evans on "The Science and Practice of Hydro-Mechanics." I. 8 p.m.

FRIDAY, JAN. 16.

Royal Institution.—Professor Lyndall on "Living Conflagra." 9 p.m. Architectural Association.—Mr. F. R. Farrow on "The Ventilation of Public Buildings." 7.30 p.m. Institution of Civil Engineers.—(Students' Meeting).—Mr. F. Geere Howard on "Secondary Batteries." 7.30 p.m.

SATURDAY, JAN. 17.

Royal Institution.—Dr. Waldstein on "Greek Sculpture from Phidias to the Roman Era."

Miscellaneous.

Kenilworth New Waterworks.—The Kenilworth Waterworks, constructed to meet the growing requirements of the town, were publicly opened on the 1st inst. The new waterworks have been provided by a private company, with a capital of 10,000*l.* in 5*l.* shares, of which 1,500 have been issued. The water supply is obtained from a sandstone rock by driving into a hill-side, and adit 5 ft. wide and 16 ft. deep for a distance of 275 ft. This yields an ample supply of remarkably good water, estimated at from 12,000 to 16,000 gallons per hour. This is raised from a well 22 ft. deep to the top of a tower on Lady's-hill by two 12-h.p. gas engines, by Messrs. Lude Stern. The tower, which is 667 yards from the well, is 92 ft. high, and on the top of it there has been constructed a circular wrought-iron tank, another 12 ft. in height, capable of storing 27,000 gallons of water. The tower is considerably above the level of the highest house in the town, and the supply will be by gravitation. The pumps were supplied by Messrs. Percy & Co., of Birmingham; and the total lift, from the well to the surface level of the tank, is 136 ft. The mains, between five and six miles in length, extend all over the town, and are fitted with sluice-valves, fire-hydrants, and stand-posts. The rising main is 7 in. in diameter, and the service pipes vary from 7 in. to 3 in. The works altogether have cost about 8,500*l.*, but this includes some capital expended for the purposes of the Local Board, upon which that body will pay interest. The engineer, Mr. E. Pritchard, C.E., of Birmingham and London, designed and superintended the execution of the works, for which Messrs. E. Smith & Sons, of Kenilworth, were the contractors. The Glenfield Company, Kilmarnock, supplied the whole of the hydraulic fittings; and the pipes were furnished by Messrs. G. & S. Roberts, of West Bromwich.

Prices of Steel.—Steel for structures continues to approximate in price to iron, and, for large sections is as cheap. Steel sheets are increasing in use for tin plates, and steel hoops are likely to altogether supersede iron hoops for baling purposes. The following table summarises the fluctuations in value during the last five years—

Table with 10 columns (years 1880-1885) and 10 rows (various steel products like Steam Coal, Pig Iron, etc.) showing prices per ton.

Scrap-iron and steel remain at the low prices of the summer, namely, about 45*l.* for heavy scrap-iron, f.o.b.; old spring-steel, about 43*l.*; old iron rails, about 53*l.*; old double-head steel rails, about 54*l.* Italy has lately been the best foreign customer; the export to the United States has nearly ceased, most of the few shipments thither have been to San Francisco.—Matheson & Grant's Engineering Trades Report.

The World Tree.—The tree of mystery springs from the primordial alyas, where the mountain Asgard is the centre of the world. The tree itself forms with its leaves and branches the heavens and the earth, the cardinal winds are stags that run about, the air itself is an eagle in the midst thereof, and the storms that disturb the firmament are typhids in the squirrel that plays in the branches. The Indian idea is the same in a remoter form; the world tree is the tree of Paradise, the ambrosial tree yielding immortal food. In the Rig Veda the tree is Brahma himself made visible, having as companions two birds, which represent day and night. This cosmogonic tree is the rose-apple that grows in the lake Ara, the lake sacred to Brahma, filled with the waters of eternal youth. The Eastern idea permeates all primal talk of men; the Buddhists have the Ambrosial tree that abounds in knowledge; the Iranian tree of the fire-worshippers is a vine-producing immortal drink, and it is associated with another tree which is called the Impassive or Inviolable. These are the two trees of refreshment and knowledge, the parallels of those that appear in the narrative of the Fall, and while in one sense they represent day and night, so in another they stand for good and evil. In the Assyrian legends they are combined, and the manner of representing the one sacred tree or Asperal on the Nimvite marbles gives us a direct key to the so-called honey-suckle ornament of Greek sculpture, for this is not the honey-suckle at all, but a far off and degraded symbol, and once more we are reminded of our figure of the five-stemmed ash.—Gardener's Magazine.

Manchester Architectural Association. At the ordinary meeting, held at the Old Town Hall, January 6th, 1885, Mr. J. Spencer Hodgson in the chair, Mr. A. H. Davies-Colley read a paper on "Stained-glass Windows." He described the different processes of colouring glass, together with the characteristics of the various periods. He considered the drawing should be as good as possible, and strong in outline, bringing out the true character of the design; the shading of figures to be avoided as much as possible, which should be entrusted to artists. Windows to the north should be warmer in tone than those to the south. A discussion followed in which Messrs. Barker, Chadwick, Ward, Charleywood, and Hodgson took part.

Altars and Reredoses.—A new high altar and reredos is in course of construction at St. Francis Church, West Crompton. It is being worked on the spot under the superintendence of Brother Patrick, O.S.F. When completed it will be one of the largest in England. It is designed by Messrs. Pugin & Pugin, of Westminster.—A new Lady altar has just been placed in the Convent Church of St. Leonard's. It has been executed by Mr. Boulton, of Cheltenham, from the designs of Messrs. Pugin & Pugin.—A new reredos has just been erected at St. Austin's Catholic Church, Stafford, from the designs of the same architects, by Mr. Wall, of Cheltenham.

Union of German Builders.—A central organisation of German builders was lately formed at Meiningen. The objects of the association include the elevation of the social and economical position of the German building industry, the protection of trade interests in legal and other matters, the organisation of labour and tenders, the improvement of credit relations, &c.

Sir Frederick Bramwell, F.R.S., the newly-elected President of the Civil Engineers, and who is also the Chairman of the Executive Council of the Inventions Exhibition, has chosen the subject of "Engineering Inventions since 1852" as the subject of his inaugural address, to be delivered on Tuesday evening next (Jan. 13th), at the Society's house in Great George-street, Westminster.

For school buildings, Stoughton, Guildford, for the Guildford School Board:—

Alfred Gale	£3,500 0 0
Wells, Martin, & Co.	3,430 0 0
Mower	3,417 0 0
H. J. Sanders	3,403 0 0
George Stalard	3,350 0 0
Stephens & Bastow	3,330 0 0
W. Tribe	3,148 0 0
John Bottrell	3,140 0 0
Greenwood	3,100 0 0
C. Smith & Sons	3,094 0 0
C. Claridge	3,050 0 0
H. Kuperlet	3,025 0 0
H. Ingram	3,007 10 8
Woolgar & Son	3,0 0 0
Samuel Woods	2,985 0 0
Peter Peters	2,924 0 0

For alterations, &c., at St. Andrew-street, Holborn, for the Liverpool Victoria Legal Friendly Society. Mr. F. G. Smith, architect. Quantities by Mr. Walter Barnett:—
Wm. Shurman (accepted)..... £3,958 0 0
[For full list, see p. 869, Dec. 27, 1884.]

For alterations to the Ivy House, &c., Hoxton, for Messrs. B. & G. Hyman, Mr. Edward Brown, architect, Hanbury-street, Spitalfields:—

Riddle & son	£2,325 0 0
Salt	2,175 0 0
J. Anley	1,960 0 0
R. Mayr	1,945 0 0
W. Shurman	1,944 0 0
Hawkins	1,897 0 0
Jackson & Todd	1,797 0 0

For alterations to show-rooms at 138, High-street, Hounslow, for Mr. Henry Easley. Mr. J. K. Morgan, architect:—

Shawyer	£738 0 0
Hogben	248 0 0
Danels (accepted)	230 0 0
Billins	210 0 0

For the erection of St. James's Catholic Chapel, Twickenham, for Cardinal Manning. Messrs. Joseph Stanlatus Hanson and C. George Kemp, joint architects. Quantities by Mr. Henry Smith, 5, John-street, Adelphi:—

Hatman & Fotheringham	£2,773 0 0
Gibbs & Fiew	2,500 0 0
McManus	2,497 0 0
Colls & Son	2,326 0 0
J. Tyrman	2,300 0 0
C. Claridge	2,295 0 0
Messom	2,232 0 0
R. & E. Evans, Peckham (accepted) ..	2,215 0 0

For the erection of two pairs of semi-detached villas at New Malden, for Mr. Edwin C. Somerville, architect, Claremont House, Lower Sydenham:—

Collier, Torkington	£1,480 0 0
Moorman	1,430 0 0
W. H. Langman, Anerley	1,283 0 0
Thorpe, Malden	1,187 10 0

For the erection of three warehouses, Whitecross, Errol, and Dufferin streets, E.C. Mr. Charles Bell, architect. Quantities by Mr. Henry Lovegrove:—
Allen & Sons, Kilburn (accepted), ..
total about

Accepted for new house in Hamilton-road, Reading, for Mr. C. Batho. Messrs. Morris & Stalwood, architects:—
John Bottrell..... £967 10 0
[No competition.]

For new house at Sandhurst, for Mrs. Osborne, Mr. Withers, architect, Adam-street:—

Lang, London	£3,395 0 0
Searle Reading	3,143 0 0
Boxey, London	3,079 0 0
Dove, London	3,075 0 0
Pattam & Fotheringham, London ..	2,973 0 0
Cowland, London	2,879 0 0
Bottrell, Reading	2,820 0 0
Spier & King (accepted)	2,600 0 0

For new house in Southcote-crescent, Reading, for Mr. J. Morris. Messrs. Morris & Stalwood, architects, Reading:—

	House.	Stables.
Higgs, Reading	£1,108 0 0	... 495 0 0
Goodchild, Reading	1,111 0 0	... 84 17 8
Woodroffe, Reading	1,017 0 0	... 77 0 0
Bottrell, Reading	830 0 0	... 69 0 0

* Accepted.

For the erection of new grocery premises, dwelling-house, warehouse, stables, and granary, for Mr. E. B. Green, Lincoln. Mr. William Mortimer, architect. Quantities applied:—

Martin & Sims, Lincoln	£1,790 0 0
Baines, Newark	1,781 0 0
Oreswood, Mansfield	1,710 0 0
Hatchiffe, Billingham	1,688 0 0
Otter & Broughton, Lincoln	1,620 0 0
Crosby & Sons, Lincoln	1,578 0 0
Greenham, Brantson	1,540 0 0
Biens Bros., Lincoln	1,525 0 0
Harrison, Sands, Lincoln	1,523 0 0
H. S. & W. Cole, Lincoln	1,489 0 0
Wright, Lincoln	1,487 0 0
Horton Bros., Lincoln	1,483 0 0
J. B. Harrison, Lincoln	1,482 0 0
Coven & Lansdowne, Lincoln	1,340 0 0
J. M. Harrison, Lincoln (accepted) ..	1,295 0 0

Accepted, for six-tight cases, counters, and fittings for show-rooms, for Messrs. William Hutton & Sons, Sheffield. F. Sage & Co. £1,000 0 0

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Vol. XLVIII. No. 2185.

SATURDAY, JANUARY 17, 1885.

ILLUSTRATIONS.

Portion of a Window in the South Choir Aisle, Salisbury Cathedral.—Designed by Mr. E. Burne Jones	102-103
All Saints' Church and Parish Room, Upper Holloway.—Mr. J. E. K. Cuts, Architect	116
St. Mary's Church, Gedding, Suffolk: Restoration.—Mr. E. F. Bishopp, Architect	107
House at Woking.—Mr. W. Ravenscroft, Architect	110
Askham Hall, near York (Plan, p. 99).—Messrs. Chorley & Connon, Architects	111
Imperial Houses of Parliament, Berlin.—Plans and Sections of the Prize Scheme for Heating and Ventilation.—Mr. D. Grove, Engineer	100, 113

CONTENTS.

The Tenure of Land in Foreign Countries	91	All Saints' Church, Upper Holloway	59	Line of Frontage	117
Recent Restorations of the Pergamene Altar. By Jane E. Harrison	93	The Church of St. Mary, Gedding, Suffolk	99	Architectural Societies	118
Improved Water Supply for the Metropolis	94	House at Matthew's Green, Wokingham	99	A Club-Room at the Institute	118
Notes	95	Askham Hall	99	Right of Way	118
A New Air-Heater	96	Imperial Houses of Parliament, Berlin: Prize Scheme for Heating and Ventilation	99	The Student's Column: Lime, Cement, and their Uses.—111	118
Royal Academy of Arts: Exhibition of Works by the Old Masters; Sixteenth Year	97	The Royal Arms	113	Recent Patents	119
The Late Mr. John Whichcote	98	Institution of Civil Engineers: The President's Address	115	Recent Sale of Property	120
Window in South Choir Aisle, Salisbury	99	The Appropriate Ornamentation of Works in Iron	116	Meetings	120
		The Surveyors' Institution Examinations, 1885	117	Miscellaneous	120

The Tenure of Land in Foreign Countries.



CIRCULAR was addressed in the spring of last year by the British Foreign Office to the various representatives of her Majesty on the Continent, with a view to obtain information as to the tenure of land abroad, and principally to ascertain whether the custom of letting land on long building leases prevailed in foreign countries. Replies have been received from twenty-two ambassadors or their secretaries, accompanied in some cases by a short sketch of the law with regard to land in the country referred to, and these documents have been recently printed, by order of the House of Commons.

It appears from this return, which relates to Austria, Baden, Bavaria, Belgium, Denmark, France, Germany, Greece, Italy, Holland, Portugal, Roumania, Russia, Coburg, Servia, Spain, Sweden and Norway, Switzerland, Turkey, and Wurtemberg, that our system of letting land on long leases for building purposes is practically unknown upon the Continent. In Belgium, however, the practice has lately come into vogue, but is confined to Brussels, where the system was introduced by a French contractor, who erected buildings on certain sites in the central boulevards, which are the property of the municipality. As a rule, houses in Belgium are built upon freehold land, which is paid for either on entry into possession, or by instalments, or by annuities. The vendor has a lien on the building as long as the site has not been fully paid for. Companies have been formed in Belgium for the construction of artisans' dwellings, the tenant having the option of becoming the owner of the house he inhabits, by paying annually as rent a sum equal to the interest upon, and a sinking fund for the repayment of, the capital expended on the acquisition of the ground and the construction of the building.

In France freehold tenure is the rule, but in the capital and in most of the large towns land is frequently let upon building leases for varying lengths of term, dependent upon the commercial, industrial, and social conditions of the several localities. All feudal tenures were abolished by the Revolution of 1789, and all real property in France, whether urban or rural, is held in fee simple (*franc-aleu*); that is to say, as long as there is no contravention of public law, the right of owners is absolute to deal with it as they think fit.

According to recent statistics, land in France consists of some 28 million holdings, divided amongst 5 million owners. Each of these holdings can be sold or let at the pleasure of the owner; entail does not exist in France, and real as well as personal estate is divided equally.

In Germany and Austria leasehold tenure for a number of years is unknown. In Bavaria, the land is held by about 458,416 independent landowners (with 1,047,596 labourers), ranging from the small farmer owning only a few cows, and the peasant who works on his own land with his labourers, to the owner of large estates, whose possessions may be almost compared to those of English landlords. The average size of an estate, arable land or wood, in Bavaria is only 5.75 hectares, or about 14 English acres; in Hanover and Pomerania, 20.93 hectares, or about 52 acres; in Silesia and Brandenburg, 16.36 hectares, or about 41 acres; whereas in England, out of a total area of 13,205,406 hectares, or about 33 million acres, not less than two-thirds are in the hands of 10,207 persons, each of whom owns more than 200 hectares, or about 500 acres. In Bavaria small estates are the rule, and when the electoral lists were prepared in accordance with the law of the 26th of May, 1818, there were only 7,182 landowners qualified to vote, that is, landowners possessing estates of the value of from 8,000 to 10,000 florins, or about 68*l.* to 857*l.* Apart from some instances of property being entailed, which can only occur among the nobility, the ownership of land in Bavaria has been treated since 1848 not according to fental principles, but according to the principles of common law, which allows the owner the greatest liberty with regard to the disposal of his property.

In Germany generally house property is invariably held upon freehold tenure, and the system of letting land upon long building leases is practically unknown. This is, no doubt, due to the fact that, as a general rule of German law, now obsolete so far as Prussia is concerned, "sale breaks lease," and this being so, no person would be disposed to erect at his own cost a permanent structure upon land held upon such an uncertain tenure as a lease.

In Denmark it is the custom to purchase small plots of freehold ground for the purpose of building houses, and the leasing of land for a term of years upon condition that it is built over is altogether foreign to the Danish practice. It is, however, customary to lease lands and tenements for two lives, but in this case the tenements built by the lessee do not escheat to the landlord at the end of the term; the landlord has the choice of purchasing the buildings at a price determined by an official

valuer, or of ordering their removal. Under this system of tenure, which is called *lifsaeste*, the tenant acquires the property for his own life, and, if married, the widow has an interest in it for the term of her life. It frequently happens in Denmark that a peasant or cottager holding under this tenure marries a very young woman in his declining years or even upon his death-bed in order to extend the term of his lease. In this tenure rack-renting is not only illegal, but is opposed to popular custom. Land is also held in what is called *arvefaeste*, which is a kind of freehold or hereditary tenure. Of this there are two categories; one simple, whereby the lessee and his heirs, on payment of a yearly or quit-rental, enjoys a perpetual lease, barred only by failure of issue, in which case the property reverts to the lessor; the second is *in infinitum*, which leaves the tenant free to hypothecate or even to sell the property, subject, of course, to the payment of the rent. This tenure bears some resemblance to Ulster tenant-right and to the *caphtzweis* of the Roman law.

In former times it was not uncommon in Denmark for estates to be parcelled out into small holdings, which were let for building purposes on long leases sometimes extending over hundreds of years; but the tendency of recent legislation has been to discourage the creation of leaseholds and to promote the acquisition of freeholds. By a law passed in 1847, no part of a landed estate can be legally leased for a term exceeding fifty years, except under the two-lives tenure. In the moorlands of Jutland, however, it is not unusual for small holdings to be let for shorter terms for building; the tenements erected on these holdings by the tenant remain his property, and do not revert to the landlord. This custom is peculiar to Jutland, and the reason why these leases are preferred to purchasing the land outright, is that the expense of the stamp and registration expenses upon transfer of the freehold is avoided. In certain suburban districts of the capital it is customary to sell plots of ground for building encumbered by certain conditions called *servitut*, and this word is to be noted as one of the few instances in which a non-Scandinavian term is employed in Danish jurisprudence. The *servitut*, although a very comprehensive term, usually applies to the obstruction of the view, the erection of unsafe or unsightly buildings, or the carrying on of noxious businesses.

In Norway land is let at an annual ground-rent for building purposes either for a term of years or in perpetuity. On the expiration of the lease for a term of years the tenant remains the owner of any buildings built upon the ground, which he is at liberty to remove.

The system of letting land on lease for

building terms does not prevail to any great extent in Sweden: in the larger towns where the houses are built and let in flats the system does not obtain, the houses being invariably built on freehold ground; but in the country leases are not uncommon, though this is usually for agricultural purposes. The tenant has the right to remove any buildings erected by himself, all other improvements, such as cultivation, fencing, planting, &c., reverting to the landlord. The natural tendency of this state of the law is, if the buildings erected are useful and substantial, to bring about an agreement between the landlord and tenant, for the former to take the buildings over from the latter at a valuation. The only cases in which leases for building dwelling-houses are usual in this country are for plots in the neighbourhood of large towns or summer resorts. The general term for a building lease is fifty years, but shorter terms are not unfrequent, also for the life of the lessee and his wife if married, as in Denmark.

The condition of tenants in Greece appears to be more favourable than on the Continent generally, the landlord being bound to keep the house in repair and to pay all rates and taxes. Freehold property is the almost universal tenure in Greece, every Greek being anxious to have a house of his own, and by law the sale of a house to a third party, as in Germany, determines the lease, and may lead to the expulsion of the tenant, who, however, has his remedy against the owner, and may claim damages.

The custom in the Ionian Islands with regard to the tenure of land differs from that which prevails in other parts of Greece. In the towns perpetual leases and leases for terms of years are granted; in the latter case, the term must not be for less than twenty years. If the lease is perpetual, no alteration can be made in the rent; the lessee in either case pays all taxes. The tenant is allowed to mortgage the premises in his occupation, but in the event of the landlord resuming possession, the latter is not liable for the mortgage. The tenant may transfer the property to a third person after having notified his intention to the landlord, who must give his decision within a month of receiving such notification. The new tenant must enter into a contract with the landlord with regard to the rent, and, failing this, the property reverts to the landlord. If the rent reserved is not paid within two months of its becoming due, the landlord has a right to eject the tenant. By a law passed in 1868 the tenant may become the owner of his house by paying the landlord the value, the rent being capitalised on the 6 per cent. table, or eighteen years' purchase. The practice of letting ground on building leases is at present unknown in Greece.

It appears from the report of Consul Franz, Her Majesty's Consul at Rome, that in Italy the system of letting houses and ground upon lease has been generally abandoned, in consequence of the facilities afforded by the laws of the country for the redemption of rent, which may be redeemed by the tenant on payment of a sum equivalent to twenty times the amount of the annual value of the premises in his occupation. Leases in the ordinary form are not permitted for a term exceeding thirty years by the Italian Civil Code, and it may be assumed from this fact that building leases are practically unknown in Italy.

With regard to the Netherlands, it appears from the short but extremely explicit report by Mr. Fenton, Secretary of Legation at the Hague, that property in land or houses in that country is held by the proprietor as freehold, no limited ownership such as copyhold or other similar tenure such as exists in England being known, and the system of letting or hiring land on building leases finds no favour and may be said to be almost, if not absolutely, non-existent in that country.

In Switzerland the English notion of degrees of ownership in land is not only absent from Swiss law, but is almost incomprehensible to the Swiss mind. Absolute ownership is the only condition known to them, and they can conceive no idea of such tenures as exist in England, such as leasehold for terms of years,

copyhold estate in tail, and so forth. The question of farm leases is a separate matter: these are, in general, for short terms, and are generally renewed from year to year. It would be contrary to the Constitution of the country in many cantons, and notably in Berne, to subject land to periodical and irredeemable payments, such a practice savouring too much of feudalism. In the case of an intending purchaser being unable to pay the purchase-money or the interest thereon, the vendor is not entitled to resume possession of the land, but must recover the money as if it were an ordinary debt.

The laws regulating property in land in Spain and Portugal are similar in character. The practice of letting land on building leases is practically unknown in these countries; but there are certain distinctions with regard to tenures of real property. The feudal system of tenure never struck deep root in the Peninsula, and least of all in the ancient kingdoms of Castile and Leon, where it can scarcely be said to have existed at all. Spanish real estate was not wanting at the beginning of this century in certain characteristics, which bore some resemblance to a feudal relation to an over-lord, and which distinguished it from the more purely allodial and free tenures of the present day. Every trace of these ancient tenures was swept away by the Cortes of Cadiz in 1811, since which date real property in Spain has been untrammelled by any charges or conditions, with the exception of those arising from the testamentary disposition of the owner, or from contract with other parties. Spanish lawyers distinguish, however, between *dominio pleno*, or freehold, and *dominio menos pleno*, which is analogous in part to leasehold. The former term relates to property which is held absolutely and unencumbered by any extraneous charge or burden. The latter species of tenure is subdivided into (1) a tenure in which a periodical charge is imposed without a contract, and (2) a tenure by which an annual rent is paid to the landlord under a contract. Absolutely freehold is the tenure which most generally prevails in Spain, both as regards land and buildings, and there is no difference between town and country property. Land in this manner is transferred by sale, donation, or will, and no further relation exists after such transfer between the old owners and the new. In certain provinces, however, estates are more commonly held on conditional tenures, that is, subject to a periodical payment, called in Spanish *censo*, or to an ordinary rent. The tenure by payment of *censo* is subdivided into (a) *foros*, which is for a term, generally for three reigns and twenty-nine years more; and (b) *emphyteusis*, which is of a similar nature to the former tenure, but is of permanent duration. The tenant may alienate his holding on the understanding that the new tenant undertakes to hold the property on the same terms as his predecessor. The landlord has the right of pre-emption in the case of a tenant wishing to dispose of his interest.

The law with regard to land in Portugal is similar to that in Spain, and in this country, as in Spain, leases for a building term are unknown. *Aforamento* or *emphyteusis*, in the language of the Portuguese civil code, is the transfer in perpetuity by the owner of any real property of his right of use to another person, who undertakes to pay him annually a certain fixed sum. The rent is to be fixed by mutual agreement, not by any custom; the emphyteutic estate, although hereditary, cannot be divided among the heirs of the tenant except with the landlord's consent; the value of the tenant's interest in an estate is determined by an official valuation, and is distributed among the heirs of the tenant according to law. The heirs are required to decide among themselves upon which of them the estate shall devolve, and in case of dispute the question is decided by a court of law; if none of them desire to hold it, the estate is sold and the proceeds divided equally. A tenant may mortgage his interest in an estate without his landlord's consent, provided the amount raised by mortgage do not exceed the capitalised rent with one-fifth added. In the event of a sale by the tenant the landlord has a right of pre-

emption, and in a similar manner the tenant has a right of pre-emption in the case of the sale by the landlord of his seigniorial rights.

Owing to the want of statistical data with regard to Russia, it is almost impossible to obtain trustworthy information as to the tenure of land and buildings in that country, but it may be safely asserted that tenements in general, and especially in towns, are freehold, and it would also appear that the system of letting land upon building agreements does not prevail in Russia. From the circumstance that Russia is comparatively a thinly-populated country, with imperfectly developed means of communication between the towns, land is cheap, and the conditions of sale and tenures of real property are less complicated than in more thickly-populated countries. In Russia Proper mortgages are frequent; but there is no official register of these transactions. In Poland, on the contrary, an official record is kept of all transactions with regard to the transfer of land, and it is stated, on the authority of her Majesty's Consul-General at Warsaw, that the system of hypothec in force in Poland is admirable, and could hardly be improved upon. Generally speaking, every Pole lives upon his own freehold, which is almost invariably mortgaged at 5 per cent., with a sinking-fund, to the *Crédit Foncier*. The civil law in vigour in the Baltic provinces is based upon the Roman law, that in Finland upon the Swedish law, and that in Poland on the French Code Napoléon.

Landed property in Turkey is classified as follows: *mulk*, or freehold property belonging entirely to private persons; *mirî*, or Crown land; *mefcûlî*, or endowed property; *metrukî*, or land given up to the public for forming roads or common pasture; and *meat* or waste land. *Mulk* property is of four kinds, viz., (1) that which lies within a commune or district, or within a limit not exceeding about a quarter of an acre outside the boundary of the same; (2) land, formerly Crown land, given to private individuals; (3) *Ushri*, or titheable land divided at the time of the conquest of the country among the soldiery; and (4) *Haradjî*, or land the possession of which has been confirmed to non-Muslim inhabitants. Land in Turkey is generally sold in small lots, so as to enable persons to build houses for themselves, but it is sometimes let for terms of years at a small annual rent, the buildings erected upon the land becoming the property of the landlord at the expiration of the term for which the land is demised. Such leases are rare in towns, but more rare in the country as distinguished from the neighbourhood of towns.

In Servia and Roumania building leases are unknown. In Roumania, the legislation is based upon the French civil code, the sale of land is unconditional, and reservations of rent are never made. At Bucharest, a large building society (La Société de Construction) has extensively stimulated the erection of new houses in that city, and for this purpose building sites have to be acquired which are invariably freehold, and cost from 1,000l. to 2,000l. and upwards, according to their situation.

Emphyteusis, literally an "in-planting," is a perpetual right in a piece of land which is the property of another: the right consists in the legal power to cultivate it, and to treat it as one's own, on condition of cultivating it properly and paying a fixed sum at stated times. Although the emphyteuta had not the ownership of the land, he had an almost unlimited right in the enjoyment of it, unless there were special agreements limiting his right. . . . He could sell his interest in the land, after giving notice to the owner, who had the power of choosing whether he would buy the tenant's interest at the price which the intended purchaser was willing to give. In the case of the lessee's interest being transferred to a third party, a fifth part of the price, or of the value of the property, when the nature of the transfer did not require a price to be fixed, was payable to the owner on the admission of the new emphyteuta, which, as a general rule, was paid by him. If the owner of the land refused to admit the proposed

new tenant, the seller could, after certain formalities had been complied with, transfer all his rights without the consent of the owner. The lessee was bound by the Roman law to pay all public charges and imposts, and to keep the property in proper order, and to pay the rent regularly. The tenant could dispose of his interest by will, and, in case of intestacy, it passed to his heirs in the same manner as other property. The lessee might lose his rights by surrender to the owner, by failure of issue, by injuring the property, by non-payment of rent or taxes, or by alienation without the consent of the owner.

RECENT RESTORATIONS OF THE PERGAMENE ALTAR.

BY JANE E. HARRISON.



NTIL the opening of the South Kensington Cast Museum the fame of the sculptures of the great altar of Pergamene was in England, to all but professional ears, little more than a rumour. Visitors to the British Museum will have seen in the archaic room two startling fragments, a pain-stricken giant, and a torso ending in snake coils; but in their isolation these fragments have been more wonderful than comprehensible. Now, at South Kensington, the two principal, and in a way central, groups of the frieze may be seen side by side in their entirety, and a fair notion of the general scope and style of the sculptures may readily be formed,—I say may, but I might easily say must; for, of all the varied contents of the Cast Museum these colossal slabs are, with their sensational style of beauty, most sure to catch and rivet the eye of the untrained gazer. The literature of the Pergamene altar is likely from this time on to be a matter of public as well as professional interest.

The two books* before us are of widely different import and character; the first is professedly popular, the second learned and technical. I take them advisedly together, because my advice is, read the first that you may understand the second. Dr. Trendelburg's work (offered as homage to Dr. Curtius on his seventieth birthday) consists of six beautiful phototype plates, representing groups from the frieze, and an accompanying text. The plates are taken from the six principal groups, as restored by A. Touleux. It need scarcely be said that the originals have been left untouched, and the restoration attempted only on casts. Dr. Trendelburg hopes that his work will serve a double purpose: first, it will make the Pergamene altar known, in intelligible form, to those lovers of art to whom the originals, and even the casts, are inaccessible; and, secondly, it will facilitate the enjoyment of, and even the scientific study of, the fragmentary originals. Any who have pored laboriously over these shattered originals will be ready to thank Dr. Trendelburg, and to add their testimony to the usefulness of his work. In looking from fragment to fragment, the eye and the imagination and the reason are all heavily taxed, and to have the effort of one's fancy caught and permanently visualised is no light gain. Of course in any matter of restoration there will be differences of opinion as to details: these the archaeologist will weigh and ponder for himself; but for the general student a clear idea of the composition, even if a detail or two be faulty, is of the highest importance, and even to the archaeologist himself is a help not to be disdained. The way to use Dr. Trendelburg's excellent book to the best advantage is to place side by side with his restored plates photographs of the original fragmentary slabs, and then to judge for oneself of the justice of his restorations.

Though Dr. Trendelburg's book is avowedly a popular one, the text does not confine itself to a mere explanation of the plates and enu-

meration of the restorations. The introduction is occupied with the altar as a whole, the meaning of the Gigantomachia frieze, and its relation to certain architectural peculiarities in the structure. Further, with reference to each of the restored slabs, we have a great deal of valuable criticism on the composition of the groups, the technical treatment of the reliefs, some light thrown on the position of the sculptures in the history of art; and last, but not least, more than one *excursus* into the somewhat obscure and unknown tracts of Pergamene mythology. The book is an excellent proof that it is possible to be very learned without being the least unreadable.

I shall confine myself, in the main, to Dr. Trendelburg's remarks on the two groups now to be seen in the South Kensington Cast Museum. I have said that these two groups are, in a sense, the central groups of the frieze; but, of course, to speak of the central group of a frieze would be to condemn the composition offhand; rather, as Dr. Trendelburg beautifully suggests, we may regard the two groups as two richly-wrought clasps that bind together a lovely, sculptured girdle. Their place was, no doubt, in the east, *i.e.*, the principal front of the altar. The two groups are manifestly composed to balance each other, and each represents the moment of supreme victory; the one the victory of Zeus, the Saviour, to whom the altar was dedicated; the other, of Athene, the Victory-bringer (Nikephoros), his warlike daughter. The composition of the Zeus group sways to the left, that of the Athene group to the right, though each is finely balanced within itself. The Zeus group claims our first attention. To Zeus, and Zeus only in all the Olympian phalanx, are allotted three opponent giants; such was the convention of Greek art from the time of black-figured vase-painting. In the three opponents there is a fine gradation of defeat. To the left, utter defeat in the figure of the prostrate young giant, beautiful and in completely human form, smitten in the thigh by the burning thunderbolt whose flames are already bursting out to catch the giant's shield. Probably in the original this flaming thunderbolt was a good deal helped out by paint. To the right of Zeus is a second giant, also of human form, just smitten, but by no thunderbolt; he bears no weapon himself, and Dr. Trendelburg thinks he has cast away sword and shield that he may spring forward to seize and bear away the ægis of Zeus, but too late, for already the Gorgon's eye is upon him, and he stiffens into stone. To give in stone the effect of stiffening into stone was a *tour de force* which just suited the Pergamene artistic temper. The third giant is still in mid-fight, but defeat is obvious and certain: against the second thunderbolt of Zeus he can only uplift a helpless stone. This giant's form ends in serpent coils, and the triple contest is somewhat quaintly closed by a fourth impending fight. The eagle of Zeus, alert with open beak, watches to pounce, if need be, on the head of the angry rearing snake. This little episode occurs more than once in the frieze. Prominence is given to the figure of Zeus very simply, but finely and effectively. He is taller than his opponents, and alone towers erect above them. He is with his body full face, and both arms are wide outstretched so as to fill as much as possible of the field. The dying giant is in profile, the gorgon-struck giant is turned three-quarters face. The giant with the stone in actual conflict with Zeus turns his full back, with outstretched arms to balance his divine opponent,—everywhere a balance of pose and line, which is, to say the least, astonishingly clever. The actual opponent of Zeus is a bearded giant,—maturity fitly contends with maturity. The eye of this same giant is hollowed out, and probably contained a pupil of enamel, or some fiery precious stone, which would greatly enhance the wild and terrible look of the face.

In the corresponding group of Athene, the victory-bringer, we have composed in similar fashion the goddess and three figures to balance her. But not three combatants; though she is goddess of war, Athene is a woman, and it is enough if she contend with one giant, and he the youngest of the brood.

He holds no weapon, his hope is only in flight: he has two swift wings, but his form is otherwise human; the goddess has overtaken him and caught him by the hand, but it is not she who slays him,—she sends her sacred snake to bite him in the breast. In the remainder of the frieze we see many goddesses deal death-blow, sometimes in very brutal fashion, to their foes, and we feel that it was a fine thought that gave to Athene only victory the end, not slaughter the means. Athene strides on to the right, and balancing her the figure of Nike, goddess of victory, flies to the left to crown Athene. Between them necessarily is left a large triangular space. The sculptor has skilfully filled it by the most pathetic figure in the whole frieze. The giants are earth-horn, and in this their last extremity, when her youngest son is in dire peril, out of the earth comes his mother, Ge herself, with uplifted hands. But the mother pleads in vain to the—

"Daughter without mother, born of god."

Athene vouchsafes not even a look, but passes swiftly on in her triumph. It is Dr. Trendelburg's fancy that the giant is Ge's youngest, best-loved son, most like his mother in the face, and the fancy is so charming that I scarcely like to say I do not feel sure it is founded on fact. Ge has her name written near her, and her customary attribute the cornucopia; her character as earth-mother is well shown in the full figure and rich abundant hair. The wings of the Victory cleverly balance the wings of the falling giant.

The remaining groups I must note only in passing. By far the most beautiful is that of Helios, the sun-god, rising in his chariot from the waves, a motive clear to all lovers of the Parthenon marbles; beneath the horses of Helios lies a prostrate giant, perhaps the most beautiful figure in the whole frieze. A giant confronts the chariot horses, and seeks in vain to check them in their course. To the Greeks the myth had its obvious interpretation; in vain was the onset of barbarism and darkness against the dawn and clear shining of Hellenic light and culture and freedom. To the left preceding the sun-god rides his herald the Dawn (Hêc). Her horse looks back to the coming sun, and the face of the dawn-goddess herself should, as Dr. Trendelburg rightly observes, be turned back, though the restorer has made it face forwards. The deities of light abound throughout the frieze.

Another noticeable slash shows the conflict between the triple-bodied Hekate, with her flaming torch, and a giant upheaving a huge rock; also the fight of Orion and Artemis, in which, as the story went, the young giant was disarmed and vanquished by love for the maiden goddess. Only one other group I must note, because to its understanding Dr. Trendelburg makes an important contribution. This group contains the figure of a goddess who has become familiar to German critics by the not too commodious name of the snake-encircled vessel-hurler (*Schlangehtöpfwerferin*). A tall, powerful, matronly-looking woman seizes a half-giant by the shield with her left hand; with her right she is about to hurl at him a round vessel, something like a curved flower-pot with a small snake curling round it. She is aided in her attack by a huge serpent. This figure has long been a crux to archaeologists. It was not difficult to give a name to goddesses who carried such customary emblems as sword and spear, torch and bow, but this snake-encircled vessel was not of so easy interpretation. Some, judging from the snakes, called her a fury; others a Bacchant; a third party held that we have here a recantite allusion to an attack made on the navy of Eumenes by an enemy armed with vases full of snakes. Dr. Trendelburg breaks new ground. He thinks, in the first place, that sufficient attention has not been paid to the sacred fillets (*επιπυρατα*) with which the head of the goddess is adorned. These would make her out as of some solemn special import, a deity of some definite ritual significance. Further, the shape of the vessel, he thinks, is such that it could have been used neither for drinking out of nor for drawing water;

* Die Gigantomachie des Pergamenschen Altars, Skizzen zur Wiederherstellung derselben, entworfen von Alexander Touleux, erlindert von Adolf Trendelburg. Berlin: Wasmuth, 1884.

Ueber die Kunstgeschichtliche Stellung der Pergamenschen Gigantomachie von Henrich Büttner. Berlin: Weidmannsche Buchhandlung, 1884.

it is of considerable thickness and weight. In a word, he concludes it was a mortar.* The mortar was an attribute naturally of the gods and goddesses of healing; in the mortar, as we know from the comedy of Aristophanes, the *Phoitos* (which lets us into so many of the mysteries of ancient medical practice), the god Asklepios compounded his medicines. The female goddess Hygieia is the daughter and constant companion of Asklepios, but the Pergamene figure is too manly for Hygieia, the maiden. Dr. Trendelburg thinks it may represent Epione, the wife of Asklepios, a less frequent figure in ancient art. All he asserts positively, however, is that a goddess, wearing fillets and carrying a mortar, round which is curled a snake, attended also by a large serpent, must belong to the cycle of the medicine deities. The conjecture is doubly interesting, because from its temperate climate, fine situation, and abundant water supply, the place was a natural medical resort: it had medicinal springs and great facilities for sea and river bathing, and, in fact, a regular hydropathic establishment sacred to Asklepios. The subject of Asklepios worship in connexion with Pergamene worship has been recently discussed by Mr. Warwick Wroth, who has made the mythology of Asklepios peculiarly his own, and it will be interesting to know if he confirms Dr. Trendelburg's conjecture.

Turning to Dr. Brunn's monograph, one is in a different atmosphere, and at first in a controversial one. It is well known that it was the peculiar merit of Dr. Brunn that in his history of the Greek artists, published in 1857, he collected together, with considerable insight and an instinct almost prophetic, all the scattered evidence, literary and monumental, of the Pergamene school. He, and at first he only, saw the unity of style, which linked together, as the outcome of one tendency, work so seemingly different as the Laocöon, the Farnese Bull, the so-called Dying Gladiator, the Ludovisi Gaul, and the votive groups of Attalus. Now, nearly thirty years later, comes the discovery of the great altar of Pergamos, and threatens with sudden eclipse the conclusions so laboriously arrived at from these scattered statues. Dr. Couze asserts, with a boldness he probably now regrets, that if we would concern ourselves with the art of Hellenistic times, this altar of Eumenes must be the centre point of our study. It is scarcely to be wondered at that in the joy of so great a discovery, and so splendid an acquisition, sound judgment was thus led astray.

Dr. Brunn was not likely to let such a statement pass unchallenged; valuable he owns these altar sculptures are, but they are, after all, mere decorative work, and cannot rank as a standard by which to judge sculpture in the round; and, still more important point,—these sculptures are securely dated in the reign of Eumenes II. (196-175 B.C.). How absurd, then, to use them as criteria for the Alexandrian art of the third century B.C. Dr. Brunn passes from his polemic against Dr. Couze to an elaborate analysis of the sculptures themselves; this it would be fruitless for me to follow as it can only be appreciated when the sculptures themselves or complete casts from them are before our eyes. But his conclusions I may shortly summarise. Thirty years ago Dr. Brunn distinctly affirmed that in the art of the early Pergamene and Rhodian schools, the art which produced such works as the "Dying Gladiator," the possibilities of pathetic expression had reached their utmost goal, any further manifestation must degenerate into affected mannerism or fantastic licence. This dictum Dr. Brunn holds is fully borne out by the discovery of the Eumenes altar frieze of the second century B.C. In spite of its undeniably sensational splendour, we have in it no fresh outcome of the Greek spirit; it is but an ingenious compilation of foregone artistic motives. The style of such a compilation is at best but a skillful mannerism. Dr. Brunn illustrates his point by an ingenious comparison

between sculpture and rhetoric. In Asia Minor, during the third century, B.C. there was a school of rhetoric, the chief representative of which was Hegesias of Magnesia; of him it was said that he sought to give effect to his oratory by the ingenious manipulation of the rhythm of his sentences, altering the natural order of the words for the sake of effecting a recondite juxtaposition. Such eloquence might startle the attention of the hearer, but it could neither persuade his intellect nor kindle his emotion; it was, in fact, no true eloquence at all, but mere effective declamation. As was the Magnesian rhetoric to the true Athenian eloquence, so was this later Pergamene art to the ideal creations of Pheidias. It created nothing, it did but dexterously manipulate already-existing material with a view to sensational effect. It laid hold of an artistic vocabulary already complete, and expended it with a prodigality that was often vulgar, always wasteful (*ritiosa abundantia*, Cic.); it decked out a trite and commonplace thought with the apparatus of ready-made artistic formularies; having within itself no luminous thought to convince, no passion to persuade, it sought to dazzle the spectator with the flash of mere meretricious splendour, to goad his emotion with the constant stimulus of mere physical pathos.

Having thus dealt hard,—but I believe perfectly just,—measure to the Pergamene sculptures as expressive art, Dr. Brunn does not deny to them their full meed of praise as effective decorations. Their fantastic manner, which is expressly so barren, is often decoratively successful and perfectly permissible; wings not meant for the earth-born giants to fly with, and therefore expressly bad, yet fill the given space with excellent decorative effect; the more fantastic the form often the better it is as a mere complex of lines,—a mere pattern. How essentially decorative the frieze is, how little a part of the tectonic framework of the building, one can see at a glance; it is not born out of the basis it encircles, it is rather stuck on to it. Its nearest analogy is, as Dr. Brunn shows, the frieze of the Erechtheion. In the Erechtheion the architectural frieze is of dark Eleusinian stone, the sculptured decoration is clamped on and made of different material, i.e., white marble; obviously no integral unity was intended. In fact, both in the Erechtheion and in the Pergamene altar the frieze appears, so to speak, in duplicate, the background of solid stone, and the vitalised version of it rendered into sculpture. This double rendering gives to the frieze a strength and substantiality which, in the case of the Pergamene altar, is much needed, as the heavy weight of the superimposed Ionic colonnade would to the eye seem otherwise insupportable. The sculptures of a frieze so composed, not being part of the architectural structure, are not really in relief, and are therefore free to a great extent from the laws of relief composition. Hence the prevalence of startling full-front and back views in the Pergamene frieze, and also, so far as can be judged from the fragments in the Erechtheion frieze, contrasting so markedly with the "profile" composition of the Parthenon. If one may regard, as Dr. Brunn does, this Pergamene frieze as a sort of second rendering of its own background, not as worked in relief on that background, certainly all the decorative distress of the composition disappears; from a mechanical point of view the grouping is successful: it is static, well balanced, and therefore well suited as a support for the heavy superimposed weight. But probably many will think Dr. Brunn's theory fanciful, though they had better read his criticism in detail before they disallow it.

To sum up, he characterises the Pergamene frieze as a great epideiktic effort, a sort of final and sensational panorama of the outside aspects of the art of the past, and, concluding with a second ingenious metaphor, he adds:—"Comparing Greek art as a whole to an architectural structure, we may say, with a double significance, that the younger Pergamene school in the sculptures of the Gigantomachia effected thus much,—to the proud edifice of the history of Greek art it added a new decorative member which was at once its crown and its close."

IMPROVED WATER SUPPLY FOR THE METROPOLIS.



THE important Parliamentary paper recently issued under this title, contains a report* by Mr. J. Thornhill Harrison on a project designed by himself by which the metropolis is to be furnished with what is considered to be a perfectly pure water in lieu of the present supplies from the Thames, which are complained of as impure. As far as the report goes, the project deals only with the volume now drawn from that river, which contributes 50 per cent. of the whole quantity. That taken from the basin of the river Lea, amounting to 38 per cent., does not come under consideration. The proposal is recommended on the grounds,—

First. Of the *quality* of the water, which is said must be of the purest, inasmuch as it will be drawn directly from the chalk at a depth of from 10 ft. to 20 ft. below the surface, through which it has filtered from a widespread and elevated gathering-ground.

Secondly. That, as regards the *volume* obtainable, it is asserted that there is at command at least double the volume at present withdrawn from the Thames; and

Thirdly. That there will be an annual saving in cost, owing to the absence of any necessity for filtration, and to a large reduction in the expense of pumping, while the area now employed for reservoirs and filter-beds would be left at the disposal of the companies for other purposes. It is thought also that Parliament would relieve the companies from the present annual payments of 10,000*l.* to the Thames Conservancy Board.

The proposed source of supply is that part of the chalk formation within the watershed of the Thames lying to the north and west of Windsor, including the areas within the basins of the rivers Kennet and Colne, and measuring about 1,100 square miles, the elevation of which varies from 100 ft. to 600 ft. above Ordnance datum. The rainfall within that area ranges from 24 in. to 36 in., from which it is calculated 400 million gallons are daily discharged into the Thames; but as the water absorbed into the chalk travels through it very slowly, it is probable that months, perhaps years, may elapse before some of the rain falling and absorbed on the highest portions of the chalk area would find its way to the river, and consequently in that area there exists a very large subterranean reservoir, which, it is conjectured, forms the gathering ground for the chief perennial supply of water to the Thames below Wallingford.

In support of that theory Mr. Harrison affords an interesting explanation of the present geological features and of the disturbances which must have occurred to create the faults which exist in the chalk formation, and which, by intercepting the subterranean flow, help to form the great reservoir of water contained in it. In order to illustrate more clearly the character of the district whence he proposes to gather the required volume, he prepared a model, representing an area of twelve square miles, with Windsor in the centre, and showing the inclination of the chalk formation with superincumbent beds, and the manner in which the drainage from it must flow into the Thames on the assumption that it cannot escape to the sea by passing under London.

The mode in which the water is to be collected consists in constructing a large receiving well at "Black Pots," near the main road from Eton and Upton to Datchet, with an overflow into the Thames, below the Windsor Lock. From this it is proposed to drive a tunnel below the summer level of the Thames, in the chalk, and below the gravel, westward to the river near Bray, the dimensions of which are to be 12 ft. in diameter, gradually diminishing to 6 ft., with a slope of 1½ ft. per mile. In regard to the quantity of water obtainable at Windsor, Mr. Harrison

* Since the above was written a paper has appeared in the last issue of the *Archäologische Zeitung*, in which Dr. O. Puchstein contends that the supposed mortar is really a fragmentary hydria. This is a question for experts to decide.

* Return to an Order of the Honourable the House of Commons, dated Dec. 2nd, 1884, for Copies of Reports made to the President of the Local Government Board by Mr. John T. Harrison, M.I.C.E., as to "Sources of Water Supply for the Metropolis." London: Henry Hansard & Son.

ives the results of certain gaugings taken in April and July last year, from which the variation between Windsor and Datchet is calculated to have been 250 million gallons in April, and 55 millions in July, which last, however, he considers to be too low, and himself estimates at 116 million gallons. In order to convey the water to the works of the Companies, who now pump their supply direct on the Thames, the suggestion made is to build a main-carrier 12 ft. diameter from the well at Black Pots to Hampton, eleven miles in length, with shafts at every quarter of a mile, and an "overflow-weir" placed several feet above the summer level of the river, so that the water may be conveyed in 4 ft. iron mains to the pumping wells of each company, the mains having to be carried across the Thames. The whole cost of the scheme, inclusive of land and distribution works, is estimated at 700,000l.

Mr. Harrison himself is careful to explain that he abstains from expressing any opinion on the objections to the quality of the present supply, and therefore he may or may not acknowledge their validity. Were the supply of London a subject of discussion now or the first time, or were it simply a question of an additional volume, this scheme would, of course, deserve serious consideration, especially when put forward by such an authority as Mr. Harrison, but in its present shape it is unquestionably open to the fatal objection of having half the metropolis exposed to the contingency of having its water supply suddenly cut off by injury to its single main duct, arising either from accident or design. In these days of dastardly and secret outrage, when miscreants do not hesitate to attempt the destruction of a massive structure like London Bridge, the much simpler proceeding of blowing up the main water conduit at one of the quarter-mile shafts, and so depriving two millions of inhabitants of a daily necessary of life, would be much too fascinating a crime to be withstood. It was a possibility of this kind which was urged as one main objection to the proposal of leading water to London from distant sources like the lakes on the Welsh mountains. It must be remembered, too, that one of the set-offs to the cost of the proposed scheme is the abolition of reservoirs and the conversion of the areas now occupied by them to some other profitable use, so that there will be no storage in reserve whence a supply could be drawn pending a stoppage in the aqueduct.

But what proportion of the consumers constitute the "many" who are said to complain of the quality of the existing supply? The probability is that the objectors would be found to represent a very small percentage of the community.

After all, as has been often pointed out in the columns of the *Builder*, the main criterion of the wholesomeness or otherwise of the water is the actual, not the possible, mortality, which is traceable to the present supply, not that which gets defiled in the cisterns in which it is allowed to stagnate in close proximity to sewer or other foul gas, but to that which is drawn direct from the Companies' mains.

There is, moreover, a doubt as to the available volume of water at Windsor, as measured by the quantity said to imperceptibly enter the Thames between Maidenhead and Ditton, and to vary from 250 to 55 billion gallons. Mr. Harrison's estimate of 16 million gallons is apparently obtained by assuming that the previously recorded minimum of 350 millions is not so correct as Messrs. Taylor's measurements last year. But it is at least possible that that recorded minimum may, after all, be correct, and in that case the estimated quantity of 116 millions would be an excess by 100 millions. If so, then what will be the state of London as regards water if it is to be dependent on the springs which furnish a portion of that volume?

But there remains the further question as to the effect which will be produced in the district from which the supply is proposed to be drawn. Protests on that score have already begun to appear against the scheme as projected, and though the effect on the Thames itself below Teddington Weir will be the same

whether the present daily volume of 80 million gallons be drawn by the Companies direct from the springs at Bray or from the river itself at Hampton, it is quite possible that so large a draft on the higher level may make a very serious difference to the navigation of the intermediate reaches, and should it therefore be found that the quantity of water so withdrawn affects the general contribution of the springs to the river, its conservators would scarcely consent to forego the annual 10,000l. which they now receive from the companies, even if they did not insist on a restoration of the volume necessary to maintain the navigation in its present state. Whatever other shape it may be capable of being worked into on further consideration, the scheme does not, as it now stands, commend itself as a substitute for existing arrangements.

NOTES.

FROM the letter of "One of the Chapter" in the *Times* of Wednesday, in continuation of the Peterborough Cathedral dispute, and the subsequent admissions of the Dean, it seems pretty plain that not only the Canons, but the Dean himself, did very distinctly give the world to understand, when they first asked publicly for funds for the repair of the tower, that nothing was intended beyond numbering the stones, taking them down, and rebuilding them as they stood. Of course, it is quite open to the Dean and the Restoration Committee to say, "Behold, we show unto you a more excellent way"; but it can hardly be open to them to say, or let Sir E. Beckett say for them, that there was no such understanding. The argument, if so it can be called where argument there is little, is continued by a long letter from Mr. Thackeray Turner, who seems to think his position as hon. secretary to the "Anti-Scrape" Society constitutes him an authority on architecture, and who effuses over the beauties and perfections of the levelled tower. It is remarkable by what class of correspondents the *Times* columns are always crowded in these cases.

A lawyer, whose foible is omniscience; a sketching parson, who draws towers of his own and calls those of Mr. Pearson monstrosities; and the amateur secretary of a society that talks twaddle over every old wall that is pulled down,—these are our architectural instructors in the leading journal. However, the conductors of that print, from the leader on the subject last week, do seem to have a dawning sense that it is possible to have enough of Sir E. Beckett's letters. From the latest of these effusions, by the way, it appears that Sir Edmund rates each man's right to an opinion on the subject in proportion to the money he has subscribed; a "canon of taste" certainly worthy of its author.

IT appears from a return recently presented to both Houses of Parliament that the practice of letting land upon building leases for long terms is almost entirely unknown upon the Continent, and that in the few countries where the custom prevails it is only to a very limited extent in large towns and their neighbourhood, and that the buildings erected by the tenant upon the ground demised do not escheat to the owner at the expiration of the lease, as is the case in Great Britain. The tenant is, moreover, in most Continental countries protected by a custom resembling Ulster tenant-right; he can dispose of his holding by giving notice to the landlord, and has the right of pre-emption at a fixed number of years' purchase of the annual rent. The most common tenure of land in foreign countries is freehold, and no evils appear to have resulted from the absence of leases with restrictive covenants, which are relied upon by the opponents of land reform in this country as being necessary for the welfare of the community, and the protection of the weak against the strong. There do not appear to be any records to fix the date when the custom of leasing land for terms of 99 years took rise in England, but it is not improbable that it began in the latter part of the

sixteenth century, when the nobility gave up their London houses and removed westward. Their estates being entailed it was, of course, impossible to sell the ground in parcels if it had been desired to do so, and it is readily conceivable that the practice of letting upon a long building lease originated under these circumstances, and being found convenient, the practice was followed by corporations, and afterwards by private persons.

AT the meeting of the Royal Institute of British Architects last week (theoretically a private meeting), a very important donation was announced, that of a coloured copy of the great work got up by the French Institute, under the auspices of Napoleon, as a memorial of the expedition to Egypt at the close of the last century. The work, entitled "Description de l'Égypte, ou Recueil des Observations et des Recherches qui ont été faites pendant l'expédition de l'Armée Française," consists of twenty-three volumes, dealing with antiquities, natural history, and geology, &c. It is on record that a company of the most eminent scientific men of the day accompanied the army, and carried their paraphernalia on donkeys, and when the regiment formed square to repel an attack, the cry was, "*Savants* and asses to the centre." However, the doings of the *savants* are now more important to us than those of the soldiers. At the same meeting a member put forward a suggestion that the library-books should be open to all comers to take them down for reference, instead of obtaining them through the librarian. There would soon be a fine confusion in the library if that were done. Those members who quoted the example of the British Museum Reading-room must have had scant experience there, if they suppose every reader replaces a reference-book when he has used it. There is an absolute want of conscience on the part of many readers in this respect; books are constantly taken out and kept the whole day by readers who only wanted them for a single reference. The Institute Library will be of far more use to members if the books are kept in thorough order, and they never will be except under the tutelary care of the librarian. A very few careless and disorderly persons would soon introduce hopeless confusion in the placing of the books. Mr. F. R. Farrow, the holder of the Godwin Bursary for 1884, read part of the report of his tour, which will be published in the *Transactions* shortly. The report was very highly spoken of by Mr. P. Anson and others.

UNREMITTING efforts are being made by the Railway and Canal Traders' Association to bring before the public the effect of the proposed new Railway Bills. With a view of disseminating information on the subject, prior to the Cannon-street Hotel conference they circulated a very exhaustive statement showing the principles and aims of the Bills, which are condemned most vigorously. It is stated that they are not even what they profess to be in the preambles,—they do not provide a "simplified system of charge,"—and an elaborate appendix is given to prove this. The mileage rates of five of the eight companies concerned are identical, two more have a slightly differing scheme, and one,—the North-Eastern,—an entirely different one. There can be no doubt that this want of uniformity will go far to destroy the usefulness claimed by the companies for the measures, and until they all agree and all the other lines adopt the same system, there must be endless confusion, especially as regards through rates in which several lines are interested. The fact that the companies seek for powers to charge for "terminals" is looked upon by the Association as rendering the mileage scheme quite worthless, as there would be so much vagueness about these additions that the public would be as much in the dark as before as to the real extent of their charging powers. But the companies offer to show in their rate-books at each station or wharf a statement of the amount of terminal charges at that station or wharf. This is a step in the right direction, and the Association ought to give the companies credit for it. It is notice-

able that the companies introduce into these schemes the classification of goods as compiled by the Railway Clearing House. This divides all goods traffic into eight classes, and, though it has long been used by the railways, it has never received Parliamentary sanction.

THOSE of our readers who have read what Mr. Ruskin calls the terminal letter of "Pors Clavigera," with the dainty little frontispiece by Miss Kate Greenaway, may remember "the beautiful city of Bassano on the Brenta between the mountain and the plain," where the Signora Zanchetta passed the eighty-five years of her busy, happy, and useful life, and where, if we can credit Mr. Ruskin's gossiping correspondent, people occasionally live to more than one hundred, and not unfrequently to eighty or ninety years. The municipal authorities are about to demolish the fortifications of this singularly favoured city, which date from the fourteenth century, and are said to be in an excellent state of preservation. The proposed action of the municipality has given rise to some opposition on the part of the local archaeologists and artists, and Signor Giacomo Boni, a Venetian architect of some repute, referred to the proposal in terms of disapprobation at the inaugural meeting of the winter session of the Venice Athenæum. The Italians, as a rule, have very slight regard for Medieval antiquities, and only recently a large portion of the walls of Brescia was pulled down in order to provide a suitable entrance on the occasion of a contemplated visit from the King, which, however, did not take place.

THE Japanese village which has been conveniently arranged under cover in the vicinity of Albert Gate will probably be an object of attention, and a sort of agreeable lounge for the curious, until the more important attractions of the season are in full swing. For those who would go to such an exhibition for the study of Japanese art or domestic architecture there is not really much to attract. They can see a carver transferring a design to wood by cutting through the thin paper on which the design is traced, and which overlays the wood; a carpenter planing by drawing his plane to him instead of pushing it from him (Japanese do everything the reverse way to other people); he can see studious silent persons painting fans with the left hand or right hand indifferently; and he can see for himself the lath and paper kind of dolls' house construction which is used in ordinary Japanese habitations, and how the houses stand on so many legs like a stool. It was amusing, too, in the theatre, to witness a kind of pantomime dance executed by a heavily-draped lady with a fan in her hand, and to realise how much nearer to life some of the Japanese drawings of men and women really are than might have been supposed, even to the peculiar twist or "kick-out" of the skirts of the dress which is so familiar to us in Japanese drawings of women. But, of course, the best class of Japanese art-workmen do not come over in this kind of *entourage*; and a good deal of modern work may be seen which seems to represent the *Soho* bazaar element of Japanese work. Nor do we much admire the system of arranging men and women in booths to make a show of them. They do not look as if they liked it; but that, we suppose, is considered in the bill.

COUNT ENRICO GRITTI has recently presented to the city museum at Venice the banner which was carried on the prow of the barge of his ancestor the Doge Andrea Gritti.

ACCORDING to the *Courier de l'Art*, the "Société des Artistes Français" is in considerable alarm in regard to the possible effect on the *Salon* of the establishment by the State of a *Salon triennal*, the first opening of which will take place next year, so that there will be two *Salons* in Paris in that year. They are in some fear lest the triennial *Salon* should injure the old and recognised annual *Salon*, both in drawing away works which would otherwise have been sent to the annual *Salon*, and possibly

in encroaching upon the space hitherto allowed to the latter in the rooms of the Palais de l'Industrie.

A MEDAL has been awarded by the jury of the "Exposition des Arts Décoratifs" at Paris, to M. Adolphe Guillon, whose admirable drawings from the sculpture at Vézelay we had the pleasure of publishing in December, for "reproductions des vieux carreaux."

THE new number of the *Edinburgh Review* contains a paper of considerable interest on "Recent Discoveries in the Roman Forum."

A COURSE of free evening lectures on subjects connected with building is announced to take place at Carpenters' Hall, London-wall, in the months of February and March. The lecturers will be Professors Kerr (of King's College), Church (of the Royal Academy), and Bonney, Corfield, Kennedy, and Roger Smith (of University College), with Mr. Blashill and Mr. Slater. The subjects will be of a nature to interest and instruct not only artisans, for whose benefit the course is primarily intended, but also students of architecture, surveying, and building; and the Carpenters' Company wish it to be distinctly understood that the attendance of all persons in any way interested in, or connected with, the art of building is cordially invited. These lectures form a kind of sequel to the exhibition of carpentry and joinery held last year by the Carpenters' and Joiners' Companies in the same Hall; and should they prove successful it is likely that they may be followed by other efforts to promote a knowledge of the principles of good building among those whose occupations render such knowledge of importance to them.

M. EUGENE MÜNTZ, *lauréat* of the Institute of France, and curator of the Library and Museum of the Ecole Nationale des Beaux-Arts, was appointed to succeed M. Taine in the "Cours d'Histoire et de l'Art," and gave his opening lecture on Wednesday, the 7th, in the Hemicycle of the school. After a tribute to his predecessor, he entered into the subject of the part played by archaeology, history, and æsthetic in the study of the monuments of the past, combating what he considered to be the false antagonism which has been set up between archaeology and æsthetic. In speaking further of the varied influences of climate, race, and tradition on the development of the fine arts, he emphasised the part which was to be attributed to the constant and regulated discipline of the French school, in the artistic excellence of that country, and after sketching briefly the succession of the great schools of art in Europe, concluded by a concise review of the principal historians of art, from Pliny the elder to our own day. M. Müntz will take for his subject for the year "La première Renaissance Italienne."

A SOCIETY, calling itself the Strand Improvement Association, has issued a coloured lithograph from a drawing by Mr. H. W. Brewer showing in a bird's-eye view a suggested alteration in the thoroughfare of the Strand between Somerset House and the Courts of Justice. The proposal is of an ambitious character, and apparently aims at nothing less than the entire reconstruction of the northern side of the Strand between St. Mary-le-Strand and the gateway of Clifford's Inn. A crescent is proposed to be formed on the north side of the Church of St. Mary-le-Strand, and an enclosed garden laid out in front of the Church of St. Clement's Danes, Temple Bar being reconstructed and made into a gateway to the garden. The total cost of this improvement is roughly estimated at one million and a half, but as there is no plan showing the extent of the property which would be affected it is impossible to offer any opinion as to the sufficiency of this estimate. No provision is made for supplying what is really an urgent want, namely, a new approach to the Courts of Justice from the north, and the only effect of the suggested improvement would probably be to still further increase the congestion of traffic at Temple Bar.

THE *Semaine des Constructeurs* (Jan. 10th) comments sarcastically on the bold project for erecting a colossal tower, in connexion with the forthcoming International Exhibition, of a height of 300 mètres (nearly twice that of Cologne spires). M. Bourdais is the architect responsible for the proposed scheme. *La Semaine* admits it to be a bold idea, but "l'audace coûte très cher," and our contemporary wants to know the advantage of it. There is to be an electric light on it to light all Paris; but considering that intensity of light diminishes as the square of the distance, one will be 900 times less lighted than by distributed lights placed at a height of 10 metres, for example; besides "nos rues resteraient plongées dans la plus noire obscurité, tandis que les toits de nos maisons offriraien aux seuls habitants des caves parages, les chats, les promenes les plus vivement illuminés." M. Bourdais, however, is equal to the occasion, and proposes mirrors to direct the light to the places where it is wanted. So there is a new entertainment offered to visitors.

WE have received what may be called a pamphlet *de luxe*, under the title "Who Spoils our New English Books?" a question asked and answered in a paper read at a meeting of the Library Association at Cambridge, in 1882, by Mr. Henry Stevens, among whose various titles, arranged in wedge-form on the title-page, are included "Citizen of Noviomagus" and member of "Blackballed Athenæum Club." Mr. Stevens is of the opinion (which we do not contest) that the art of printing, binding, and generally getting up books in the best manner, is woefully decaying in England, and enumerates ten different classes of sinners (for list, see the book*), the Purchaser or Consumer, in his ignorance and indifference, being the greatest. We were wondering the other day how a poet like Lord Tennyson could consent to let his latest drama come out in a uniform harsh green, repellent to the eye, and of a texture equally disagreeable to the touch. For works of the higher order of literature, no doubt, it is supposed that simplicity in binding is in the best taste,—the value lying in the contents; but then there is all the difference between a noble and an ignoble simplicity. Mr. Stevens's booklet, we presume, is meant as an example how to get books up. They pe and paper are admirable; the page shows a wide margin on the bottom and outside edges, which is really in accordance with practical considerations, since it is by those edges that we turn the pages; but it is a little overdone; the print seems rather squeezed into a corner. But is it an element in the best way of producing books, to leave the pages un-numbered? The reader will not thank the Noviomagian for that. Among a number of miscellaneous tags of quotations referring to books and the book-trade, with which the title-page and fly-leaves are garnished, occurs the following brief but comprehensive criticism extracted from the New Testament—"Whom Satan hath bound."

A New Air-heater.—At the meeting of the Royal Scottish Society of Arts, on Monday night, Mr. James Gowans, Vice-president, in the chair, Dr. W. G. Black exhibited and explained the action of an air-heater, contrived by himself, for warming the air of rooms. The apparatus consists of a chamber of sheet-iron, so constructed that it can be fitted on the top of a stove. Air, allowed to enter it by one pipe, is heated in passing through, and discharged by another pipe of the same dimensions, in such a way that it will ascend towards the ceiling, and thence descend gradually and diffuse itself through the apartment. This method, Dr. Black submitted, did not involve any admixture of smoke with the heated air; it dried the air during the time it was in the chamber, and it would have a sanitary effect in destroying organic germs. Some discussion followed, in which Dr. Macadam said he did not see that the apparatus could provide for the ventilation of a room; but as far as the heating of the air was concerned, he had no doubt it would have that effect. Mr. Sang then submitted "An elementary view of the strains on the Forth Bridge due to the shifting load."

* Published by H. N. Stevens, St. Martin's-lane.

ROYAL ACADEMY OF ARTS.

EXHIBITION OF WORKS BY THE OLD MASTERS: SIXTEENTH YEAR.

The present exhibition is not marked by the appearance of any picture of absolutely the best rank of merit, it at all events possesses a large number of works of more than average interest and value. We shall take the somewhat unusual course of commencing with works of the English school. This winter, in the halls of English art, belongs especially to insuborough. The artist has now been enabled to form a better estimate of his value by the specific of distance. The Grosvenor Gallery sends us with the materials for tracing the growth and compass of his powers, but the best of his larger works has to be sought in the rooms of the Academy. It is the extensive series (195) bearing the full-length portraits of Squire Hilliard and his wife, painted in the ten years of the artist's life. The youthful and handsome pair are walking gracefully and surely along arm in arm. Their attention is just being attracted to some moderately-tant object. The dog by their side, as with Gainsborough's dogs, is an expectant animal, full of affection for his master. The lady is, indeed, rather a nymph than a woman of flesh and blood, but the squire is completely human. A three-quarter length portrait of Mrs. Albert is not less excellent in the skillful arrangement and selection of drapery; it is a picture of the same type as the portrait of Mrs. Basset (59 at the Grosvenor). Of Sir Gainsborough's, the portraits of two ladies, Ladies Erne and Dillon, painted and dated together, exemplify the style of a somewhat earlier period (circa 1770) of the artist's career, whilst the best portrait of Lady Mulavey (47) once more represents his advanced years.

Reynolds is again brought before us in numerous beautiful works, no less, indeed, than twenty-four, none of which appeared at the Grosvenor last year. Of these the fascinating portrait of little Penelope Boothby (55) is shown to every one through the medium of engravings. The self-portrait of the artist, holding his hand to his ear (39) and wearing a bright, yet conscious expression that plainly tells of deafness, is to us a more satisfactory picture than the better-known one with the ear trumpet. Here the face stands out of a warm surrounding darkness with remarkable brilliancy and animation. The full-lengths of John Underhill (189) and his wife (198) are likewise splendid examples of the master's style. The husband is simply and effectively presented, standing in an open landscape, before a mottled sky. The beholder's eye is at a low level, and the figure rises before him in a striking fashion. A great part of the picture is clearly the work of assistants, but the head has been carefully finished by Sir Joshua's own hand. There are other portraits of Mrs. Masters in the collection, one (143) a half-length, likewise by Sir Joshua, the other (25), a bust, by Romney. A comparison between all three is interesting.

There are in all eight of Romney's pictures shown. Undoubtedly the best is the full-length of Lady Brooke (102) in the long room. In certain not altogether pleasant qualities of colour, in the long rhythmically-flowing curves of the dress, and still more in the presentation of character, this is one of Romney's most characteristic works. The brightness of the face and the excellent rendering of the rich hair are examples of the painter's special gifts. Strictly speaking, we ought to have mentioned Hogarth before the inseparable triad, and as an artist he stands so much alone that we take him at any time and in any sequence. A few of the Old Masters Exhibitions has been so well represented as here. Five of his works are before us, and amongst them some of his best. First comes the strong and solid, rather than attractive, portrait (6) of James Quin, the actor. The face looks forth with a certain lightness out of the nebulous importance of a full-bottomed wig. More generally pleasing is the group of little figures in a room, entitled "A Conversation at Wanstead House" (28). The persons represented are the first Lord Tynley and "many of his vassals and dependents." The picture contains high artistic qualities of light and colour, about which, owing to the badness of illumination at the time, we are unable to say more. The faces are in many instances bright and expressive, and,

though the grouping is formal, the result is good. The background of the room is dark; the faces stand out from it in full light, handled with much skill. Two of the series of pictures entitled the "Four Times of the Day" put in a welcome appearance. Unfortunately, the owner of the companion pair could not be persuaded to gratify the public with a sight of them. The two shown, "Morning" (44) and "Night" (48), make us additionally anxious to behold the others. Both represent scenes in London, treated in the fearlessly satirical vein of the artist. Both are full of vigorous treatment, of strong delineations of character, and of that apparently accidental juxtaposition of incidents out of which the moral of the work arises. The "Southwark Fair" (144) is a larger picture, of a character almost Shakespearean. To treat, however, any of these pictures with justice would require more pages than we have lines to spare. Of the other great English artist, J. M. W. Turner, there are four examples. The "Burning of the Houses of Parliament" (197) is the most striking of them. It stands forth like a flaring incarnation of rage. On the one hand rises an indignant cloud of flame, with the Abbey towers seen like hot iron through the mist; on the other is the long stretch of bridge lighted up by the fire, with a multitude of folk, just visible if you fix your gaze on them, though the light dazzles so much that you can hardly see anything else but it. Lawrence, Stothard, Constable, and many other English painters are more or less well represented, but we cannot now pause over their work. "The Boulogne Fish Market" (3) is a good Bonington.

It was from the Low Country painters of the seventeenth century that English art derived its chief impulse. It is not without fitness, therefore, that at these annual exhibitions the second room is always reserved for them. It contains a small but hold sketch by Rubens of St. Peter and St. Paul (78), standing each in an archway. It is a design either for stained glass or for a wall-decoration, one would suppose, but whether it was ever carried out we cannot say. The finest Rubens occupy the position of honour in the long room. They are three important works from the Blenheim collection, possibly now making their last public appearance in England. The best of the three is certainly the portrait of Anne of Austria (117). She is seen as a seated three-quarter figure, in a black dress, with a large white ruff. The white complexion, for which she was famed, and the too much ruff she used to wear, are both shown by the painter, who has likewise treated with evident delight the arms and hands, of which it was said that all Europe knew the fame. The "Venus and Adonis" (146) manifests much of the artist's power and some of his weaknesses. The colour is unsatisfactory. The head of Venus is of extraordinary beauty, tender and fair, and her hair is splendid for quantity and glossy flow. She sits in a shady place under the trees, and would gladly restrain her lover, but the youth will away after his dogs, though baby Cupid lung his leg never so hard. The "Lot and his Daughters" (148) is much less attractive. The composition is poor, and of the heads only those of Lot and his wife are fine. She is weeping and miserable, just passing by a suggestive pillar.

Of Vandyck there is one very fine work, which throws the other three into the shade. It is the full-length portrait of Strafford in armour (188). Here we feel that the man himself stands before us, the strong governor, the relentless politician. In his face is a mastiff-like strength; the pose of his figure marks unhesitating decision of character. The "Buckingham Family" (145) from Blenheim is likewise a fine work, full of the "gloss of satin and glimmer of pearl." The equestrian portrait of Charles I. (183) is a school picture, if we mistake not, designed undoubtedly by the master. The slaty tones of the horse were never laid by Vandyck's brush.

There are many very excellent examples of the Dutch painters of the seventeenth century. To begin with Franz Hals, Lord Braybrooke's "Fiddler" (94) is a work which neither requires signature nor date (1630) to attest its genuineness. The same may be said of the "Dutch Lady," painted five years later. Both are examples in their different way of the grip the artist had of his subject and the forcefulness of his expression. Mr. Huis's "Conversation Piece" by Dirk Hals (136, dated 1614) is a beautiful piece of colour,

the dresses of the two ladies on the left forming together a very pleasing passage. At first sight this set of long-legged folk almost seem like a joke of the artist's; but the length of limb is found on examination to be apparent rather than real, and is the result of the sartorial fashion of the time. Van Goyen has been better represented on other occasions than in the three pictures now brought together. Solomon Ruysdael, on the contrary, could scarcely be seen to better advantage. Most important for size and of excellent quality is the "River Scene" (152). A dark clump of trees in the midst of the shadowed foreground renders the light behind all the more luminous, whilst the cloud-drift across the sky gives the distance an animation which in the foreground is effected by the presence of one of the artist's favourite ferry-boats. The large Albert Cuyp (101) is a conventional and indifferent work. More satisfactory is the "Landscape with Cows" (93), which breathes the quiet sentiment of evening and approaching rest. The little "Sultry Morning on the Maas" (107) is, perhaps, the best of all. One canvas only claims to have felt the touch of Rembrandt. The subject, "Tobit and the Angel" (135), is undoubtedly treated in his style, but the faces seem to want that fire of feeling which he never failed to infuse into them. A picture by Solomon Koning (82, dated 1635) is an early example of that artist under Rembrandt's influence. It is called "A Merchant," and the catalogue states that the table is covered with "papers and documents." In reality it represents an author writing, and the huge tomes spread out before him are monuments of stored learning and not musty account-books. "An Old Woman" (137), by G. van den Eeckhout, is a poor work inspired by the same great master. We cannot expect every year to see such a magnificent Terburg as that which delighted us last winter. The "Lady at her Toilet" (121), though not in such perfect preservation as the "Letter," is, nevertheless, a fine work. It manifests the painter's faultless understanding of the use of colour,—what it can do and what it cannot,—and, as a piece of workmanship, is as fine as anything can be. The Queen's Metron, "Le Corset Bleu" (109), is a picture possessing similar qualities and worthy of the closest examination. The so-called "Water Doctor" (76) is quite up to the average of Gerard Dow, the lights being handled with much skill, and the accessories, brass things and books, being of course finely finished and well chosen for harmony of colour. Art van der Neer is only too unpleasantly prominent; none of his exhibited works, except the "River Scene in Guelderland" (108), being possessed of charm. The exception, however, is a work of merit. Jan van de Capelle's "Calm" (117) is of his usual style. In former years, however, we have been shown works which throw this into the shade. Paul Potter's "Sportsmen" (119), though a small picture, is one of the painter's best works; the figures on horse and foot are well grouped together; the whole is good in light and colour, and well worked out. Of Jan Steen's works we have had a more attractive display than those shown this year. All of them are unpleasant in colour and some in subject, though in none is the artist anything but himself, individual and original as he always was. "The Month of a River" (141), by William van de Velde, is a pleasant little piece, worth comparing with one or two other treatments of a similar subject by different artists in the same room.

The fifteenth and early sixteenth century schools of Northern Europe are not numerously represented this year. The earliest picture is a "Marriage of the Virgin" (215), foolishly ascribed to Van Eyck, but in reality a Cologne work of about 1480. This is followed, in point of time, by the most important work in the Exhibition, the famous "Adoration of the Magi," by Mabuse, from Castle Howard (230). Mabuse was an artist of the School of Bruges, who, up to nearly the fortieth year of his life, was subject only to Flemish influences. His picture represents him at the height of his native power, and before that power had been corrupted by the pernicious influence of Italy. Had he but stayed at home and gone on painting in this fashion, gathering increase of experience and dexterity, the last twenty years of his life might have produced as rich a harvest of mature work as Dürer himself gave forth. The fates determined otherwise. For perfection of finish, definite knowledge of what to do

and how to do it, few pictures in the world surpass this extraordinary work.

The styles of Bernard van Orley and Mostaert appear in two pictures, a lady's portrait (153), ascribed to the former, and a "Magdalen" (202) by the latter. Of sixteenth-century German artists there are a few works of the second rank. Two wings of some altar-piece (219 and 221), ascribed to a certain Hans Braun, unknown to us, are in reality good specimens of the style of Bartholomew de Bruyn. From the Dublin National Gallery come two South German portraits, that of Margaret Knoblauchin (174) by a Swiss follower of Holbein, and that of Anthony Handertpfundt (175), by Wolfgang Hauber, a conscientious imitator of Dürer.

Coming now to Italian pictures, there are none of great merit belonging to the early schools. The North Italians are best represented. First comes an unpleasant, but seemingly genuine, work of Bartolomeo Vivarini (206), painted under Paduan influence. The "Madonna" (207) is a signed picture by a rare pupil of Bellini, Giovanni Manuetti. The "Madonna with Saints" (211) is an early work by some other pupil of Bellini's, just possibly Cima. "Diana and the Fishermen" (205) and the "Battle Piece" (258) are both good pictures, and show the influence, though not the handiwork, of Giorgione. Far less excellent is the "Three Kings" (227), falsely ascribed to Catena. It is by some Germanising Venetian of small importance. The "Punishment of Actæon" (159) is rightly ascribed to Veronese, though at first glance it more resembles a painting by Titoreto. It contains no splendour of drapery and no elaborate architecture. The charm of it is the play of light upon the nude, which is inspired by Titoreto, and the rare harmony of colour, which is Veronese's own. The other picture ascribed to the same artist (168) is a poor school work. An animated representation of the "Piazza Colonna" (154) is a really good example of the powers of Francesco Guardi.

The front of a *casone* (218) is a rare piece of work, probably from the studio of Vittore Pisano. The "St. Catherine" (216) is one of Crivelli's most pleasing productions, full of tender sentiment and graceful design. It is in perfect preservation. The bust portrait in profile (209) is rightly given to Ambrogio Borgognone. It shows him under the influence of Antonello, and is one of the best specimens of his work. Very close to him are the panels forming a further instalment of the decorative frieze belonging to Mr. Willett, some of which were shown last year. They are exceedingly interesting, and quite up to the average of what we saw before. The "Madonna" (222) is of the ordinary Milanese type.

The "Holy Family" (173) comes from the period, though not the hand, of Marco d'Oggione. The so-called Bottinone (228) is likewise a Milanese painting with strong Florentine elements, and treated in an archaic manner. A good and well-conserved example of Francia appears in the "S. Roch" (176), which is both signed and dated (1502).

Some interesting Florentine pictures are placed in the Fourth Gallery. None of the works of the school of Giotto are of any importance. The little "Journey of the Three Kings" (250) shows the combined influences of Angelico and G. da Fabriano. An "Allegory" (254), ascribed to Signorelli, is probably by Piero di Cosimo, who had a liking for such subjects; by no possibility is it a Signorelli. The lunette (235) is by Botticelli, and thoroughly characteristic of his early period. The round "Madonna" (244) is a school-work. The eight little pilaster panels bearing saints (252, 250) are good school pictures from a master's design. There is a very simple and beautiful "Madonna," by Albertinelli (225), and four little paintings (213) are likewise ascribed to him. A half-length "St. George" (208) is only of Ghirlandajo's school. The little round "Madonna and Saints" (203), ascribed to Raffaellino del Garbo, is at least a most charming work of the late fifteenth-century Florentine school. The *casone* front (212) and the "Entombment" (217) are poor anonymous works of the same period, showing Botticelli's influence. There are several anonymous fifteenth-century Sienese pictures (232, 213, 251), and one, a "Madonna" (210), with which the name of Matteo da Siena is in all probability justly associated.

The authorship of the picture of a "Choir-master" (180) is a problem to the solution of

which we can offer no help. The work is certainly fine, probably Italian, and painted in the last part of the sixteenth century.

The best Spanish picture is a "Madonna in Glory" (161), by Murillo, of his usual kind, though better than usual in treatment. We prefer it above the famous but vulgar work in the Louvre. The so-called "Portrait of a Genoese Noble" (150), really a picture of a Man-at-arms, is a thoroughly sound and effective piece of workmanship. Velasquez's hand had no share in the painting of the "Head of a Man" (181), though his influence is apparent throughout it. Zurbaran is accredited with the unattractive "Franciscan Friar" (162).

The "Assumption" (172) is a genuine piece of Nicholas Poussin's work. The definiteness of the artist's intention, and the easy skill by which he attains his ends, are the good points in a picture which is not likely to be popular in these days. Two "Fêtes Champêtres" (115 and 128) are good examples of what was possible to Jean Baptiste Pater, one of the best followers of Watteau.

THE LATE MR. JOHN WHICHCORD.

It is with great regret that we record the death of Mr. John Whichcord, F.S.A., architect, and past-President of the Royal Institute of British Architects. He died at his residence, 23, Inverness-terrace, on the 9th inst., after a short illness, the cause of death being inflammation of the lungs, terminating with paralysis of the heart.

Mr. Whichcord was born on Nov. 11, 1823, so that he had but recently entered on his sixty-second year. His native place was Maidstone, where his father (who died in 1800) carried on a large practice, besides holding the position of County Surveyor. The future President of the Institute was educated at Maidstone, and afterwards at King's College, London, under Dr. Lonsdale. He commenced his professional work as his father's pupil in January, 1840, and became a student at the Royal Academy in 1844. In the same year he was elected an Associate of the Institute. In these early years of his professional life he assisted in the erection of public buildings in Canterbury, Maidstone, Rochester, and other towns. He also made surveys for railways intersecting the county of Kent, and took part in the construction of locks, bridges, and other hydraulic works on the River Medway. He went abroad in 1846, passing through France to Italy, and proceeding to the Ionian Islands, Greece, and Turkey. Having got so far, it is not to be wondered at that he was seized with a strong inclination to visit Syria and the Holy Land. He travelled for a lengthened period in Turkey in Asia as an Arab, living with a tribe, and making a journey to the Euphrates. Returning to Syria, he made a visit to every known spot mentioned in the life of our Saviour. Having acquired the language and assumed the costume of their custodians, he was enabled to visit the Mahometan holy places and mosques without hindrance. Departing from Syria, he went into Egypt, proceeding as far up the Nile as the Third Cataract. He returned to Europe in the early part of the year 1850, but went abroad again the same year for a shorter tour in France, Italy, Germany, and Denmark. As may be supposed, he made a large number of sketches while on his travels. On his return he entered into partnership with the late Mr. Arthur Ashpitel, in conjunction with whom he carried out several important works, of an engineering as well as of an architectural character, not only in England, but in Italy, France, and Germany. This partnership was terminated in 1858, and Mr. Ashpitel died in 1869. In 1851 (a year before the Metropolitan Board of Works was created) he was appointed by the magistrates District Surveyor for Deptford. He was elected a Fellow of the Institute in 1850, and President in 1879, holding office for two years. Mr. Whichcord's work as President of the Institute was characterised by his usual energy and business capacity; and whatever differences of opinion may be entertained as to the policy continued under his régime, those who differed most from that policy will be the first to admit that in his guidance of the affairs of the Institute he was actuated by an earnest desire to promote the welfare of architects and the prosperity of architecture. It was mainly due to his efforts that the Obli-

gatory Examination was put on an effective footing. He was an admirable chairman, displaying great tact, and always keeping a meeting over which he presided well in hand. He was elected President of the Architects' Benevolent Society in 1881, in succession to Mr. T. H. Wyatt. He held the appointment of consulting architect to the Colonial Government in respect of the new Houses of Parliament at Cape Town, and designed the internal fittings of those buildings. He was one of the surveyors to the Railway Department of the Board of Trade. The principal buildings with which his name is associated as architect are St. Stephen's Club House, Westminster, the National Safe Deposit Company's building, and the New Zealand Banking House, Queen Victoria-street, besides numerous buildings for mercantile purposes in the City of London, including the large block of offices known as No. 9, Mining-lane; No. 24, Leeward-street; No. 8, Old Jewry; Mansion House Chambers, Queen Victoria-street; and Messrs. Brown, Janson, & Co.'s Banking House, Achurch-lane. He was architect of the Hotel Hotel at Brighton, the Clarence Grand, Dover, and other buildings of the kind. He was also architect of St. Mary's Church and parsonage, Shortlands, Kent. Of recent years Mr. Whichcord has been largely occupied as arbitrator in reference and compensation cases, being frequently employed in those matters by the Government, the Metropolitan Board of Works, and railway companies. He was the author of "The History and Antiquities of Christ Church, Maidstone," "The History and Antiquities of St. Mary's, Aldermanbury," "Polychromy of the Middle Ages," besides several other works. He contributed many valuable papers to the Transactions of the Royal Institute of British Architects. In conjunction with his partner, the late Mr. Arthur Ashpitel, he published a work entitled "Observations on Baths and Wash-houses," and also a companion work on the "Erection of Fireproof Houses in Flats." He was a Fellow of the Society of Antiquaries (elected in 1818) and a member of the Institution of Surveyors.

Mr. Whichcord was, in 1865, a candidate for the representation of Barnstable in Parliament. He contested the borough on Conservative principles, but unsuccessfully. He took an active interest in the Volunteer movement, and in 1869 became a captain in the 1st Middlesex Artillery Volunteers, having previously served in the Kent Yeomanry. For the first-mentioned corps he, in conjunction with Sir John Monckton, raised a battery mainly composed of young architects and lawyers. He took an active part in Freemasonry, having been initiated into the "Jerusalem" Lodge in 1845.

Mr. Whichcord was twice married. By his first wife (an Italian lady) he had no issue. By his second wife (whom he married in 1860, and who survives him) he had a family of seven children, five of whom are living.

The funeral took place on Thursday last at Kensal Green Cemetery, and was attended by the President and several members of the Council of the Royal Institute of British Architects, besides deputations from the District Surveyors' Association, the Surveyors' Association, the Institution of Civil Engineers, and the "Jerusalem" Lodge. Amongst those present were the following:—Sir John Monckton, Sir Charles Hutton Gregory, C.E., K.C.M.G.; Major Davies; and Messrs. Ewan Christian, E. R. Robson, J. Macvicar Anderson, W. H. White, Thomas Chaffield Clarke, Octavius Hansard, Alfred Conder, J. Tavenor Perry, Henry Curry, Joseph Clarke, Arthur Cates, Professor Hayter Lewis, Benjamin Tahherer, John Clarkson, Banister Fletcher, Robert Walker, William Cunningham Glen, C. L. Enslake, and Cole A. Adams, President of the Architectural Association.

The Builders' Ball.—The thirty-seventh annual ball in aid of the funds of the Builders' Benevolent Institution is to take place at Willis's Rooms, King-street, St. James's, on Thursday next, the 22nd inst.

* For illustrations and description see *Builder*, vol. xxxii. (1874), pp. 308, 309, 311.

† In conjunction with the same gentleman, Mr. Whichcord was architect of the Lambeth Baths, Westminster Bridge-road, one of the earliest and largest establishments of its kind in London.

Illustrations.

WINDOW IN SOUTH CHOIR AISLE, SALISBURY.

WE give this week two more of Mr. Burne Jones's figures from a window in the south choir aisle, Salisbury Cathedral. Two figures from the same window were illustrated in the *Builder* for January 3rd.

ALL SAINTS' CHURCH, UPPER HOLLOWAY.

THIS church, now being erected from the designs of Mr. J. E. K. Cutts, which were selected in a limited competition of five architects,—Mr. Ewan Christian being the professional referee,—consists of nave, chancel, organ-chamber, large west porch, and large vestries. It is faced on the outside with red bricks, the interior being plastered with arches, quoins, jambs, and reveals of red brick. The stone of the pillars, tracery, &c., is from the Monks Quarry. The roofs and vaults are of pitch pine, and the paving of the nave of wooden blocks. Messrs. Dove Bros. are the contractors, whose tender for the work is complete was 4,975*l.* The church provides 18 sittings.

THE CHURCH OF ST. MARY, GEDDING, SUFFOLK.

THIS interesting and quaint little church, which lies in the immediate neighbourhood of the Architectural Association this year, is being restored under the supervision of Mr. E. F. Bisschopp, architect.

The general features are of Decorated character, though there are evidences of a much earlier date. Traces of the moat, which originally surrounded the church, are still distinctly perceptible.

After various patchwork repairs, executed during the dark age of the last two centuries, the building had fallen into a most deplorable condition, the nave being quite unfit for divine service. Upon being instituted to the office, the new rector, the Rev. J. Sidney Tucker, set most energetically to work on the restoration. This has been carried out strictly to the founder's lines, reverentially preserving every original feature, and substituting no modern patchwork for ancient solidity of construction. So that Gedding, with its Norman apertures, lepers' grating, triple chancel arch, &c., will amply maintain its character for being not only one of the oldest, but most interesting churches in the kingdom.

The nave roof has been taken off, reframed, and refixed, all the sound old oak timber having been re-used. In hacking off the plaster which figured the outside face of the walls, two Norman windows were discovered, one on either side of the nave, north and south. These have been carefully opened up and glazed. The upper window in the chancel has been exposed to view, together with its original ironwork upon therein. The triple chancel arch is being restored, some of the stonework having been removed and made good in brick. There are slight remains of the rood-screen, and the six ancient benches left will be refixed.

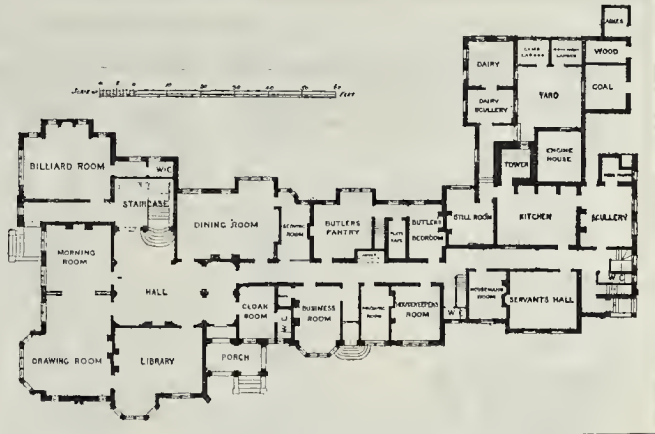
The upper part of the tower, if ever erected, has disappeared, and is now of brickwork, with a hipped tiled roof. The restoration of the tower and the porch, shown in the view to replace one in white brick, pulled down, is not included in the present contract.

The contractor is Mr. R. Tooley, of Ipswich.

HOUSE AT MATTHEW'S GREEN, WOKINGHAM.

THIS house, which has been erected from the designs and under the superintendence of Mr. Ravenscroft, of Reading, is situated in well-wooded and pleasantly-placed grounds near Wokingham.

It occupies the site of an older house, which not only was devoid of interest, but in such a condition that the enlargement of it first contemplated was found to be impracticable. The present house, with lodge, conservatory, &c., all designed to be in harmony, was carried out by Mr. Filewood, formerly of Reading, but now of the firm of Silver, Son, & Filewood, of Maidenhead, for the proprietor. The whole cost was about 7,000*l.*



Askham Hall, near York.—Ground Plan.

ASKHAM HALL.

THE new Hall is to replace an existing one, of no special interest, which was not convenient in arrangements or good in its sanitary conditions. The present building, which is in process of construction, is planned with all the advantages of our now extended knowledge of hygienic requirements. The whole structure is underlaid with a stratum of cement concrete; the drainage has arrangements for automatic flushing; and the methods of heating and ventilating the house are of a very complete character. The view and plan speak for themselves as to the designing and planning of the building. Externally no attempt has been made at elaboration of detail beyond what is necessary to emphasise the reception portion of the house. A certain picturesqueness of grouping has been sought for as suitable to the position which it occupies, embosomed in trees, and the dominant feature in the little village whose old-fashioned green and rural pond it overlooks. Internally the principal feature is the central hall, around which the reception-rooms are ranged. This portion of the dwelling is carried up two stories, is lighted by a domed ceiling, and is treated with some little amount of detail. The materials of which the hall is built are red bricks and tiles, with Bolton Wood stone dressings. The dwelling will be the country seat of Sir Andrew Fairbairn, Member for the Eastern Division of the county of York, and has been designed, and is being carried out, by Messrs. Chorley & Connon, architects, of 15, Park-row, Leeds.

IMPERIAL HOUSES OF PARLIAMENT, BERLIN.

PRIZE SCHEME FOR HEATING AND VENTILATION.

WE give here the plans of the system of heating apparatus and ventilation to which the prize was awarded during the past year in a competition for the best design. The scheme is by Mr. D. Grove, and the following is a translation of so much of his report as is requisite to render the scheme intelligible:—

Draining-in of the Air.—Besides the disposition of the openings for the entrance of fresh air in the walls of the slopes of the west front, the use of the fountain in the Königsplatz (see fig. 4) is proposed as a point for taking in the air. As the bottoms of the necessary channels should only be 1.8 metre (about 5 ft. 10 in.) below the surface, the difficulty arises of constructing them large enough to pass the requisite quantity of air. By using the best wood-paving immediately over the vault of the channel, or over cast-iron pipes with an under-bedding of concrete, the depth of the construction of the channel covering can be limited from 25 to 15 centimetres (about 10 in. to 6 in.), so that the channel can have a clear height of 1.55 to 1.65 metre (5 ft. to 5 ft. 4 in.). It remains desirable to raise the ground at this point as much as possible, or to lower the bottom of the basin. The uprising and misty stream of the fountain so lowers the temperature of the body of air

over the basin that there results a rapid descending stream from the upper clean air strata to the lower; this takes the air into the openings arranged around the inner border of the basin. The sectional area of these may be taken as 33 square metres (about 391 square yards). The water flowing off is conducted to the ends of the channels by the slopes, there distributed in open shallow gutters of galvanised sheet iron, of which four in each of the twelve channels are arranged with slight falls back towards the fountain. The area of the water-surface amounts, with 40 metres (about 151 ft.) length of channel, in the whole to 800 square metres (about 928 square yards). If the water of the fountain, the quantity of which according to data amounts to 50 cubic metres (about 1,766 cubic feet) per hour, experiences a warming in the whole of about 6° Centigrade (108° Fahr.); it draws from the air per hour 300,000 units of warmth,* and thus effects for 250,000 cubic metres (over 8,000,000 cubic feet), a moderation of the temperature of 4° Centigrade (7.2° Fahr.). An alteration of the warmth by evaporation is not to be calculated on, as the thawing point under circumstances is higher than the temperature of the water. With a strong and ensured change of air, a very considerable lowering of the temperature in summer is not requisite; but for times of particularly great heat the arrangement is so contrived that the coils of pipes in the air-collecting room, serving during the winter as heating bodies, can be connected with a cold-water supply according to the system of Linde, with a freezing-machine in the boiler-house. These pipes have a diameter of 50 millimetres (nearly 2 in.), and an outer surface of 3,360 square metres in area (about 4,018 square yards).

Purifying of the Air.—By utilising the whole height of the cellar and basement stories for the collecting-room for the air under the hall of the west front, a moderating of the speed of the air stream to 0.6 m. (about 2 ft.) per second is aimed at, and room is gained for abundant filter surfaces, 300 square metres (about 359 sq. yds.). The filters are wooden frames spanned with porous stuffs specially manufactured for the purpose, and can be removed for purposes of cleaning. The dust is already partly beaten down by the water spray before reaching the filters.

Tempering of the Air.—The groups of heating pipes behind the filters serve for raising the warmth of the air 12° Cent. (21.6° Fahr.). These can be shut off singly, are far reaching, arranged at all places for easy access, and contain the necessary heating surface to deliver the amount of warmth requisite for moistening it. Vertical and movable door-valves make possible the conducting and regulating of the streams of the colder and warmer air strata.

Moistening of the Air.—The air thus raised 12° Cent. is nearly completely saturated with

* Translator's note. The unit of warmth, according to the German standard, is the amount transmitted in one hour per cubic metre (10.754 square feet) through a body with parallel surfaces.

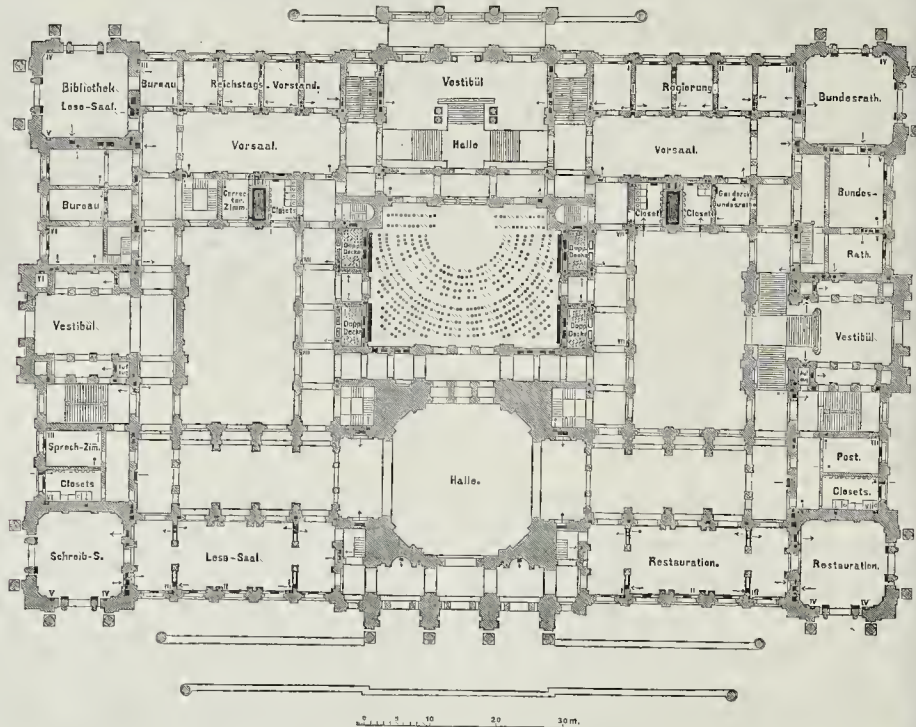


Fig. 1.—Ground Plan.

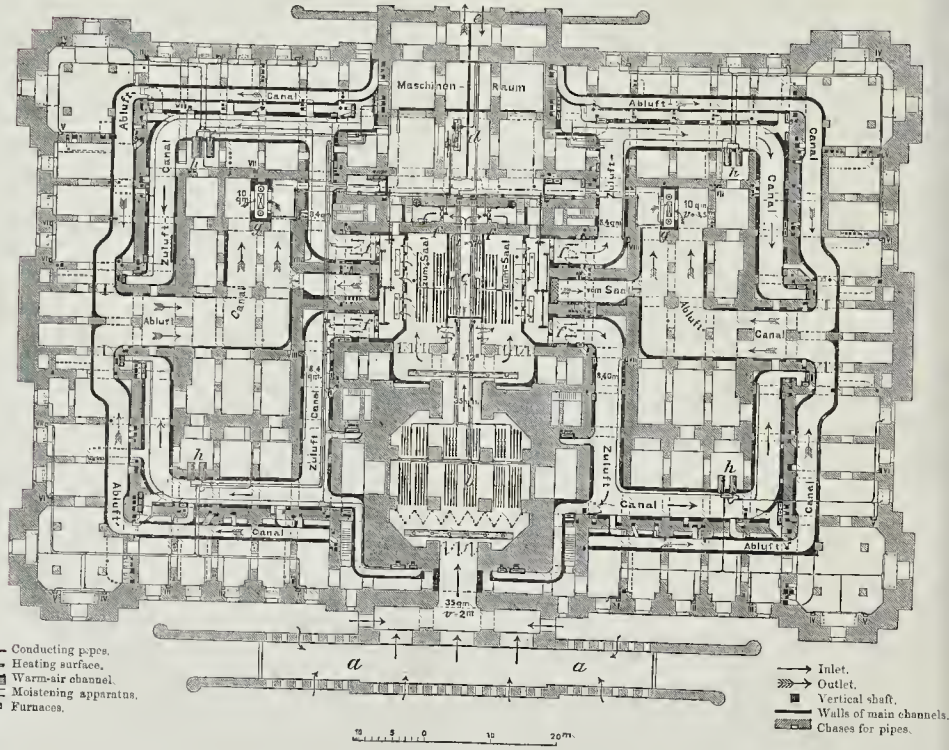
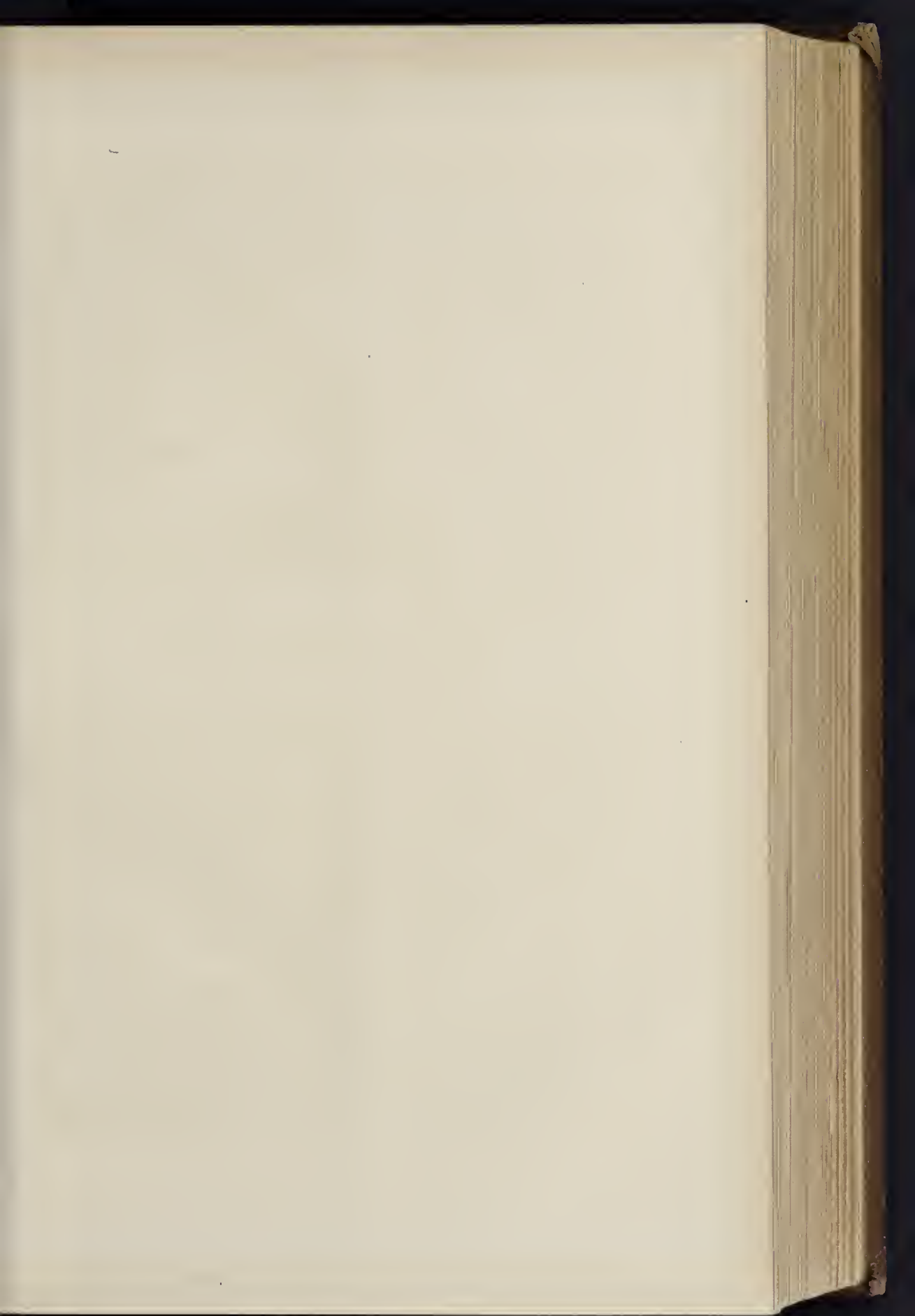


Fig. 2.—Basement Plan.

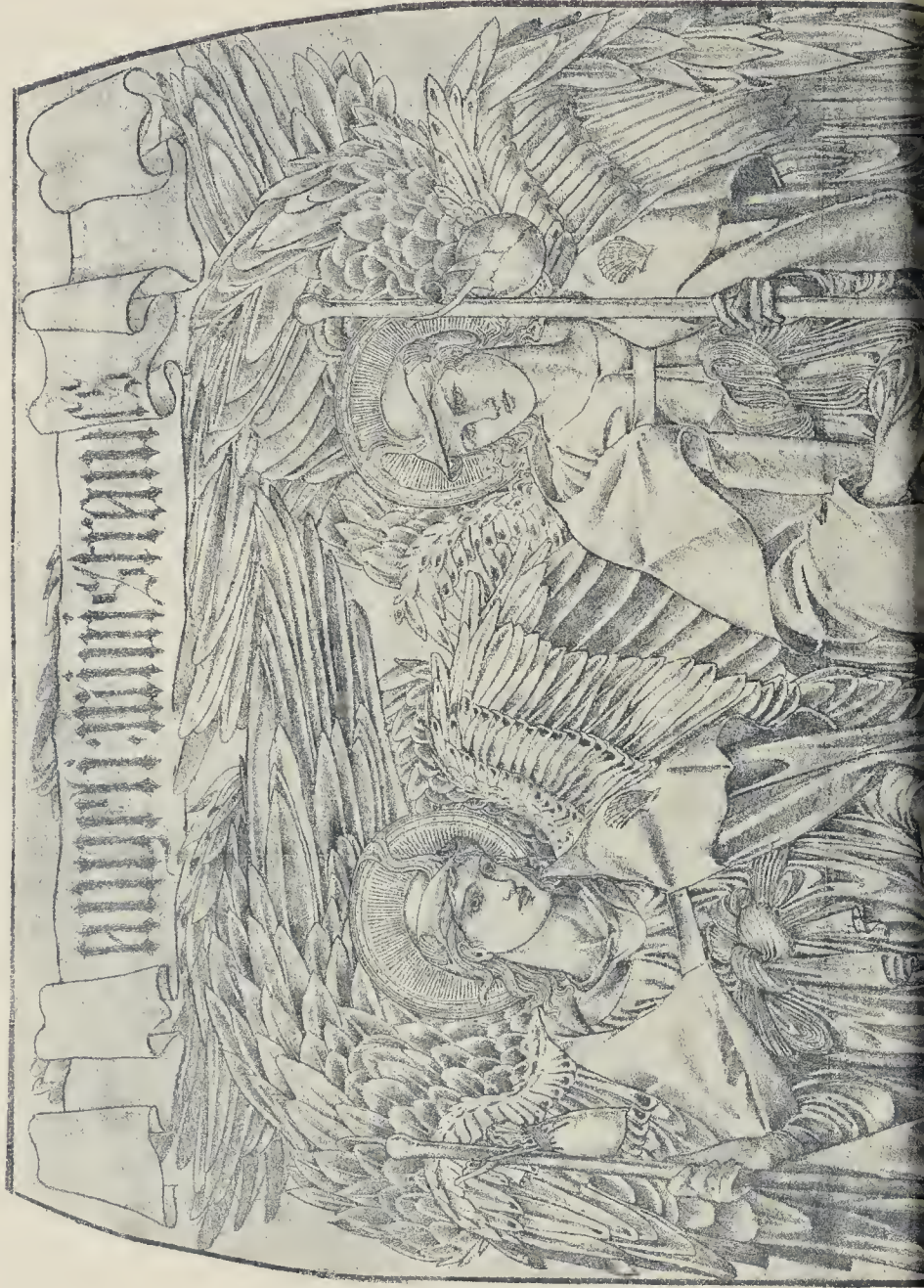
— Conducting pipes.
 — Heating surface.
 — Warm-air channel.
 — Moistening apparatus.
 — Furnaces.

→ Inlet.
 → Outlet.
 — Vertical shaft.
 — Walls of main channels.
 — Chases for pipes.

IMPERIAL HOUSES OF PARLIAMENT, BERLIN: PRIZE SCHEME FOR HEATING AND VENTILATION.
 MR. D. GROVE, ENGINEER.



THE BUILDER, JANUARY 17, 1885.





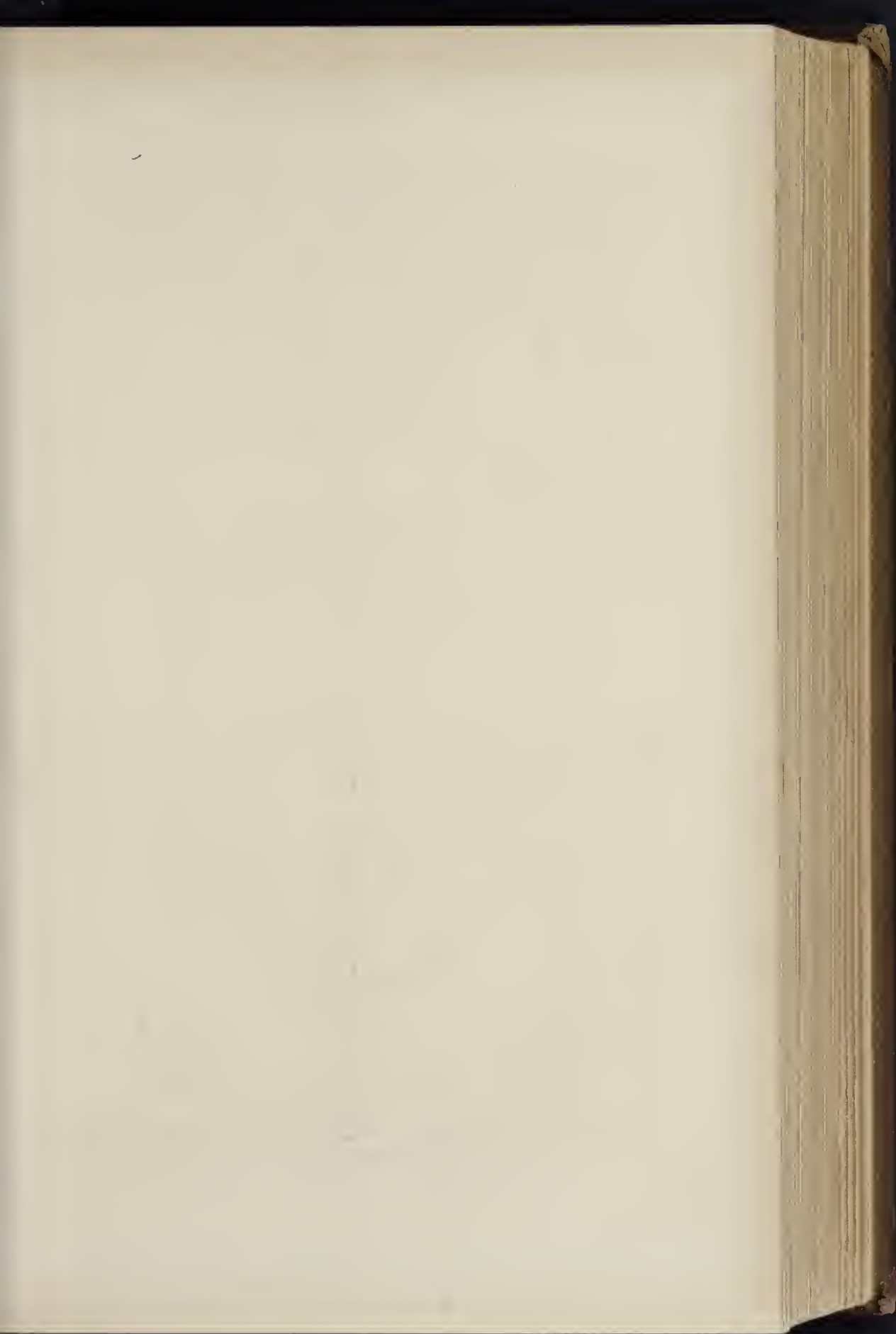
THE PHOTO. SPENCE & CO. LONDON

FROM A WINDOW IN THE SOUTH CHOIR AISLE, SALISBURY CATHEDRAL.

DESIGNED BY MR. E. BURNE-JONES.

EXECUTED BY W. M. MORRIS & CO.

N.B.—For two other figures from the same window see "Builder," January 3rd, 1885.



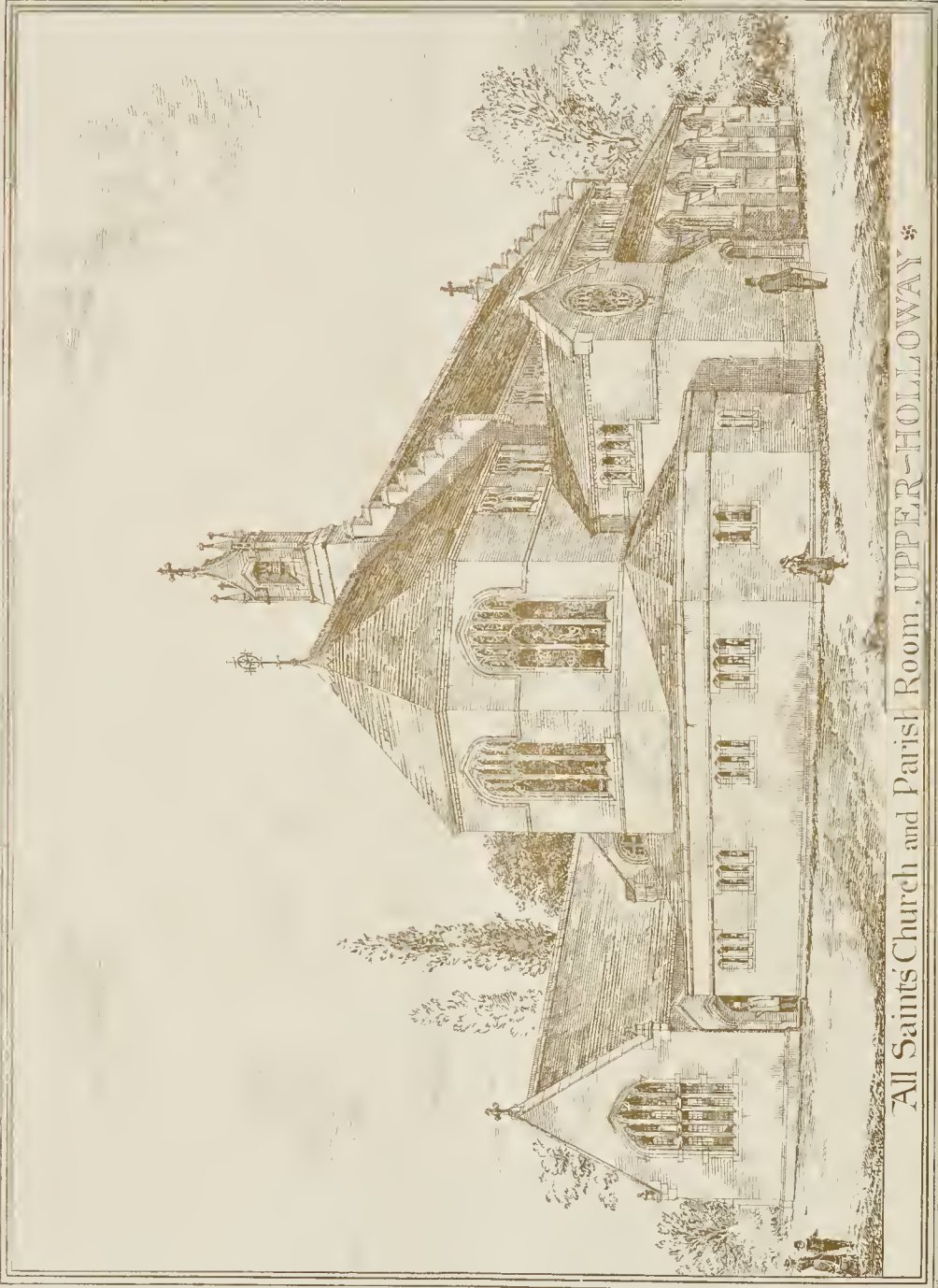
THE BUILDER, JANUARY 17, 1885.



HOUSE AT WOKINGHAM, MR. W. RAVENSCROFT, ARCHITECT.



THE BUILDER. JANUARY 17, 1885.



All Saints Church and Parish Room, UPPER-HOLLOWAY *

WINDMILL, in THE BUILDER, 17 JANUARY 1885, p. 10.

Mr. J. E. K. CHURCH, ARCHITECT.



J. A. W.

ST. MARY'S, GEDDINGTON, SUFFOLK. RESTORATION.—MR. E. F. BISHOPP, ARCHITECT.



ASKHAM HALL, N^o YORK.
FOR SIR ANDREW FAIRBAIRN, M. P.
MESS^{rs} CHURCHILL & CONNOR, Auctioneers,
4, Pall Mall, London.



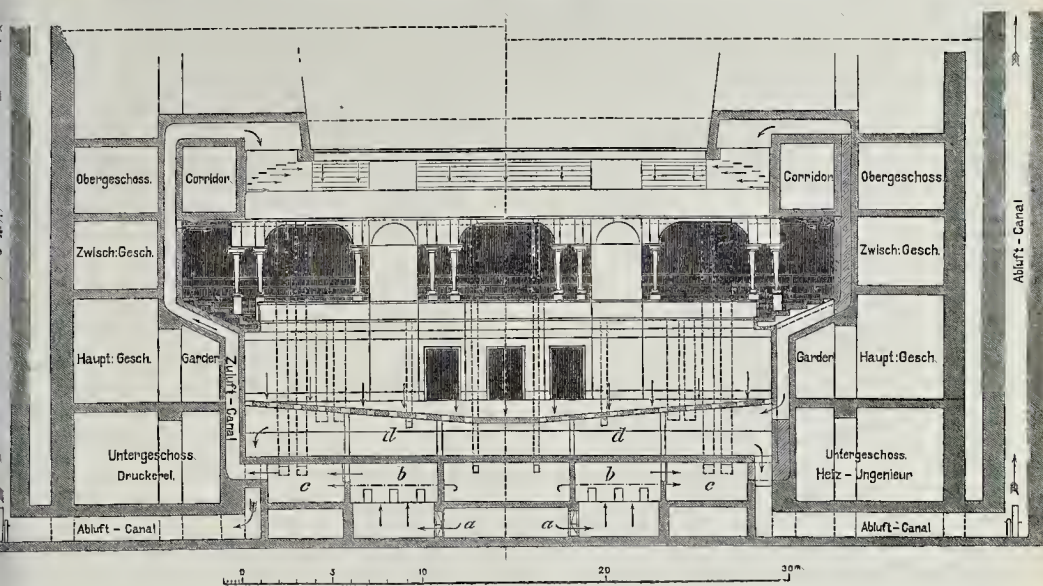


Fig. 3.—Section of Centre Portion.

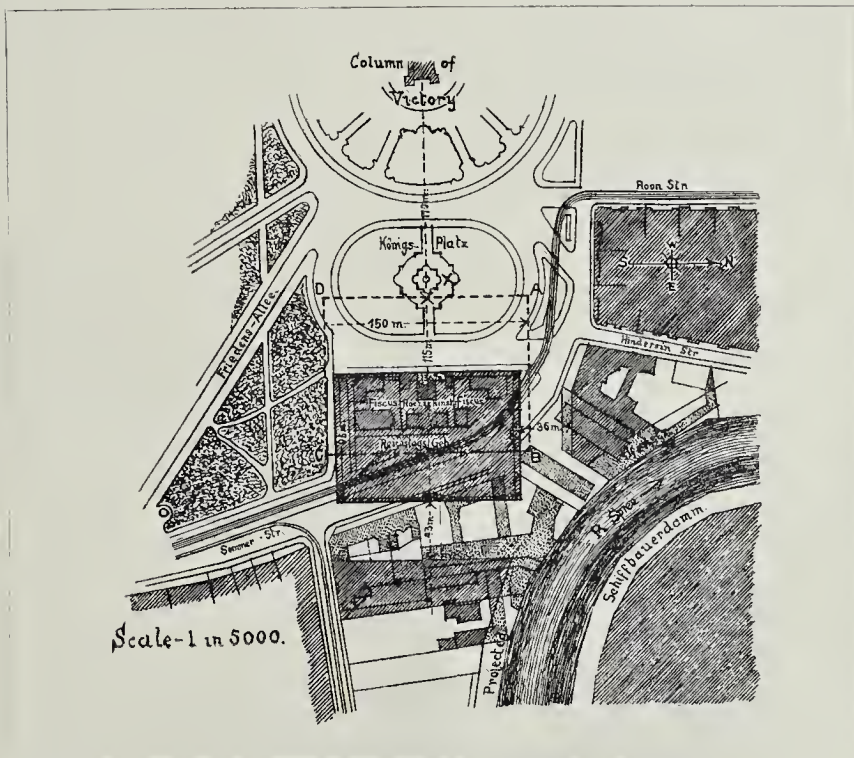


Fig. 4.—Site of the Future Reichstags-gebäude, with immediate Surrounding.

NOTE.—The shaded surface as shown marks the definite site of the Reichstags-gebäude; that with dotted outline, marked with the letters A B C D, the site for the competition of 1872. The letter X marks the fountain proposed to be utilised.

moisture by abundant water spray and evaporation. By the further warming which follows on this the degree of saturation is raised to the required percentage. By means of fixed hygrometers this is controlled, and variations are equalised with the aid of a second moistening apparatus behind the second group of heating bodies.

Further Warming and Distribution of the Air.—Before distribution in the principal channels of the individual parts of the building, the further warming of the air takes place in special chambers up to + 20° C. (68° F.), and for the large hall up to + 17° C. (62° F.).

Ventilators.—The ventilators are separated for the large hall and the four corner groups of the building; their capability of action is strictly measured with a view to loss by pressure.

Principal Channels.—The size of the principal channels is adapted to the constructional planning of the cellar story; the dimensions in the clear resulting from this, 4 metres wide and 2.1 metres high (about 13 ft. 1 in. wide by 6 ft. 10 in. high), are so full that with a more complete occupation of the whole building and full effect of the ventilation at the same time for all the rooms, the rapidity of the air stream in the principal channels will not exceed the measure of 2 metres (about 6 ft. 7 in.).

Vertical Channels.—The sections of the vertical channels are all measured for full effect at an external temperature of + 5° C. (41° F.), and entered in the drawings according to brick dimensions (rounded above). The existing thicknesses of the walls are sufficient in all places for providing for the channels. Should it appear desirable to the building authorities to diminish certain of the sections, this is very easily possible in those rooms which do not require the full effect without propulsion at an outer temperature of + 5° C. (41° F.), as in the chambers for the sittings.

Carrying off the Air.—The same principles were suitable for the arrangement of the channels for carrying off the air as for the channels for bringing it in. By bringing these together in the cellars, and by the arrangement of two aspiration shafts, of 35 metres (about 114 ft. 10 in.) in height, and together 26 square metres (about 215½ square feet) in section, which will be warmed by the steam going off from the engine, eventually by direct steam, as also two exhausters, the full effect can be reached with safety at all times, independently of external influences, and without raising the pressure of air in the rooms.

Closest Ventilation.—By the complete separation of the inlet and outlet of the air for the closets from that of the other rooms, perfect security against the entrance of closet air, &c., into the corridors, &c., is attained. The air is carried off as well under the seats as at the ceilings, furthered by gas-burners and exhausters (worked by the water for flushing).

Engine for Steam Service.—The service of steam follows from the boiler-house through two pipes, the dimensions of which are so chosen that under ordinary circumstances one suffices for action. The steam-pipes are freed from water in the ordinary way by self-acting condensed water flow-off pipes. The to and from services are arranged separately for the distinct heating groups: all division and return valves, condensed water flow-off pipes and collecting vessels are united in the control room under the vestibule and principal staircase of the east front, so that from there the circulation of the steam can be conducted to all parts, shut off, and regulated. In the same place is situated the engine for driving the ventilators (50-h.p. horizontal, with Colman's distributing valve motion) and the main transmission.

Air heated by Steam.—There is a special heating-chamber for each individual room arranged perpendicularly under the same. The heating-chambers are situated, suitably marked, in a continuous row by the wall of the principal channels, and are therefore accessible in the easiest manner; the front wall is formed movable, the dimensions so measured that the medium speed of the stream in the same does not exceed 0.5 metre (about 19 in.).

Regulation of the Heating of the Air by Steam. The regulating valves are intended to be constructed in a most simple manner, close-shutting, balanced, with bronze framing and adjusting apparatus; the detail is reserved for special working out. The permissible maxima and minima of the temperature are signalled

both in the heating-chamber and in the office of the officials having the oversight thereof; then follows the insertion of the flap-valves and valves in the simplest and most sure manner in the heating-chamber itself by the officers in charge of it. For indications of the temperature, electrical connexions with signals from the maxima and minima thermometers to the decided-on points are allowed for afterwards, and considered in the estimate. Direct speaking-tubes are also provided for between the engineer's office and the points where the principal channels commence, the principal hall, &c., telephonic communication with the upper stories, and a pneumatic-tube from the mixing chamber to the office for entering the trials of the air.

Hot-water Heating.—Each of the four groups for the heating parts of the building is divided into two systems with separate boilers; one of which serves in each case for the library, office, dwellings, and closets, the other for the remaining rooms, so that the first can be warmed independently of the action of the whole arrangement. Both boilers and systems are connected with each other, provided with valves, and can be put in action at pleasure, either singly or together.

Arrangement in the individual Rooms.—The air streams into the individual rooms at a suitable height above the floor, near the ceiling or the floor, as needed, and in turn goes from them. Close-shutting flap-valves, simply constructed, are provided everywhere. In the larger rooms the internal architecture will give the possibility to introduce a further division of the air. Proposals for these, however, must remain reserved for special working out, as with these the constructional considerations are of corresponding influence, and detailed working drawings, for instance, are not yet to the present time before us.

Principal Hall.—For the principal hall, the possibility of bringing in the air direct in the most simple and natural manner follows from the existence of a fixed situation, and of a large area at disposal under the floor, viz., equally distributed under all the seats. As the air streaming in is tempered to 20° C. (68° F.), and enters with a minimum speed under the seats, every possibility of a troublesome draught is excluded. By the warmth of the human body, and the products of respiration, the temperature of the air is raised. This rises to the ceiling, and there immediately follows the carrying away of it in accordance with natural laws. The arrangement of the principal hall is disposed to correspond with this. As, however, a good effect can also be attained by another situation for the inlets, the choice of one or other of the arrangements may depend on personal views. [It appears that the author of the scheme contemplated having the power of reversing the localities of inlet and outlet for the great hall or Parliament House proper, and prepared a special section showing the air propelled or allowed to rise through upcast shafts first and entering through the cove in the ceiling, being then drawn off through the floor. The section (fig. 3) indicating this arrangement is the one that has been sent to us for illustration of the scheme, somewhat illogically. It shows, however, the three tiers of chambers under the floor of the great hall, as described; but in regarding it as an illustration of the scheme as above described, the direction of the arrows at the cornice and floor of the hall must be regarded as reversed, and the "inlet-canal" (inlet shaft) shown at the left of the section of the hall must be regarded as a descending exhaust shaft communicating with the main exhaust shafts ("inlet-candle") shown on the extreme right and left of the section. These apparently remain the same in both cases; but in the scheme which the author (rightly, we think) prefers, of admitting the warmed air below and taking it out above, the vitiated air is drawn down first and sent up again through the main exhaust chimneys. In the second or alternative scheme it passes direct from the floor of the hall to the "inlet" chimney.—Ed.] The following may yet be noted with regard to the arrangements chosen in the scheme before you to make possible an exact control of the temperature of the air entering through the floor. An air-reservoir must be formed under the hall, in which the air is already found at its proper temperature; further, we must be able to effectuate quickly and surely the regulating during changes in the sitting of the House; for

example, during divisions. For this purpose two stories, sufficiently high to pass through, are to be formed over the cellar story, between the floors of the lower story and of the hall, by the insertion of a middle floor. The freshly-warmed air (tempered to about 17° Cent., say 62° Fabr.) streams out of the preliminary warming-chambers to the ventilators in the cellar story. From these the air is passed on to the next story, where it is divided into two rooms situated in a parallel line against each other, of which one is heated. Around the other, between the heated and unheated chambers, is left a passage, 1 metre (about 3 ft. 4 in.) wide, that can be placed in communication with the more or less warmed chambers by means of regulating slides (the slides are movable outwards from one position by means of simple rollers and draw apparatus). These mixing passages open upwards towards the third story, the control-room. According to the height of the control thermometer, less or more warm air is admitted to the mixing passages, and by this means the proper temperature is already formed below the floor for every part of the hall. One part of the control-room is separated for the Tribunes, that the temperature of those may be independently regulated. Corresponding to this special carrying-off channels are arranged. The thermometers are connected electrically with signals in the engine-room and control-office. The warming-chambers of the hall are provided with warm-water heating (low-pressure), to regulate with certainty the mildest tempering of the air, and to gain a constant supply of moderately warm air for regulating purposes. The draw-off channels are led down to the lower story, having a total sectional area of 6.25 square metres (about 67½ square feet) for both sides of the hall united there by the shortest route and connected with the aspiration shafts. During the heating of the hall it would not be advantageous to take off the warm air at the ceiling. The disposition hit upon makes possible in the simplest manner the carrying off of the air at the floor by reversing the valves to the suction-channels leading past at the sides. Lastly, the position of these channels affords the advantage still, of no small value, of being able to attain during the cleaning of the hall a complete and sure removal of all dust particles. For this object the control-room is placed in connexion with the suction-channels by large (closely-shut) openings. When these openings are set free, and at the same time the doors and skylight over the hall opened, a streaming in of fresh air, but weak, is maintained thereby towards the control-room by a corresponding fixing in of the slide-valves to the air-chambers, and when, in the last place, both suction-shafts are claimed for the hall alone at the same time, by shutting off the other parts of the building, it is possible to effect the most thorough cleansing and the removal of all dust particles directly towards the suction-shafts.

Total Cost.—The total cost of this design is indicated in the estimate of cost, according to which it amounts to about 482,500 marks (about 23,652,100). To this it should be noted that all dimensions are calculated for the attainment of an effect according to the programme (conditions) at the same time in all rooms.

Action.—In making use of a centralised scheme of the importance of the one projected, it is not sufficient so to manage the working that any irregularities which may happen can be remedied in a supplementary way; measures should be taken to prevent complaints at the first. This is only possible when the working is carried out with regard to all the conditions coming under observation, number of the rooms used, frequency of their use, external temperature, height of the barometer, degree of moisture, direction of the wind, &c., on the basis of a continuous observation of the working in every part of the general arrangements. An engineer should for that reason be appointed on whom the responsible superintendence is incumbent, who works at and revises regularly the reports on the course of all the apparatus, determines in the first place the principles for regulating it on the basis of actual observations, and issues special instructions for particular cases. The general management of the apparatus follows from the disposition thereof without anything further. Subordinate to the engineer, besides the staff of the boiler-house, who are not to be considered here, are an engine attendant (chief stoker), two permanent stokers, and an

assistant stoker (as a reserve and for educating as a substitute during changes in the staff). The management of the complete practical service is subject to the chief stoker, according to the directions of the engineer. The three stokers attend to the separate parts of the building (middle building, north and south), with a relief or respectively a change so that each becomes acquainted with all the parts; prepare the reports on the height of the thermometer, hygrometer, anemometer; and look after the cleaning and maintenance of all apparatus and working-rooms. When in full working order a regular round should be organised through all the rooms, and specially through the principal air-galleries and heating-chambers."

THE ROYAL ARMS.

We have a modern version of the herald's visitations of the latter part of the Middle Ages in our Government calling upon all tradesmen (and their name is legion) using the Royal arms to showily what authority they do so. We therefore venture in this article to give a short account of the origin and history of our national shield and its accessories.

"Let us begin at the beginning," says Planché in "The Pursuivant of Arms," &c. We cannot do better than follow such advice. But where is the beginning? Well, putting aside all conjecture and all tradition that are unsupported by examples, we cannot give an earlier origin to "the Royal coat" than the reign of Richard I., whose seal is engraved with the three "lions of England," even as we now behold them on every side of us.

And here we must pause to add that perhaps, strictly speaking, according to the rules of heraldry, our Royal animals are only leopards. Much has been written on this point, and it has been very hotly contested, but lions they have ever been in the paths of our enemies and lions they must ever remain.

This shield of our "Cœur de Lion" was borne by his unworthy successor John, by Henry III., Edward I., II., and III., until the thirteenth year of the latter's reign, when he quartered the "four-de-lis" with the lions, thus showing his claim to the throne of France through his mother, who was a French princess, and this quartering was retained by us till the present century. And here we must pause again to put the unanswerable question,—What is the "four-de-lis"? Well, some writers have held that it represents a flower, others say the head of a sceptre, others again assume it to be the point of a spear, and yet again it is claimed as a frog or a toad! Books upon books have been written on this mystery and we are as much in the dark as ever.

The shield assumed by Edward III. "bolds good" until about the year 1405, when the number of the *fleurs-de-lis* was reduced to three in each quartering to correspond with the alteration made by the French, and commonly known as "France modern," as distinguished from "France ancient," the former quartering. We have now reached the reign of Henry IV.

This shield of "France modern" and England quarterly will carry us on to the reign of James I., who brought in the Scottish lion rampant, the origin of which, as a writer observes, "is veiled by the mists of antiquity." The Irish harp was introduced at the same time. These "arms of the Stuarts" will run till May 1st, 1707, when Anne bore England impaling Scotland, France modern, and Ireland.

The "Arms of Hanover" came with George I., and were retained until the accession of Queen Victoria.

The "fleurs-de-lis" were removed from the Royal shield of Great Britain on the 1st of January, 1801.

The Royal crest is a lion standing on a crown, and wearing a crown, and was first borne by Edward III. on a cap of estate. We must say a few words about the "supporters" of our Royal arms, and here we have no authority for going farther back than Henry VI., who bore two white antelopes, also a lion and a panther, or an antelope. Edward IV., a lion and a bull, or a lion and a hart. Richard III., a lion and a boar, or two boars. Henry VII., a dragon and a greyhound, or two greyhounds, or a lion and a dragon, and all the Tudors bore the same supporters with slight variations.

The familiar "Horn and unicorn" date from the accession of James I., and have remained undisturbed until the present day.

The origin of supporters is another of the many disputed points in heraldry into which we cannot enter. They are of great service in determining the date of any building that bears them. The motto, "Dieu et mon droit" was assumed by Henry VI., and has held its ground ever since. It was an ancient English war-cry.

With regard to the crown, all our monarchs since Henry IV.'s time have worn it with two arches, with the exception of Henry VI. and Charles I., who arched their crowns three times, and this is sometimes a clue to a date.

The Royal banners or standards are charged with the bearings of the shield of arms for the time being.

We cannot tell why Wales should have been left out in the cold, but it is a fact that the Principality has never been represented on the national shield, and it is a fact to be regretted.

INSTITUTION OF CIVIL ENGINEERS: THE PRESIDENT'S ADDRESS.

SIR FREDERICK BRAMWELL delivered a very able and interesting address on Tuesday evening last, on taking the chair, for the first time since his election, as President of the Institution of Civil Engineers. We make the following extracts from it,—Principles are generally very soon determined, and progress ensues, not by additions to the principles, but by improvement in the methods of giving to those principles a practical shape, or by combining in one structure principles of construction which had hitherto used apart. So far as novelty in the principle of girder-construction is concerned, I must confine myself to that combination of principles which is represented by the suspended cantilever, of which the Forth Bridge, only now in course of construction, affords the most notable instance. It is difficult to see how a rigid bridge, with 1,700 ft. spans, and with the necessity for so much clear-headway below, could have been constructed without the application of this principle. The St. Louis Bridge of Mr. Eads may, I think, be fairly said to embody a principle of construction novel since 1862, that of employing for the arch-ribs tubes composed of steel staves hooped together. In suspension bridges there has been introduced that which I think is fairly entitled to rank among principles of construction, the light upper chain, from which are suspended the linked truss-roads, doing the actual work of supporting the load, the rods being maintained in straight lines, and without the flexure at the joints due to their weight. In the East River-bridge, New York, there was also introduced that which I believe was a novelty in the mode of applying the wire cables. These were not made as untwisted cables, and then hoisted into place, thereby imposing severe strains upon many of the wires composing the cable, through their flexure over the saddles and elsewhere, but the individual wires were led over from side to side, each one having the length appropriate to its position, and all, therefore, when the bridge was erected, having the same initial strain and the same fair play. The employment of testing machines has come into the daily practice of the engineer. In lieu of such machines being used, by the few, and at rare intervals upon small specimens, for experimental purposes, they are now employed in daily practice and on a large scale. In harbour work we have had the principle of construction employed by Mr. Stoney at Dublin, where cement masonry is moulded into the form of the wall, for its whole height and thickness. By a very carefully thought-out apparatus blocks are raised off the seats whereon they have been made, and are transported to their destination. It is no simple undertaking (even in these days) to raise (otherwise than hydraulically) a weight of 350 tons, which is the weight of the blocks with which Mr. Stoney deals. An extremely ingenious mode of dealing with the slack chain prevents its becoming fouled and not paying out properly when the block is being lowered. This is accomplished by reeving the slack of each chain over two fixed sets of multiple sheaves, and, automatically, the slack is kept clear. A noteworthy instance of the use of pneumatic appliances in cylinder-sinking for foundations is that in progress at the Forth-bridge. The wrought-iron cylinders are 70 ft. in diameter at the cutting edge, and have a taper of about 1 in 46. At their bottoms there is a roofed chamber, into which the air is pumped, and in which the men work when

excavating, this roof being supported by ample main and cross lattice girders. At the Tay-bridge, also now in course of construction, the cylinders are sunk, while being guided through wrought-iron pontoons, which are floated to their berths and are then secured at the desired spot by the protrusion, hydraulically, of four legs, which bear upon the bottom, and thus, until they are withdrawn, convert the pontoon from a floating into a fixed structure. Modes of "cut and cover" have been proposed for the performance of sub-aqueous work, sometimes by means of cofferdams, and with the work therefore open to the daylight during execution, and sometimes by moveable pneumatic appliances. A construction known to very few is the diving apparatus known as the "Bâteau-plongeur," and used at the "barrage" on the Nile. This consists of a barge fitted with an air-tight cabin, provided with an air-lock, and baving in the centre of its floor a large oval opening, surrounded by a casing standing up above the water-line. In this casing another casing slides telescopically, the upper part of which is connected to the top of the fixed casing by a leather "slieve." When it is desired to examine the bottom of the river the telescopic tube is lowered till it touches the bottom, and then air is pumped into the cabin until the pressure is sufficient to drive out the water, and thus to expose the bottom. This appears to be a very convenient arrangement for shallow draughts of water. Mr. Stoney uses for the greater depths he has to deal with, when preparing the bed to receive his blocks, a diving apparatus which (while easily accessible at all times) dispenses with the necessity of raising and lowering, needed in an ordinary diving-bell, to allow of the entrance and exit of the workmen. Mr. Stoney employs a bell of adequate size, from the summit of which rises a hollow cylinder, furnished at the top with an air-lock, by which access can be obtained to the submerged bell. In the dress of the diver there has been general improvement in detail and manufacture, in the application of the telephone, and in the introduction of the chemical system of respiration, the invention of Mr. Fleuss. He has succeeded in devising a perfectly portable apparatus containing a chemical filter, by means of which the exhaled breath of the diver is deprived of its carbonic acid; the diver also carries a supply of compressed oxygen from which to add to the remaining nitrogen oxygen in substitution for that which has been burned up in the process of respiration. Armed with this apparatus a diver is enabled to follow his avocations without any air-tube connecting with the surface; indeed, without any connexion whatever. A notable instance of a most courageous use of this apparatus was afforded by a diver named Lambert, who, during one of the inundations which occurred in the construction of the Severn Tunnel, descended into the heading, and, proceeding along it for some 330 yards (with the water standing some 35 ft. above him), closed a sluice door through which the water was entering the excavations, and thus enabled the pumps to mowater the tunnel. Altogether on this occasion this man was under the water and without any communication with those above for one hour and twenty-five minutes. The apparatus has also proved to be of great utility in cases of explosion in collieries, enabling the wearer to safely penetrate the workings, even when they have been filled with the fatal choke-damp, to rescue the injured or to remove the dead. In sub-aqueous work, where the influx of water is a source of great difficulty, perhaps nothing has been devised so ingenious as the Thames Tunnel shield; improvement has, however, been made by the application of compressed air. In the instance of the Hudson River Tunnel, the work was done in the manner proposed so long ago as the year 1830 by Lord Cochrane (Earl Dundonald). There are, happily, cases of sub-aqueous tunnelling where the water can be dealt with by ordinary pumping power, more or less extensive, and where the material is capable of being cut by a tunnelling-machine. This was so in the Mersey Tunnel and would be in the Channel Tunnel. In the Mersey Tunnel and in the experimental work of the Channel Tunnel Colonel Beaumont and Major English's tunnelling-machine has done most admirable work. In the 7 ft. 4 in. diameter heading in the new red sandstone of the Mersey Tunnel a speed of as much as 10 yards forwards in twenty-four hours has been averaged, while a maximum of

of 11 yards 2 ft. has been attained, while in the 7 ft. heading for the Channel Tunnel, in the grey chalk, a *maximum* speed of as much as 24 yards forwards in the twenty-four hours has been attained on the English side, and with the later machine put to work at the French end a *maximum* speed of as much as 27 yards 1 ft. forwards in the twenty-four hours has been effected. In ordinary land tunnelling since 1862 there has been great progress by the substitution of dynamite and preparations of a similar nature for gunpowder, and by the improvements in the rock-drills worked by compressed air, which are used in making the holes into which the explosive is charged. For boring for water and for many other purposes the diamond drill has proved of great service, and most certainly its advent should be welcomed by the geologist, as it has enabled specimens of the stratum passed through to be taken in the natural unbroken condition, exhibiting not only the material and the very structure of the rock, but the direction and the angle of the dip of the beds. . . . In the days of Brindley and of Smeaton canals and canalised rivers formed the only mode of internal transit. The competing railway was in a position to take away even the local traffic of the canal. Canal proprietors have from time to time endeavoured to improve the rate of transport, and with this object have introduced steam in lieu of horse haulage, and by structural improvements have diminished the number of lockages. By inclined planes barges were transferred from one level to another, but an important improvement is the application of direct vertically-lifting hydraulic power. This system reduces the consumption of water and the expenditure of time to a *minimum*. With respect to canalised rivers, if means could be devised for giving full effect to the river channels for flood purposes, while maintaining them for the provision of motive power and of navigation, it is desirable that this should be done. The great step in this direction appears to be the employment of ready, or it may be of automatically, movable weirs. Messrs. Vernon Harcourt and R. B. Buckley, in the session of 1879-80, dealt with foreign, notably with French and Indian, examples. An instance of improvement since then has been the construction by Mr. Wiswall, the Engineer to the Bridgewater Navigation Company (on the Mersey and Irwell section of that navigation), of the movable Throstle Nest Weir at Manchester. By the adoption of movable weirs, rivers in ordinary times may be dammed up to retain sufficient water to admit of a paying navigation and water for the mills on their banks, while in times of flood they shall allow channels as efficient for relief as if every weir had been swept away. The great feature of late years in canal engineering is the provision of canals for saving circuitous journeys in passing from one sea to another, or for taking ocean steamers many miles inland. But the old fight between the canal engineer and the railway engineer, or, more properly speaking, between the engineer when he has his canal "stop" on and the same individual when he has his railway "stop" on was revived, even in the case of the transporting of ocean vessels from sea to sea, for Mr. Eads is proposing to connect the Atlantic and the Pacific Oceans by means of a ship-railway across the Isthmus of Panama. He suggests that the largest vessels should be raised out of the water in the manner commonly employed in floating docks, and should then be transferred to a truck-like cradle on wheels, fitted with hydraulic bearing-blocks (this being, however, not a new proposition as applied to graving docks), so as to obtain practical equality of support for the ship, notwithstanding slight irregularities in the roadway; while he proposes to deal with the question of changes of direction by the avoidance of curves and by the substitution of angles, having at the point of junction of the two sides turntables on which the cradle and ship will be drawn. These can be moved with perfect ease, notwithstanding the heavy load, because the turntables will be floating in water contained in circular tanks. The question of preserving the level of the turntables, whether unloaded, partially loaded, or loaded, is happily met by an arrangement of water ballast and of pumping. Mr. Eads has so dealt with the mouth of the Mississippi as to cause that river to scour and maintain a channel 30 ft. deep at low water, instead of that at 8 ft. deep which prevailed there before his skillful treatment. Sir Charles Hartley has

been successful in improving the navigation of the Danube, and one of the lectures of the forthcoming series, on "Inland Navigation," is to be delivered by him. There are many improved machines for excavating, to be used either below water or on dry land. . . . Probably few materials have been found more generally useful to the civil engineer in works which are not of metal than has been Portland cement. During the last twenty-two years great improvements have been made in the grinding and in the quality of the cement. The artificial material, brick, cannot in these days be said to surpass in quality the bricks used by the Romans in this island 1,900 years ago, but as regards the mode of manufacture and the materials employed there is progress to be noted. The brick-making machine and the Hoffmann kiln have economised labour and fuel, while attempts have been made, which I trust may prove successful, for utilising the clay which is to be found in the form of slate in those enormous mounds of waste which disfigure the landscape in the neighbourhood of slate quarries. Certain artificial stones, moreover, appear at last to be made with a uniformity and a power of endurance, and in respect of these qualities compare favourably with the best natural stone, and still more favourably having regard to the fact that they can be made of the desired dimensions and shape, thus being ready for use without labour of preparation. Of timber in new countries the engineer is commonly glad to avail himself to an extent which among us is unknown. Owing to the ready adaptability of metals to the uses of the engineer the employment of wood is decreasing. Many attempts have been made to render timber proof against the two great defects of rapid decay and of ready combustibility. The asbestos paint is used to coat the wooden structures of the Inventions Exhibition. To the employment of this it is not too much to say those buildings owed their escape in last year's very dry summer from being consumed by a fire that broke out in an exhibitor's stand, destroying every object on that stand, but, happily, not setting the painted woodwork on fire, although it was charred below the surface. A surface application may not enable wood to resist the effects of a continued exposure to fire, but it does appear that it can prevent its ready ignition. Eight years since I delivered at the Royal Institution a lecture on "The Future of Steel," and every year that has passed has justified the opinions I then ventured to put forward as to the way in which steel, made by fusion, would supersede iron made by the puddling process; and I am not afraid to repeat my prophecy that the time will come when the use of iron made by that process will be restricted to the manufacture of the small articles produced by the hand labour of the village blacksmith, for whose art its plastic character and ready power of welding eminently fit it. . . . Excepting in the magnitude of the work and the excellence of the design, of which the new Liverpool waterworks now in progress may well stand as a typical example, there is not much to say as regards progress in those waterworks which are dependent upon storage. In the United States and Canada the waste of water that takes place not only causes the mains to be incapable of keeping up the pressure under the excessive draught, but renders sources of supply insufficient which otherwise would be ample for years to come. Progress has been made here in the matter of house-fittings, by which waste has been greatly checked, and the risk of contamination that formerly existed with certain closet-fittings is ended. This question of house-fittings has always been a difficult one, and cannot be grappled with by water authorities such as those in the United States and in Canada, i.e., municipal authorities afraid of offending the voter. We owe it, however, to Mr. Deacon, the engineer of an English municipal water authority, that it is now possible to deal with the correction of household fittings at a minimum of cost, and, what is equally important, with a minimum of annoyance to the householder. By the employment of the waste-water meter, situated under the flagstones of the footway, and controlling a group of houses, it is possible to find out the total waste in the whole of those houses, and on the mains supplying them; then to localise that waste so as to attribute its true proportion to the houses that are the offenders, and to attribute the proportion, if any, to the pipes of the suppliers of water.

Having ascertained these facts, not only can the suppliers of water cure the defects in their pipe system, but they are enabled to cure the household waste, not by the expensive and annoying process of an inspection of the fittings throughout the whole district, involving the annoyance of, say ninety householders whose fittings are in perfect order to detect the ten householders whose fittings are in a reprehensible condition, but by the mere visitation of those ten who are in default, and who cannot, therefore, complain of the visitation. In most of our towns the supply is satisfactory, but in spite of the alarm raised by the suggestion of double mains, we might do well in many cases where there is a pure but limited supply to have a dual system of mains, and thus to distribute the pure water separately and for potable purposes. The Parisians, at least, have recognised the expediency of thus sorting their supply when that supply is of varying quality, and when the best of it is limited in quantity. In cases where there appears to be no thoroughly satisfactory source of water, the experience of the efficacy of iron purification, as practised at Antwerp, does hold out very considerable promise.

THE APPLICABLE ORNAMENTATION OF WORKS IN IRON.

The following is a portion of a paper read last Wednesday evening, at the Civil and Mechanical Engineers' Society, by Mr. Richards, J. U. —

"Before coming to the subject of exposed or visible ironwork, I should like to say a few words on the covering of such structural ironwork as is necessarily concealed, I mean in buildings which it is desired to render fireproof. In these cases it is now generally accepted as an axiom, "that no building can be fireproof unless all constructive ironwork is protected", and here arises a strong temptation, in protecting the construction with concrete or terra cotta, to assume that one is at liberty to imitate the forms of stonework, and to revert to old and well-established proportions. The argument commonly advanced is: that in such a case your ironwork is the skeleton only, and that as in the human body the bones are clothed with a beautiful form unlike themselves, we may clothe our iron skeleton in any beautiful form that we like; but the analogy, as commonly applied, will not hold good; to cover the iron construction with an imitation of stone construction, is to cover a skeleton of iron, which is supposed to be ugly, with a sham skeleton proper to another body, which is held to be beautiful, instead of surrounding the bones with a beautiful exterior that shall still indicate their forms and proportions.

The application of our principles to such cases will lead us to indicate the forms of our construction, if, for instance, we have to protect a station of the H-form, its general outline being a square or an oblong, suggests a clothing of similar form; if of the + pattern, the plan



of its covering should preserve the cruciform shape in its faces while the angles might be filled in with splays or moldings: such treatments are truthful, exhibit thoughtful design, and better preserve the proportions of the constructive forms.

A circular column would naturally have a circular encasement, but again the proportion should not be destroyed, and direct imitation of stone columns should be avoided as far as possible. Girders and cantilevers should be dealt with in the same manner.

The faces of the casing can, of course, be decorated with panelling, banding, and so on, in any way suitable to the material used for the purpose, and to its position. We thus see that, even where our ironwork is hidden, attention to artistic principles will guide us to original and appropriate ornamentation.

Coming now to exposed or visible ironwork, let us first glance at the natural treatment of wrought iron. We have here a material which can be rolled, hammered and forged, bent, twisted, or perforated, built up or framed and jointed, in various ways: the webs of plate girders and of cantilevers can be ornamented by perforation, while in built-up girders of the lattice or the Warren kind the actual construction often gives an ornamental form; the

various parts,—the lattices, for instance,—might often be made decorative by being fashioned or cut, especially where they are formed from plates rather than angle or T-irons, and the joints should receive more consideration artistically than is usually bestowed upon them; although no unnecessary features are to be added for the mere sake of ornament, a few pounds weight of iron added to the necessary features, to allow of their being made ornamental, as well as useful, is perfectly legitimate. The application of hammered scrollwork to some of the parts of built-up structures, if not overdone, is an evident means of obtaining beauty and giving interest to the work.

In large roofs, or in bridges, I look to the further development of the combination of cast with wrought iron, as opening a wide field for ornamental treatment.

When we turn to cast iron, we are dealing with a material which, as used for structural purposes, is but little older than the century in which we live, and for the treatment of which there is no direct precedent. Here we have a material which, as its name indicates, is cast in a mould, and which, consequently, shares with other materials, which are similarly treated, the liability,—owing to the cheapness with which such decoration may be produced,—to be ornamented with imitations of carved and band-wrought work. There are, however, difficulties of manufacture connected with the casting of iron, especially in large pieces for structural purposes, which will guide and limit us in seeking for the appropriate ornamentation of it. One principal point is that in designing for cast iron, the material must, as far as possible, be of uniform thickness throughout, otherwise we shall have cracks and flaws in the process of cooling; this shows at once that our ornament should avoid anything like undercut carving, any system of design that calls for projecting knobs or blocks, which cannot be easily cored; it also shows that, for the same reason, our mouldings and surface ornament should be of slight projection, and without deep sinkings or hollows, unless the back of the casting can be made to follow the face surface, without affecting the strength, and without adding undue difficulty to the process of manufacture.

In designing a column or stanchion for execution in cast iron, we will consider first its form on plan. The circular hollow form gives, of course, the most economical use of material, but has certain disadvantages. You cannot get at the interior for examination or for painting, and you cannot easily see that you have the necessary uniform thickness of material throughout. For these reasons I am inclined to prefer the stanchion, as being better suited to the character of the material.

If, however, a hollow column be used, other forms than the circle may be adopted, such as the square, with rounded or moulded angles; the regular octagon, with or without projecting faces; the irregular octagon,—that is, one with four main faces and four subordinate ones, which may be moulded,—and others which will suggest themselves to you. The advantages of these forms of plan are, less likelihood of imitation of stone details, greater appearance of stability, owing to the actual increase in size, as well as to the apparent increase when such forms are seen in perspective, and the advantage which flat faces offer for the proper treatment of the capitals. The last reason also suggests that where circular columns are adopted, slightly projecting vertical fillets should be added, carrying down the lines of the brackets at the top, and giving an appearance of rigidity to the shaft.

In detached stanchions the cross-with-equal-arms plan seems the best in ordinary circumstances, but often the form of the stanchion should, I venture to think, be suggested by the superstructure which it has to carry.

In dealing with these supports in elevation, I will speak first of the capital or top. A capital, in the ordinary sense, as applied to a stone column, is not wanted at all; such a capital is a separate block of stone placed on the shaft, and ornamented by moulding or carving cut into its solid mass; these have, however, formed the types from which cast-iron capitals have been generally derived, and most unsatisfactory we all know their effect to be; for instance, we see a Corinthian capital, or some approach to one, in such a position; now, from association of ideas, we expect to find below a Corinthian capital a column of the usual Corinthian proportion, that is, about ten diameters high, in-

cluding the eap and base: so by putting this capital, we challenge comparison between the proportion of our iron column and the old stone one, and the consequence is that the iron is denounced as a wretched, skinny abortion, or in some other equally uncomplimentary phrase.

In designing the top of a column or a stanchion for pure utility, as in some position where it is not to be seen, what do you do? You put at the top a projecting flange, somewhat like what we architects call the shanks, but with projection enough to allow of the proper bolting of the girder, or whatever else is to be carried; you then arrange brackets, cast on, to carry this top flange. Let us treat our ornamental capitals on the same lines and we shall satisfy our artistic principles, and not set a-going any invidious comparisons between our works and those of the masons.

I have ventured to prepare a sheet of illustrations showing how this may be attempted. I do not, of course, put these designs of mine forward as being perfect, or claim for them anything more than that they are attempts to grapple with the problem of uniting to sensible and natural construction such ornament as is appropriate to the nature of the material. You will see that I have everywhere used what I will call the bracket form of capital and shown how it may be applied to different kinds of columns and stanchions.

In dealing with the shafts all the edges may well be moulded in a very simple and refined manner. This is almost suggested by the difficulty of obtaining absolute squareness in section when you have to withdraw a casting from a mould. The surfaces may be panelled and the panels enriched, but all sinkings should, of course, be very slight, not only for the practical reason to which I have already referred, but because this again suggests the character of the material and its method of manufacture. Plates running the entire length of the column should certainly be avoided; it is difficult to get true lines in them. They make a small column look smaller and taller than it really is, and they are imitations of a familiar form of stone ornament. Horizontal bands around the columns, however, will always tend to increase the apparent diameter, and so are valuable. Short lengths of fluting between these bands, and in such positions as the tops of the columns, where they add apparent stiffness and power to support the weight, may be used, but they should be small and sharp in section, instead of wide and flat, as in stonework, as they then suggest the hardness of the material.

In the cross-shaped stanchion you will see that I have introduced small horizontal stiffeners or flanges, and endeavoured to treat them ornamentally; although these only add slightly to the actual strength, they are very valuable artistically, as seeming to bind the whole together; they also serve the same purpose as the bands on the columns, by adding apparent breadth.

When foliated ornament is used, although we should not imitate stone or wood carving, we can hardly expect to invent an entirely new system of foliage for our purpose; and it is not only quite legitimate to turn to the works of the past for suggestions, but it is our duty to do so, otherwise we throw away a part of our heritage.

In what direction should we make our investigations? We require low relief, and that sharpness and crispness of outline which should accompany it, if it is to be effective. This we shall find in the early Greek work which was executed in a hard material, in the Byzantine work, which inherited the traditions of the Greek, and,—for surface and panelled decoration,—in much of the early Renaissance detail; learning from these beautiful works of former ages, we may, without servile imitation, obtain in time a modified and consistent system of iron foliated ornament. One word more under this head: Our foliated ornament must be conventional; naturalistic decoration is seldom satisfactory in effect when applied to any part of a structure which appears to be doing work,—that is, carrying a load, or resisting a thrust, and never, unless it comes direct from the hand of the artist, in the form of carving or of painting.

The remarks which I have made as to mouldings generally apply of course to the ornamental bases of columns; these should have very slight projection, and be in no way imitations of the ordinary stone base, with its deep hollows, and bold rounds. The use of

stanchions will get over all this difficulty, as each face would have its own projecting mouldings, possibly connected by a horizontal band.

In cantilevers or large brackets, modelled or perforated ornamentation will be used in the spandril panels, which the forms of these features will suggest. Such ornament might be arranged with projections, producing the effect on one side, and sinkings on the other, so that the thickness of the whole might be fairly uniform in all its parts. Cantilevers should never be cast hollow, but always with a visible web of the necessary thickness only.

In America whole fronts of business premises are sometimes constructed of iron; and in many cases, in our own city, where every inch of window space is of importance, the same system might be adopted with advantage. Such fronts, to be artistically good, will need very careful designing. We must cast ourselves loose from old traditions, and work in the spirit which I have tried to indicate to you. There must be no great hollow sham cornices and strings carried on hollow, closely-spaced cantilevers, such as I have read of in accounts of the American examples. With a sheet of drawing-paper and time to spare I think that I might work out something that should obey the laws of art, but, until I have done that, I am afraid that I can hardly launch into a detailed description of such a front. I should certainly start with honest stanchions and girders, and where I had any surfaces to cover, I think that wrought-iron plates with ornamentally-cut edges, or cast-iron modelled panels, would be the line I should first try."

THE SURVEYORS' INSTITUTION EXAMINATIONS, 1885.

UPWARDS of 100 candidates have entered their names for this year's examinations. Of these, fifty-five offer themselves for the Students' Entrance Examination, on the 20th and 21st inst., and the remainder for the professional examinations in April next for land agents, valuers, and building surveyors. Under the provisions of the Charter, candidates for the Professional Associateship can now enter by examination only. The Compulsory Examination for the Fellowship does not come into force for several years to come, but a considerable number of candidates who have already passed the Professional Associates' Examination have offered themselves for the voluntary examination for this class.

LINE OF FRONTAGE.

At the Hammersmith Police Court Mr. William Pears, of Houghton-place, Amplehill-square, was summoned by the Metropolitan Board of Works for unlawfully, and without the consent in writing of the Board, erecting or causing to be erected certain buildings or structures known as Nos. 2 and 3, Elysium-row, King's-road, Chelsea, beyond the general line of buildings in the said row, contrary to 25 & 26 Vict., c. 102, sec. 75. Mr. Burton, solicitor, appeared for the Board, and Mr. Glyn for the defendant.

Mr. Geo. Vulliamy, the Superintending Architect, having been called to prove his certificate, stated that the buildings were 5 ft. in advance of the general line of buildings, and he had so certified.

Mr. Glyn raised an objection that the Board were out of time in taking their proceedings, six months having elapsed since the buildings were commenced, and that the shops were erected on ground previously occupied by old buildings; and called evidence to show that the works commenced in April last, and notice thereof given to the District Surveyor, and that the shops were erected upon the old site.

Mr. Paget said he should hold the objections good, and dismissed the Board's summons, with 5*l.* 5*s.* costs.

"Wolves in Sheep's Clothing."—Under this title our monthly contemporary, the *Plumber and Decorator*, makes a good onslaught on sham plumbers and their ways, and calls attention to a number of little insidious dodges, and the nature of the men who practice them. "The following announcement will give some idea of what manner of man the so-called plumber frequently is:—'X. Y. Z. buys all sorts of old furniture, &c., &c., at the best prices. If you want a plumber or general house repainer, go to X. Y. Z., who will execute the work and take any old lumber in exchange.' The man is disguised under the above initials, but we have reason to believe his name to be legion."

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The third ordinary meeting of the current session took place at Queen's College on Tuesday evening last, when Mr. W. H. Kendrick, Vice-president, was in the chair. Mr. J. Goodman was nominated as an ordinary member. A paper was read by Mr. W. Hawley Lloyd, on "Four Years' Experiences of the Restoration of a Cathedral Church." The lecture was illustrated with a large plan of Worcester Cathedral, and several views and sketches made by the author during the period of the restoration. A vote of thanks, proposed by Mr. J. King James, seconded by Mr. J. Cotton, and supported by the Vice-president, was unanimously accorded to the lecturer for his interesting paper. On the motion of the Vice-president, seconded by Mr. Victor Scruton (hon. sec.), it was requested that Mr. Hawley Lloyd be good enough to supplement his remarks by conducting the members of the Association over Worcester Cathedral some time during the present session. The lecturer agreed to do so.

Edinburgh Architectural Association.—At the meeting of this society on Monday evening last, Mr. Washington Browne in the chair, Mr. John Kinross read a paper on the subject of "The Study and Progress of Architecture." After a humorous reference to the way in which many young men found themselves in what he called an "ill-paid profession," Mr. Kinross proceeded to notice the chaotic state in which the question of style was at present, and the difficulties which that presented to a student in determining what style he should devote his attention to. For a comprehensive study of architecture time and means were necessary, and he advocated, if that were possible, the study of the noble works of Italy and Greece, not merely from drawings, but as they stand on Italian and Grecian soil. The refining effect of such study could not be over-estimated. He differed from Fergusson in thinking that Scottish work was not worthy of study. There was much beautiful early work still remaining in Scotland, and also admirable domestic work, which, perhaps, deserved to be studied more than any other kind of Scottish work. Scottish country mansion-houses seemed to grow out of the ground; they fitted in to nature; and the proportion of their rooms and the beautiful detail that was in them made them worthy of study. In speaking of modern progress, Mr. Kinross said they had in Edinburgh a very brilliant example as to the effect of very careful study of the Italian Renaissance and a judicious use of the best materials; and they had a very fine example of what the study of their old Scottish would lead to in the new block built by Mr. Finlay at the Water of Leith. These buildings, though in very different styles, showed beautiful results of careful study and good taste. In England, it was remarked, great progress had been made during the last twenty years, and of that some account was given,—the work of the leading architects being referred to.

Leeds and Yorkshire Architectural Society.—On Monday evening Mr. J. A. Gotch delivered a lecture to the members of this Society at their rooms in Albion-street, Leeds, on "English Houses in the Seventeenth Century." The accommodation in those days was very much the same as it was now, but it was arranged in a much less convenient manner. Magnificence was the chief characteristic, and for this purpose a good deal of comfort was sacrificed. The lecture was illustrated by means of diagrams, one of which represented a place built by the Earl of Dorset, who succeeded Lord Brough in the office of Lord High Treasurer; another illustrated the house of a squire of the time, such as Francis Tresham, who was implicated in the Gunpowder Plot; and a third showed the house of Sir Walter Raleigh. The lecturer quoted from the works of poets of the seventeenth century, thus bringing contemporary witnesses to give their evidence with regard to the home life of the period. The President of the Society (Mr. Edward Birchall), who occupied the chair, said it was intended to have brought forward the question of the proposed incorporation of the society at that meeting, but the subject had been postponed.

Mr. Alfred Meeson, architect of the first Alexandra Palace, died at his residence, No. 4, Harley-road, South Hampstead, on Jan. 12th, 1885, aged 76 years.

A CLUB-ROOM AT THE INSTITUTE.

SIR,—Your correspondent last week (p. 85) appears to misunderstand me. For a number of years past the question has been brought up in a decided way from time to time, whether the architectural profession could be provided with a *rendezvous*, of the nature of a club-room, probably at the Institute; and my proposal is that those who are in favour of such a measure might, perhaps, be encouraged at the present time to consider how far the recently-acquired and little-used "arbitration room" could be made available for this purpose. This purpose, as I understand, is simply to have a room at headquarters set apart during two or three hours in the afternoon for a casual *rendezvous*, where a member, having anything on his mind, might expect to meet some other members to compare notes with. I am told this would be useful to many in business, and agreeable to many more in respect of fraternal intercourse. For my own part, I am disposed to support the principle to the utmost. I feel that our profession is sadly in want of some bond of real practical union, which this might be made to supply. The formal meetings of the Institute are not enough. I cannot help thinking that in my younger days we had more true fellowship amongst us than we have now. As we expand in numbers, our cohesiveness diminishes. Anything, therefore, that would serve to bring us together, not merely formally once a fortnight, but informally any day, would be a step in the right direction. Surely no one can dispute this in principle; how to accomplish the object, and under what restrictions, I regard as matters of detail.

ROBERT KERR.

RIGHT OF WAY.

SIR,—Can any of your readers inform me if there is a fixed width for a private right-of-way entrance for carts and vans over one field to another for agricultural purposes? If so, what is the width, and do you measure from hedge or ditch, or where could I get the information? It is an acquired right by user, not by grant, and is situate in Essex.

I am about to lay a field out for building, and this entrance is on one side of it, next the ditch, and I want to know what width I must give. A. B.

CHURCH-BUILDING NEWS.

Macclesfield.—The parish church, dedicated to St. Michael, was re-opened, after partial restoration, on the 7th inst. Probably the only part of the original edifice is some portion of the basement of the tower. This tower, and the two chapels on the south side (one belonging to the Leghs of Lyme and the other erected by Thomas Savage, archbishop of York, who died A.D. 1507), are the only portions of the edifice which boast of anything like antiquity. It is intended to thoroughly restore the church in sections, and this present section, No. 1, just completed, embraced, in the main, the extension of the chancel and north aisle eastward, and the additions of clergy and choir vestries on the south side. The state of the vaults by which the basement of the edifice is everywhere fairly boneycombed, gave rise to many unexpected difficulties, but all the work is now well got over. Tegsnose, Cefo, and Alderley stones are used in the new masonry, and the roofs are of oak. There is a handsome mosaic floor in the chancel, into which a large figure of St. Michael is skillfully introduced. This is by Messrs. Patterson, of Manchester. The stone carving is by Mr. Harry Hems, of Exeter, and the heating apparatus, which has been placed under the north chapel, has been supplied by Mr. Harlow. Mr. Westwood did the gas-fitting, and Messrs. Martin, Ferrar, and Mellor the glazing. The general contractor was Mr. H. S. Aspinall, of Macclesfield, and the architect under whom the works have been carried out was Mr. James Stevens, F.R.I.B.A., of Mosley-street, Manchester, and Macclesfield.

Chipping Norton.—In connexion with the restoration of St. Mary's Church, Chipping Norton, a handsome marble mosaic pavement has been laid in the chancel, also Irish fossil steps. The whole of the aisles, &c., have been laid with marble mosaic, the work being done by Mr. Jos. F. Ebner, Clerkenwell-road, Hatton Garden, London.

Bronpton (Hunts).—A new reredos, designed by Mr. A. W. Blomfield, was fixed in this church for the Christmas festival. It is executed in rich-coloured alabaster. In the centre arch is the Crucifixion, and in the side arches Dorcas and Mary of Bethany, the nobleman of Capernaum and Cornelius; these are of painted tiles and mosaic, by Messrs. Powell & Sons, of Whitefriars; and the alabaster work is by Messrs. Earp, Son, & Hobbs, of London and Manchester.

Hornhill.—The ancient and picturesque parish

church of Hornhill, Kent, was the scene of an interesting service on the 3rd inst., the occasion being the dedication of a reredos, which has been presented to the church by Mrs. Warton, of Kemsdale. The nave of the church was restored some six years ago, but the cast end of the chancel presented a somewhat bare and unfinished appearance. This is now remedied by the erection of the reredos, which is of Caen stone, with pillars and facings of marble. A special interest attaches to this material, as it was procured from the ruins of Rome. The reredos was designed and executed under the direction of Mr. James Forsyth, of Hampstead, whose works in our cathedrals and elsewhere are well known. The design includes the various Evangelical symbols; the Alpha and Omega, at the extremities; and the Latin and Greek monograms of our Lord's titles, on each side of the central compartment, in which is represented the Archangel Michael,—the parish church being dedicated in his name. Curtains, which were manufactured by Messrs. Helbrouner, are hung between the reredos and the north and south walls. The reredos has been erected as a memorial of the late Mr. Charles Warton, J.P., by his widow.

The Student's Column.

LIME, CEMENT, AND THEIR USES.—III.

THE theory of a lime-mortar is not quite the same as the theory of a cement-mortar, for the reason stated when describing the natures of limes and cements. The cement being strongest when used by itself, it necessarily follows that all additions of sand reduce the strength of the mortar, and that the quantity of sand added determines the strength which is required of the mortar; in fact, the cement is "let down" to the desired strength by the addition of the sand. A lime-mortar is different; it has been explained that limes, more especially the rich limes, have but little power of cohesion, therefore when used neat they are at their weakest; but by the addition of sand in a proper proportion the lime, by adhering to each particle, is enabled to develop its full power of adhesion, while the requirements of cohesion are reduced to the minimum, or that a lime is "worked up" to the desired strength by the addition of the sand. Thus, though the desired result is obtained by the same means, whether using cement or lime as a matrix, the action in the one case is exactly the reverse of the other. The object to be obtained is, of course, the maximum of strength at the minimum of cost.

It will now be seen in what manner the size and form of the grains of sand act in producing a strong and economic mortar. Whether it be a cement or lime mortar which is being made, the object is to surround each grain with a coating of the matrix, that the coating of matrix shall be even in thickness throughout the mass, and that there shall be no space between the grains of sand, which must either be left vacant, or must be filled with the matrix. In the former case they would be a source of weakness, and in the latter there would be a waste of material. A round globular grain is evidently, therefore, the worst that can be used; if a perfectly square grain of even size could be found, and it could be ensured that the grains would all lay square with each other, the minimum of matrix would be required, for the mortar would be itself like a piece of masonry. This, however, is impossible, even if it were desirable. Now if a sand is obtained which is composed of sharp irregular-shaped grains, of varying size, it can be well understood that the matrix can be so intimately mixed with it that while in some cases the larger pieces are in juxtaposition on some part of their surface, the smaller grains would fill up those voids caused by their irregular form, and a thoroughly homogeneous mass secured, which would contain the maximum of sand with the minimum of matrix.

There has lately been a considerable correspondence in the columns of the *Builder* as to the value of sea sand as a building material,—the question asked being whether the salt would not act deleteriously on the mortar made with it. It may be at once stated that if the sand is to be used for concrete underground, or anywhere out of sight, where the efflorescence arising from the presence of the salt is of no importance, sea sand has the same value as other

which value would be determined in ordinary way by its sharpness and size; for it must not be assumed that sand is always the same,—it varies in all things in nature. As a rule, however, and is mechanically a good building sand, or the purposes of ordinary work it must be used with clear water, and washed well, in order to remove from it all traces of salt; otherwise the salt will continually work out to the surface of the work, and spoil it by efflorescence and dampness. For this reason only must the salt be eliminated. As a matter of construction a partially-washed sea sand will be of more value than one perfectly clean, for chloride of sodium in sea salt, in all quantities, though it retracts the setting limes and cements, eventually increases its hardness.

The larger pieces of stone or aggregate which are used to make a concrete deserve equal, if greater, care in their selection than the smaller. The definition of a sound concrete is the same as that of a mortar, with the difference that in the case of concrete the mortar, the combination of cement or lime and sand, may be considered as the matrix and the stones as the aggregate; it follows, therefore, that no two pieces of aggregate must be in contact, but each must be surrounded by the matrix, and each grain of sand in a mortar.

The aggregate should be strong, as it is impossible to make strong work with weak materials; it should be irregular and angular in shape, and it should be clean. The definition of "clean" is not so differently understood, as many are under the impression that if a quantity of stone or rock is crushed or broken to a desired size, the resulting crushed stone is clean. Now, for practical purposes, such is not the case. In crushing or breaking a stone a certain amount of fine impalpable powder is produced, and this is as detrimental to the production of a good concrete, as is loam or any other earthy matter. An aggregate, therefore, should always be washed after, and not before, and should be reduced to the proper size.

In selecting an aggregate smooth glassy surfaces should be avoided,—rough and uneven surfaces, having a certain porosity, make the best concrete, owing to the better adhesion which the matrix has to them. For this reason, when a river ballast or shingle is used it should always be broken in order to break up and destroy the rounded and even surfaces,—but shaly or shingle does not under any conditions make the best concrete, and should only be used for foundations, and similar work where it is likely to have to withstand anything but a pushing force. The best concrete is produced by aggregates possessing the already-mentioned desired properties, such as hard limestones, granites, &c.

The size of the aggregate must vary according to the magnitude of the work in which it is used; the larger the aggregate the less matrix is required, resulting in economy in cost; in foundations, and backing of retaining walls, very large aggregate may be used, provided it is of sufficient strength to withstand the crushing weight put upon it; but in more finished work, where appearances have to be considered, and here it is subjected to other strains besides that of crushing, such, for instance, as walls, doors, &c., it is generally advisable to crush the aggregate to such a size that it will all pass through a ring 2 in. in diameter, for paving slabs, window-sills, steps, and other purpose-made concrete it is usual to crush the aggregate so that it will all pass through a sieve having holes $\frac{3}{8}$ in. square.

The proportion of aggregate to matrix is a matter which requires care in determining in order to obtain the best results; the proportion is determined primarily by the strength required, and secondly by the attainment of that strength at the minimum of cost. The point where strength and economy are attained is when the larger and smaller aggregates and the matrix are so balanced that a solid concrete is produced, without excess of matrix. A very good way of arriving at the amount of matrix required is to take a fair sample of the aggregate which it is proposed to use, divide it by means of sieves into three portions; first, the one representing the sand, which would form with the cement the matrix; secondly, the smaller pieces of aggregate; and thirdly, the larger pieces of aggregate. If sufficient of the larger aggregate be now taken to fill a bucket, or other similar vessel, and water poured into

it until it is full, and the water then measured into another vessel, the exact quantity of smaller aggregate and matrix required to fill the interstices between the larger is ascertained. The height of the water in the measure should be marked and the measure emptied; the smaller aggregate should then be placed in it up to that mark, and water again poured in until the aggregate is just covered; this water, if again poured into a measure, will determine the amount of matrix, i.e., the sand and cement, required to fill the interstices between the smaller aggregate; to the quantities thus arrived at it is necessary to add from 10 to 15 per cent. to allow for the matrix which would be required to go between each piece of aggregate. The quantities of matrix can then be composed wholly of cement or lime, or of one of cement to any proportion of sand which it is thought will be sufficient to give the desired strength. It is perhaps right to mention that the separation of the aggregates into three parts in order to determine the proportion of matrix required, varies somewhat from the usual practice, which is to measure the aggregate in one only; but though taking slightly more trouble, it has the advantage of determining the proportion which the fine, small, and large aggregates bear to each other, and allows of a correction being made in the preparation of the aggregate, should either one be found to preponderate, or be deficient in quantity, and thus a better and sounder concrete is obtained.

The knowledge of the whole of the materials of which mortar is composed having been acquired, the proper means of using them must be studied in order that good and economical results shall be obtained, and the way in which a mortar or concrete is made has as much to do with the result obtained as the choice of good materials; for though it is impossible to obtain a satisfactory result from bad materials, it is always possible to obtain a bad result from the very best materials if they are improperly used.

Errata.—In the second paper on this subject, given by us last week, the reader will, perhaps, note the following corrections:—Page 87, col. 1, line 20 from top, for "need not" read "must not." In the same column, line 34 from bottom, read "never increases much more in strength." On same page, centre column, line 13 from bottom, for "just merits attention" read "first merits attention."

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

5,936, Improvements in Flooring Cramps. T. Thornton.

The improvements over the ordinary form of flooring cramp are chiefly that the distance between the fulcrum and the weight is lessened by means of a movable end added to the sliding bar, whereby greater leverage is obtained. There are also points of novelty and usefulness in an improved wedge attachment for releasing the bar, and in the tongue until the spring actuating it. A movable end or falling piece is attached to a sliding bar; this piece falls below the end of the bar against a projection or abutment under the bar. A ledge or rim is made on the underside of the wedge to move in a corresponding groove in the sides of the box for the purpose of keeping the wedge when slack or free from the tongue. The tongue is made longer than in the ordinary form of flooring cramp, and some small details of construction are introduced which may be generally regarded as improvements.

2,338, Improvements in Ornamenting Glass. J. Sherrin.

Pieces of glass of various colours are cemented on sheets of glass blinds to doors and windows, and for similar purposes. The pieces are cut into different shapes, and on each piece is put a little cement; it is then placed on a sheet of glass the size of the window, and various pieces added in the same way until the pattern is complete.

2,012, Improvements in the Construction of Sash Pulleys. W. J. Penny.

The object of the invention is to afford a ready means of taking out the pulley-wheel from a sash or other pulley, which would greatly facilitate the execution of repairs when needed. The pulley-wheel is cast with a short central spindle on which are afterwards formed two rims or shoulders, one on each side. The face-plate and pulley-hox is cast in one with two recessed apertures and bearings in the sides of the pulley-hox. The opening in the face-plate, wherein the pulley-wheel, is inserted is recessed to a sufficient width to allow the arms of the pulley-spindle to pass through and drop down into the recessed apertures in the sides of the pulley-hox. When the pulley-wheel is to be removed a Bradawl or other pointed tool is inserted

in a hole made in the periphery of the pulley-wheel, and the pulley-spindle is then lifted over the recessed bearings and the pulley-wheel taken out.

822, Chimney Cowl and Roof Ventilator. A. C. Smith.

The ventilator head is made with any required number of concentric conical guard-rings tapering inward and upward, and with bands fixed to their edges. The first guard-ring overlaps the top of the main shaft, and they are formed so as to leave a central passage upward for the smoke, &c. Vertical guides, at equal distances apart, are fixed between the guard-rings, reaching in an oblique direction from the outer edge almost to the inner edge of the guard-rings, thus causing wind and air to take an upward course. The top may be provided with a cap, with or without a depending curtain.

4,161, Chain Pulleys. R. J. Smith.

Relates to the means of renewing the working parts. For this purpose, in the case of large pulleys the teeth are bolted separately or in series inside the groove of a suitably-turned drum. In the case of smaller pulleys semicircular faced pieces having cupped recesses are bolted against the sides of a central groove. In either case the grooved pulley has radial feathers, wearing-pieces, and key-ways for the same, for the purpose of rendering them immovable in their position.

APPLICATIONS FOR LETTERS PATENT.

Jan. 2.—70, E. R. Wethered, Improvements in Door Lock Furniture.—73, W. Sanderson and T. A. Moffit, Door Latches and Catches.—77, J. H. Stone, Improvements in Call and other Bells.—82, H. Curzon, Preventing the Bursting of Water-pipes from Frost.

Jan. 3.—108, F. Thompson, Improvements in Pocket Saws.—117, J. Bennison, Chimney Pots for Preventing Down-draught and Curing Smoky Chimneys.—136, A. M. Clark, an Improved Girder.—145, J. Tulloch and T. Tulloch, Incombustible Composition for Finishing the Interiors of Buildings.—160, T. E. Fielder, Brick Mould Stock.

Jan. 6.—171, L. Coke, Improvements in Stoves.—202, A. J. Boulton, Improvements in Sieves.—212, H. Salomo, Carrier for Wood-turning Lathe.—217, W. Court, Wood-block Flooring.

Jan. 7.—230, B. Goulton, Improvements in Locks.

Jan. 8.—255, T. Thornton, Window Fasteners.—264, J. Walker, Cupboards and other Door Fastenings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,103, W. M. Hawkins, Improvements in the Construction of Buildings.—11,888, W. B. Lake, Protection of Wood or other Materials from Fire.—14,522, F. Jupp, Pneumatic Door-closer.—14,648, J. Samuel, Metallic Roofing Slate.—14,712, J. Meorath, Erection of Fireproof Buildings.—14,847, T. Hawkins, Improved Method of Glazing.—14,908, P. Bowden, Machinery for the Manufacture of Bricks and Tiles.—15,324, G. Usill, Pipe Joints and Joining.—15,334, F. Hobbs, Cement for Lead Light Glazing.—15,927, J. King, Apparatus for Closing and Preventing the Slamming of Doors.—16,154, J. Ball, J. Rawson, and F. Rawson, Manufacture of Chisels, Gouges, and Augers.—15,197, E. Turner and J. Reynolds, Combined Circular Rack and Band Machine for Sawing Timber.—15,204, W. Clynno, with Stop Chamfer and other Wood-working Machines for Shaping or Sharpening the Teeth of Saws.—15,488, C. Hett, Connexion for Water-closets.—15,753, J. Campbell, Ladders or Steps.—15,954, M. Ker, Raising and Suspending Venetian Blinds.—16,068, B. Turner, Door Springs.—16,670, J. Webb and F. Smith, Collar-joint for Sewer and Drain Pipes.—16,950, W. Smith, Manufacture of Portland Cement.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

1,322, F. Oldfield, Improvements in Sliding Windows or Sashes.—2,413, D. Griffiths, Improved Roofs.—3,814, W. H. Tylor, Drain Traps.—3,971, E. Pearson, Water-closets.—4,578, A. Chesterman, Improvements in Hinges.—4,720, S. Wilding, Machines for Shaping or Sharpening the Teeth of Saws.—5,050, W. Cunliffe, Imitation Stained Glass.—5,172, W. Greenwood, C. Mitchell, and H. Lund, Weather Bars for Doors.—14,087, J. Farthing and J. Lorrimer, Artificial Asphalte.—3,352, F. Howcroft, Supporting Window Sashes.—4,063, J. Phillips, Gully Tank and Trap.—4,570, S. Slater, Door-sill, Brasses and Securing Same.—4,649, G. Paine, Apparatus for Opening and Closing Swing Sashes, Shutters, and Doors.—4,877, A. Bicknell, Apparatus for Cutting or Surfacing Wood Pavement.—4,973, S. Skinner, Sawing Machinery.—8,749, J. Adams, Door Springs.—15,354, J. Holroyd, Construction of Sewers.—15,720, M. Adams, Ventilating and Disinfecting Apparatus for Sewers, Drains, &c.

The Institution of Civil Engineers.

The newly-elected Council have re-appointed Mr. H. L. Antrobus, the senior partner of Messrs. Conitts & Co., as treasurer, and Mr. James Forrest as the secretary. At the same time Dr. William Pole, F.R.S., was appointed honorary secretary, in the room of the late Mr. Charles Manhy.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JANUARY 5.

By W. H. S. GILBERT & Co.
Green Street-green, Kent.—Five freehold cottages... £750

JANUARY 7.

By S. WALKER & RENTZ.
Rotherhithe—14, 16, and 18, Trident-street, 66 years, ground-rent 7l. 4s. 415
23 to 33, odd, Trident-street, 46 years, ground-rent 15l. 665
Shepherd's bush—138, Coningham-road, 79 years, ground-rent 9l. 270

By SCOTFIELD, OMBS, & BUCKLEY.
The reversion of one-fourth of one-eighth share of a ground-rent of 250l. a year, also to the same share of the premises falling due in 1840. 68

JANUARY 8.

By E. & S. SMITH.
Stoke Newington—51, Green-lanes, 30 years, ground-rent 5l. 5s. 245
Enfield, Upper Marston-road.—Two plots of freehold land 60

JANUARY 12.

By J. SPARROW.
Homerton—49, High-street, freehold 400
By E. E. CROUCHER & Co.
Dalston—2, Fasset-road, 67 years, ground-rent 4l. 10s. 340
Clerkenwell—19 & 11, Wilmington-place, and a ground-rent of 4l. per annum, 80 years, ground-rent 3s. 4d. 270

JANUARY 13.

By VENTON, HULL, & COOPER.
Bayswater—56, Chestnut Villas, freehold 1,325
Hastings (near)—Fairlight Cottage, with meadow, 27 years, ground-rent 1l. 10s. 500

By G. F. CALVERT.
New North-road—83 & 81, Street-road, and South Cottage in the rear, 24 years, ground-rent 13l. 10s. 456

JANUARY 14.

By E. W. RICHARDSON.
Clapton—3, Castlewood-road, 34 years, ground-rent 12l. 550
Bow—51, Turner's-road, 80 years, ground-rent, 4l. 10s. 300
Bethnal-green—129, 124, 124, & 126, Old Bethnal-green-road, and 1, Georgestreet, 73 years, ground-rent 65l. 1,206

By TOSKIN & HANBING.
Lewisham—Freehold building site, containing 2a. 0r. 18p. 2,430

By W. B. CRAWFIELD.
Enfield—Bycullah-road, Geldard House, freehold... 1,350

MEETINGS.

MONDAY, JAN. 19.

Royal Institute of British Architects.—Mr. William White on "The Fireproof Closing of Openings in Party-walls under the Metropolitan Building Act." 8 p.m.
Royal Asiatic Society.—8 p.m.
Society of Arts (Continental Lectures).—Dr. G. V. Poore on "Climate and its Relation to Health" (11. "The Effects of Soil, Drainage, and Vegetation upon Climate"). 8 p.m.

TUESDAY, JAN. 20.

Institution of Civil Engineers.—Mr. A. Hamilton-Smythe on "A Comparison of British and Metric Measures for Engineering Purposes." 8 p.m.
Statistical Society.—Dr. Robert Giffen will read some "Further Notes on the Progress of the Working Classes." 7.45 p.m.

WEDNESDAY, JAN. 21.

Builders' Foremen and Clerks of Works Institution (9, Conduit-street, W.).—Annual Meeting. 8.30 p.m.
British Archaeological Association.—(1) Mr. H. Syer-Cuning on "St. Albans, Abbess of Wessex." (2) Mr. C. Lynam on "The Inscription on the Carew Cross." 8 p.m.
Royal Meteorological Society.—Annual Meeting. 7 p.m.
Society of Arts.—Mr. D. Pilson on "Labour and Wages in the United States." 8 p.m.

THURSDAY, JAN. 22.

Society of Antiquaries.—8.30 p.m.
Society of Arts (Howard Lectures).—Mr. W. Anderson on "The Conversion of Heat into Useful Work." 1V. 8 p.m.

SATURDAY, JAN. 24.

Architectural Association.—Visit to St. Marylebone Parish Church. 3 p.m.

Miscellaneous.

Middlesex Hospital Extension.—The hydrofuge parquet, which is damp-proof, sound-proof, and fire-proof, and the mosaic pavements at the above, have been executed by Mr. Jos. F. Ebner, Clerkenwell-road, London.

Liverpool.—The Turner Memorial Home for Incurables, designed by Mr. A. Waterhouse, A.R.A., is now approaching completion, and has had erected in the chapel a reredos of alabaster. In the three central compartments, carved in white alabaster, are the subjects of Christ Healing the Sick and Lame, Christ giving Speech to the Dumb, and Christ restoring Sight to the Blind. This work has been executed by Messrs. Earp, Son, & Holbs, of London and Manchester.

Baptist Church, Hendon.—The committee for building a new Baptist Chapel at Hendon have referred the designs received in competition to a professional assessor for advice, having for that purpose appointed Mr. Banister Fletcher.

British Archaeological Association.—At the meeting on Wednesday, the 7th inst., Mr. Geo. R. Wright, F.S.A., in the chair, Mr. C. Lynam sent a cast of the inscription on the cross at Carew, and drawings of another cross at Penally, visited during the Congress. Mr. J. H. Whieldon sent further details of the Roman Bath at Collingham, which will be published in the next part of the *Journal*. The Chairman referred to some seventeenth-century carvings which were taken down from Goat-hurst Church, Somerset, and which, although still in the building, were now for sale. The importance of retaining these in the church was urged by many speakers. Mr. Lofins Brock, F.S.A., referred to the collection of baluster shafts found in the walls of Jarrow Church during the rebuilding, and now preserved in the porch. A Saxon date has been given to these, but their resemblance to Roman work was pointed out. They were probably derived from the Roman buildings in the locality, as was the case at the Saxon Church, Dover, and the transepts of St. Alban's Abbey. The discussion upon the charities of the Royal Abnury, adjourned from the last meeting, was brought to a close. A paper was then read by Mr. C. Lynam on the recent excavation of the site of the Abbey of Ilulton, Staffordshire. The whole arrangement of the church and the conventual buildings has been recovered, and the site has been again filled in after careful measurement, the plans being produced.

International Inventions Exhibition.—The Council of the Society of Arts announce that they will award the following Gold Medals in connexion with the International Inventions Exhibition.—Under the Joint Stock Trust, one Gold Medal for the best application of Photography to a Permanent Printing Process; Group XXVII, Class 149; Group XXIX., Class 159. Under the Howard Trust, five Gold Medals for the best exhibits (coming within the terms of the Trust) in the following classes.—One for the best exhibit in Group IV., "Prime Movers," Class 26.—Steam Engines and Boilers; one for the best exhibit in Group IV., Class 27.—Gas and Air Engines; one for the best exhibit in Group IV., Class 28.—Means of Utilising Natural Forces; one for the best exhibit in Group XI., "Hydraulic Machines," &c., Classes 59 to 62; one for the best exhibit in Group XIII., "Electricity," Class 72.—Distribution and Utilisation of Power." Under the Fothergill Trust, one Gold Medal for the most novel and best exhibit in Group XXVIII., "Philosophical Instruments and Apparatus," Classes 148 to 158. Under the Alfred Davis Trust, three Gold Medals to be awarded in Division II. of the Exhibition (Music), Groups XXXII. to XXXIV., Classes 166 to 180. The Council propose to ask the juries in each class to recommend for their consideration either two or three exhibits which they might consider deserving a prize. It will not be necessary for any special application to be made in respect of these prizes. The medals are each of the value of 20l.

The Widening of New Broad Street.—Several new buildings are at present in course of erection in connexion with the widening of New Broad-street to the extent of 8 ft. Nearly all the premises required for the purpose of widening the street have now been taken down, and amongst other new structures now in progress is an extensive block of buildings at the corner of New Broad-street West, and Old Broad-street, having a frontage to the first-named street of about 45 ft. in length, and running southwards along Old Broad-street, in the direction of London Wall. The buildings are faced with red brick and Portland stone, and are intended for offices. Mr. Edwin T. Hall, of Moorgate-street, is the architect, and Messrs. V. Bangs & Co., of Bow, are the contractors.

A New Architectural Work.—Mr. Owen W. Davis, architect, is (as will be seen by an advertisement in another column) about to publish, by subscription, "Art and Work," containing about 550 examples of antique, Italian, Renaissance, "Adam," Oriental, and modern work, in marble, stone, metal, wood, colour, &c.

West Sussex County Surveyorship.—At the Court of Quarter Sessions for West Sussex held on the 8th inst., Mr. Ellice-Clark, M. Inst. C.E., was unanimously elected County Surveyor. Mr. Ellice-Clark will continue to hold his position as Engineer and Surveyor to the Hove Commissioners.

London and Middlesex Archaeological Society.—At a meeting of this Society on Monday evening at King's College, Alfred White presiding, Professor John Hales read a paper entitled, "Notes on Anglo-Saxon Charters relating to Hampstead." Professor Hales said that it was a curious fact that what was now to be the borough of Hatfield had existed within the same boundaries the manor of Hampstead one hundred years before the Norman conquest. The first charter relating to Hampstead was granted by King Edgar, and the second by King Athelred. The date of the first was 986; it had been known for many years, and the original itself exists in the archives of Westminster. The second charter, which had been only lately known, was amongst the Ashburnham manuscripts which had been secured to the nation, and were now in the British Museum. Mr. Hales, in his history of Hampstead, had proposed that the charter of Athelred was forged, but he (Professor Hales) thought it might fairly believe in its genuineness. It is the signature of the king's wife Elfrida, who granted the manor of Hampstead to a certain person named Mangola, whose identity had hitherto been traced. The second charter confirmed the grant of the first, which set out the limits of Hampstead. Mr. E. P. Seaton, resident engineer of the Metropolitan (Inner Circle) Railway, read a paper on the discoveries made in the excavations in forming the extension of the new line to the Tower.

The Supply of Natural Gas in America. There exists a belief that the natural gas supply of the United States will soon be exhausted, but, from what has recently been stated by American contemporaries, this does not appear to be the case. Within the last few weeks reports have been received from Pittsburgh, Pennsylvania, Cleveland and Findlay, Ohio, Mitchell, Dakota Territory, and at least five points in Alabama, announcing the discovery of natural gas wells. Scarcely a day is said to pass without the discovery of a new well, some portion of the country. The remarkable deposits in western Pennsylvania and east Ohio are well known to the reading public, and a great and growing industry is in process of development. Possibly it may be an extravagant statement, but it is believed that the discovery of natural gas in Pennsylvania is only second in importance to that of oil. It is a well-attested fact that the town of Fredonia, New York, has been lighted by same gas well for more than forty years, and we are told that the Chinese have been using certain gas-wells for 4,000 years, and that they still yield a good supply. It is only a few months since American geologists affirmed that the natural-gas belt did not extend beyond Pittsburgh, and yet successful wells are now in operation at Cleveland, Steubenville, Findlay, and other points in Ohio.—*Iron.*

Free Lectures to Artisans.—The Company announce a course of eight lectures to be given at their Hall, London-venue, to artisans and others connected with the building trade. The first will be delivered by Professor Kerr, of King's College, on Wednesday, February 11th, at eight o'clock, when the subject will be "The Comparative Anatomy of Beams, Trusses, and Arches." Tickets for the course can be obtained at the Hall of the Company after January 21st.

Royal Victoria Coffee-hall.—The quenters of the Science Lectures at the above hall will be glad to learn that they were resumed on Jan. 13th, when Prof. H. G. Seeley, F.R.S., lectured on "More about the Sun"; on Jan. 27th Commander Cameron will lecture on "How I got from the East to the West Coast of Africa."

Albo-Carbon Light.—We understand that the Italian Church, Hatton Garden, has just been lighted with the Albo-Carbon light by Sanitary Engineering and Ventilation Company of Westminster, who also recently applied the same system of lighting to the New Oratory, South Kensington, and several picture galleries.

Incorporated Society of British Artists.—At a special assembly of the Incorporated Society of British Artists, held on Monday evening last, Mr. W. T. Dannat was elected a member.

School Furniture.—We learn that North of England School Furnishing Company (Limited), of Darlington and Newcastle, has opened a London depot at 121, Newgate-street.

Climate in its Relation to Health." First of three Cantor Lectures, on the state in its Relation to Health," was given in the rooms of the Society of Arts, on Monday last, by Dr. G. V. Poore. The lecturer, by directing attention to the chemical composition of the atmosphere, and its com-

Directories.—The progress of electric work in commercial importance is strikingly indicated in the volume in which Berly's "Universal Electrical Directory for 1885" is comprised. It professes to be a complete record of all the industries directly or indirectly connected with electricity and magnetism, and is a most voluminous and almost alarming compilation. Among other works of the same class, we have the "Railway Diary and Officials' Directory for the present year," giving the returns of traffic and particulars of the constitution and the official staff of every railway company, &c.

Church Clocks.—A large clock has just been completed at Alston Church, Staffordshire, by Messrs. John Smith & Sons, Midland Steam Clock Works, Derby. It strikes the hours upon a large bell, and has two dials facing south and west. The same firm have also just erected a similar clock at Rolleston Church, Staffordshire.—At Helpston, Peterborough, a large clock has just been erected in the church by Messrs. Smith. It strikes the hours upon a large bell and has one large dial. These clocks are fitted with all the latest improvements, and are not to vary more than fifteen seconds a month.

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Table with 5 columns: Nature of Work, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page. Rows include Execution of Works and Supply of Materials, Erection of Warehouse, Granite Kerb, Kenish Flint, Pipes, &c., Supply of Broken Granite Kerb, Cubes, Broken Flints, and for Laying Pavement, &c., Glass for Locomotives and Windows of Railway Carriages, Execution of Works, Erection of Two small Bridges, New Granite Carriage-way, &c., Excavating, &c., Beulah Park Estate, Painting Work, and Repairs to Swimming Bath, Brick & Stone Work, Bricklayer, Mason, Carpenter's, &c., work, Darlington, Corporation Sewage Works.

PUBLIC APPOINTMENTS.

Table with 5 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page. Rows include Town Surveyor and Inspector of Nuisances, County Surveyor.

TENDERS.

Table for alterations at the Public Baths and Washhouses, Spa-road, Hammersmith. Lists names of contractors and amounts: W. J. Botterill £2,328 0 0, Scrivener & Co. 6,454 0 0, B. E. Nightingale 5,323 0 0, W. Johnson 6,273 0 0, J. Marsland 6,105 0 0, J. Bentley 6,081 0 0, J. C. Boyver 6,025 0 0, W. Martin 5,930 0 0, H. L. Holloway 5,875 0 0, Tarrant & Son 5,793 0 0, J. Tyerman 5,735 0 0, Smith & Sons 5,720 0 0, Howell & Son 5,687 0 0, D. D. & A. Brown 5,683 0 0, Hann & Co. 5,660 0 0, F. Dixon 5,400 0 0, F. Higgs 5,257 0 0, G. Stephenson 5,193 0 0, Smith & Barnes 5,083 0 0, J. Bullers 4,995 0 0, W. Smith 4,905 0 0, W. Schofield 4,675 0 0, J. Stayner (accepted) 4,669 0 0.

Table for Porcelain, Iron Baths, and Gear. Lists names and amounts: Jeakes £3,400 0 0, Bradford & Co. 2,727 0 0, Frazer 2,695 0 0, Batrill 2,153 0 0, Bushby 2,134 0 0, Smith & Barnes 2,012 0 0, Thomas & Taylor 1,987 0 0, G. Elliot 1,948 0 0, Seaton 1,916 0 0, May 1,909 13 0, Pratt & Reynolds 1,825 0 0, Thompson, Leeds 1,950 0 0.

Contract No. 2. For the erection of a new house, &c., at Sandhurst, Berks, for Lieut.-Col. Harvey. Mr. W. Ravenscroft, architect, & Market-place, Reading. Quantities supplied by Messrs. Cooper & Sons, surveyors, Mailhead and Reading: Botrill, Reading £8,591 16 10

Table for new wards, &c., to the Infectious Hospital, Hillingdon, for the Uxbridge Joint Hospital Board. Lists names and amounts: Freeman, Surveyor to the Board. No quantities: Ham & Co., Windsor £2,182 0 0, C. F. Keasley, Uxbridge 1,618 0 0, J. Hardy, Cowley 1,447 0 0, F. T. Taylor, Uxbridge 1,443 0 0, W. Brown, Southall 1,435 0 0, C. Brown, Harfield 1,350 0 0, P. Bell, Southall 1,295 0 0, Schellen & Williams, South Reading 1,287 0 0, A. & B. Hanson, Southall 1,274 0 0, F. Quinton, Southall 1,150 0 0.

Table for the erection of new schools, including teachers' residences, boundary walls gates, &c., proposed to be erected by the Egham School Board, at Egham Hythe. Mr. E. Harner, architect, John-street, Adelphi: Knight & Sons, Chertsey £4,900 0 0, W. Keavell, Windsor 4,542 0 0, G. Reavell, Staines 4,380 0 0, Green Bros., Colnbrook 3,885 17 6, F. A. Key, Windsor 3,414 0 0, A. L. Oates & Sons, Egham 3,655 0 0, A. Simpson, Egham 3,615 0 0, Hann & Co., Old Windsor 3,474 0 0.

For the erection of two houses on the Earlsfield Estate, S.W., for Mr. H. W. Keatch. Mr. Wm. P. Miller, architect, Wandsworth-common: Spencer (accepted) £750 0 0

Table for the erection of a house and shop at Barmouth, for Mrs. Edwards. Mr. Thomas Roberts, Assoc.-Archit., Inst. C.E. architect: Jones, Criecheth £1,727 11 0, Hughes, Portmadoc 1,660 0 0, Griffiths, Criecheth 1,570 0 0, Edwards, Barmouth 1,557 0 0, Jones, Portmadoc 1,553 0 0, Thomas & Parry, Llanbedr 1,512 0 0, Davies, Barmouth 1,469 0 0, Evans, Harlech 1,445 0 0, Jones & Edwards, Barmouth 1,411 11 0, Roberts & Williams, Talsarman and Harlech 1,420 0 0, Owens, Barmouth 1,384 0 0. [Architect's estimate, 1,449.]

Table for King's Heath and Greenhill sewer, for the King's Norton Rural Sanitary Authority. Mr. R. Godfrey, engineer. Quantities supplied: W. Heaps, jun., Birmingham £7,234 13 4, Currall & Lewis, Birmingham 6,926 5 0, J. White, Handsworth 6,755 6 0, Pearson & Goughly, Birmingham 6,754 8 7, Cooke & Co., London 6,272 7 4, G. Law, Kidderminster 5,701 18 7, J. Biggs, Handsworth (accepted) 5,510 14 6. [Engineer's estimate, 6,121. 15s.]

Table for the erection of offices for the Guarantee Society, 19, Birch Lane, E.C. Mr. Edwin A. B. Crooket, architect, 16, Mark-lane. Quantities supplied: Holland & Bannen £8,998 0 0, Colls & Son 8,360 0 0, Bangs & Co. (executors) 8,300 0 0, E. Conder 8,199 0 0, W. Brass 7,593 0 0, Rider & Sons 7,451 0 0, Lawrence & Sons 7,450 0 0, J. & J. Greenwood 7,449 0 0, Ashby & Horner (accepted) 7,249 0 0.

Table for detached house, Farnham-road, Guildford, for Mr. S. Farnfield. Mr. A. B. Harding, architect: Hill & Downes £945 0 0, Newdick 925 0 0, Currington & Peto 915 0 0, Kingierlee 897 0 0, T. Downes 890 0 0, Bannam 839 0 0, G. & R. Smith (accepted) 837 0 0.

lyling Ambulances in Paris.—Dr. Henri Nactel, though an American, has succeeded in winning an agitation in Paris in favour of providing town ambulances on the American model. An influential temporary committee was formed for this purpose, on which were the names of Dr. Pasteur, Dr. Berthelot, Guérin, Dr. Bédard, Baron Larrey, Senator Rubin Schwartz, the former Prime Minister Jules Simon, and the well-known journalists E. Lockroy, John Lemoine, E. Maguier, &c. Recent meeting of this committee was held under the presidency of M. Jules Simon, when Nactel exposed his scheme. He proposed to establish two methods of communicating in the hospitals in case of accidents. First, on there is no extreme urgency, the local ambulance station would supply means of telephoning to the nearest hospital to send an ambulance. Secondly, when there is not a moment to be lost, or the case is too serious to transport to the police station, telegraphic posts, similar to the fire alarms used in the streets, might be employed. A number of red boxes or pillars in all the principal streets could be opened by a key kept in the nearest shop, and the alarm given. On the receipt of this signal an ambulance should be ready to start in forty-two seconds, horses being kept day and night in harness. The ambulance would accompany the ambulance. It was further proposed to raise a fund by voluntary subscriptions to start this service; and a magnificent fête will forthwith be organised, the proceeds to be devoted to this purpose.—Lancet.

Iron Girders.—We have received Messrs. Messures Bros.' annual calendar card, containing numbered sections of girders and other ironwork; a useful form of list for immediate reference. We observe that Messrs. Messures, in their sections of iron and concrete floors, retain the same with the usual upper flange section. It is a question at least of some theorists think there is a question about it) whether this is not waste weight and material in the iron, concrete covering, of course, a very considerable resistance to compression strain, which must naturally help the upper flange of the beam, and then if it do not abrogate the necessity for an upper flange at all. The error is one on the side of strength, no doubt, but not on that of economy.

Hydraulic Lift, Eastcheap.—Messrs. Reichald Smith & Stevens, of Queen's-road, Eastcheap, have been instructed by the A-rated read Company to erect at their new premises, Eastcheap House, Eastcheap, one of Stevens & Major's Patent Hydraulic Balance Passenger Lifts, with compensating apparatus for reducing the amount of water used. The architect of the building is Mr. George Edwards, ofrompton-road.

For Montem-street Schools, for the London. Mr. E. R. Robson, architect.

Boxall, & Barber, surveyors.....	13,440 0 0
Patman & Co.....	13,939 0 0
Howell.....	13,225 0 0
Hart.....	13,222 0 0
Kerley.....	12,987 0 0
Shurmer.....	12,809 0 0
Simpson.....	12,790 0 0
Downs.....	12,657 0 0
Tongue.....	12,625 0 0
Bangs.....	12,535 0 0
Coz.....	12,624 0 0
Niblett.....	12,400 0 0
Grover.....	12,434 0 0
Lathey.....	12,427 0 0
Croaker.....	12,381 0 0
Wall Bros.....	12,371 0 0
Scrivener & Co.....	12,280 0 0
Jerrard.....	12,172 0 0
Atherton & Latta.....	12,121 0 0
C. Wall.....	12,100 0 0
.....	12,089 0 0

For the Huddle-street Schools, for the London. Mr. E. R. Robson, architect.

Wood.....	8,794 0 0
Larter.....	8,748 0 0
Furtle & Appleton.....	8,670 0 0
Croaker.....	8,278 0 0
Kerley.....	8,133 0 0
Steel Bros.....	7,993 19 0
Wall Bros.....	7,977 0 0
Kirk & Randall.....	7,869 0 0
Pritchard & Son.....	7,869 0 0
Shurmer.....	7,884 0 0
Bangs & Co.....	7,877 0 0
Howell.....	7,826 0 0
Grover.....	7,788 0 0
Palmer.....	7,777 0 0
Lathey Bros.....	7,767 0 0
Palman & Co.....	7,723 0 0
Jerrard.....	7,683 0 0
Sargent.....	7,683 0 0
Hunt.....	7,693 0 0
Smith.....	7,593 0 0
Simpson.....	7,530 0 0
C. Cox.....	7,554 0 0
W. Oldrey.....	7,491 0 0
Atherton & Latta.....	7,470 0 0

For repairs to No. 1, Cambridge Villas, and No. 1, Gordon Villas, Wiverton road, Sydenham, for Mr. W. Boydell, Mr. Walter Hall, surveyor, Chancery-lane:—

Pestell.....	£465 0 0
Thomas & Cardus.....	400 0 0
Leeks.....	368 0 0
Searchfield.....	398 0 0

For the erection of new Club Premises for the Royal Southampton Yacht Club, Above-bar street, Southampton, Mr. W. H. Mitchell, architect, 8, Portland-street, Southampton:—

Without Tower.....	Total.....	
W. H. Chapman.....	£4,461	£4,893
Stevens & Sons.....	4,427	4,784
J. Dyer.....	4,410	4,717
J. W. Rowland.....	4,129	4,463
H. J. Sanders.....	4,088	4,446
J. Bull, Sons, & Co.....	4,089	4,437
J. Crook.....	3,887	4,329

[All of Southampton.]

For the erection of villa residence, Burkenhead avenue, Kingston, for Mr. W. Hall, Mr. H. J. White, architect, Wallington, Surrey:—

J. Horrocks, Croydon (accepted).....	£200 0 0
--------------------------------------	----------

Accepted for forming new roads and sewers, &c., Regent's Park-road Estate, Finchley, for the Directors of the Birkbeck Freehold Land Society. Mr. Sydney B. Grossener, surveyor, 23, Southampton-buildings, W.C.:—

F. Found.....	£3,854 0 0
---------------	------------

[No competition.]

For alterations and additions to Moray House, Blackheath, for Mr. J. Macdugall, Mr. J. T. Barker, architect, No. 8, Puroval's Inn. Quantities supplied by Mr. H. Burton:—

S. J. Jerrard.....	£2,849 0 0
Holliday & Greenwood.....	2,689 0 0
W. Smith.....	2,677 0 0
Smith & Son.....	2,567 0 0
J. Beale (accepted).....	2,654 0 0

Acton Main Drainage.—Mr. Rowles writes to say that his total should be 36,723l., not 37,623l.

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TO CORRESPONDENTS.

N. H. J. W. (Ishaks)—F. & G. H. A. H. J.—E. S. R.—M. and T.—W. H. B.—H. H. S. (too late for this week)—C. R. A.—T. S.—G. G. W.—A. F. O.—W. S. S.—W. & J. R. C.—A. W.

All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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We cannot undertake to return rejected communications.

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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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THE INDEX and TITLE-PAGE for Volume XLVII. (July to December, 1884) were given, as a supplement, with the Number for January 10.

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READING-CASES (Cloth, with Straps, to hold a Month's Numbers, price 2s. each) also.

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The Builder.

Vol. XLVIII. No. 2190.

SATURDAY, JANUARY 24, 1885.

ILLUSTRATIONS.

Design for the Completion of the Houses of Parliament: View from the End of Great George-street.—By the late Sir Charles Barry, with some Modifications by Mr. Charles Barry	134-137
Design for a Bridge and Gatehouse: Royal Academy of Arts 10f. Premium.—By Mr. E. G. Dawker	142, 143, 147
Baptistery and Font, St. Matthew's Church, Bayswater.—Mr. John Johnson, Architect	146

CONTENTS.

The Antiseptic Treatment of Timber	123	Provincial News	152
The Relation of the Colours Sense to Art.—By Charles Roberts	124	School-Building News	152
F.R.C.S.	124	Stained Glass	152
The Monuments of Athens	125	The Student's Column: Lime, Cement, and their Uses.—IV.	152
Notes on Workmen's Homes	125	Recent Patents	154
Notes	125	Recent Sales of Property	153
Recent Discoveries by the Académie in Egypt	127	Meetings	154
The Late Mr. Samuel Huggles	129	New Fenbody Buildings at the West End	154
The Ventilation of Public Buildings	129	Royal Meteorological Society	154
Design for the Completion of the Houses of Parliament	132	Miscellaneous	154
Design for a Gate-House and Bridge	132		
Baptistery and Font, St. Matthew's Church, Bayswater	132		
Competitions	132		
The Fireproof Closing of Openings in Party-Walls: Royal Institute of British Architects	149		
Architectural Association	151		
Sanitary Aid Committees	151		
"A Club-Room at the Institute"	151		
Asbestos Paint	152		
The Royal Arms	152		

The Antiseptic Treatment of Timber.



HERE can be but two opinions as to the growing importance of studying the question of timber preservation, having regard more particularly to the reckless manner in which our own forests have disappeared and the

little care that is bestowed on the forests of our colonies and the United States,—forests as yet of vast area, but nevertheless thinning so rapidly as to be palpable to the most casual observer. It is true that the substitution of iron and steel for wood in the navies of the world has largely diminished the call for timber in that direction, but this diminution is made up for by the enormous extension of the railway system and the demand for sleepers and telegraph-poles, as also for the piles necessary for the great harbour and reclamation works that are so numerous at the present day. Any information concerning the practical preservation of wood is, therefore, of extreme value, and Mr. Boulton's pamphlet* (the result of a paper read last autumn before the Institution of Civil Engineers) is one which deserves careful study.

The appearance, on a large scale, of the dry rot in the ships of the British Navy, at a time when they really were the wooden walls of old England, was naturally a subject of considerable alarm, when we know that a single seventy-gun ship required for its construction the oaks of forty acres of forest, and, therefore, it was not to be wondered at, that, as early as the beginning of this century, various proposals were made to stem the evil by the use of various salts of metals. The inquiry assumed more definite proportions, however, when the railway era was fairly inaugurated, and it was found that stone sleepers were too rigid to be useful; and several materials were experimented upon for timber preservation with more or less success. The first system of treatment was called Kyanisising, after its inventor, Mr. Kyan, and consisted of the use of corrosive sublimate. It answered the purpose very fairly, especially when the timber was in a dry situation, though it failed when tried under water, and particularly under sea water. Moreover, corrosive sublimate was found to be rather too volatile at ordinary temperatures, and to be injurious to those who had to handle it. Margaryising, the system adopted by Mr. Margary, was the

employment of the sulphate of copper, which appears to be the most reliable of all the metallic salts, and is still in use in France. Burnettising (after Sir William Burnett) was the adoption of chloride of zinc, a good timber antiseptic, but very soluble in water. It is still in favour in Germany and Holland. Finally came Mr. Bethell's celebrated patent for creosoting,—a bad name for the existing process by coal tar, as in reality creosote is a product of the destructive distillation of wood, which has never been used for timber preservation; and the only excuse (a very far-fetched one) for the name was because somebody discovered carbolic acid or phenol in both coal-tar and wood distillation. "There is a river in Macedonia and a river at Monmouth, and there be salmons in both"; so that it must be understood that creosote, in its popular application to wood-preserving, is not creosote, but oil of tar.

The basis of the action of all these remedies was supposed to be that they coagulated the albumen of the sap, and formed insoluble compounds that arrested decay; but as it has been proved by experience that the salts of metals are not so efficacious or so permanent as the tar-oils, the so-called creosoting process has now for a considerable period outlived its competitors. Even in France, where the sulphate of copper has held its own longer than anywhere else, partly because there was a difficulty of getting the creosote, partly because Dr. Boucherie injected the sulphate in a peculiarly ingenious manner, and partly because it was noted that the salts of metals became washed out in damp situations, even there the creosoting process has met with great approbation, since Mr. Forestiere observed how thoroughly the timber was protected against that most troublesome pest, the *Teredo navalis*. The oil used in creosoting is thus prepared. When coal is carbonised for gas-making, the products given off are four, viz., illuminating gas, ammoniacal or gas liquor, coal-tar, and coke,—all of them, in their several ways, of extraordinary commercial value, though, in the present case, the coal tar, a black treacly-looking substance, is all that we have to deal with. It may be mentioned, however, incidentally, that the waste or gas-liquor is the parent whence the ammonia group is manufactured on a large scale. By distilling the coal tar, three separate groups of products are obtained:—first, the oils which are lighter than water, such as the naphthas, which are of incalculable importance to the country, as from them are ultimately procured the aniline dyes; secondly, the oils which are heavier than water; and, thirdly, the pitch, which is the residuum of the distillation. The lighter oils form a category of themselves

quite distinct from the heavier ones, and have never been used for creosoting purposes; but they are extremely rich in their own particular constituents, yielding, amongst other results, the benzoles from which the aniline is obtained, the toluols, the solvent and burning naphthas, and carbolic acid, whence is derived the picric acid, used for fulminating purposes. The heavy or "dead" oils form the creosote of the timber-yard, and they were formerly treated *en masse*, though now each constituent can be separately removed according to its volatility. These dead oils are divided by the trade into two kinds,—"London" and "country,"—the former being the distillation from the best Newcastle coals, which are usually supplied to the South of England, and are much richer than other coals in semi-solid substances, such as anthracene, naphthalene, &c. The country oils, on the other hand, are distilled from the Midland coals, and are more volatile, besides containing a larger proportion of tar acids. In the earlier days of Bethell's patent, the heavy or dead oils were alone used, it being considered that the crude naphthas were useless as antiseptics, and that the pitch, from its solidity, would form an impediment to the injection; but the fashion gradually came into use of mixing a small percentage of country with the London oils, as diluents of the more solid material; and, in point of fact, the country oils became popular and mentioned in specifications.

The inspectors liked them, because they were thinner and injected with less trouble, and also because the timber thus treated looked cleaner and less muddy. The late Dr. Letheby, too, gave a great impetus to the growing use of the country oils, as he considered that the carbolic acid (which had been discovered in coal tar by Runge in 1834) was the key of the whole position, and that the efficacy of the treatment consisted in the percentage of carbolic acid. It was his object, therefore, to exclude the naphthalene and para-naphthalene of no value, but to include the lighter portions of the oils, viz., those which distilled between 360° and 490° Fahr., as containing the tar acids in the greatest abundance. Here again, incidentally, we may mention that this para-naphthalene, useless in timber preserving, has been found to ultimately yield anthracene, the parent of alizarine, that beautiful red dye, that has so completely superseded madder in textile operations.

Dr. Letheby, however, did not have it all his own way, for the investigations of De Gemini and Rottier, in France, and of M. Coisne, in Belgium, seemed to entirely disprove his conclusions. The latter gentleman an engineer in the service of the Belgian Government, placed shavings in a putrefying

* Boulton on "The Antiseptic Treatment of Timber."

pit for four years, saturated with creosote containing respectively 15 per cent., 8 per cent., and 7 per cent. of tar acid, while one sample was of heavy specific gravity, and held no tar acid whatever. This last experiment, however, was the most successful of all, and throughout the whole series it was evident that the results were in favour of the heavy oils, and that the tar acids were of no use at all. The Belgian Government accepted M. Coisne's statement, and does not stipulate, in its railway specifications, for any tar acids, though it allows 30 per cent. of naphthalene, one of the very substances discarded by Dr. Lethely. Following an inverse method of examination, M. Coisne procured and analysed some creosoted sleepers that had resisted decay for twenty years, and he found no tar acids, but, on the contrary, plenty of naphthalene. Similar experiments were undertaken by Mr. Boulton, in 1882, on sleepers from various railways which had been in use for from sixteen to thirty-two years, and his analysis proved four things:—1. That no tar acids were detected by the ordinary methods. 2. In the majority of cases the semi-solid constituents, such as naphthalene, were present. 3. Only small percentages remained of oils distilling below 450° Fahr.: all these facts proving that it was through the action of the heaviest and most solid portions of the oils that the preservation was effected. 4. He detected an alkaloid called acridine, which, he thought, played an important part in the action, it being undoubtedly a powerful germicide and solidifying within the pores of the timber, without evaporating or being washed out. Mr. Greville Williams also came to the conclusion that the antiseptic results of creosote were due more to the basis of alkaloids than to the tar acids, the former remaining while the latter seem to disappear. It is, therefore, most probable that it is this unfortunate quality of evaporation that disqualifies the tar acids, seeing that, taken *per se*, there is no doubt but that these acids are powerful antiseptics, and that their presence arrests decay. Mr. Boulton's experiments show that if tar acids and naphthalene be separately exposed at the same temperatures, the former will evaporate much more quickly than the latter; indeed, by repeated washings with cold water, both carbolic acid and cresylic acid (its near relation and a constituent of tar oil) can be completely disposed of, a most important fact in connexion with the exposure of timber to sea-water.

Viewing all these facts in their bearings upon specifications, it would seem as if the London oils, as they come from the still, are not sufficiently volatile, nor do they comply with the requirement as regards the percentage of tar acids. A pressure is, therefore, put upon the manufacturer to meet the case by taking out some of the heavier portions, by which the bulk is rendered lighter and the proportion of the tar acids to the diminished bulk is increased. But Mr. Boulton considers that this is a mistake, and would rather relegate the lighter portions of the tar acids, and especially carbolic acid, to their proper position as sanitary antiseptics, for which they are unrivalled, and would encourage the use of the heavier portions. He also agrees with the joint creosoting specification of Sir Frederick Abel and Dr. Tidy, who resolved to exclude no semi-solid bodies which completely melt at 100° Fahr., and further changed the standard of volatility from 90 per cent. at 600° Fahr. to 75 per cent.

Without going into the vexed regions as to the exact relations of putrefaction and the germ theory, the conclusions drawn are,—that the best antiseptics for timber are to be found amongst oils and bitumens, which fill up the pores of the wood. Of such bodies, those that contain germicides are to be preferred, and other properties being equal, those which either solidify in the pores of the wood, or which require an extremely high temperature to volatilise them, and which are insoluble in water, are the best of all. With regard to the creosoting process, Mr. Boulton lays great stress on the hygrometric condition of the timber at the time of injection, neglect of which has often been the cause of failure.

The power of absorption of moisture in woody fibres is so great,—fir timber being able to take up as much as from 60 to 150 gallons of water to the load of 50 cubic feet,—that it has always proved a great difficulty in the way of treatment, as the subjecting of the timber to a dry heat invariably results in injury to it. Mr. Boulton has, however, successfully met the difficulty by a most ingenious combination of air-pump action with the use of creosote heated up to 213° Fahr. With charges of very wet sleepers, he has withdrawn water equal in volume to 50 gallons per load of timber, the water being replaced with an equal volume of creosote by the action of the air-pump alone.

THE RELATION OF THE COLOUR-SENSE TO ART.

BY CHARLES ROBERTS, F.R.C.S.



OUR short English proverb "Tastes differ," which often winds up a discussion on aesthetic subjects, assumes a somewhat wider form among the French, and is to the effect that it is useless to dispute about questions of taste and colour. One of the chief reasons for differences of opinion is that, although taste and colour are at bottom mental conceptions, people do not see their physical incidents with the same eyes. Take the case of the beauty of the human form, for instance. A short-sighted person sees only an average of the most conspicuous features in the hazy condition of one of Mr. F. Galton's compound photographs, while an acute-sighted person detects all their minute imperfections: hence the openings for a long discussion on personal beauty. With regard to colour the opportunities for disagreement are still larger, as the variations of the colour-sense in different individuals are greater and of a more subtle kind than those of the refraction of the structures of the eyeball. There are, for instance, a few persons in the world (two of whom have come under my own notice), who can form no notion of colours except as mere shades of black and white. There are others, again, whose scale of colour is deficient in one of its fundamental elements, and not only does the red, or the green, or the violet, as the case may be, disappear in its true form and in its various combinations, but the elements which do remain produce colour-scales entirely different from our own. Farther, there is a condition of the colour-sense which, although recognising all the colours of the spectrum in their purer and more intense forms, is quite unequal to distinguishing the lighter shades one from another, or greens from various forms of grey and the dull tints which are affected by many aesthetes of the present day. Finally, there is a considerable variation in the fine appreciation of shades of colours among persons who possess a good colour-sense, so that no one should venture to criticise, much less to ridicule, another person's colouring, until his own colour-sense has been proved to be good by a proper scientific examination. It is, indeed, very probable that the colour-sense varies as much in different persons as does any other physical quality of the body,—the stature, for example,—and that not only are there giants and dwarfs, so to speak, of colour-perception, but the intermediate stages are grouped, according to the theory of probabilities, increasing from a minimum of complete colour-blindness in larger and larger numbers to an average colour-sense, and diminishing from the average to a maximum of the higher colour perception, the groups forming the usual binomial curve.

The more decided forms of colour-blindness are easily detected by several well-known methods of procedure, and the finer differences by an instrument devised by Lord Rayleigh for demonstrating the truth of what many artists are slow to believe, that yellow is a compound colour composed of red and green light. The instrument consists of an arrangement to superimpose red and green light upon each other in different proportions, together with a pure yellow light as a test colour. It is in the efforts to produce a match to the test colour that the quality of the colour-sense of different persons is proved. Some persons require a larger

amount of red light than others to neutralise the green, or, on the other hand, more green light than red, so that to some persons the spectrum yellow is almost orange, while it is pale green to others. Here, again, we have the observations forming a binomial curve between the extremes of orange and pea green, pure yellow being the average of all the observations. A similar variation occurs, no doubt, with all the other colours of the spectrum.

It might be thought that persons who are colour-blind, or who labour from any deficiency of the colour-sense, would take little interest in either the practice or the enjoyment of art, as colour forms so large and important an element in most artistic productions. Yet this is far from being the case. Not only do many persons so affected take a great interest in pictures, and endeavour to paint them, but, it is strange to say, it is in the region of art as engravers, &c., that such persons have found a profitable and enjoyable occupation. Many persons first learn of the existence of their chromatic defect by the artistic instinct endeavouring to assert itself, and when failure is the result much ingenuity is displayed in overcoming the impediment. Professor Wilson records the case of a gentleman who was a skilful draughtsman who in early life discovered his inability to arrange his own palette, and was accustomed to rely on a relative to select his colours, which he had then not difficulty in using, or mixing to the shades he required. This person's account of his colour-sensations is very instructive, because as an educated man he appears to have made himself familiar with the names of many colours and shades of colours which are not commonly recognised by persons with a good colour-sense. It must not be inferred, however, that a person who applies the proper names to colours is not colour-blind, as the names may have been learned from other characters than their colour; and, on the other hand, a person may be ignorant of the names of colours and yet possess a perfect chromatic sense. The vagueness of the language employed by colour-blind persons shows also that there is no distinct line drawn between a good and an imperfect colour-sense, as is popularly supposed. The gentleman I have referred to could distinguish the orange, yellow, and blue in the rainbow, but he could not see the green, and he was very uncertain about the red. On one occasion he was surprised to find that a letter he had written home during his absence was half in black and the other half in red ink. Red cabbage, growing or in infusion were of the most beautiful blue to him, and it was by not observing any change by acids in the infusion when attending Professor Hopley's chemistry class, when he used to stare for the whole hour expecting to see a change, that he became fully convinced of his defect. Red (pick) in the lips, cheeks, or nose appeared blue to him; and pinks, lilacs, purples, and blues were the same colour only differing in intensity. Browns, russets, maroons, olives, citrons, and a host of others, were just any thing he could guess at, and he never spoke of colours if he could avoid doing so.

Now this person was red-blind; that is to say, his retina, according to Young's theory of colour sensation, did not possess the nerve element which recognises or responds to the stimulus of the waves of light of the greatest wave length, and which produce the sensation of red. Hence red in its purest and most intense form disappeared from his chromatic scale, and in its lighter shades appeared grey, while in its combination with other colours,—as, for instance, in purple, which is a mixture of red and blue or violet,—it was overwhelmed by the blue, which explains why to his eyes a change was wrought in the red cabbage infusion by the acids. In like manner, the retina is sometimes deficient in the nerve element which recognises the medium rays of light, and green-blindness is the consequence; while a similar fault with regard to the short rays results in violet-blindness. For differentiating these various kinds of colour-blindness, we employ purple, because it holds the unique position of appearing of a different colour

each kind. It is blue to the red-blind, because the red cannot be detected in its composition; it is red to the violet-blind, because the violet or blue cannot be detected in it; and grey (theoretically white) to the green-blind, because it is composed of his two (instead of our three) fundamental colours. The confusion of red and green by some colour-blind persons is explained on the Young theory by supposing that the nerve fibres of the retina devoted to the recognition of the red and of the green colours overlap each other, and rays of light failing to excite one set,—say the red,—excite to a less extent the next set, or green ones.

It is in consequence of the disposition of colour-blind persons to see many colours as grey, or mere shades of light and darkness, that art affords openings for the occupation of such persons. The engraver and other artists in black-and-white, engaged in reproducing coloured pictures, experience considerable difficulty in estimating the "shade value" of many colours which does not occur to the colour-blind. The following statement, also taken from Professor Wilson's list of cases, of the experience of a colour-blind engraver, will serve to illustrate this point, and perhaps, encourage others labouring under similar chromatic defects to turn them to good account. "Strange as it may appear, my defective vision is, to a certain extent, a useful and valuable quality. Thus: an engraver has two negative colours to deal with; that is, white and black. Now, when I look at a picture I see it only in white and black, or light and shade; and any want of harmony in the colouring of a picture is immediately made manifest by a corresponding discord in the arrangement of its light and shade, or, as artists term it, 'the effect.' I find at times many of my brother engravers in doubt how to translate certain colours of pictures, which to me are matters of certainty and ease. . . . The appreciation of the various shades of colour, or the weight of colour, as I may term it, is exceedingly nice and critical with me."

It is a singular fact, not without interest to persons engaged in arts and manufactures, that the decided forms of colour-blindness are much more common among men than women (in the proportion of ten to one), and that it is more common among the uneducated than the educated classes. At public schools and universities it exists to the extent of 2.5 per cent. while among the criminal classes it reaches the high rate of 11 per cent. This evidence points to a close connexion between colour-blindness and colour-ignorance, and shows the great necessity there is for the systematic teaching of colours in schools. To the majority of persons the very alphabet of colour is unknown; and even among artists, old and exploded theories of chromatics are obstinately retained in spite of the advances which the science has made in recent years.

THE MONUMENTS OF ATHENS.*

MANDBOOKS dealing with the topography and monuments of ancient Athens have of late become plentiful. German readers are now in possession of Baedeker's excellent guide, and for English readers there is Mr. Murray's new handbook. The little work before us has a somewhat different claim on our attention. It is, so far as we know, the first attempt by a Greek to make the antiquities of his own country intelligible to his own countrymen. With this laudable end in view, M. Kastromenos tells us in his preface, he has "ventured to collect his feeble studies into the present treatise." If the studies have been feeble, we must own that the treatise has the merit of consistency; we regret this the more because the book is dedicated to the author's sister, M^{me}. Schliemann, a lady whose just fame deserved a worthier tribute. "She it was," says M. Kastromenos, "who first took me by the hand and breathed into me a passionate love for the splendid monuments of antiquity,

changing thus my original devotion to the Hermes of gain into a worship of the Hermes of learning." If the studies of M. Kastromenos correspond to his treatise, and both are "feeble," we must further allow to the translator a third correspondence. We remember Miss Agnes Smith as the author of a pleasant book of travels in Greece. When an adventurous lady tells us brightly the story of her tour through the difficult Peloponnese, we readily pardon a good deal of blundering over the names of gods and heroes, but when the same lady proceeds to translate an archaeological book, and to give us renderings (very free "renderings") of inscriptions, we are bound to ask for a little care in spelling and translation. The book will, no doubt, be in considerable demand among non-classically educated travellers, both American and English, and though we can scarcely share the high hopes of the translator, that the intelligent seeing of the monuments will inspire these tourists "with a sense of the worth of humanity, and therefore the worth of their own individual life" (is this last needed?), yet they will find their archaeological studies less irksome if they avail themselves of some such handbook as M. Kastromenos has prepared for them. Only, in the name of archaeology, we implore Miss Smith to get her second edition revised by some scholar not wholly guiltless of elementary accident. Was it wise without note or comment to translate *Ακαμαντις παύων νῆα*,—"the hoys of Acauanantis were victorious?" (p. 67). The monument of Lycistrates, from which the inscription is taken, gives rise to a good deal of unfortunate writing. It went by the name, as every one knows, of the Lantern of Demosthenes. No one who has seen the monument will wonder much at it being called a lantern, or get much help if he needs it from a sentence like this:—"It nevertheless appears that the name arose from the whole outer shape of the monument, which, in conjunction with the tradition about Diogenes, was compared to the lantern and referred to the philosopher" (p. 65).* A little further on we meet with the following rather hazy piece of information:—"The reward of victory in the Dionysiac festival at Athens was called a tripod. It was of bronze, and was termed choragic." At a certain festival we learn the spectators wore "what were termed *ἠηθιστοὶ πῆρασοι*, or broad-brimmed sun-hats"; a schoolboy who construed in this fashion would be promptly asked, which was "broad-brimmed" and which was "sun-hats," and would become manifestly uncomfortable. Even archaeologists have their luck, but we are tempted to incredulity when we read,— "The forms of which we have spoken [*i.e.*, pulpitum, dromos, &c.] were distinctly shown when the theatre was uncovered in 1862 by the architect Shack, with the help of a bronze coin, on which the Dionysiac theatre was engraved." Is this a survival of the use of the divining-rod? Our suspicions are confirmed by many instances of very naive logic, *e.g.*, "We have, therefore, no excuse for calling the monument the Arch of Hadrian, *inasmuch as the said name means something quite different.*" This arch of Hadrian has a chapter to itself; albeit, we are told "it is of no great interest, though it is not wanting in value nor in grace of execution or style." Fearing, we suppose, the charge of pedantry, Miss Smith docks Herodes Atticus of a syllable, and renders two respectable elegiacs thus (p. 49):—

"Herod Atticus, of Marathon, had all that is here: He lies in this grave, and his name we revere."

Of him, among other things, we learn that he completed the Panathenaic Stadium, "giving it greater magnificence with Pentelic marble." Perhaps the mention of "Herod Atticus" engenders the Biblical phraseology, for we are told of the "sanctuary" of the Eumenides. "The Turks called this place *Karason*, which, being interpreted, means 'black water.'" Miss Smith has the sanction of the Health Exhibition when she writes "*Hygeia*" (p. 8); hut it might be well to remember that, though the form occurs, it is confined to late authors and inscriptions.

* The italics are throughout our own.

There is really, we hope, nothing psychical or astral or otherwise ghostly about the Parthenon, but why are we assured that "it was built on the ruins and foundations of a more ancient temple, which may still be plainly seen, because the later one was 3 in. or 4 in. larger, by a visible addition" (p. 10)? We are sorry to hear that probably in the very earliest years of Christianity the masterpieces of classical art "quite lost their glitter"; hut, after all, nothing is certain in this world, when "the fact of the temple having been built between B.C. 406 and B.C. 393 is only a supposition arising from a passage in Xenophon." The arrangement of the Erechtheion has always been considered somewhat problematic; perhaps the following sentence will throw some light on it. "We are unable to say anything either about the doorway or about the eastern wall, but we observe that at the ante of the long walls on the northern and southern sides there exist, towards the interior, smaller pilasters opposite to them, and that this looks like the beginning of a wall which, nevertheless, probably never existed. Yet there are railings."

As the translation of this book "has had the benefit of the author's supervision," we would gladly shift as much as may be of the blame on to the broader shoulders. The modern Greek language is, indeed, the outcome of centuries of degradation, and is little fitted to be the vehicle of exact ratiocination, or, indeed, precise statement of fact. But, if the book is to be of use,—which, if it were thoroughly rewritten, it might be,—to English readers, it must not do other despite to the language into which it is translated.

NOTES ON WORKMEN'S HOUSES.

ONE of the latest of those most excellent volumes which have been the outcome of the last American census, is an article on the factory question by Col. Carroll Wright, the able chief of the Massachusetts Bureau of Industrial Statistics. It is replete with comparative information as to the position of the factory classes, not only in the United States, but in other countries as well, and some interesting information is given, the results of inquiries made by him on the Continent, as to the cost and style of artisans' dwellings, particularly in Belgium, Germany, and France. Taking these countries in the order named, we find that at Verviers, which is a busy clothing town, the workmen earn from 2s. 6d. to 3s. 3d. a day and the women 1s. 6d. to 2s. 6d., and they can rent four rooms and a small garden for 12l. per annum; two rooms on the second floor for 7s. 3d. per month, or two on the third floor for 3s. 8d. per month. The tenements are small, though comfortable, and, as a rule, the cottages are much better than the flats, which prevail to a considerable extent. Many of the houses, with four rooms, cellars, and scullery, let for 12s. per month. They have separate hall-ways and are generally well finished.

At Essen, in Prussia, the seat of Herr Krupp's gigantic steel and cannon-making works, a foreman gun-maker earns 9l. per month, and pays just that sum per annum for his house, which includes four rooms, a drying-place on the roof, a cellar, and a garden. An ordinary workman, earning 3s. a day, pays about 7 guineas a year for three large rooms, drying-place, cellar, and garden. For 20l. per annum an excellent tenement can be had, consisting of seven large rooms and the usual appurtenances. Every workman belonging to the place is housed in dwellings belonging to Herr Krupp, so that he can control all the sanitary arrangements and see that everything is done properly. There are three colonies of residents, each with its special name and laid out with parks, schools, churches, chapels, and stores. The housing of the single men at Essen is on the barrack principle. At Chemnitz, in Saxony, where men earn in the factories from 10s. to 20s. per week, working twelve hours a day, very good flats of three rooms can be got on second and third floors for 7l. per annum.

At Noisiel, in France, the seat of the Menier Chocolate Works, in the department of Seine et Marne, the selling price of an artisan's

* "The Monuments of Athens: an Historical and Archaeological Description." By Pangiotis E. Kastromenos, translated from the Greek by Agnes Smith. London: Edward Stanford.

dwelling is about 149l., payable part down and the remainder by annual instalments. They are excellent houses,—the roof covered with Holland tiles, the gutters of zinc, and the window-sills and staircases of stone. The heating is carried out by stoves, the chimney-pipes being taken up the walls in a hollowed groove. The floors of the upper stories are of pine, and the interior staircases of beech, the ceiling above the cellar being plastered, and the kitchen paved with tile or brick. The price of these Noisiel houses has recently been raised, for the purpose of preventing speculators from buying them in the name of working men, and also to prevent sub-letting.

The factory town of Mulhouse, in Alsace-Lorraine, offers great advantages in the direction of housing the working classes, partly on account of the well-known care devoted to the subject by the employers, and partly from the number of industrial societies. The usual plan here is to build four separate houses under one roof in a square, each fourth part constituting a dwelling. The average cost of a house here is 86l., plus the price of 192 square yards, which is nearly 6l. The yearly rent is 7l., the tenant becoming owner at the end of fifteen years by paying in addition 4s. 6d. per month. The houses are coated with mortar made of hydraulic stone and river sand, coloured white, yellow, or gray. The sills of the windows and the threshold of the floors are of stone, the lintel bars of round iron, and the houses are separated by lattices made of oak laths. The area covered by the house is 38 square yards. The framing of the windows is of stone without projections; the chimney-shaft is of brick, and the roof is covered with tiles. The privies are always placed in the garden, and the inside of the drains is covered with cement, the bottom being of concrete. The refuse water of the household runs into the main sewer, and the water supply is from pumps set over well-holes 20 ft. deep. The smoke-pipe is of sheet iron, and after it leaves the stove in the dining-room it connects with a pipe of double-burnt earthenware, so as to avoid condensation in going through the kitchen.

In the United States considerable attention is now being paid by employers to the subject of workmen's dwellings, and particularly in New England, where the bulk of the factory labour is congregated. Foremost in this direction is the Willimantic Linen Company in Connecticut State, which has recently built some really charming sets of cottages with large gardens, ranging from 19l. to 25l. per annum rental. As no two are alike, they offer real facilities for inculcating amongst the inhabitants a taste for art decoration.

NOTES.

In the *Times* of Tuesday last the Dean of Peterborough enters into a pretty long defence of his position in regard to the restoration, a defence which appears very rational and complete. The Dean can write common sense on the matter without vilifying other people, and is in a much better position as his own advocate than when allowing Sir E. Beckett's amenities to interpret for him. From this letter it appears that the present position is, that the Chapter have agreed to allow raising the tower, on condition of having the pointed arches rebuilt. This is, as we have already said, an illogical and half-and-half measure, which is good neither architecturally nor archaeologically. The Dean says very pertinently that he has had several offers of additional funds on condition the Norman arches are restored, "but who will contribute towards a patchwork of this kind?" If this be done, a foolish and irrational thing will be done, which future generations will vainly regret. Mr. Freeman endeavours to draw a distinction between Chichester and Peterborough, because in the former case the tower fell, in the latter it has been taken down to prevent it falling. This is rather too fine-drawn a distinction for most of us to see. Mr. T. G. Jackson, who reiterates his conservative protest, justly complains of Sir E. Beckett referring to him as an "amateur" (which may have been either ignorance or

impertinence),* but when he persists that to build up the old tower, stone for stone, is "the best we can now do," though we admire his modesty, surely we may ask him to be content with speaking for himself.

THE conference presided over by Lord Henniker on the 14th inst. proved most unmistakably that the proposed new railway Bills will be very strongly opposed in Parliament. Five M.P.'s, representing various trading interests, were present, the resolution pledging the meeting to oppose the measures being moved by Mr. Barclay, M.P. The closer the schemes of the companies are examined the more reason there seems for regret that they are so overreaching as to provoke such hostility. There is evidence of an immense amount of trouble and care having been expended in their production, and that every point has been exhaustively considered. It is quite time, too, that the Railway Clearing-House Classification (which we referred to last week as having never been legalised) should receive Parliamentary revision and sanction. This is continually fluctuating, and the trader is never secure from having his particular manufactures suddenly moved up a class. The radical changes recently made in the "small's" and "owners' risk" systems were so damaging to the traders that they would, doubtless, be much relieved to find the classification more of a fixture. There is much that is useful in the measures, but the powers sought for would bring the companies' maximum rates up so high that they will hardly be allowed to pass a second reading. The resolution passed by the meeting was forwarded to the President of the Board of Trade, with a request that the views of the Government should be stated at the earliest opportunity, and it will be interesting to know how Mr. Chamberlain and his colleagues regard the state of affairs.

ONE item in the news contained in the *Archäologische Zeitung*, the publication issued yearly by the Archaeological Institute of the German Empire, is a full and precise account of the acquisitions of the British Museum during the past year. The account is extracted from Mr. Newton's annual report to Parliament, and records not only newly-acquired statues, but gems, terracottas, vases and all miscellaneous antiquities. Would not the *Journal* of the Hellenic Society be doing good service if, in one of its two annual issues, it published a similar report? And could it not place itself in connexion with all Continental museums under state control and publish yearly, at least, an abstract of their official report? One of the great difficulties in archaeological research is the getting together of the necessary material, and, indeed, often the uncertainty as to where that material exists. With respect to private and small municipal collections, we fear that difficulty must long exist, but with State collections the information is to be had, and only needs to be made accessible. If we may be pardoned a second suggestion, we believe that the Hellenic Society's *Journal* would do good service if it further devoted a couple of pages yearly to the enumeration of the contents of the various German, French, Russian, and modern Greek archaeological periodicals, and to the citation of all important monographs, such as are not always accessible even in University libraries.

IN reference to the subject of building leases, it may be observed that these are almost unknown in Scotland, and the consequence is that the general run of buildings erected there are of a substantial and permanent nature. The practice is to build upon a feu contract, under which the feudal superior, the owner of the land, grants to the feu a permanent right to the holding upon payment of a fixed annual

feu-duty. A plan of the ground to be feued is prepared by the architect of the superior, and if streets are to be erected thereon he generally also prepares the elevations, a copy of which he is bound to give to those who take a portion of the ground upon payment of a stipulated fee. When the ground is laid out for villas, each villa must cost not less than a certain minimum, and the plan be approved of by the ground architect. In the southern district of Edinburgh the annual feu-duty asked is now double the amount given about twenty years ago. It was then at about the rate of 20l. per acre, and is now about 40l. This of course enhances the value of the older feus to the holders, as the superior cannot demand more than the sum stipulated in the contract. The feus for streets are based upon the frontage generally from 1l. per foot and upwards. Feu duties are considered most eligible investments, many of them being purchased by insurance companies, and for endowed institutions they form a first claim upon the property, and are easily collected. In some instances a "duplicand," or twice the annual value, is exacted every twenty years, but this practice is now, we believe, falling into desuetude. There is generally a clause in the feu contract under which the feu can redeem the annual duty upon payment of a certain number of years' purchase-money. The system is found to work easily, and does not lead to the evils which supervene upon terminating building leases.

ON Wednesday morning, the 7th inst., a large crowd of unemployed working-men, estimated at between 200 and 300, many of whom belong to the building trade, assembled in front of the Council-house, Birmingham, for the purpose of seeking an interview with the Mayor, with a view to getting employment by which they and their families might continue to live. The Mayor (Alderman Martineau, a nephew of the great authoress) declined to see them, and referred them to his secretary, who, after hearing the statements of a small deputation, told them that the Mayor had no power to give them employment, and referred them to the Public Works Committee as represented by the Borough Surveyor. This did not satisfy the men, and they then sought to see the Mayor at his private residence at Edgbaston, but there they were met by the police, who drove them away. These unfortunate ignoramuses in distress protested that they had supposed the functions of Mayor to be of a less ornamental character than it appeared. Since that time mass meetings of the unemployed have been held, at which from 4,000 to 5,000 men have attended, and processions through the town have taken place with the object of calling public attention to the prevailing distress, with the result that the Public Works Committee have hired the stone-yard attached to the Workhouse from the Guardians and set some score or two of men breaking stone for the roads, a very small result as yet, and one not likely to meet the necessities of the case, seeing that many of the distressed are jewellers and others whose work has been of a similar light nature, and whose hands and general physique are not suited to such employment. Meantime the distress is increasing. It is reported that the Messrs. Tangye (Limited) have discharged some hundreds of their workmen, and placed many others on short time, and many factories in the district have not half enough to do.

THE London, Tilbury, and Southend Railway Company obtained powers last session to acquire certain property at Whitechapel for the purpose of their undertaking, and this property, which included the German Reform Church on the east side of Hooper's-square, Leman-street, Whitechapel, and the Seventh-Day Baptist Chapel, Mill-yard, Leman-street, with the disused graveyard in the rear, was purchased by the Company. There appears to be some difficulty in dealing with the ground as building land, and a clause has been introduced into a Bill promoted by the Railway Company to exempt the portions of the

* From a subsequent letter, even more insolent than usual, it appears to have been ignorance. We should have supposed Mr. Jackson's name was pretty well known; but his reputation is in connexion with the artistic side of architecture, of which Sir E. Beckett knows nothing; and besides, Mr. Jackson does not write letters to the *Times* to advertise his own books and buildings, and his own greatness generally, as Sir E. Beckett is allowed to do.

premises referred to from the operation of the Dissused Burial Grounds Act, 1884. This will be good news for the Society with the lengthy name of which Lord Brabazon is chairman, and it seems to show that the Act in question is not entirely inoperative. The dissused burial-ground contains about a quarter of an acre, it is situated in a densely-populated neighbourhood, and would, no doubt, be an acquisition as an open space; but it would be too much to expect the Railway Company to relinquish it, after having paid for it as building land, for the value which would be paid for it as ground which is not capable of being built over.

THE new volume of the Architectural Association Sketch Book contains a great deal of interesting matter, and is quite an important addition to an architect's library, whether only to turn over for pleasure, or to use for the higher and more rational end of "cribbing." There appears to be rather less of clean and highly-finished drawing than there used to be in some old numbers, but a great deal of admirable and sufficiently clean sketching. Opinions, as practically shown, differ about the relations of lines to actual facts. One draughtsman conceiveth himself that he shall show the inner angle where a wall meets, a buttress, for instance, by a thick dark line; yet there is no line at such a place in the building itself, saying that formed by the difference of the incidence of light on two different planes of wall. Another will be for leaving out all lines except the joints of the masonry, and showing those as thick as ropes, so that the drawing is all joints and no angles. This is called "force." There are many drawings that keep a sensible medium, and represent accurately and with balance what line, without shading, can represent. There are some brush drawings reproduced by Sprague's process, among which certain by Mr. Lethaby are pre-eminent in artistic feeling. We do not think the border of the title-page very happy; the straight zigzagged main lines of the floral design are too stiff, and, moreover, they look rather as if they were pulled over the circular medallions as over pulleys. Some of the buildings sketched remind us how deficient is our modern architecture, most of it, in simplicity and breadth of style: the Holstein Tower, Lubek, for instance, with its great unbroken round towers, and the arcaded work between them.

DR. WALDSTEIN, the curator of the Fitzwilliam Museum, commenced, on Saturday last, a course of three afternoon lectures at the Royal Institution, on Greek Sculpture from Pheidias to the Roman era. His view of the subject turned more especially on the relation between the sculptor's aim and the sculptor's material; the archaic age showing a want of harmony in one direction, the imperfect rendering of natural facts, which obtruded on us the idea of stone or bronze, of rigid material rather than of life; and the sculpture of the decadence showing a want of harmony in the opposite direction, in a too great realism, and in the representation of momentary and complicated action which was unsuited to the condition of sculptural material. The canon or type of human sculptural form, as evolved by Polykleitos, was illustrated by casts of the existing copies of his "Doryphoros" and "Diadumenos" (spear-bearer and diadem-wearer), and the lecture concluded by a reference to the statue ascribed to Kephisodotos the elder, and formerly called "Leucothea" (a female with a child in her arms), and its recent identification by Dr. Brunn with the subject of "Eirene and the infant Plutos." The next lecture, to-day (Saturday), goes into comparison between the age of Pheidias and that of Skopas and Praxiteles, and the special qualities of the latter; and the third lecture, on the following Saturday, will be devoted to the age of Individualism, and to Græco-Roman art.

IN a letter to the *Athenæum* of last week Mr. Albert Hartshorne draws attention to the announcement that subscriptions have been started for the restoration of the Eleanor Cross

at Northampton, which was restored, in a very conservative manner, only forty years ago by Blore. That it should now need restoration or repair again is attributed by Mr. Hartshorne to the manner in which it has been maltreated by missiles thrown at the figures in the ingenious sports of the youthful inhabitants. He expresses a hope, which we share, that the old figures, though dilapidated, may not be removed with the view of setting up restored imitations. Such a proceeding would be simple Vandalism. Purely architectural detail which has been damaged, and of which some portions remain as models, may be restored in a sense; but the work of the sculptor stands in quite a different category. No one can restore that.

WE learn with much pleasure that Miss J. E. Harrison, whose critique on the Pergamene altar we published last week, has "received a call" from the managers of the Museum at Leicester to deliver a course of lectures on "Greek Art." For some time past Miss Harrison has been attracting ever-increasing classes to her lectures at the British Museum, and the success she has met with there bears witness not less to the interest of her subjects than to her powers as a lecturer. When Miss Harrison some three or four years ago, under the strong insistence of Mr. Newton, C.B., and other competent judges, made her first attempt to raise the interest of ladies in the treasures of Greek art in the British Museum, some ten or twelve "amateurs" were with difficulty got together. In her course brought to a conclusion at Christmas more than eighty "students" were regular in their attendance, and there is every reason to suppose that both the elementary and advanced classes which will meet in the Archaic Room of the British Museum during the next six weeks will not be less fully attended.

THE "Society of Painter-Etchers" announce their Exhibition for this year to take place at the Dudley Gallery, opening May 25th. All forms of engraving on metal, whether by the burin, the etching-needle, by mezzotint or aquatint, or by whatever other process the artist may choose as a means of original expression, are understood to be included in the term "painter-etching," and are eligible for exhibition, provided that they are *bona-fide* original works, not reproductions.

A COURSE of fifteen lectures on Practical Surveying, with special reference to the forthcoming examination at the Surveyors' Institution, will be commenced by Mr. G. W. Usill on February 2nd. Seven will be on office work, and eight in the field on Saturday afternoons.

FROM a correspondence in the *Dundee Advertiser*, which has been forwarded to us, it appears that at a meeting in connexion with the Dundee Institute of Architecture, Science, and Art, the other day, the Rev. G. Mure Smith gave a lecture on bells and bell-music, especially dwelling on the beauty of old tunes chimed upon bells, carillon-fashion. Whereupon Mr. G. S. Aitken, architect, writes to the *Advertiser* (which gave a good report of the lecture) to the effect that bells were not meant for playing tunes upon, but rather for a "mosaic of sound," and that change-ringing was a far more suitable way of using bells than chiming. We are with Mr. Aitken entirely. Bells are not really musical instruments; they are too uncertain both in time and tone, and destitute of expression; they are an "effect," that is all. Moreover, we never heard a carillon tune that was properly its tune; and people in this country do not seem to know, or to mind, whether they are or not. Indeed, at one church in the vicinity of Aldgate there is a tune-playing carillon which plays more than one well-known hymn-tune with absolutely wrong notes in certain places, in order to escape the expense of another bell to give the note wanted. It is difficult to know in this case whether the people who made the peal, or those who accepted it in this form, were the greater idiots. But at the best, carillon-playing is only trying to make bells do what they are not fitted for.

UNDER the title of "Salon Parisien," a collection of paintings, of which the bulk are by M. Jan Van Beers, has been opened at 160, New Bond-street. There is no work there equal to his "Soir d'Été," which we specially noticed in last year's Royal Academy; but there is a great deal of exceedingly clever painting of figures and costumes, the most marked characteristic of the exhibition being a number of studies of exceedingly over-dressed young women of a very *demimonde* type (in some cases we might say not even "demimonde"), varied by some which are the reverse of over-dressed, sprawling on sofas and chairs in such attitudes as may best exhibit the artist's powers of drawing and foreshortening. Some of these, as "Mécanolie" (4), and "Fatigue" (14), are as clever in execution as anything in realistic art that is to be seen at present. Occasionally there is a higher note struck, and some of the larger quarter-length paintings, such as "Stella" and "Irma" (24, 26), are very sweet in expression as well as beautifully finished in execution. The "Portrait of Peter Benoit" (28) is admirable as a realistic portrait, and one or two works seem to indicate that M. Van Beers could paint a lady if he chose. As it is, the collection stands as one of the cleverest and one of the most intensely vulgar picture exhibitions which have been seen in London. The very title-page of the catalogue (drawn by the artist), across which prances a *danseuse* of the lowest type, is enough to frighten away respectable people, and suggests the idea of its being a "music-hall" programme rather than the catalogue of a picture exhibition. We will not insult our neighbours by accepting this exhibition as representing *l'Art Parisien*, but it represents a certain type of French art of which there has been a great deal too much of late years.

RECENT DISCOVERIES BY THE AUSTRIANS IN LYCIA.

THE book that lies before us,* the official account and publication of discoveries made during the two recent expeditions made by the Austrians to Lycia and Caria, has long been eagerly looked for,—nowhere, perhaps, with such eagerness as in England. Englishmen were the first to penetrate the mountain fastnesses of Southern Asia Minor. We have had first Fellows, then Spratt, Forbes, and Daniell, later Waddington and Falkener. The British Museum is rich beyond any other collection in Lycian marbles. We have the matchless Harpy tomb, the most wonderful and beautiful monument that archaic art has left us; we have the Nereid Monument of Xanthos from Caria; thanks to the skill and energy of their present guardian, we have the Mausoleum marbles now worthily housed in their new and splendid hall. To the long series from Lycia, some of us feel, very bitterly, that England might have added the two great friezes from the Heroon at Djölhaschi, friezes which are now the chief treasure of the Museum of Antiquities at Vienna. It would have been for the advantage of all archaeological Europe could these sculptures have been seen side by side with our already exciting Lycian collection. But England was too poor or too niggardly or too ignorant,—which was it? The time is gone by for lamentations. It remains for us now to learn from the publications of the Austrian Government what was the treasure which might have been ours, and to console ourselves, as best we may, by the cheering fact that our nation possesses a cast of part of these Lycian marbles, set up in the Kensington Museum.

We may as well say at once that this Djölhaschi Heroon, which has brought such honour and glory to the Austrian nation, and which weighs so heavily on some British consciences, is not the subject of the present volume. The Heroon and the sculptures that adorned it are to have a separate book to themselves. The re-discovery and removal of these sculptures was, indeed, the object of a separate and special expedition, which started in 1882, the

* *Reisen in Lykien und Karien, angeführt im Auftrage des K. K. Ministeriums für Cultus und Unterricht unter dienstlicher Förderung durch Seine Majestät Kaiser Franz Joseph I., Commandant Fürst Wrede beschrieben von Otto Benndorf und George Niemann, mit einer Karte von Heinrich Kiepert, 49 Tafeln, zahlreichen Illustrationen im Text.* Wien, Carl Gerold. 1884.

funds for which were supplied, as is well known, by private subscriptions among a few Viennese nobles and gentlemen. All the at present accessible information about this Heron has already been made known in the *Builder* in the reports of Professor Newton's lecture on Djölhaschi, at University College; for the rest, we have to wait the appearance of the promised book. The volume we have at present in hand is the first of two. In these two (the second of which is to be edited by Drs. Petersen and Felix von Luschan) are to be contained the whole account of the discoveries of the two expeditions in 1881 and 1882 respectively, excepting the *Djölhaschi Heron*. The present volume takes the expedition of 1881, but its statements are corrected when necessary by the experience of 1882.

To Dr. Benndorf, in the main, is due the first inspiration. The Lycian Apollo had long haunted him with prophetic signs and omens. At last, when the Austrian excavations at Samothrace were closed, the suggestion often made to the Government by Dr. Benndorf took shape and became active. In the spring of 1881 Dr. Benndorf, with, as his colleagues, Professor Niemann for architecture, Dr. Felix von Luschan for natural history, and last, but not least, the Court photographer, Wilhelm Burger, set out for Constantinople. We may well give honourable mention to Wilhelm Burger, for to his skill are due the forty-nine exquisite photographs heliographed for the book. In a country like Lycia, where topography and architecture and sculpture are so implicated, these beautiful illustrations are of the first importance. We may say, before turning to the substance of the book, that it is printed in luxurious folio; that, besides the heliographs, there are eighty-nine woodcuts and 132 facsimiles of inscriptions, all published for the first time. To these we must add a beautiful map embodying the latest corrections and additions to the map of Spratt.

The man-of-war *Taurus*, in which the expedition started, was not destined to go straight to the land of the Chimæra. Putting in at Smyrna on the 4th April, the explorers were met by the terrible news of the great earthquake at Chios, and they charitably turned aside to carry help to the sufferers. Dr. Benndorf devotes a whole chapter to this Chios earthquake. We may as well say once for all that the reader who expects to find in this book a purely archaeological treatise will be, according to his individual taste, agreeably or disagreeably disappointed. Drs. Benndorf and Niemann write advisedly in a somewhat popular style, more after the fashion of the bygone *dilettante* traveller than the modern archaeologist. Their book is pleasant reading to the amateur, for many inscriptions and architectural measurements are plentifully besprinkled with details of Lycian modern life and customs, but particulars about the number of miles, the weather, and the roads are to the specialist somewhat irritating.

These we omit. After four days' delay at Chios, the voyage was continued; the explorers availed themselves of facilities for landing on the way to Lycia, and stopped for a short time at Halicarnassus, Cos, and Cnidus, Loryma, and Rhodes. At Halicarnassus, Dr. Benndorf copied three inscriptions, and was so fortunate as to buy a sculptured bas-relief of white marble, which now, with all the other results of the expedition, is to be seen at Vienna. The slab is no great size, but from its style, and from iron clamps still remaining on it, it must have formed part of a frieze. It represents two youths on horseback; they wear short chitons girdled, and from the symmetrical way in which they sit, they seem to be engaged in some formal race or competition. The relief is in bad preservation, the heads of both riders almost effaced. It was found in a courtyard of the Greek quarter of Halicarnassos, and Dr. Benndorf conjectures that it may once have belonged to the palace of Mausolos, the site of which, according to Mr. Newton, is to be sought for close to the present Greek quarter.

The 10th of April found the explorers at Cos. The modern wonder of the town of Cos is its huge plane-trees (beautifully reproduced in phototype L). It stands in the place of Hippocrates, with its huge ancient branches supported by wooden stays and stone pillars. Two Turkish *caffés*, the resort of all the town, find shade and shelter beneath it.

Leaving the town proper, the explorers passed to the castle by the sea. At the entrance,

over the first door, Dr. Niemann noted and sketched some slabs of marble, sculptured with masks and festoons of very late Greek style, and built into the rough stone wall. The masks are Satyr types not unlike those on the round Dionysos altar at Athens. Inside the castle (entrance to which was only obtained with difficulty) Dr. Niemann found three interesting slabs with figures sculptured in high relief. The slabs lead into two walls standing at right angles to each other in a garden within the castle walls. These slabs had been seen by Mr. Newton in his researches at Cos, and he conjectures that they may have been taken away from a temple at Cnidus by the Knights of St. John and built into the wall of this fortress of Theus at Cos. The slabs had, since Mr. Newton's visit, been heard of, but not seen, by Ludwig Ross, who failed to obtain access to the castle, and they were somehow passed over unnoticed by M. Oliver Rayet, though he noticed some similar slabs outside the castle wall. Dr. Benndorf now publishes the slabs in full. The sculptures represent three figures in excited motion between an altar and a cista. Near the cista is a large snake rearing upwards in many coils. The figure nearest the left is advancing to the cista and extends her right hand to the snake; in her left she holds something, which is probably a thyrsos; she is dressed in a long sleeveless chiton and a *himation*, which forms an arch behind her head. To the right, at the opposite end to the cista is an altar, near which a male figure takes refuge, leaning on the altar with his left hand. He raises his right as if in fear or astonishment. The lower part of his body is draped by a *himation*, which, as in the case of the woman, forms an arch behind his head. Between the man and woman stands a female figure, with both arms outstretched as if in interposition. It seems probable that we have here a scene from the life of the semi-Hellonic semi-Oriental god whose worship was so popular in Phrygia, Dionysos Sabazios. His worship was closely connected with that of Rhea and with the Orphic mysteries. Apollodoros (III. 5, 1) tells us Hera,—who never seems to have been happy unless she was persecuting some one else,—drove Dionysos mad, and made him wander from place to place, till at last he came to the goddess Rhea. She purified him from his guilt, and taught him the mysteries. It may be that here we have the scene of reconciliation and purification. The snake was specially sacred to this Dionysos Sabazios; a golden snake was given to the initiated in his mysteries ("Aureus coluber in sinu dimititur consecratis et eximitur rursus ab inferioribus partibus atque imis."—*Arnob.* 5, 21). The two other slabs seem to form one composition. On the one slab, to the right, are three figures dancing, two of which at least seem to be Satyrs; on the second slab, to the left of the Satyrs, a tree, and near it a male and female figure, both standing; the woman seems to have her arm about the neck of the man. The group probably represents Dionysos and Ariadne; to the left two figures, probably dancing Satyrs. The whole relief is much effaced.

So much for the sculptured remains inside the castle. On the outside built into the wall of a bastion near the sea are further analogous fragments reproduced in Plate IV. exactly as they now stand in the bastion. The topmost piece of frieze was built in concrete of two slabs, in each of which are four figures. On the left-hand slab is a group of two seated figures; a bearded god, with a *himation* across his knee, sits leaning on his left elbow, and holds in his right hand something which may be a sceptre or more likely a thyrsos; a goddess, richly draped, sits by his side, holding in her left hand some attribute too much mutilated to be made out. To the group there advances from the right a woman figure, and offers to them some large object she holds in her hand. To the right of this figure, and on the second slab, a Satyr is dancing with three Maenads. One of the Maenads plays the cithara, the Satyr plays the flute, a second Maenad the tambourine, while the third swings the thyrsos. Lower down on the bastion is a second bit of frieze, the subject of which is barely recognisable; a Satyr may be made out with a panther skin waving behind him; he seems to be holding a shallow cup in front of some wild beast to tempt him on. Two other Satyrs are busy about a preparation for a drinking bout, one is emptying a wine-skin which he carries on his shoulder into a krater held by the other Satyr by the

rim. It is interesting to compare these frieze fragments, now that we have authentic photographs of them before us, with the similar fragments that Mr. Newton describes as seen at Cnidus ("History of Discoveries," p. 449). Dr. Benndorf cites as follows: "A seated female figure, her lower limbs enveloped in a peplos. She looks towards a Satyr, who stands before her brandishing in his right hand what appears to be a thyrsos; his left is extended towards the female figure, and has probably been enveloped in a mantle. On the left of this group is another Satyr moving away from the scene, but looking back. In the other relief a female figure is seated on rocks before an altar. The lower half of her body is clad in a peplos; in her left hand she holds some uncertain object. She is looking back. Behind her stands a female figure, having a peplos wound round the lower half of her body. The seated figure in this group may, perhaps, represent Ariadne." Mr. Newton adds that the execution of the work is poor, and dates it as late Roman. A comparison of the now published figures at Cos, with this description of the fragments of Cnidus, leads almost inevitably to the conclusion that Mr. Newton's conjecture was correct, that all the fragments of the frieze came originally from Cnidus, and that some portions were carried as building material to Cos, by the Knights of St. John; further, that as the subjects are so manifestly Dionysiac, the original source of the frieze must have been the temple at Cnidus, which stood close to the theatre, and was, therefore, in all likelihood, sacred to Dionysos. The male and female figure twice found in conjunction would then of course be Dionysos and Ariadne, not, as has been suggested,—in consequence of the snake,—Asklepios and Hygieia.

The explorers spent the remainder of their time at Cos in investigating the plain west of the town where M. Rayet ("Milet de la Golfo Latmique") believed he had detected the remains of an ancient Asklepeion. Their efforts were in vain, but in their wanderings, they came across inscriptions and countless architectural remains, notably a number of funeral monuments in the form of cylindrical altars surrounded by sculptured wreaths in Hellenistic and Roman fashion. Some of these were well preserved, others completely in fragments, and these fragments built into modern walls. Of one curious marble slab Dr. Niemann took a sketch. The slab is finely worked, and has on the upper part a round shield in relief; it probably formed the side-wall of an adicula. Coming back to the town they came across the remains of a Roman aqueduct, also the foundations of a theatre a considerable size. Near the theatre they found a fragment of a colossal female head; probably, from the treatment of the hand, the portrait of a Roman empress. In the town itself they bought two pieces of sculpture in marble, now in Vienna. A seated figure in a sort of archway in relief, no doubt representing Cybele. The goddess has her feet on a footstool, and is dressed in a gilded chiton and a *himation* thrown over the knees and the left shoulder. Under the left arm she holds a tympanon; her right, much mutilated no doubt, held a cup. On her knee reposes a lion. This relief is interesting because its restoration is certain; because, as the marble of which it is made closely resembles the Pentelic marble. The type of the goddess mother, seated in a little shrine with a lion on her knee, a cup in her left hand, and a tympanon supported upright on her right, and leaning against the right arm, occurs with extraordinary frequency in Attica, and in isolated instances outside Attica, where, as a rule, exportation can be manifestly proved. It was a common custom among the ancients in any place where a special cult prevailed for little copies of the shrine of the god or goddess, containing the sacred image, to be cheaply multiplied. For example, in Sicily, countless little terra-cotta figures are to be found in every collection, public or private, representing a goddess of somewhat archaic type, sometimes seated, sometimes standing, a modius on her head, and in her arms either a dove or a pig; in the one case she represents Aphrodite, in the other Demeter. Such images were probably not for temple service,—they never bear inscriptions,—but for daily household reverence. We have only to recall the silver shrines made for Diana of the Ephesians, and, indeed, the modern trade in Madonnas. The cult of the goddess Cybele, mother

of the gods, was, we know, much revered at Athens. Pheidias, or his contemporary, Agoracritus, made a statue of the goddess for her temple at Metroon. In all probability it is a rough copy of this statue in the Metroon that we possess in the Cybele figured by Dr. Beunhoff, and repeated in countless replicas, many of which may be seen in the public museums of Athens. About them all, rough though they are, there hangs something of the grand ideal manner. The cult of Cybele, like all other Oriental forms of worship, became, as is well known, very popular in the fourth and third centuries B.C. Probably it was during these Hellenistic days that the copies were made for private worship.

The second piece of sculpture obtained at Cos is less interesting in subject, but far better preserved. It is of coarse white marble, a figure of a woman, and reproduces the familiar motive popularised by Niobe's daughters,—a maiden bending forward as she moves away, and lifting up her robe.

Leaving Cos the *Taurus* passed on to Cnidus. Little could be done there but to follow in the footsteps of Mr. Newton and to find that many sites and remains described by him had already disappeared. A few coins and fragments of terra cotta were collected, the best of which represents the youthful Heracles with bow and quiver, lion's skin, and club (an apparatus unusually complete, the bow and quiver belonging to his early, the lion's skin and club to his later, accoutrements). Dr. Beunhoff found his chief interest at Cnidus in investigating modern life: he gives a very full and elaborate account of the weaving processes of the Carian peasantry, an account instructive, because of certain analogies between ancient and modern processes. At Loryma Dr. Niemann made careful architectural investigations about the fortress on the Acropolis, which seems to have served in turn the purposes of Carian, Rhodian and Rhodian conquerors. The remains of these successive systems of building are still recognisable. At Rhodes the explorers were received by the Italian Vice-Consul Bibotti, and obtained from his collection some valuable vases and terra cottas, chiefly archaic. An account of the whole collection is promised in a later publication. At Rhodes Dr. Beunhoff parted from the civilised world; his discoveries in the wild highlands of Lycia we must postpone to another time.

THE LATE MR. SAMUEL HUGGINS.

We regret to have to record the death, at Chester, on the 10th inst., of Mr. Samuel Huggins, whose name will be known to many of our readers. Mr. Huggins was born at Deal in 1811, but spent most of his life in Liverpool. He was educated as an architect, and had a keen love of architecture as an art, and a great knowledge of its history, as well as a very clear-seeing critical intellect. He was, however, a sensitive and retiring man, and never seemed able, or even inclined, to try for success in the field of active professional work; but it is a mistake to suppose (as from some notices of him in local papers seems to have been supposed) that he was only a writer and a critic. He was, during a great period of his life, a frequent and diligent designer, but his designs were for his own pleasure and study merely,—at least, they mostly did not take practical form; but some of them would be very interesting to architects. Mr. Huggins was a devoted Classicist, but he did not consider that Classic architecture in the present day consisted in copying orders or Italian details; on the contrary, he was always urging the study of new combinations, and had portfolios full of small studies of his own, mostly shaded in Indian ink, of numerous "variations" on columnar architecture, in the form of designs for imaginary buildings and monuments. Our impression from recollection (it is many years since we had the pleasure of looking over them) is that many of these are worth publishing in some form. At one time, we remember, their author contemplated offering them to the Library of the Institute of Architects.

Mr. Huggins put together, in 1863, a chart of architectural history, showing the relation and progress of the leading styles in the form of a river; it was very well done, and in a way that made it a good memorandum also for dates of architectural epochs. It was accompanied by a small book entitled "The Course and

Current of Architecture," giving a very well-written critical review of the leading styles.

Mr. Huggins took a very active part in the protest against restoration which commenced a few years ago, and was, like some other "protestants," rather one-sided in his views on the matter. He has also the distinction of having made one of the very best-arranged catalogues of a library, that of the Liverpool Free Library, which could be met with: a kind of good work for which all students of books ought to hold a man's memory in good repute.

Mr. Huggins wrote a good deal in our columns at one time, mostly under his own signature, and he was a frequent and very excellent contributor to the Transactions of various learned or literary societies. Personally he was a man of very high and unselfish character; his own advantage, either in the form of money or reputation, seemed to be the last thing he ever thought of; he was of a very reverential turn of mind, though holding very "advanced" views both in religion and politics; and he had an ardent love of nature. He was a good and intellectual, though not a strong or a successful man. *Requiescat in pace.*

THE VENTILATION OF PUBLIC BUILDINGS.*

The subject of ventilation is usually looked upon as practical rather than artistic, in spite of the fact that the architectural journals now contain an advertisement of "Artistic Ventilation," but it is to the art-loving section of our body that I would particularly address myself rather than to the so-called "practical men." If we will only study the fundamental principles of these sanitary questions, we shall be able to combine the science which is demanded of us with the art that we love.

The subject divides naturally into two parts, the principles and the practice of ventilation.

The following appear to me to be the fundamental principles of all ventilation, and as they are seven in number, we may, if you please, call them the "seven lamps of ventilation."

1. Ventilation is the substitution of foul air by fresh air, and is only successfully effected when without draught.
2. Foul air is air vitiated to a certain definite extent.
3. Fresh air is air in a normal state of purity.
4. Draught is the unpleasant contact of moving air with the person.
5. Air is a fluid and a gas.
6. Heated air is lighter than cold air of equal purity.
7. Foul air is heavier than fresh air of equal temperature.

Before passing on to the practical application of these principles, we may profitably spend a little time in considering each of our "lamps."

We first said that "Ventilation is the substitution of foul air by fresh air, and is only successfully effected when without draught." Many, indeed the majority of the public, imagine that the object and aim of ventilation is solely to produce an agreeable temperature, and, if the room is too hot, they exclaim against the want of ventilation; if too cold, they find fault with the excess of ventilation; but we must remember that purity of the air it is that depends on ventilation, and that temperature is no criterion of the purity of the atmosphere. Note also that ventilation is the substitution and not the dilution of foul air by fresh air. When the air has become vitiated we must not simply dilute the air with fresh, but remove it altogether, and substitute fresh air in its place. Such is the ideal view of ventilation, but, owing to the natural laws of gaseous fluids, we shall find that an approximation only to this requirement is possible. It is, however, an end to be aimed at, even if we can only partly attain to the realisation.

The necessity for the fresh air is found in our dependence upon a pure atmosphere for our health and vigour. The inhabitants of close rooms, persons who breathe air which has already been breathed, are subject to diseases which may cause death, amongst which may be mentioned pulmonary consumption and certain classes of fevers. But whilst some persons may be killed outright by breathing air which has been polluted by the breath of other

persons, the majority are subject to a low condition of health. The reason of this is partly because the oxygen of the air is necessary for keeping in activity the chemical processes upon which life depends, and that, in the act of breathing, the oxygen in the air is taken up by the lungs, and the expelled air is thus deprived of its oxygen; and partly because an individual in expelling the air from the lungs expels with the air carbonic acid gas as well as a large quantity of organic matter, i.e., a portion of the body, which latter has a tendency to putrefy rapidly in stagnant air, and which may thus become a dangerous poison.

We said that ventilation "is only successfully effected when without draught," the reason of this provision is obvious: if draught is felt, the public at once prefer to have no ventilation at all than to have it with draught, for the evil effects of foul air are slow and insidious, the effects of draught are palpable and immediate.

Our second definition was that "Foul air is air vitiated to a certain definite extent."

We have already noticed that air is vitiated by the extraction of oxygen by the lungs and also by the production of organic impurities. But in addition to that expelled from the lungs, carbonic acid and organic impurities are given off continuously by transpiration from the skin. The amount of the carbonic acid is about one-fourth or one-fifth of that exhaled from the lungs, while the organic impurities vary both in amount and character according to the activity or the state of feeling of the individual, and the exercise of varying emotions; so that, for example, a theatre will require more ventilation during the performance of a tragedy than a comedy, so also with a church. It is, however, hardly advisable to so plan our ventilation scheme that its regulation by an ordinary specimen of the genus *verger* shall depend upon the pænetic, joyful, or mournful character of the sermon.

The carbonic acid and the organic exhalations are not the only additions to the atmosphere made by individuals. A large increase of watery vapour is caused by the expiration of moisture from the lungs, and also by insensible perspiration from the skin. This added moisture vitiates the air in a twofold manner, first, by inducing more rapid decomposition of the organic impurities and the consequent formation of unpleasant and injurious gases; and, secondly, by hindering the proper evaporation from the skin, which is essential to prevent the unhealthy rise of the bodily temperature which we call fever.

Thus we see that air is vitiated by the changing of its oxygen into carbonic acid, by the addition of organic impurities, and by the increase of its humidity.

We have next to consider what degree of impurity can be admitted in the atmosphere of public buildings.

The amount of air expelled from the lungs and skin per minute is '33 to '35 of a cubic foot, and contains 4 per cent. of carbonic acid, while about 4 cubic feet of air are saturated with moisture by each person in the same time of one minute, so that a supply of 4½ cubic feet per minute for each individual would be sufficient, could we ensure that he would receive this fresh air, and no other each minute. To do this, however, it would be necessary to enclose each one standing in an upright case, with about 4 in. or 5 in. clear all round, and to admit the fresh air at one end, and remove it immediately when exhaled at the other. Only under these conditions would the supply of 4 cubic feet per minute be sufficient, as advocated by early writers on ventilation.

Air is, however, as our fifth lamp shows us, a gas, and hence is subject to the law of the diffusion of gases, so that the exhaled air at once mingles with the surrounding atmosphere, and is thus diluted and spread over a large area.

Although it is true that the carbonic acid is one and half times as heavy as pure air, yet the heat imparted to it by the lungs renders it lighter, so that it is rapidly diffused, and when once diffused no length of time effects the least settlement or separation.

Thus the air of any apartment will rapidly approach a condition of equable impurity, and the point which we must seek to elucidate is the extent to which air may be vitiated without becoming foul, that is, injurious to health or unpleasant to the senses.

We have seen that the exhalation both of

* A paper read before the Architectural Association by Mr. F. E. Farrow, on the 16th inst.

water vapour and of organic impurities is variable in the case of every individual and the circumstances of his bodily and mental condition; it is therefore usually thought advisable to take the amount of carbonic acid in the air as a test of purity, and as a general rule it may be assumed that the admissible amount of carbonic acid is twice that of the normal atmosphere, that is '8 per 1,000 in volume. This degree of pollution will be attained in a continuously occupied room at the rate of 32 cubic feet per minute. In rooms occupied for a short time only, as in schools, churches, and chapels, a less supply of air is sufficient in practice, both because the cubic contents of the room will supply the needs of the inmates to a certain extent, and also because there is usually a continual leakage through windows, doors, and walls, and the occupancy of the room being for a short time only a greater degree of vitiation may be neither hurtful nor offensive, provided that the humidity of the fresh air be not excessive.

Dr. Reid, who devised the original system of ventilation for the Houses of Parliament, considered that under ordinary circumstances a well-distributed supply of 10 cubic feet per minute was ample.

In Germany the usual practice is to supply 10 to 12 cubic feet per minute for schools, 20 to 25 cubic feet for meeting-rooms, and 40 to 75 cubic feet for hospital wards.

The Austrians provide from 15 cubic feet for theatres and banqueting-halls, to 25 cubic feet for ball-rooms, council-chambers, &c.

In America from 10 to 30 cubic feet, according to the purposes of the room, are given, with an increase to 60 cubic feet in the case of hospitals.

These figures of course make no allowance for the vitiation of air by gas lighting, or other extraneous causes. Each burner requires 45 cubic feet per minute, which must be provided in addition to that supplied for the audience.

Our third definition was "Fresh air is air in a normal state of purity." Now by "normal state of purity" we must not understand the condition of the external atmosphere at any given moment in such a city as London, where the air is so frequently laden with that noxious compound which we call fog, and is always, more or less, impregnated with organic and other impurities, which we term dust. In a state of normal purity the air should contain 21 per cent. of oxygen, and 79 per cent. of nitrogen nearly, with '4 per 1,000 of carbonic acid, and one fifty-millionth part of organic impurities. Such a measure of purity is, however, almost unattainable in a town atmosphere, but an approximation should be made thereto by washing the air with a waterspray, and filtering through cotton-wool.

Our fourth definition was "Draught is the unpleasant contact of fresh air with the person." This unpleasant contact usually produces the sensation of cold; but we must not forget that there is such a thing as an unpleasant hot draught, though it is neither so injurious nor so offensive as the cold draught, the bugbear of all ventilators, and the dread of the ventilated.

Cold draught from the incoming fresh air arises from four sources:—1, Over rapidity of current; 2, Lowness of temperature; 3, Too great humidity; 4, Too little humidity. Each of these causes produces the sensation of cold by lowering the temperature of the surface of the body, the first and fourth by causing excessive evaporation from the skin, the second by the increased radiation of heat from the body to warm the surrounding atmosphere, and the third, by the extraction of the corporeal heat to maintain the undue suspension of watery vapour.

Fresh air should never enter at a greater rapidity of current than 2 ft. per second, while a rate of 1 ft. per second is perceptible at the point of entry. Nor should the temperature for our climate and hygrometric conditions be less than 50° F., this being lower by 20° than is possible in America.

Cold draught may be caused not only by the incoming fresh air, but also by local currents induced by the cooling of the internal atmosphere and its consequent descent; these local currents are especially caused by skylights, windows, and open roofs, and their presence may often serve to condemn in the eyes of the public an otherwise carefully-planned and satisfactory system of ventilation.

The last three of our "lamps" or principles we may consider together, as they are inti-

mately connected. "Air is a fluid and a gas," and is therefore subject to the laws of diffusion of gases and expansion of fluids, consequently "heated air is lighter than cold air of equal purity," and "foul air is heavier than fresh air of equal temperature." The consideration of these principles at once brings us face to face with one of the most important and most warmly contested points in ventilation, the position of the inlets and outlets for the supply of the fresh and the removal of the vitiated air. Are we to introduce our fresh air at the lower part of the hall and extract it at the top? or are we to bring in our fresh air at the top and take it out at the bottom? The different views taken of these questions have led to many a fight between the advocates of the upward and downward systems of ventilation. Let us examine the two methods by the light of our "lamps." The advocates of the downward system claim that foul air is heavier than fresh air, and therefore we should extract the foul air at the lower level, but we must remember that our principle is that foul air is heavier than fresh air of equal temperature, and if we look at the source of foul air we see that it is exhaled by the individual, whether from the lungs or from the skin, at a temperature of 90°, and therefore, except at this temperature, has *primæ facie* a tendency to rise in respect of its warmth, though there is doubtless a counteracting influence by reason of its impurity. Accordingly we conclude that foul air on its production has a tendency to rise, unless the difference in temperature between it and the surrounding atmosphere is insufficient to counterbalance the increased weight of its impurity. The point at which the weight of exhaled air at 90° is balanced by the weight of fresh air is at a temperature of 85° for this latter. If, then, the surrounding temperature is below 85°, the foul air commences to rise and will continue to rise until it loses so much of its heat as to render it specifically heavier than the normal atmosphere. During this ascensive process, however, it must not be forgotten that, as air is a gas, diffusion is taking place rapidly, and the foul air is therefore, while losing heat, losing weight also by the dilution of its impurities with the purer atmosphere. The impurities produced by gas-lighting are even more ascensive in their character, owing to the great amount of heat developed in combustion. Therefore we can readily see that if fresh air be admitted at the top of the hall it will meet these ascensive columns of vitiated air and become itself adulterated before reaching the occupants, and this adulteration will be in a continually increasing degree until the air breathed by the occupants will be the most vitiated possible for any given supply of fresh air. The descending system has, however, advantages in the avoidance of draught and the equitable supply of air to all parts of the room alike.

The universal system in Germany and Austria is to introduce the fresh air at the upper part of the room in winter and at the lower part of the room in summer, the extraction being in a contrary direction, so that the warm air in winter, cooling naturally, descends, while the cool air in summer, becoming heated, rises. This method and the argument in favour of it depend to a very considerable extent on a very high dew-point, so that there is a far greater chance of success than there would be here in England with a low dew-point.

In the case of a hall without ventilation there is a constant rolling stream of air passing upwards from the heating apparatus to the top of the room; then, cooling, it again descends on the other side of the hall, and so keeps up a constant circulation. Now if ventilation is introduced to such a hall and is insufficient to carry off the whole stream of heated air as it ascends, the roll of the atmosphere will not be wholly diverted, but will still continue, and thus there may be with advantage an extraction of air at the lower level. But this method of extraction can only be justified for adoption when artificial heating is abundant, and when no gas lighting is in use to vitiate and heat the upper strata of air. This will accordingly limit the effectiveness of the method to the day-time of a portion only of the winter months, and hence may, I consider, be practically inadvisable in our country.

To summarise the lessons we gather from a consideration of the principles of ventilation:—First, we learn that our object in ventilating a public building should be to provide an

adequate supply of fresh air, uncontaminated as far as possible by contact with foul air, which latter should be removed as speedily as may be; and, further, that an adequate supply may, in ordinary cases, be taken to mean from a minimum of 10 cubic feet per minute for each individual, rising to about 30 cubic feet, according to the use and circumstances of the building.

Next, we learn that draught must be avoided by careful regulation of the rate of current, temperature, and humidity of the fresh air, and that vitiation of the instreaming atmosphere will be best obviated by bringing in the fresh air at the lower part of the hall, and extracting the foul air at the upper part.

We have now to consider the best method of achieving the desiderata at which we have arrived, and the application of principles to practical work.

Our object is the introduction of fresh air and the extraction of foul air, and this object we must attain with certain conditions already formulated. There are three distinct methods by which our object may be attained:—(1) We may force in the fresh air, and allow the foul air to escape by the propulsive force of such fresh air; (2) we may draw out the foul air and allow the fresh air to enter and to supply its place; or (3) we may both force in the fresh air and draw out the foul air. Which of these three methods we should adopt must depend both upon the peculiarities of each individual case, and upon the means which we propose to employ to obtain our end.

These means may be divided into two classes, natural and artificial. By natural ventilation is understood that obtained by means simply of the natural power of air under certain conditions to produce and sustain motion. Artificial ventilation is the adoption of mechanical or other artificial agency to produce the desired currents of air.

Natural ventilation depends chiefly upon the difference in temperature between the incoming and outgoing air, if this difference be considerable the flow will accordingly be greater than when little difference exists. If some of the openings be exposed to the direct action of the wind, this will also tend to produce a current, and this is the operative principle in what is termed the "cross-ventilation" of hospital wards. The air pressure on two sides of a ward is rarely if ever equal, and hence if windows be open on opposite sides, a current will nearly always be maintained, and frequently a very strong current. Similarly, if there be two openings or two series of openings at the upper and lower part of a room or hall, a current of some kind will be almost always found to exist. Thus, we have in this way a very simple and cheap method of ventilation, but it can hardly be called desirable or satisfactory. The varying pressure, whether of the wind or of temperature-difference, will cause a constantly-varying rate of flow in current, so that if provision be made for ample ventilation when the current is sluggish, a swift current will produce an unbearable rapidity of change unless means are provided for reducing the area of the openings, but even then constant alteration will be required to meet the constant change of motion. The direction of the currents, too, will be always liable to sudden and unexpected reversal, and above all it is practically impossible to sufficiently regulate any heating arrangements to accommodate the varying exigencies of the moment.

Natural ventilation may be usefully adopted in private buildings, but for the large supply and other requirements of public buildings it is almost out of the question.

There is, however, one form of natural ventilation which may be with advantage employed in public buildings occupied for a short space of time only, and by a number of persons, small in comparison with the cubic contents of the apartment, that is, by a thorough freshening and renewal of the atmosphere during the times between the occupancy of the room; as, for example, in some schoolrooms, where the children are frequently sent out for a short space of time, when the windows and doors may be all opened, and the air freshened up for the next session.

Artificial or mechanical means of ventilation may be classed in three groups:—

1. Mechanical means, needing no attention, i.e., self-acting.
2. Mechanical means, needing a small amount of attention.

3. Mechanical means, needing constant attention.

The first group of these are of varying character, but all depend for their action on the fact that air is a fluid, and for the most part derive their motive power from the wind.

One of the oldest, and for a long time most esteemed, of self-acting appliances is the so-called "syphon" ventilator of Charles Watson, which consists, as most of us probably know, of two tubes of unequal length, enclosed in the snugly casing so dear to ventilating tradesmen.

If all other openings into the apartment, as doors and windows, were closed, an upward current of the internal air was established in the longer tube, and a downward current in the shorter, similar to the action through the legs of a syphon, but not, mark you, by reason of the principle of the syphon, but from the difference of temperature of the air in the two tubes. In the event of any more ready access of the air, the apparatus simply acted as an ordinary atrial outlet. The great success of this device can only be understood by remembering that it was the first substitute for no ventilation; for the evils of its action are apparent in the old introduction of a cold descending stream coming directly down upon the heads of the inmates, and passing through, and consequently cooling and mixing with the ascending current of foul air. A cooler atmosphere was, of course, produced, but this we have already determined is not ventilation.

The next series in this group of self-acting ventilators are those various modifications of the "Archimedean screw" system rejoicing in the high-sounding titles of "Empress," "Imperial," and the like. These consist of a wind turbine connected to the upper end of a spindle whose lower extremity is furnished with screw blades, two or more in number; the turbine, actuated upon by the wind, revolves, and with it the spindle and screw, by which a current is induced of greater or lesser intensity. When once erected these, of course, need no further attention until from the wearing out or rusting of the moving parts or increase of friction they come to a dead stop, but as their moving parts continually decrease in smoothness of working they rapidly lose in efficiency, and at the best are but feeble in their action except under strong wind pressure.

Our third series in this group have of late far surpassed other competitors in the field of "self-acting" ventilators. They are based on the principle of the kinetics of a fluid across the mouth of an open pipe, and their effect can never be greater than would be obtained by a simple open pipe provided that the stream of crossing air always passed in a favourable and equable direction; but as this is, under the circumstances, never experienced, means have been devised in the construction of mechanical appliances of this kind to provide for the regulation and direction of all wind currents in the desirable course.

Two well-known typical examples of this series will suffice to enable us to understand the general principles.—Banner's cowl and Boyle's so-called "air-pump" ventilator. Banner's cowl consists of a horizontal trumpet-mouthed tube, arranged with a wind-sail, so as to revolve over the mouth of a vertical tube, in order that the wind may be always received in the conical mouth, and directed horizontally across the mouth of the open tube. Nothing could be simpler and nothing more effectual, as long as the cowl revolves freely and the wind blows.

Boyle's ventilator has no moving parts, but consists of a skilful arrangement of curved plates and cross diaphragms, so disposed as to divert any wind-current into such a direction that the principle we are considering may come into operation.

We are, doubtless, most of us aware of the worthy strife which has been waged between the partisans of these last two inventions; but, looking at it dispassionately, we may fairly admit that each is logical in its idea and efficient in its action. Personally, of the two, I prefer Boyle's ventilator, because it has no moving parts to get out of order, and is more easily enclosed in a turret or flèche, to obviate the fearful ugliness from which all these devices suffer.

I do not propose to weary you with descriptions of the numerous modifications of these types, of which there seems to be an increasing supply every month. If we do but rightly understand the principles involved we shall be

able to judge for ourselves of the respective merits and advantages of each for our particular purpose, and to decide which will in any one case give the best value for our client's money.

We should, however, consider the peculiar advantages and drawbacks of the group of "self-acting" ventilators. As we have seen, they depend upon the wind for their primary motive power, and hence they are, naturally, irregular and spasmodic in their action; for instance, in the experiments made by Professor Corfield, Mr. Rogers Field, and others, on Boyle's ventilators at the Custom House, it was found that on two successive days the extracting action of the 3 ft. ventilators varied from 1,347 cubic feet per minute on the first day to 535 cubic feet per minute on the second. Such variation as this at once shows the great difficulty of using any "self-acting" ventilator where satisfactory ventilation is aimed at. Not only will there be an ever-varying speed of current, but the heating arrangements will require special provision to meet this variation, and must, therefore, be adapted for a large reserve of power. Some current will almost always be attainable unless the moving parts are checked by friction, dust, or wear, as the movement of the air is very rarely less than six miles an hour, and averages twelve miles an hour.

Our next group of mechanical contrivances are those which are not self-acting, but require a small amount of attention.

The first class in this group consists of those arrangements for supplementing the action of natural ventilation by the creation of an artificial difference of temperature by means of columns of air rarefied by adventitious heat. For example, we may adopt a large fire with a heating furnace at the bottom, and into this admit channels from the apartment to be ventilated. Similarly, the use of a series of gas-jets or of hot-water coils will induce an artificial current, and are usually of easier application than a regular extraction-flue. Arrangements such as this have the advantage of far more equable and certain action than those of the first group ("self-acting" ventilators), and it is possible to make a calculation of the effective power that can be attained by the consumption of a certain amount of heating power which shall be fairly near the truth. These devices are, however, occasionally liable to failure when severely tested by strong and sudden gusts of wind or cold air unless provision be made for such contingencies.

The whole of the types we have already noticed are, you will have observed, adapted only as exhausters, the foul air being drawn out by these means, while fresh air is allowed to enter by suitable inlets, and with proper provision made for warming the same on admission to the apartment. The methods of warming the fresh air are almost numberless, and may consist of close stoves, hot-water or steam pipes, gas stoves or ordinary fireplaces, as may be best adapted to the particular case in question.

The remaining mechanical means of inducing currents both in this and in the third group, may be applied either as exhausters or injectors. Thus in this group we have first those mechanical aids, which consist of arrangements for driving fans by means of water-power. This type of apparatus comprises a horizontal turbine, fixed at one end of a spindle, with fan blades at the other. The spindle revolves on accurately-fitted centres of hard material, as phosphor bronze, and are supplied with ample lubricating jets; the turbine is driven by the impact of fine jets of water, and thus works the fan.

Verity Bros.' patent ventilator is a good example of this type of apparatus, while another, called the *Aërophor*, is being introduced from Germany by the agents of Messrs. Treutler & Schwarz, of Berlin. The results and the cost of both these inventions are very nearly equal. Messrs. Verity's apparatus works with a pressure of 35 lb. to 50 lb. on the square inch, and their medium size with the consumption, or rather use, as the water is not wasted, of ten gallons an hour propels from 350 to 450 cubic feet of air per minute; with smaller pressure, of course, a larger amount of water must be used to obtain similar results. The *Aërophor* is rather cheaper in first cost, especially in the larger sizes, than Verity's patent, but requires a rather larger amount and higher pressure of water to obtain equal power. Where a constant supply of water is provided, this type of apparatus may well be employed, as the pres-

sure in the mains is usually about 60 lb. to the square inch, otherwise the requisite pressure must be obtained by the use of cisterns.

These appliances have many advantages, from the small amount of attention they require, the simplicity of their working, and the ease with which they can be regulated or stopped at will, the turning of a stop-cock being all that is needed to start or regulate them. Their disadvantages are the liability to failure during frost for want of water and the small amount of power attainable, the largest specimen ever made by Messrs. Verity being an extractor of only 4,000 cubic feet a minute, and the largest stock size of the *Aërophor* exhausting only 3,000 cubic feet a minute, with 120 gallons of water per hour.

Another instance of the employment of water-power for inducing current is seen in the "*Acolus*" waterspray ventilator, though in this case there is no moving mechanism, but simply a conical spray shower of water from a downward vertical jet under considerable pressure, which, acting within a tube, causes a corresponding downward current of air. Thus, the action is simpler even than the turbine ventilators, while the consumption of water is naturally greater, and the full power is not great, the largest size extracting 5,000 cubic feet a minute, with 200 gallons per hour at 45 lb. pressure.

We now come to the third group of mechanical means, those which require constant attention. These universally consist of rotary fans driven by steam or gas engines, and so needing a continual attention. I do not propose to go into the question of the merits of various forms of fans, still less into the consideration of the different types of steam or gas engines, because firstly, these are strictly within the province of the mechanical engineer; secondly, because to take up this branch of the subject thoroughly would of itself occupy a long evening; and, thirdly, because there is very little difference in the comparative effect of different forms of fan for any given horse-power. Our province is to consider what are the necessary requirements of the ducts or air-passages, their form and their dimensions. The desirable rate of flow for a forced current in a main channel is about 600 ft. a minute, while the inlet or suction air-passage to a fan should have one and a half times the area of the outlet or distributing duct. To compensate for resistance of air in passage along the channels, and yet to preserve the smallest efficient areas of distributing ducts and passages, their sectional area should be increased by $\frac{1}{10}$ for every foot of distance from the fan, added to a constant increase of one-fourth for each square foot in area of the main channel to allow for the great resistance of small passages.

The air-channels must be exclusively devoted to their purposes, and should not be used or even be made so as to be available for passages. They must be clear, unobstructed, and smooth, with all angles rounded, all corners filled in, and all enlargements avoided, so as to present the least of resistance to the flow of air.

This third group of mechanical means is, of course, by far the most preferable where the expense both of first cost and of maintenance can be borne, and it is indeed the only way of providing a thoroughly sufficient and efficient scheme of ventilation for a large or complicated public building.

We have now glanced at the various types of apparatus which we may employ to force the fresh air into our hall or to expel it when vitiated. We will now consider a little further the advisability of using any one of the three methods of directing a current which we saw to exist, i.e., whether it is better to force in the fresh air or to force out the foul air or both.

One point we must never forget: whichever method we adopt, we must have both inlets and outlets, separate and distinct, and without any doubt as to which function they discharge. So many of the public have an idea that if they have an exhausting apparatus at work, the fresh air will come in somehow and somewhere. It will undoubtedly, to a certain extent, through windows and doors, in fitful gusts and piercing draughts.

Many of the mechanical means we have discussed are, as we saw, adapted only as exhausters, and, therefore, if we use them, we shall probably simply supplement them by free inlets for the fresh air without injecting power. This method has the great advantage of easy applicability. It is such a simple thing

ust to put up an exhauster and knock a few holes in the wall for the fresh air to come in as it lieth. But there is with this method the great drawback that the inlets will not be at the same distance from the exhaust, and, moreover, will be subject to different atmospheric pressure according to the direction of the wind, with the result that the entry of the fresh air will be greater at some points than at others, and, moreover, will be changing and fickle according to the varying circumstances of the inlets. If the exhaust system be adopted care must be taken to neutralise, as far as possible, the tendency to unequal action of the inlets.

Suppose, however, that we force in the fresh air and allow the foul air to pass out merely by the propulsive force of the entering air, what is the result?

We shall be able to maintain an equable, well-distributed, and regular stream of inflowing air, but our outlets will be liable to be more or less overpowered by great difference of temperature or strong wind pressure, and this will especially be the case if the outlets are too large or too numerous, points which must be carefully attended to, together with the adoption of carefully-planned baffles for the wind.

Thus we see that both of these methods are liable to cause draught, from the peculiar dangers to which they are each exposed, and we therefore come to the conclusion that if our scheme of ventilation is to be relied on to give satisfactory results we must employ both of these methods,—we must both force in the fresh air and force out the foul air. Of course we may possibly often use for one of these purposes, especially for the expulsion of the foul air, means which are not altogether satisfactory in themselves, but will give good results when combined with good impulsive power.

The question of the position of inlets and outlets we have already touched upon, as regards the direction of the current, but it is important to remember that other points in relation to the openings demand our attention. The rate of entry of the fresh air will, of course, decide the area of the inlet openings, but this area should be subdivided to the fullest extent, and distributed as evenly as possible throughout the apartment. On no account should the stream of fresh air be able to enter in a mass, and pass compactly through the hall, for if so the parts of the atmosphere over the direct stream will be stagnant, or nearly so, just as one sees in a mill-pond where, in spite of a swift current through the centre, the corners are almost quiescent; for, remember, air is a fluid as much as water is.

So important do I think this equable distribution of the inlets that I personally believe it is better to endure the disadvantages of floor-gratings rather than have the currents at the sides of the room only. Here is one of the advantages of the downward current arrangement, as the air can be evenly distributed without the disadvantages of gratings.

It is preferable that the direction of the openings should be in all cases vertical, as horizontal entry of the air is very apt to cause troublesome local currents of greater intensity than the fresh-air flow, and thus produce the ever-dreaded draught.

A capital device for preventing draught is the construction of a sub-hall, in which the fresh air can be both properly prepared and warmed, so as to be quite ready to enter the main apartment. Here the draught, if there be any, will be expended, and the fresh air enter in an even and regular flow.

The different means of heating the fresh air would take too long now to describe, but it must be remembered that the fresh air should always be warmed when entering before entering, or immediately on entering the hall, so as to prevent the feeling of draught. Warming a building by a current of warmed air, which speedily is expelled as foul with a scheme of ventilation, is, of course, more expensive than the usual heating and re-heating of one body of air only, but if the public are to have ventilation, they must be prepared to pay for it, and this loss of heat is merely one item of the cost.

I have thus endeavoured to bring before you and the readers of the science of ventilation, and to enunciate its governing principles. The application of these principles will vary in almost every case, and each of us must decide for himself what is the best method of dealing with any particular building with the means at his disposal, and this may, with care and expe-

rience, be well accomplished without placing ourselves at the mercy of the sanitary tradesmen, and allowing them to place forests of pipes and other monstrosities in the most conspicuous position.

Mr. Farrow at the close of his paper explained some drawings exhibited on the walls. One was a plan of the Rathhaus in Vienna, showing the ventilation of a large ball-room capable of accommodating 3,000 persons. The ventilation scheme is divided into two equal and similar halves. The fresh air enters the cellar, and is driven by fans along passages in the basement. It then enters several heating-chambers, in which the air is warmed by contact with steam-pipes; it passes upwards through a large vertical shaft to the roof of the ball-room, and falls on the heads of the inmates at the rate of about 1 ft. per second. The foul air is extracted by several shafts let into the cellar and is expelled by another fan. A similar plan of ventilation is adopted in the Banqueting Hall. Mr. Farrow also explained the ventilation of the Vienna Opera House, and of several works in this country on which he had been engaged.

For a report of the discussion which followed, see p. 151.]

Illustrations.

DESIGN FOR THE COMPLETION OF THE HOUSES OF PARLIAMENT.

WE give this week a view of the completion of the Houses of Parliament as intended by Sir Charles Barry, a scheme to which considerable reference was made during the recent sittings of the committee on the "restoration" of Westminster Hall. It was then stated by Mr. C. Barry that plans by his father were in existence for an extensive addition, commencing at the clock-tower and returning along the line of St. Margaret-street, which it had always been his wish to see carried out at some future time. Plans for this addition were made by him, and a view of the proposed addition is given as a plate in Dr. Barry's "Life" of Sir Charles Barry. The present view has been drawn afresh from those plans and the elevations and sketches existing. Some modifications, however, have been made by Mr. C. Barry. The plan, which we published a few weeks ago (December 13) is drawn more inwards, towards Westminster Hall, at the southern end, so as to leave St. Margaret-street wider at that point; the original plan would have left rather a narrow gut in the roadway at that point. The crowning feature over the gateway is altered from a small lantern, as in the original design, to a larger octagonal lantern, raising the centre, which was formerly rather depressed between the two flanking towers.

The original design was made at the time when Sir C. Barry foresaw the probable removal of the Law Courts at no distant date. It thus represents what he would have regarded as the best use to make of the space, architecturally and practically, whenever that removal took place. He was well aware that greater space would eventually be required for rooms and residences in connexion with the Houses of Parliament, and, in fact, the space has been required long before now, and many outstanding offices are in use, at heavy rentals, to supply the defect of space in the Westminster Palace. Mr. C. Barry calculates that the money thus expended annually is considerably greater than the interest on the outlay which would be necessary to erect the new buildings as here shown; an argument which, to our remarkably economical Government, will probably be stronger than anything that could be urged in regard to architectural effect or completeness, and from our point of view also that is in one sense the strongest or at all events the most unanswerable argument in favour of at least giving full consideration to this scheme at the present moment. Other things apart, we should not desire to shut Westminster Hall out from sight; but seeing that so much more room is really wanted (and that want will go on increasing) it is surely more in accordance with reason and common-sense to provide for this by completing the great building according to its architect's intentions, than to provide a few paltry rooms between the buttresses of Westminster Hall, and leave the rest to be found on the system of rabbit-burrowing in offices about

the neighbourhood. To carry out this scheme will be doing the thing once and for all, in a way worthy of the nation, and, if Mr. Barry's calculation is right, at an ultimate saving of money. If there is difficulty about the immediate expenditure, or if it is concluded that it gives more room than is wanted at present, the completion would be quite capable of being carried out in two instalments; half now, and when ultimately required.

The First Commissioner of Works suggests lately that some of the present buildings now used as residences might be taken for Committee-rooms, and residences provided elsewhere. In that case, the block fronting St. Margaret-street could very well be made a residential portion, and would be very suitably situated for that purpose.

The view is taken from the end of Great George-street, and shows as the prominent foreground feature the great gateway at the angle of new Palace-yard, which would form a grand entry to the precinct of Parliament. Sir Charles Barry proposed (and his son seconded the proposal) that this tower-like mass of building containing the gateway, with its octagonal lantern rising above, should be named "The Albert Tower."

DESIGN FOR A GATE-HOUSE AND BRIDGE.

WE give the design by Mr. E. Guy Dawkins for this subject, which obtained the 101. prize at the Royal Academy. It is a good "Medieval" bridge, and as such does credit to its author, but we would rather have seen an attempt to deal in a picturesque manner with a bridge built more upon the lines of modern engineering.

BAPTISTERY AND FONT, ST. MATTHEW'S CHURCH, BAYSWATER.

THE baptistery, font, and cover were given by the late Archdeacon Hunter to the new church erected on the site of the old one in St. Peter's-burg-place.* The baptistery is formed by a apsidal extension to one bay of the nave, and vaulted in stone, the moulded ribs being supported by detached shafts. The font is of Caen stone, with shafts of polished Devonshire marble. The cover is of American walnut suspended by chains from the central boss of the vaulting; the weight, of globular form, rests just under the gas corona. The work was executed from the designs of the architect, Mr. John Johnson, Queen Victoria-street, Mansion House, by Messrs. Dove Bros.; the carving being by Mr. Lawlor and Mr. Baird. The windows are filled with stained glass by Messrs. A. L. Moore & Co.

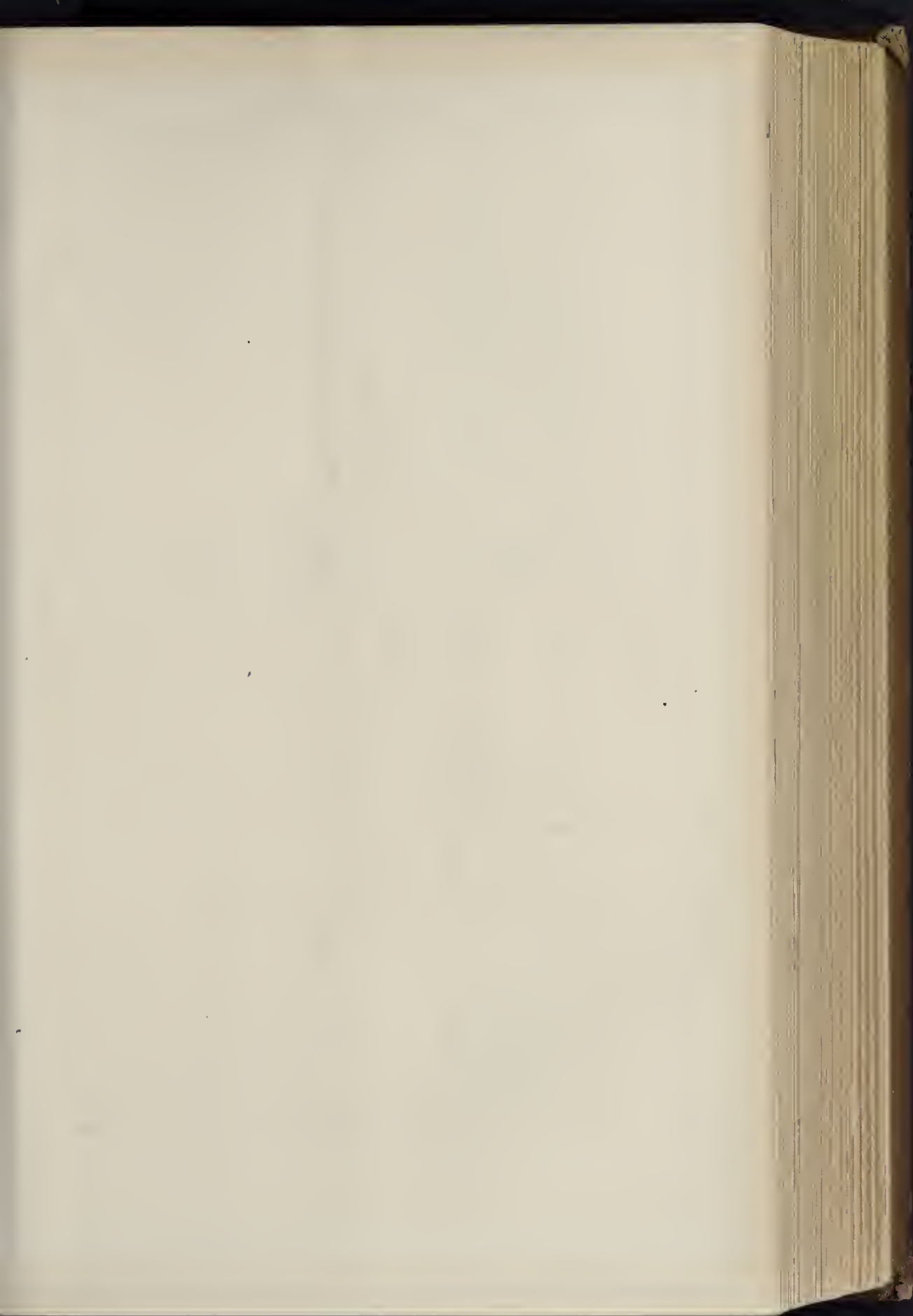
COMPETITIONS.

Newbury District Hospital.—No fewer than 120 sets of plans were sent in this competition. Mr. Waterhouse, A.R.A., spent some time in examining them, and has selected eight from which to give his final judgment. The following is the list of the eight designs so selected (mottos were optional), viz., those sent in by Messrs. Webb & Tubbs, of Reading; Mr. W. E. Woodroffe, of London; Messrs. Gordon & Taylor, Mr. H. G. Turner, Mr. J. B. Phillips, and those bearing the mottoes "Sunshine," "Economy," and "Plan" in red.

Upper Bourne Estate, Bourne-mouth.—The competition for laying out the Upper Bourne Estate near Bourne-mouth, for the Poole Town Council has been decided. The design "Spero," by Mr. Barnes, architect, of Poole, is placed first; and those hearing the mottoes "Au Bon Droit," by Messrs. Habershon & Fawcoker, architects, of London, and "Quod Petis Elic Est," by Messrs. Kemp-Welch & Pinder, architects, of Bourne-mouth, are bracketed second, and considered to be of nearly equal merit with the first.

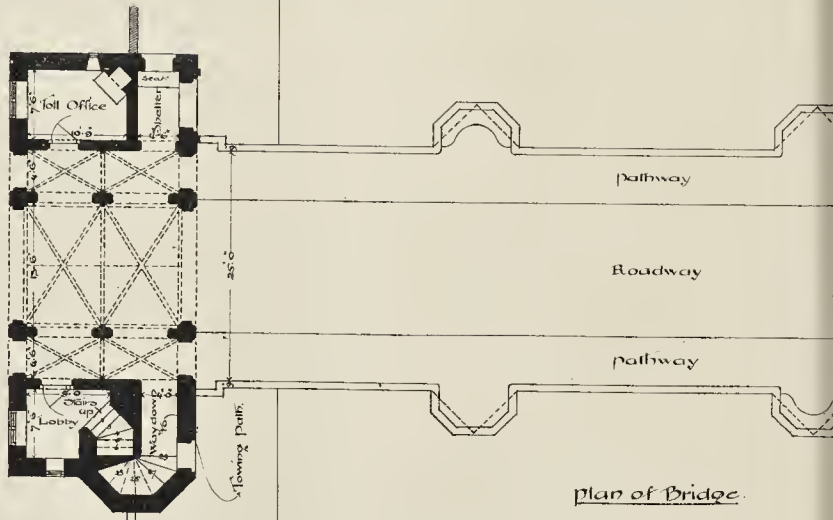
Nottingham.—Mr. W. H. Radford, Assoc. M. Inst. C.E., &c., has resigned his appointment as assistant engineer to the Nottingham Corporation, and has commenced private practice at Pelham-chambers, Nottingham, as a civil and sanitary engineer and architect.

* A view, plan, and description of the church were given in the *Builder* for April 7, 1883. We regret that our present illustration the title is misprinted "St. Matthias's Church."

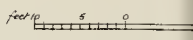




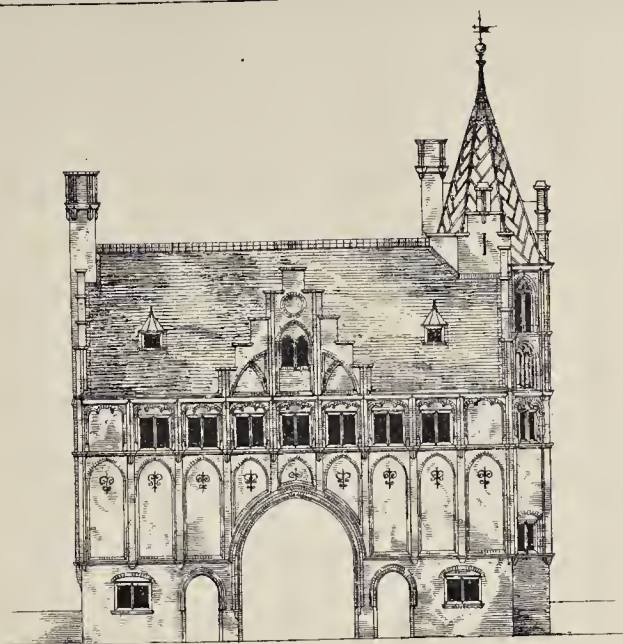
Side Elevation.



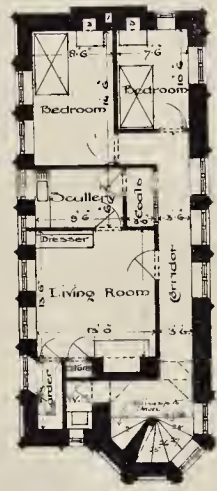
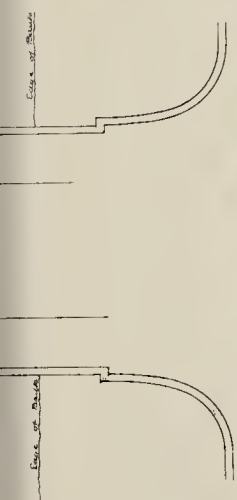
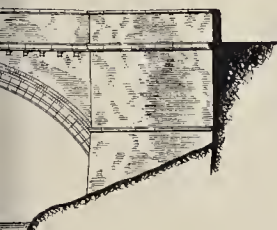
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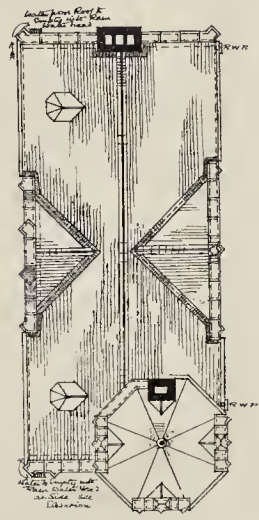
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Elevation towards Town.



~ first floor plan. ~

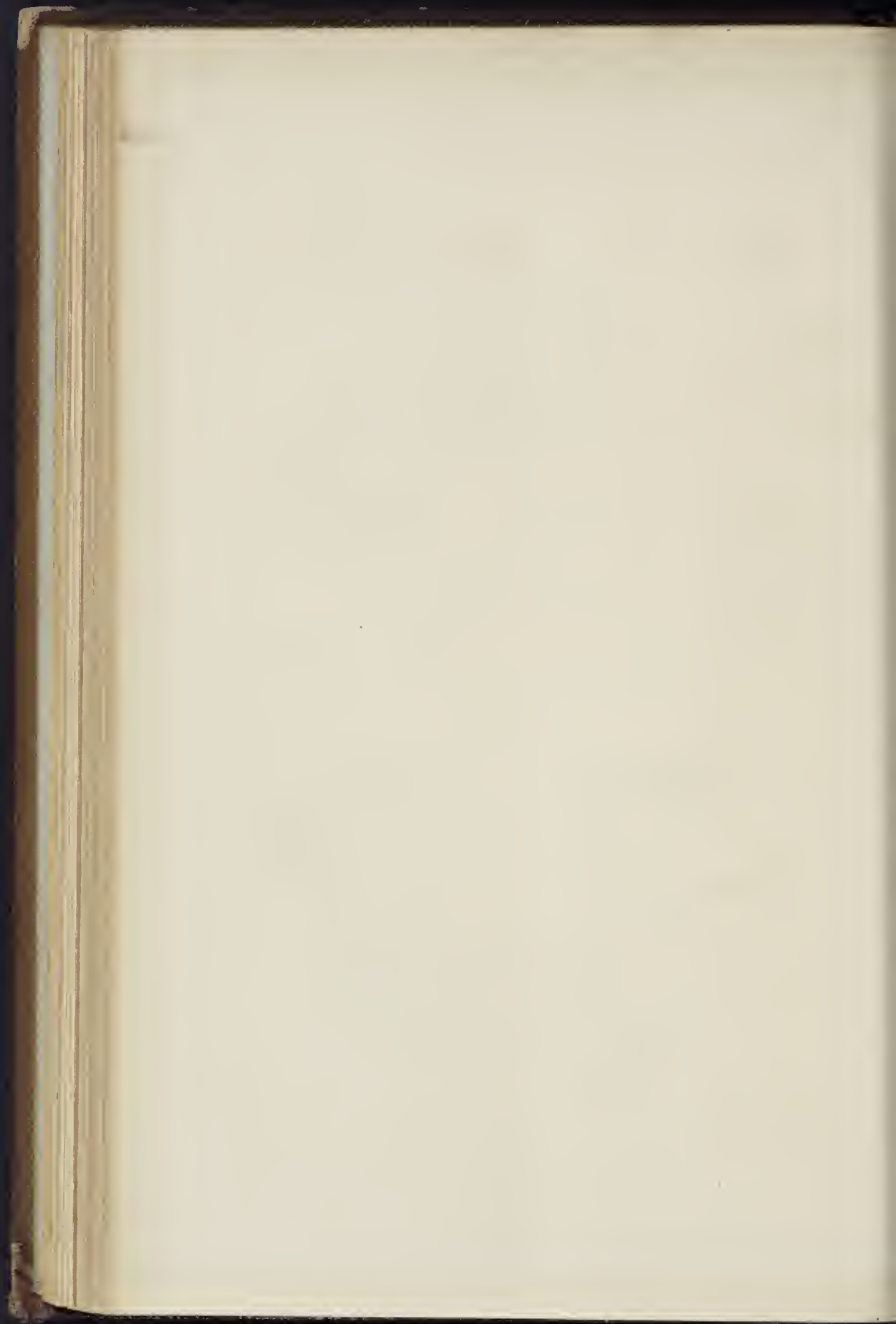


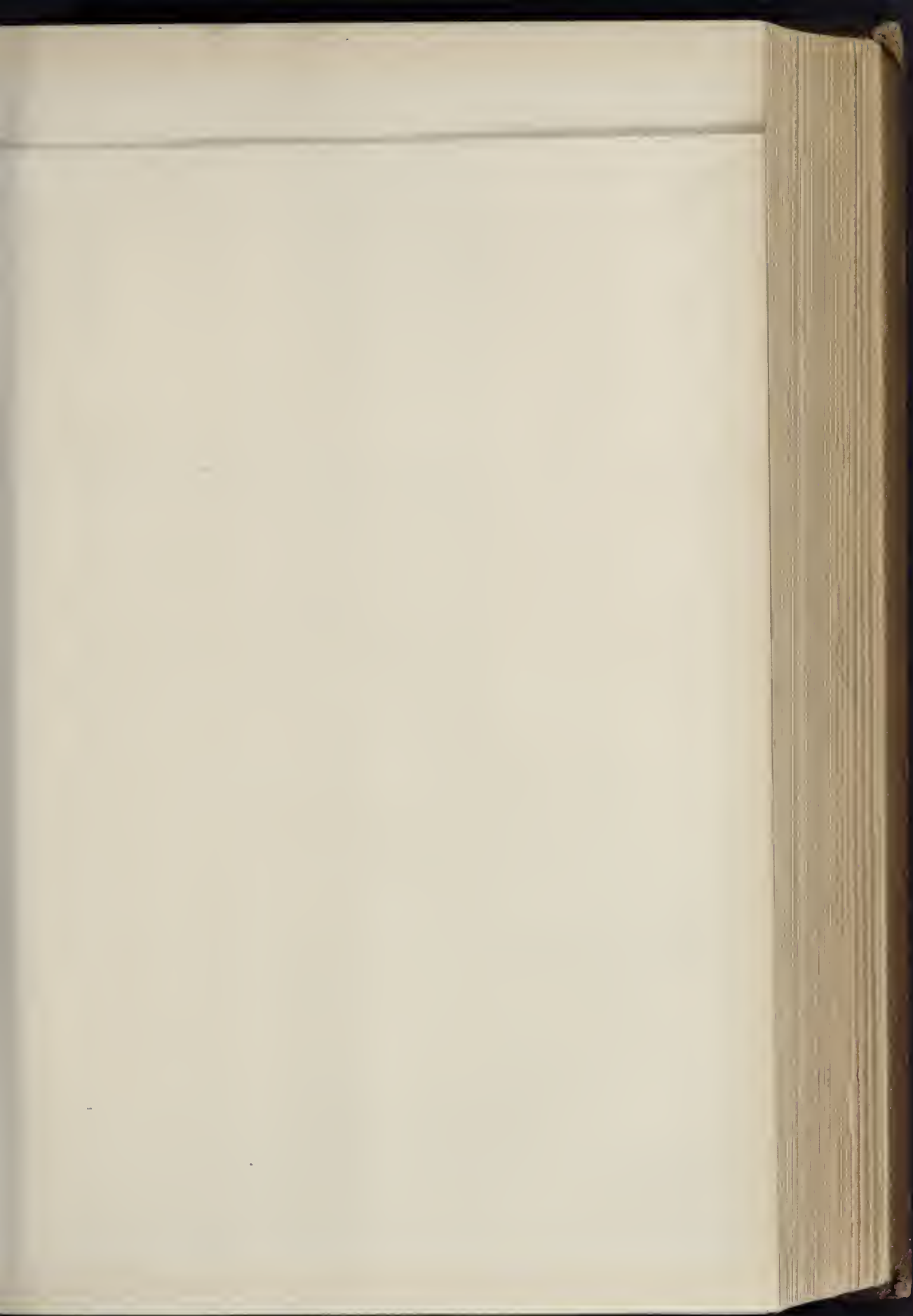
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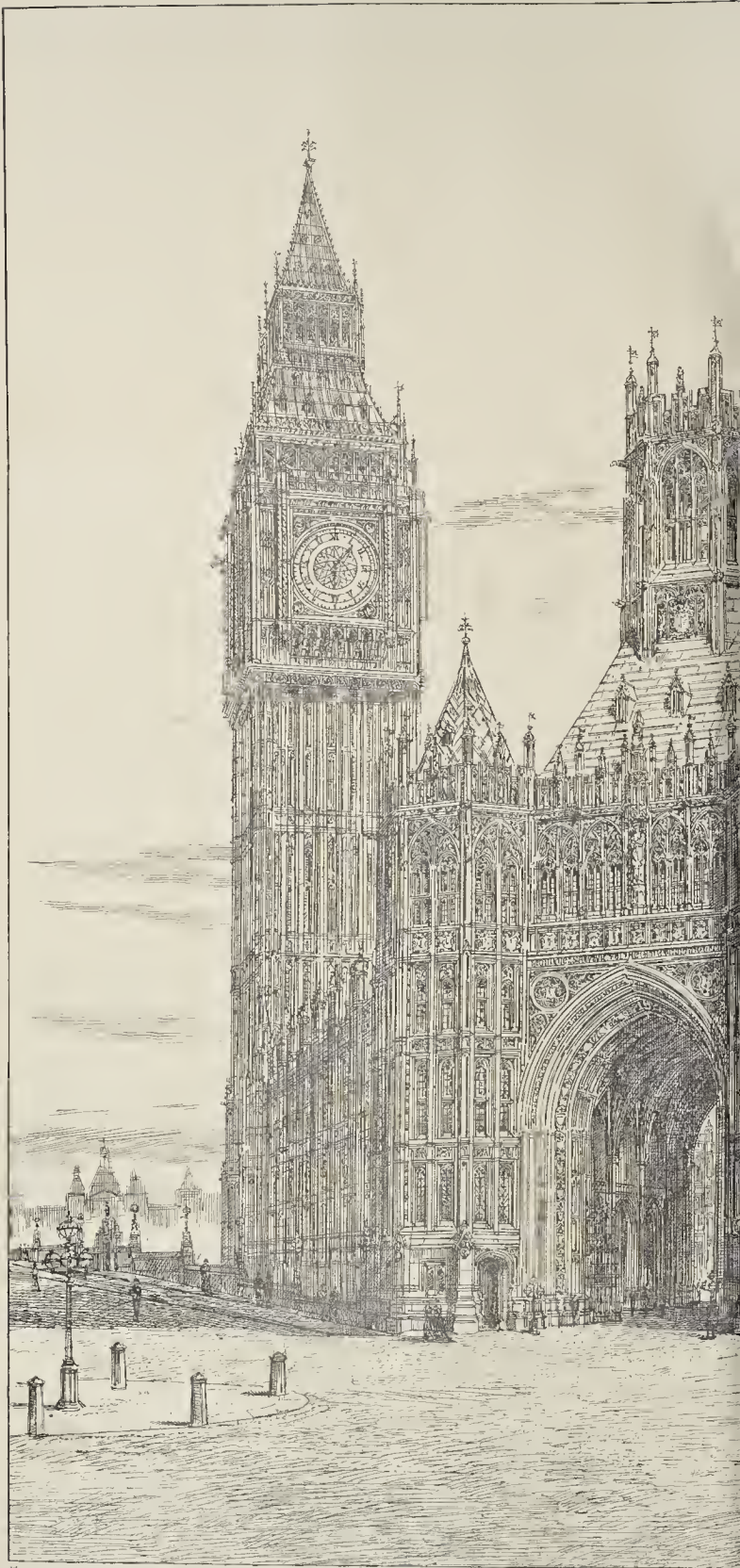
Queen St London, WC

By Mr. E. GUY DAWBER.

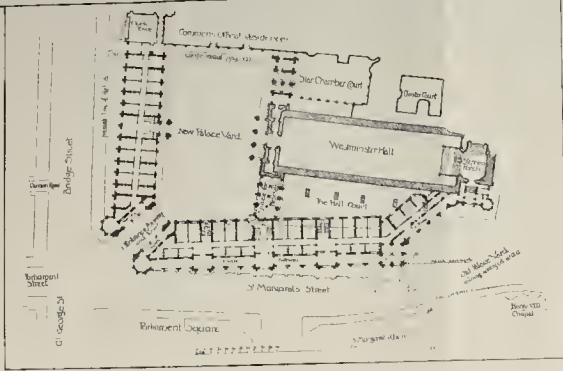
PREMIUM, 1884.







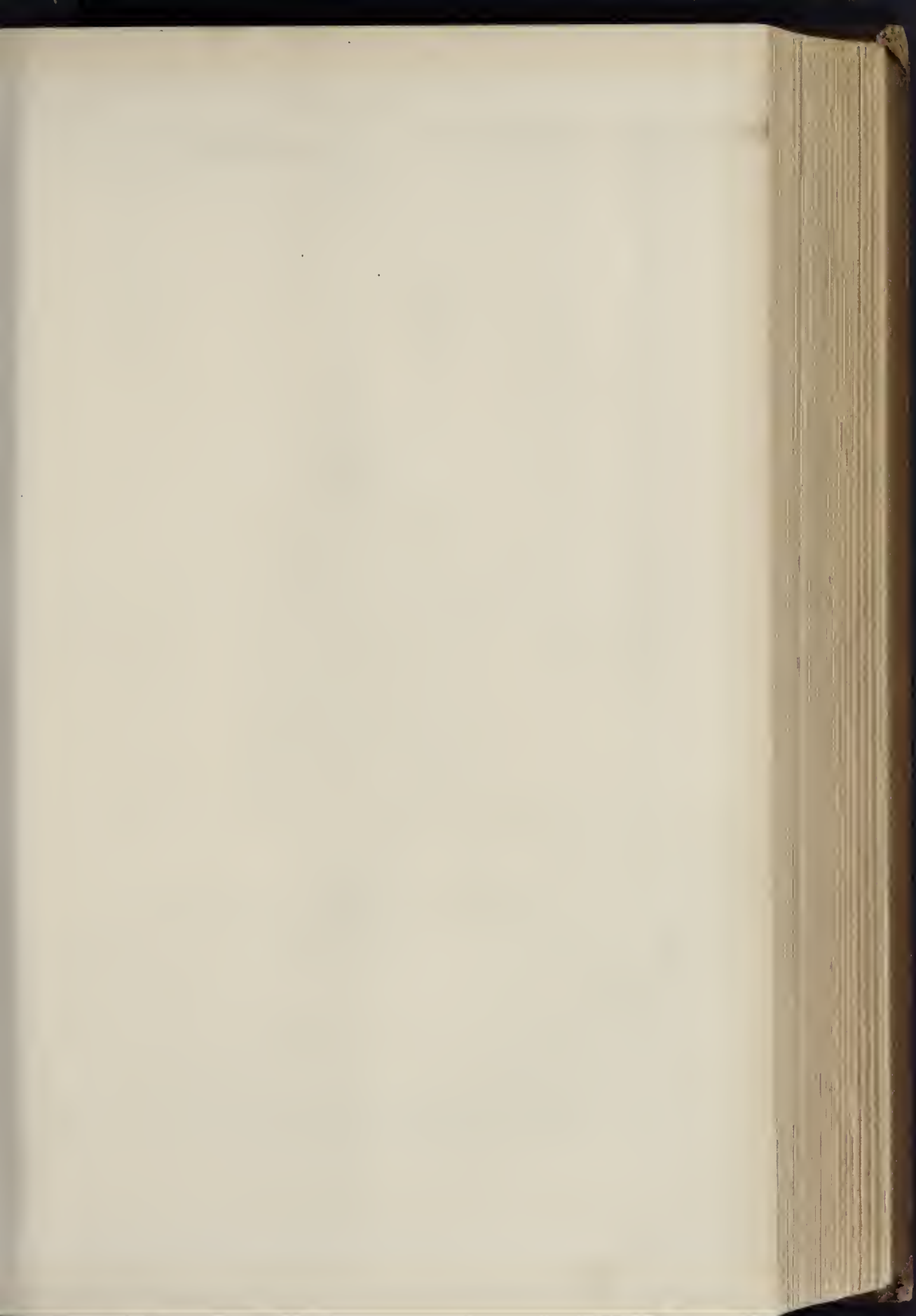
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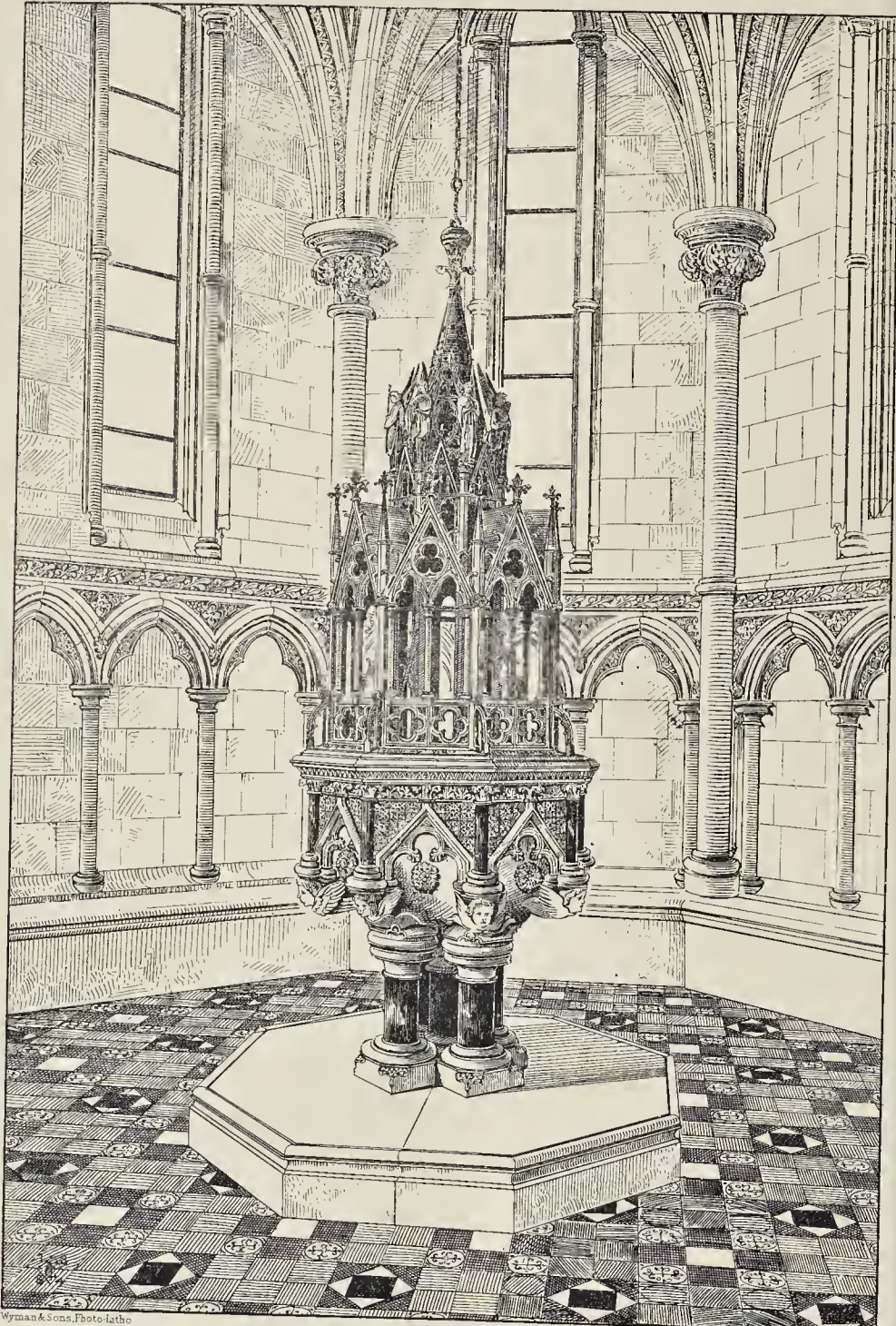


W. & A. Woodcut, London W.

FOR THE COMPLETION OF THE HOUSES OF PARLIAMENT

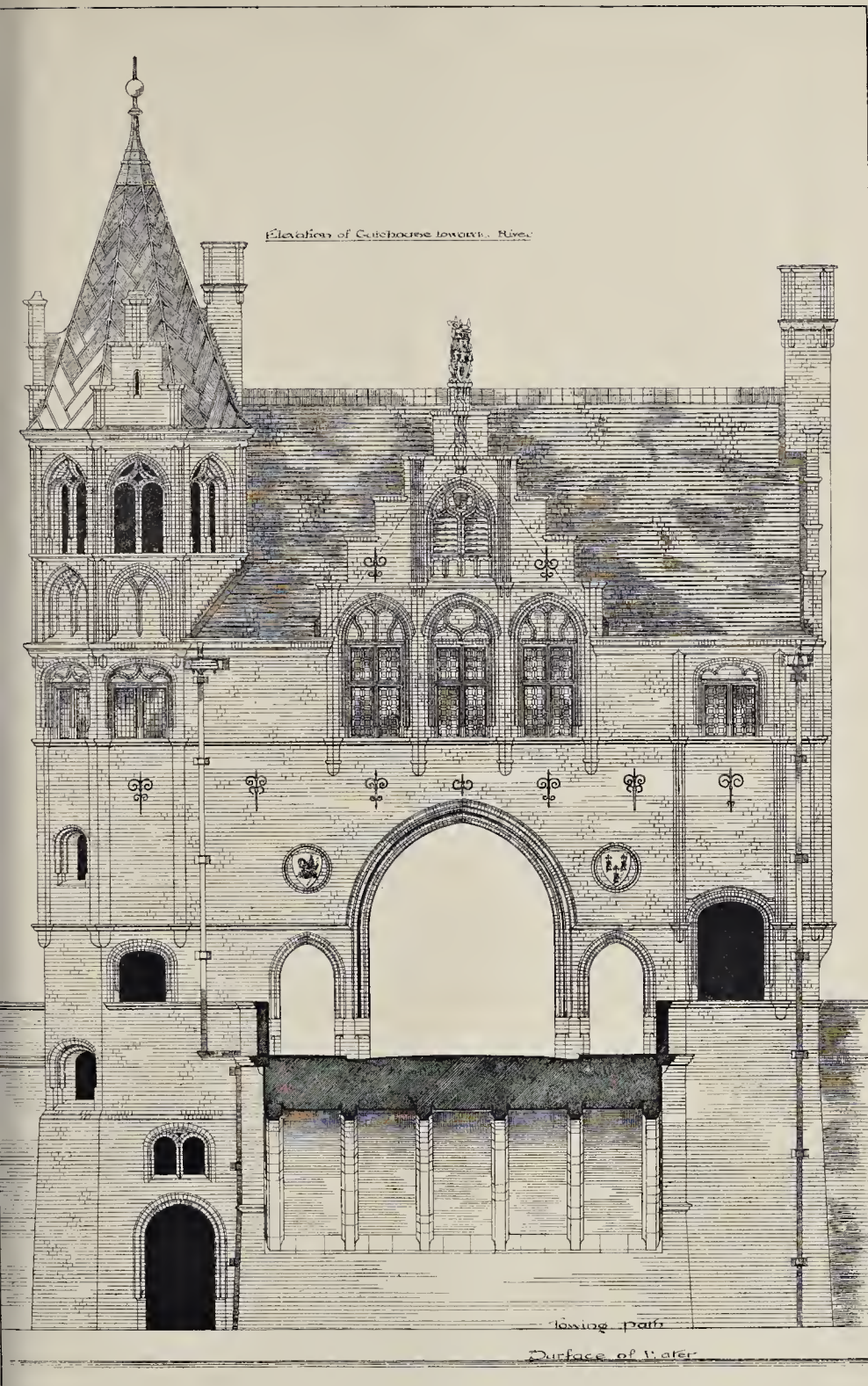
BY THE LATE SIR CHAS. BARRY, WITH SOME MODIFICATIONS BY MR. CHAS. BARRY.





©Queen St London, W.C.

BAPTISTERY AND FONT, ST. MATTHIAS'S CHURCH, BAYSWATER.—MR. JOHN JOHNSON, ARCHITECT.



DESIGN FOR A GATEHOUSE AND BRIDGE.—By MR. E. GUY DAWBER.

ROYAL ACADEMY OF ARTS £10 PREMIUM, 1884.

THE FIREPROOF CLOSING OF OPENINGS IN PARTY-WALLS.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE ordinary meeting of the Institute was held on Monday evening, Mr. Ewan Christian, resident, in the chair.

The Chairman referred in feeling terms to the loss the Institute had sustained by the decease of Mr. John Whichcord and Mr. R. M. Gibson. Remembering the interest taken by Mr. Whichcord in the success of the Architects' benevolent Society, it seemed to him that nothing would so well tend to keep his memory near as the founding of a Whichcord Fund in connexion with the Society. In this memorial both young and old might unite, as the fulfilment of the object Mr. Whichcord had had so deeply at heart, viz., of increasing the funds of the Society over which he presided.

Professor Kerr said that two of the professional papers in referring to Mr. Whichcord's decease had suggested that his presidency of the Institute was in some sense unpopular. It would be a great mistake if that statement were permitted to go uncontradicted. It was the fate of Mr. Whichcord, as President, to be, as it were, the first of a new dynasty. Circumstances had caused some difference of opinion, but beyond that Mr. Whichcord's presidency was highly esteemed by the Institute. Mr. Whichcord was a man of cultivated mind, of remarkably powerful intelligence, and of great experience of the world. It was his destiny in his profession to assume the position identified with the name of a purely practical man, and he came before them, as the recipient of their honour, in that light rather than as an artist and scientific man, which he might with a good grace have pretended to be. No one understood better the functions of a chairman,—to promote freedom of debate, and to arrive at the real sense of the meeting.

Mr. Hansard remarked that Mr. Whichcord was one of that band of brethren, of which Professor Kerr was another, who met at Mr. Asphiel's somewhere about 1857, and who propounded the first idea of a diploma for the Institute.

Mr. J. Macvicar Anderson (Hon. Secretary) also bore testimony to the value of Mr. Whichcord's opinion and judgment in difficult and intricate matters.

Mr. W. H. White (the Secretary) announced that the Council had awarded the sum granted under the Pugin Studentship for last year to Mr. Sankey. An examination of the sketches displayed on the walls would show that the Council had been justified in the course they had taken. It was further intimated that the sketches would remain on the walls for a few days.

Mr. Wm. White, F.S.A., then read a paper on "The Fireproof Closing of Openings in relation to the Metropolitan Buildings Act." After some brief preliminary observations, Mr. White came to the discussion of the main subject, consisting of three essential parts, the arrangement of the door; its fittings; and the arrangement of the opening. (1) For the material of the door, iron still held its own. It was not altogether free from perils of its own, but on the whole it was the safest. Mr. Braucon's concrete doors on iron wire lattice frames were admirably suited for fireproof purposes. Wood itself was one of the best non-conductors, and when thoroughly encased in plaster or sheet iron its resistance was remarkable. An oak door, double planked with metal or asbestos, would be very safe. A solid oak door of 3 in. or 4 in. plank, even without extraneous protection, was said to resist almost any fire, provided its edges were well protected. He did not know whether the merits of cyanite or asbestos paint on deal doors had been duly tested. But the door prescribed by the Act was of wrought iron, the thinnest panel of which was not to be less than 1/4 in. thick; hence it was commonly a sheet of iron riveted on to a skeleton framing of the same thickness, dividing it into two or more panels. The possible perils incident to this construction were pointed out, but it was owned that in many serious cases the thickness of iron provided by the Act had sufficed; still, it might often be well if the metallic shield were thickened out. Something might also be done by a contrivance for automatic closing of doors on the outbreak of a fire. Whether iron were the best material or not, it was at present the only one required or allowed

by the Act. (2) The Act required the iron doors to be fitted into a rebated frame. There must not merely be a rebated frame for the door to be hung in, but it must be so fitted that no space must be left anywhere round the edges; thus no draught must be able to pass, and no heat, save by conduction and radiation. The first effect of the great heat upon the iron would be to so expand it as to fix it in its framework and make it still more impermeable. Mr. White said he had been told by Mr. Aston Webb that on two occasions of a fierce fire in the smutting-room of a mill at Deptford, which was thoroughly burned out, the ordinary iron doors fitted in this manner effectually resisted the communication of the fire to the adjoining division of the building, although in each case one of the doors was found to be warped out of its rebate. This, doubtless, took place in cooling, when the worst of the danger was passed. As a construction exactly answering to one not meeting the requirements of the Act, and one not more satisfying the wants of those who on their own account might naturally be thought to wish to adopt a reasonably fireproof system, were introduced the doors separating the different buildings lately destroyed by the great fire in the Queen's-road, Bayswater. (3) Coming now to the third point, Mr. White remarked that the facilities afforded for the spread of fire were largely and dangerously increased by the great and improper number of openings in each divisional wall. By means of these openings each story became practically a huge horizontal warehouse, without any fireproof separation in its height, and accordingly with a succession of seven distinct risks, arising from the seven portions into which the building was nominally separated. On each of the five stories were two openings in each party-wall dividing the several structures. Thus in each party-wall there were ten openings instead of one, and they were told that nobody was responsible for this state of things except the luckless depositors, who ought to have made a personal inspection of the premises, or possibly obtained a professional opinion on their construction before risking their property there. It was not for him, said Mr. White, to give an opinion as to who was responsible for so scandalous a state of things, but he was very greatly astonished to be told there is a serious question as to the number of openings allowed by the Act in any one party-wall; he was told that District Surveyors generally take it for granted there is no restriction. He knew that some who had studied the Act very carefully were of the same opinion. Against this laxity of interpretation he argued very earnestly and at considerable length. After all, however, it seemed to be undeniable that there were really no means of enforcing these provisions of the Act. No penalties were attached to its evasion in these respects. There was no Government Commission, and no system of inspectors to watch over its enforcement, as in the case of the Factory Acts. Again, the Act merely spoke of a building "used,"—not "hereafter to be used,"—and so the condition could not be enforced till after its occupation, the restriction would not apply till after the granting of the District Surveyor's certificate, leaving the owner or occupier free to use it in any way he might see fit. If this should be so, indeed, it was a case for immediate legislation, or, at any rate, for administrative reform. It would be well if in the case of these huge warehouses matters could be put on a better footing for the protection of the public. In respect to dwelling-houses, care was really taken, the District Surveyor having power to get a magistrate's order to stop or even to take down improper work. In theatres, personal safety had not yet been really secured by the compulsory provision of due means of exit in the event of panic. He, however, had done his duty in calling attention to necessary reforms.

Mr. Woodthorpe, in opening the discussion, said that there were many defects in the Act, as in all Acts of Parliament. There was a difficulty with regard to the definition of the term "public building," and the question of the construction of the doors was capable of improvement. At the same time, they had to thank Mr. White for bringing the matter before them so ably. The Act in its present form had succeeded well in many instances where the fire was moderate, but in cases where the fire was great, it was difficult to find anything that would help to stop it. The flames generally spread, not

through the door, but by attacking the roofs. One very weak point in the Act was the fact that there were no means for compelling the closing of the doors. If this were done in the early part of the fire, it would be found very effective, and a heavy penalty should compel this to be done. In the present state of the law, the District Surveyors did the best they could, and in the face of divided opinion there was great difficulty in carrying out the terms of the Act. He agreed that the Act could easily be amended, and considered that amongst other things, the party-walls between warehouses should be carried higher.

Mr. Jennings remarked that Mr. White seemed to imply that District Surveyors had not done their duty. The District Surveyor had no positive power in himself, except to take a case before the magistrate. With respect to the question of the iron doors, the Act did not say how they should be hung. It said that they should be the distance of the party-wall, unless they were thickened as now required by the Fire Offices. Therefore as far as the Act was concerned, it was not requisite to put the door in the exact way Mr. White spoke of. As regards double doors, these had been successful in almost every case. He was present at the fire in Duke-street, when one of a pair of iron doors was opened to have a look at the other, which was found to be perfectly efficient. The requirement of double-doors was most essential for the prevention of fire spreading from one building to another, but, as Mr. Woodthorpe had said, there was no provision for their being kept closed. Indeed, in order to compel this to be done, they would require the services of a police force to examine the doors. In his experience of fifty years he had never met a single instance in which the fire had passed through a properly-built 9-inch wall. The great cause of the spread of fire was the putting of timber into the wall, the heat being sufficient to burn the ends of the timber and so communicate the fire. At the present time a large number of additions and alterations are made by persons cutting into the party-wall, sometimes without knowing they have gone through the wall. He did not think the Metropolitan Board of Works had much power to interfere. They considered they had the power of disapproving of public buildings not built in accordance with the Act, and yet he found they had allowed a wooden staircase in a church where 20,000*l.* had been spent on decoration. He hoped architects generally would take some steps to provide for further security against fire. The public had not much ground of complaint, as they could always insure their goods.

Mr. Robert Walker considered that Mr. White had been severe, not only on architects and District Surveyors, but also on the progress of modern improvement. He did not suppose that Mr. White meant to say anything derogatory to the practice of his profession, or to the high principle of modern architects in doing the best they could for their clients. But he protested, as a District Surveyor and an architect, that any gentleman guilty of direct infringement of an Act of Parliament. He had had a good deal of experience lately in connexion with the iron-door question, and he would join issue with Mr. White when that gentleman said that the fire-proof doors recently constructed had been inefficient. On the contrary, he would contend that the modern system of using fire-proof doors had been a grand and great success, and this had been recognised by the insurance offices. The Stores in the Haymarket, with the greater part of their contents, had been absolutely saved by their fire-proof doors. The same remark applied to Messrs. Crosse & Blackwell's factory, and to the painting-room at the Alhambra, with its most inflammable contents. His experience differed entirely from that of Mr. White. Fire, as a rule, did not spread laterally, but ascended vertically. He had received many applications to allow the employment of concrete fireproof doors, but he did not consider them fitted for their purpose. Every engineer knew that in fitting furnace-work it was a mistake to use Portland cement, and all the best chimneys and furnace-work were constructed with mortar, as heat made the concrete fly. He did not know that, on the whole, the sliding-door

was not the best. There had been a talk about shutting the door, but the necessity for this often did not arise until the fire occurred. In the case of the Haymarket fire the sliding-doors were closed after the fire originated, and yet they answered their purpose. If a door was made to open outwards it was a common custom to allow bulky materials to lie in the gangway, and it was generally in warehouses where these doors were, that they could not be closed in case of fire. The Act stated that stone lintels were necessary, and yet this was the worst substance that could be used. The late Mr. Whichford, however, built the whole interior of the National Safe Deposit Company's building of fire-brick. It had been said that there should be only one door in a party-wall, but hitherto they had always considered that if a person wanted an opening on each floor he should have it, and there could be no objection to iron doors if made of proper material and constructed in a proper manner.

Mr. Tavenor Perry said that when folding doors were used, they frequently opened in the middle, leaving a considerable orifice, which was not the case with sliding-doors. At the Alhambra the sliding-doors effectually stopped the fire, although a quantity of scenery was stored against the other side of the doors.

Mr. J. H. Heathman believed the cause of the spread of the fire at Westbourne-grove was due not to the manner in which the doors were hung or closed, but through a door becoming heated. The heat radiated from that to the other door, and the timber took fire. He was of opinion that doors allowed to swing had full liberty to expand without warping, and if these were closely fitted, and hung in a proper manner, they would answer far better than a door which could not expand without burning. The Act of Parliament did not prohibit the placing of goods in close contact with the door. There should also be some limit to the distance at which timber was fitted near to a door. No timber either in the floor, on the walls, or at the top of the door, should be nearer than 18 in. to any ironwork composing the door.

A visitor, who did not give his name, but who said he had attended as a representative of the Fire Offices Committee, next spoke. As a matter of fact, he said, the Offices had lost faith in the Metropolitan Building Act as far as the doors went. They had suffered so much from the construction of the doors that they had endeavoured to help themselves in this matter. They had, therefore, found it useful in the case of some of the larger docks and warehouses to establish a door of their own, and they had special surveyors engaged to go about and insist that the doors should be built in a certain form. The Offices required that the door should be a hinged one of wrought iron, not less than $\frac{1}{2}$ in. thick in the panels, hung in a cast or wrought iron rebate, and firmly bolted to the wall; such door not to be more than 5 ft. wide and 7 ft. high, and to be in two leaves, not exceeding 2 ft. 6 in. each, fastened with bolts into the frame at the top and bottom. The intention was to prevent backing when the pressure came upon the doors. The term double-iron doors was taken to mean a pair of iron doors similarly hung placed on each side of the opening in the wall so as to be distant from each other the full thickness of the wall.

Mr. Hansard believed that the Fire Offices were entirely wrong in insisting on folding-doors. The sliding-door, not too large in its dimensions, properly sunk into the floor, and with iron guides, was the best form. The top should be 1 ft. 6 in. or 1 ft. higher than the opening, and if such double doors were properly hung on sliding iron rails and wheels, he believed that no fire could possibly penetrate through the sides. According to present circumstances, a rebate was simply allowed to be sunk 2 in. in the wall. If it were insecurely fastened, directly the fire played upon it it passed round the 2-in. rebate, and the danger was immediate.

Mr. H. H. Collins thought it was perfectly futile for any insurance office to lay down rules as to how these doors should be constructed, inasmuch as they had to be made according to the Act of Parliament, whether they liked it or not. He had applied on various occasions to the Board of Works for permission to vary the method of construction as defined in the Act, but it had met with an invariable refusal. Sliding doors, sliding shutters, doors sunk in the floors, and other matters, had invariably, and he believed, rightly, been refused by the

Board of Works, who had no power to vary that part of the Act. If District Surveyors had allowed this, they must have done so in contravention of the Act. After all, the regulations laid down by the Fire Committee seemed to be almost in accordance with what the Act indicated. Many of the doors, no doubt, were never touched from the time they were fixed, and the insurance company might insist upon this being done, or charging an increased premium where it was omitted. They, as officials, could only carry out the provisions of the Act, and the insurance offices should assist them in doing so, rather than lay down rules for the construction of doors. Match-boarding was a very fertile source of fire, and there was no reason why fire-resisting plaster should not be applied to walls. Iron doors were a source not only of anxiety, but were a great nuisance to District Surveyors, and more particularly in the City of London. As Mr. White had said, if these questions were brought before the magistrates, they were simply ignored, or a decision was given totally adverse to what might be desired.

Professor Korr agreed with the last speaker that it was for the fire offices to remedy whatever faults were complained of; the District Surveyors were absolutely powerless. Some people seemed to be unaware of the course that supplementary legislation would take. He happened to be present a good many years ago at a Committee of the House of Commons to consider the Bill brought in by the Metropolitan Board of Works for amending the Building Act. It was found, in dealing with it, that the Committee were going to throw overboard the restrictions with regard to the limitation of areas. Mr. Walter, of the *Times*, for instance, could not understand why the office of that paper should be divided by party-walls; and others, representing businesses on a large scale, were very much disposed to throw the buildings entirely open. As a District Surveyor, he found people extremely reluctant to have iron doors under any circumstances, and it became really a matter of persuasion. As to going to the Police Court, that was out of the question. It was true that the District Surveyor was more or less a policeman, but, if he took the offender before the magistrate, failure was the inevitable result, and he might have his feelings outraged and himself insulted. The magistrate was really sitting for the protection of the public against unnecessary official interference, and could not be got to understand the reason for the precautions in the Building Act. The fire offices should combine together, bearing in mind that this is a commercial and free country, and that draughting will not be submitted to, except as a matter of contract. The offices had the power of contract with the public, and if they laid down ascertained rules, insisting on their performance, without doubt great good might be effected. Parliament had simply meant to advise the public what they ought to do, leaving the fire offices to bring their contracts to bear upon the matter.

The gentleman representing the Fire Offices Committee here referred to a case in which they had a warrant that the doors should be closed; but, when a fire happened in the night, it was discovered that the doors had been left open. Payment was resisted by the insurance companies, on this ground, but eventually they were advised not to plead that. Then, as to area, the limitation was often ignored, and he could point to a large building in Ludgate-hill, the dimensions of which were far in excess of the limits, and without provision for a division. They had felt bound to call the attention of the Board of Works to this matter, but were informed that the Act did not apply.

Mr. Wyatt Papworth thought it was important that the doors should be properly fixed. He had seen iron sliding doors where considerable space was left between the doors and the cement work.

A cordial vote of thanks was then passed to Mr. White for his paper.

Mr. White, in replying, remarked that, there being no means to compel the closing of the doors, he knew perfectly well the great difficulty that would exist supposing there was any compulsion. This seemed a main reason why the number of doors should be limited. If there was no limit, it could hardly be called consistent with what had been laid down in the Act of Parliament if it should be so strict in its limitations in a few details, leaving the rest

wholly uncaared for. It would be well to have sliding doors if they could be made to slide into closed fire-proof frames, but not where the door was on the face of the wall with nothing to protect it. Folding doors should not open more than to the square of the opening. He thought he had guarded against making any insinuations upon District Surveyors.

We have received the following letter from Mr. Banister Fletcher:—

"It seems to me clear that Mr. White is entirely wrong in reading the Act, because if we refer to Section XX., Sub-section XIV., we see 'no flue shall be,' &c. Clearly, therefore, no opening is to be limited to one opening, only one flue is to be built against a party structure, —which I think even Mr. White will agree, the Act never contemplated.

I might also cite Sub-section XV., but it appears to me, as it does to all those to whom I have spoken, that the meaning of the Act is clear, namely that there may be more than one opening, but that no opening shall be made except subject to certain restrictions.

The District Surveyors must interpret the Act in its legal manner, for, as Mr. Jennings pointed out, all our decisions are subject to the review of the court.

With regard to the statement made by the gentleman from the Insurance Offices as to the requirements by the Fire Offices, I venture to point out the defects.

It is well known that many fireproof-doors have been shut after a fire has commenced, as was mentioned in the discussion by Mr. R. Walker; and if they are swing doors they may have become so heated and have consequently expanded that they cannot be shut. Another drawback is that all such doors must have spaces at the top, at the bottom, and at the sides, through which the air can pass, and, of course, fire; whilst sliding-doors, which can be and are made several inches wider and higher than the opening, prevent more effectually the fire circulating; and at the bottom, as the door may and should go into a groove (as mentioned by Mr. Octavius Hansard), the draught cannot get under the door with nearly the same ease as it can with the swing door. The further objection to the swing door that it is much in the way seems to me to be important.

To show that the Insurance Office officials alter their requirements, I would mention that when I was superintending the building of the Monument Wharf and Bonded Warehouse, in Thames-street, acting as Surveyor to the Dyers' Company, much loss of space was occasioned by the Fire Office insisting that 3 ft. space should be left between the iron doors. I write this to show that the Fire Offices have varied their requirements, which would seem to show that they are not certain as to the best method, although the gentleman seemed to speak with such confidence that they thoroughly understood the subject.

I may mention that the District Surveyors' Association has lately been giving special attention to the subject of fires and fire-proof construction. One of the great causes of the spread of fires is the lift, as to which little was said last night.

I feel sure the result of the discussion will be to show that Mr. White has misread the Act, and to fully acquaint both District Surveyors and architects of the serious charge that they act in defiance of legislative enactment."

The Lambeth Water Company's Extension Works.—For several months past the Lambeth Water Works Company have been engaged in laying down a new and enlarged line of water pipes between their intake at Kingston and their reservoirs at Brixton. This has been found necessary in consequence of the great increase of supply by the company during the last few years, and the inadequacy of the existing pipes to convey the water required. Between the company's works at Kingston and the reservoirs at Brixton the distance is upwards of eleven miles, and from Kingston the pipes are being laid along the main high road, passing through the parishes of Norbiton, Wimbledon, Merton, Tooting, Balham, Clapham, to the works at Brixton. The work has now been carried forward as far as Balham. The pipes, which are 3 ft. in diameter, are being laid down by Mr. Docwra as the contractor. The undertaking includes the construction of additional storage reservoirs at Brixton.

ARCHITECTURAL ASSOCIATION.

The seventh ordinary meeting of the session took place on Friday, the 16th inst., Mr. Cole Adams, President, in the chair.

The following new members were elected:—Messrs. E. C. Macpherson, G. W. Tatit, C. H. Mason, R. W. H. Edis, G. E. Pilkington, and T. Wenhorn.

It was intimated that the first visit of the members would take place on Saturday next, the 24th inst., to St. Marylebone Parish Church, Mr. Harris, architect.

The Chairman referred to the loss sustained by the profession in the death of Mr. John Whichcord.* Those who knew that gentleman knew him as a man of rare attainments and of the strictest integrity, and one who, in his particular line, was second to none. In his younger days Mr. Whichcord, he believed, had devoted himself to the study of architecture and colour decoration, but latterly his practice had led him more into that of a surveyor, entrusted with some of the largest concerns and arbitrations in the City of London and neighbourhood. Mr. Whichcord had the rare distinction of having his name frequently put into contracts as a reference, and the more so of a man having won character for integrity and for the strictest judicial mind was worthy of notice. Mr. Whichcord was buried in Kensal Green on the preceding day, and the Chairman had the melancholy duty of representing the Association at the funeral.

The Chairman also drew the attention of the members to the Architectural Association Sketch book, the plates of which were displayed on the walls. Many of the sketches were of a very high character, being excellently drawn, and evincing much artistic feeling. He hoped the subscription list would be enlarged.

The Chairman, in introducing the lecturer of the evening (Mr. Farrow), said that that gentleman, like Mr. Gale and Mr. McLachlan (both members of the Association), had distinguished himself by winning the Godwin Bursary.

Mr. F. H. Farrow then read a paper on "The Ventilation of Public Buildings." The substance of this we give on preceding pages.

The Chairman, in opening the discussion, rejoiced that Mr. Farrow, one of their most talented members, had taken up the question of the science of ventilation, and gone so thoroughly into it. The more his example was imitated the better it would be for the profession. Mr. Farrow had not called attention to one very important medium for ventilation, viz., the warm-air stove. One of the best stoves was that designed by Mr. D. O. Boyd, the curator of the Museum of Building Appliances. By means of this a large volume of fresh air was brought into the room, and the fire, instead of drawing the air needed to support combustion from leaky doors and draughty windows, kept the room at a comfortable temperature. In his practice he had found the John tubes useful. In some positions there would be a down-draught from them, but with a little care that could be obviated. Mr. Farrow had referred to a down-draught in connexion with the syphon ventilator; but this could be prevented by having a board suspended underneath the down-cast to distribute the air. Then there was the simple plan of the ordinary sash window, with the bottom bead of the lower sash made of sufficient height to allow of the admission of air at the meeting-rails, without draught.

Mr. J. A. Gotch, in proposing a vote of thanks to Mr. Farrow, expressed his satisfaction that the paper had not been loaded with statistics.

Mr. H. G. Turner explained the system of ventilation used in the Houses of Parliament, which was believed to be the best ventilated building in the world, though the cost was very great. He differed from Mr. Farrow as to the best method of extraction. In his opinion heat was the best method, as it could be regulated to a nicety, it being possible in the Houses of Parliament to regulate the temperature to half a degree. One of the best ventilated of the smaller buildings of the metropolis was the Brompton Hospital for Consumption. There the fresh air was brought in at the ground level and warmed by passing over coils. The foul air was extracted in vertical tubes with outlets into these at the floor and ceiling levels. The out-patients' department of a hospital was often most offensive, but in the case of the Brompton

Hospital it was perfectly sweet and pleasant. The general public rather than the architects were to blame for the want of ventilation. To do it well cost money, and the public would not pay for it, while, if it were done, and anything went wrong afterwards, the unlucky architect got the blame. Mr. Turner concluded by seconding the vote of thanks.

Mr. H. W. Pratt remarked that architects frequently erred in not allowing sufficient cubical contents to public buildings, churches, and chapels. The Tobin principle had been designed to improve the ventilation of such buildings, and if the area of the tubes and their position were more studied, they would be found more successful as a simple means of introducing air. Air might be warmed without extra expense by the ordinary heating apparatus used in the buildings. Boyle's system had been designed for the extraction of the vitiated air, but architects made a mistake in enclosing the cows in turrets.

Mr. Stokes did not believe in the great necessity for extraction so long as sufficient air was introduced, for then the foul air must go away. If there was a ventilating grate they must trust to Providence for the removal of the foul air. The down-draught from the Tobins often arose through the tubes being too large, and it was better to have a great many small tubes than too few large ones.

After a few remarks from Mr. Ellison, Mr. Mountford, and Mr. Blagrove, the vote of thanks was passed by acclamation.

Mr. Farrow, in replying, said that he had purposely avoided, as far as possible, any reference to the heating of buildings, because it would have occupied the whole of the time at his disposal to have explained the different methods. He had simply dealt with the ventilation question, and the requisite amount of heat which would have to be provided in some way. The Houses of Parliament were good examples of effective ventilation, but there was no doubt the system was an extremely costly one. Most authorities were of opinion that for any given expenditure a better result would be obtained by the use of rotary fans, together with engines, &c., than by the use of enormous furnaces, and a great consumption of fuel.

SANITARY AID COMMITTEES.

From the *Charity Organisation Review*, a monthly pamphlet issued by the Charity Organisation Society, in lieu of their former weekly *Reporter*, we quote the following information in regard to the working of volunteer sanitary aid committees, given by Miss Gertrude Toynebee, a worker on the Marylebone Committee:—

"Thirty-three of these committees have been formed in London, and about twenty of them are vigorously at work. The results accomplished by the latter are quite sufficient to justify more widespread action, and it is to be hoped that when their first annual report is circulated the less vigorous committees will take heart and set to work. The facts which suggested the movement remain as a justification for its continuance. Illegal insanitary conditions in the homes of the working people are more or less universal; the tenants are not sufficiently independent to be able to protest for themselves; the sanitary officials are too few, and their standard too low, to find out any very great number of nuisances on their own account.

It will be as well to give some detailed experiences of sanitary aid work in one district, e.g., Marylebone. There we have three committees at work, the parish being divided for our purpose into North, East, and West Marylebone. These committees have now between them had about 400 cases, and they have proved to be, with very few exceptions, *bona fide* cases, trivial complaints being rare. Speaking roughly, from sixty to seventy remain on hand, the rest having been dismissed as satisfactorily dealt with. But it must here be noted that the endless amount of time and labour expended by the committees to achieve these results would be almost incredible to outsiders. There are many cases which have been visited and reported on, fortnight after fortnight, for months and months, often for six months, and not infrequently for longer. What happens is this. The sanitary inspectors not only delay their visits of inspection, but delay giving orders to the landlords, and when the orders

are given, delay taking measures to enforce them. Hence the landlords simply play with time. In most cases some trifles will be done at first, and promises of more will be made, but there the matter rests for months, until, by persistent complaints from the Sanitary Aid Committee, the whole nuisance is at last abated.

1. There is no doubt that more inspectors ought to be appointed. Their salaries would not materially increase the expenditure of the Vestry, while the improved sanitation thus obtainable would lessen the amount of ill health among the poor, and so compensate the rate-payers.

2. The present staff of inspectors ought to have their work more thoroughly supervised. At present, owing to apathy and want of system, they get through much less work than they might, and much that they do take in hand is ineffectual. Doubtless what we want is a large body of zealous, disinterested gentlemen on the Vestry, who shall make themselves somewhat responsible for the sanitary condition of their district by becoming personally acquainted with it, and with the work done by the inspectors. Such men would do much to raise the official standard of sanitary reform in their district.

Considering the difficulty the Sanitary Committees have had in getting sanitary laws enforced, it is not surprising that the tenants find that when they do muster up courage and energy to make a complaint to the vestry they cannot get it attended to. The other day one of the usual complaints of had drainage, &c., came before the West Marylebone committee. The tenant had lived twenty years in the house, and had himself complained again and again to the vestry and to the landlord, but he could get nothing done. He had constant ill-health in his family, and the doctor asked repeatedly whether the drains were wrong. When the Sanitary Committee complained to the vestry the drains were taken up and found to be broken and porous; neither the water-closet nor the sink had traps, while the only cistern was uncovered, in an outhouse, from the roof of which blacks and cobwebs fell into the water. A new pipe drain and traps were provided, and the committee hope to secure also a proper cistern. This tenant pays a heavy rent, and pays it regularly; and this is the case with a great number of the tenants with whom the committee have had to deal, so that they feel that in pressing the claims of such people to a sanitary condition in their homes they are but doing a simple act of justice.

The tenants, as a rule, have been most grateful for the interference of our committees, and this in spite of their having received a good deal of rough abuse, not only from the landlords, but, I am sorry to say, from the inspectors as well."

"A CLUB-ROOM AT THE INSTITUTE!"

Sir,—I have not misunderstood Professor Kerr, but that gentleman has misunderstood himself. There can be no cohesion between summer and winter.

What is the use of saying, "Those who are in favour of such a measure might," &c. (*Builder*, p. 118, ante), when many more than half of the members of the Institute have no vote, and whose opinions count for nothing upon a division?

It is childish to talk of "a member having anything on his mind" following any such suggestion as submitted.

If it is desirable to "compare notes," let senior members give lectures of their experiences.

There has been a late proof of a very strong cohesion among the younger members, but the attachment of this to the senior members does not surely depend upon the unsavoury atmosphere of a coffee-room.

I am jealous of the dignity and character of our premises at No. 9, Conduit-street, being preserved; and if Professor Kerr has no better legacy to leave to the Institute, he must know, at any rate, that to this "restaurant" idea must be answered

No!

. We also say "No." The notion seems to us unnecessary, and quite incompatible with the resources of the architects' house in Conduit-street.

Whiston.—A large memorial tablet has just been erected in Whiston Church, Northants, to the memory of the late Lord Boston, by his uncle, the Hon. and Rev. L. Irby, the rector of the parish. It has been executed in alabaster and Turkish marble by Messrs. Farmer & Brindley, from the designs of Messrs. Taylor & Gordon, architects.

* For memoir, see last week's *Builder*, p. 98.

ASBESTOS PAINT.

SIR,—Referring to the preservation from fire of inflammable building materials, in his presidential address at the Institution of Civil Engineers on the 13th inst., Sir F. Bramwell said:—

"The processes, more or less successful, that have been tried are so numerous, that I cannot even pretend to enumerate them. I will, however, just mention one, the asbestos paint, because it is used to coat the wooden structures of the Ironclad Exhibition. To the employment of this, I think it is not too much to say, those buildings owed their escape, in last year's very dry summer, from being consumed by a fire that broke out in an exhibitor's stand, but happily not setting the painted woodwork on fire, although it was charred below the surface. I do not pretend to say that a surface application can enable wood to resist the effects of a continued exposure to fire, but it does appear that it can prevent its ready ignition."

It may prevent misconception if you will allow me to add that there are two kinds of asbestos paint, both equally valuable in their way, viz. —

1. Asbestos paint ground in oil, and mainly used for ironwork. This is not fireproof, but resists to a remarkable extent the action of gases, foul atmospheres, &c., preventing corrosion.

2. Asbestos patent fireproof paint, exclusively for timber-work. In the latter, no oil or other inflammable material is used, and this is, of course, the paint referred to by Sir F. Bramwell, and which we have supplied for the wooden buildings of the three Great Exhibitions at South Kensington.

J. ALFRED FISHER,
General Manager and Secretary.
United Asbestos Co.

THE ROYAL ARMS.

SIR,—In your well-written sketch of these, which supplies the out-of-the-way knowledge not easily got at by the world, you omit (or, may I say, perhaps did not know) the curious fact that in Scotland the supporters, the lion and the unicorn, hold reverse positions to what they hold throughout the rest of the United Kingdom; and this was actually stipulated for in, and I believe, is one of the clauses in the Act of Union (circa 1700-1710, I think) between England and Scotland.

You can see them on the Edinburgh Post Office and Stamp Office, and I think I state a fact that when these two buildings were erected, when the then new Regent Bridge was opened, about 1818 or 1819, the stipulation was not attended to, and the local authorities insisted on its being carried out, which had to be done. I lived in Edinburgh then and can almost remember the circumstance.

EDWARD COCKBURN.

PROVINCIAL NEWS.

Loughborough.—Owing to the increase of nearly 25 per cent. in the population of Loughborough, the water supply has been gradually becoming insufficient, and during the drought of the past summer the store of water in the reservoir was wholly exhausted. So far back as 1878 it was pointed out to the Local Board that the capacity of the existing works had been reached, and that a prolonged summer drought might at any time jeopardise the supply to the town, and in 1880 Mr. George Hodson, C.E., F.S.I., of the firm of Hodson, Price, & Hodson, the then surveyor and waterworks manager, was authorised to devise a scheme of extension, and advised a resort to the Black Brook, a stream on Charnwood Forest, which, at a point about five miles from the existing works, where its watershed was about 2,800 acres, might be intercepted and brought by gravitation into the present reservoir. The minimum dry-weather yield of this stream is 500,000 gallons per day, and the average available supply will be from 800,000 to 1,000,000 gallons per day. Owing to various circumstances the Board at that time declined to commit themselves to the scheme, and consulted Mr. Eaton, of Sheffield, who recommended the construction of a large impounding reservoir on the Wood Brook, C.E., of London, upon the Wood Brook scheme. The experience of last year has, however, satisfied the Board that no sufficient supply can be obtained from the source recommended by Mr. Eaton. They have, therefore, resolved to adopt Mr. Hodson's scheme, and have served notices upon the owners of the water rights of their intention to promote a Bill in Parliament for the execution of the works. As Mr. Hodson is a member of the Board his firm cannot carry out the works, and the Board propose appointing an engineer to undertake their execution. Since this was written we learn that the Local Board have instructed Mr. Herbert Walker, C.E., F.S.I., of Nottingham, to prepare the

requisite Parliamentary plans and estimate for the scheme.

Henley-on-Thames.—A drinking-fountain of some importance is about to be erected in the Market-place, as a memorial to the late reactor, the Rev. Greville Phillimore. It will be built on the site now occupied by an awkward-looking obelisk and an equally uncomely pump which adjoins it, both of which will be removed. Mr. James Forsyth, of Finchley-road, is the sculptor.

Wigan.—A large drill-hall was recently opened in Powell-street, Wigan, by the Earl of Crawford and Balcarres, Lieut.-Col. 4th L.R.V. His lordship, in his address, congratulated the Wigan Volunteers on now possessing one of the finest drill-halls in the country. The cost has been 3,300l. Messrs. Isitt & Verity, of Bradford and Wigan, were the architects.

High Wycombe.—The useful Cottage Hospital of this town has been recently enlarged from affording twelve to sixteen beds, a new ward having been constructed, called the "Augusta" ward, from the gift of 100l. presented by her family in memory of the late Lady Carrington towards the cost. The builder was Mr. J. I. Harris, and the architect was Mr. Arthur Vernon, both of High Wycombe.

SCHOOL-BUILDING NEWS.

Witney.—The Wesleyans of Witney have just completed the erection of new and commodious schools, which were opened on the 5th inst. The building is in Late Gothic style, the walls being of stone and the roof of blue slate. The ventilating is by means of air-trunks laid along the whole length of the ceiling, with Boyle's air-pump ventilators. The building is heated with Bacon's high-pressure hot-water apparatus. The architect was Mr. E. Early Hollis, of London, and the builders were Messrs. Bartlett Brothers, of Witney.

High Wycombe.—New schoolrooms have been erected, and were, on the 11th instant, formally opened, in connexion with the Union Chapel, High Wycombe. The buildings comprise schoolroom, 50 ft. by 24 ft., with lavatories, out-buildings, &c.; and the construction, out of the old school buildings, of six class-rooms, large organ, and choir chamber, at the rear of the pupils platform; the galleries and part of the building have been re-pe-wed, and the whole decorated, the total expense being about 1,200l. The contractor was Mr. G. H. Gibson, High Wycombe, who executed the work under the direction of Mr. Arthur Vernon, architect, of the same place.

Wycombe Marsh (Bucks).—New national schools in connexion with St. Anne's Church have just been completed and opened. They comprise a large room and class-room, and are constructed in the Early Gothic style in red bricks and dark tiles. The outlay (for 100 scholars) has been 350l. Mr. W. R. Loosely, of High Wycombe, was the contractor, and Mr. Arthur Vernon, of the same place, the architect.

Woodburn Green (Bucks).—Considerable additions have just been completed to the National Schools, Woodburn, by the construction of a large class-room of brick, flint, and slate, and an ornamental Early English drinking-fountain for the accommodation both of the children and of passers-by. The builder was Mr. C. H. Hunt, and the architect, Mr. Arthur Vernon, High Wycombe.

STAINED GLASS.

Burgess Hill.—A five-light Munich east window has just been placed in the church at Burgess Hill, illustrating the text "Come unto me all ye that labour and are heavy laden," in memory of Thomas Crunden, of Burgess Hill. The work has been designed and carried out by Messrs. Mayer & Co.

Leamington.—There have been fixed in the nave of St. John's Church three more stained glass windows containing figures of St. Alban, St. Patrick, and St. Dubritius, who was the first and only bishop of Warwick. It is intended to continue the series of English saints in the other windows round the church. Those already placed have been executed by Messrs. F. Holt & Co., of Warwick.

Hampton.—The fifth and remaining window in the chancel of Hampton Church has just been filled in with stained glass representing the "Good Shepherd." The artists are Messrs. Mayer & Co., who also carried out the former windows.

The Student's Column.

LIME, CEMENT, AND THEIR USES.—I

THE strength of a cement mortar compared with a lime mortar is not as yet very clearly defined in fact, it is hardly possible to compare two. Portland cement is so much stronger than lime that the best lime mortar is equal in strength to a mortar made of equal parts good Portland cement and ten parts sand. As a mortar of this consistency can hardly be used in practice, it being what is termed "too short," i.e., not sufficiently plastic, it is clear that a cement mortar must have a greater strength than one made of lime. A cement mortar is, therefore, only used where great structural strength is required, or where it is required to set quickly.

A very good mortar is produced by a mixture of five or six parts of sand to one of cement and is one that has sufficient plasticity to be worked easily. The proportion of the cement and sand is always taken by measure, and should be seen that the sand is dry, because more sand will go into a given measure when it is wet, and it would, therefore, be necessary to use more cement to obtain the same proportion if the sand is measured in this condition. The dry measured sand should be placed on a clean platform, and the measured cement placed on the sand; the two should then be thoroughly mixed, without the addition of any water, by turning them over and over with shovels. From this heap of cement and sand so much only water added to it, once should be taken, and the same time with the trowel or spade until it is reduced to the proper consistency for use. The use of too much water should be avoided, because it reduces the strength of the mortar, and the desired plasticity should be obtained by well working it. As soon as it is properly gauged it should be used at once, and not allowed to partially set on the board and be beaten up again, for this only destroys the cement and renders it of no value whatever. Cement, when it has once commenced to set, cannot advantageously be further worked. Too much importance, therefore, cannot be attached to this detail. In making cement concrete, the same general principle must be carried out. The measured aggregate being put first on the mixing platform and the cement placed on the top of it. It is usual to have four men with shovels to mix this, and the operation is to turn over the whole of the material on to another part of the platform, and then back again to its original position, and it should be turned over at least three times dry. The water is then added from a rose. A jet of water is objectionable because it tends to wash the cement away from the aggregate, and nullifies, to a certain extent, the previous operation of dry mixing. The water should, of course, be directed to the portion of the heap which is being turned over, and the concrete should be turned over at least twice wet. By thus turning it over three times dry and twice wet, a nearly perfect mixture of the aggregate and matrix ought to be obtained, and the concrete is then ready to be removed in barrows or skips to its position on the work.

The caution regarding the use of an excess of water must again be given, for the additional reason, beyond that already stated, that too much water will wash away a considerable quantity of the cement.

It is desirable to have the mixing platform near the position in the works where the concrete is to be laid as possible, not only that the labour of wheeling may be reduced to a minimum, but also that the whole operation of making the concrete and laying it in position may be executed as expeditiously as possible; for it is most important for the production of a good cement mortar or concrete that it should be laid in position and left at rest in as short a time as possible after the water has been added to it, and that it should not be afterwards disturbed. The concrete should be laid gently in position, and then shovelled and beaten level. The practice of tipping it in from a height, except in exceptional cases, is to be avoided, as it tends to separate the larger and smaller aggregate and the matrix.

The manner of using lime is somewhat different, because, unlike cement, it is not sold in a condition fit for use, i.e., it is in a condition of pure or quick lime, which, on the addition of water, heats and swells to a greater

extent, according to whether it is a rich hydraulic lime. A rich lime expands on addition of water to twice its bulk, and, more, and then quickly falls to r, while an hydraulic lime expands but in the addition of water, and is some-it may be days,—before it falls to r. Adding water to quick lime is called slaking it, and by this process it is converted into hydrate of lime. In this condition it is used, and theoretically the best results are obtained by using a lime immediately that all of it are perfectly hydrated, and before hydrate has absorbed any carbonic acid from the atmosphere.

It should be slacked by breaking it into sized pieces, and spreading it out in a layer, and then sprinkling it with water a rose. By this means it is ensured that all portions of it have been wetted. It should be shovelled up into a heap and covered with sand, so that it may retain the heat produced by the hydration. When it has fallen to r, it should be sifted in order to remove lumps. It is then in a condition to be used into mortar by mixing it with water to the desired consistency by working it with rakes or trowels. A better mortar is made by finding it in a mortar-mill, but on small works mortar-mills are not always available. Packing lime care should be taken only to so much water as is sufficient to wet the lumps of it. If too much water is used, the slacks into a pasty mass, instead of falling powder. At the first sign of any water being away from the lime and accumulating on the floor is observed, no more water should be added, for it is an indication that the lime has absorbed all it can, and it should then be shovelled into a heap as described above. It may be made into what is called putty by adding water to it when it has fallen into powder, and making it into a thick slip; in condition it is run into a trench in the ground, where it may remain for several weeks if required for use. In this form it is usually used for internal work; but it may be used into mortar with the addition of sand. It, however, not produce so strong a mortar when made in the usual way. Lump lime generally used for mortar, and ground lime concrete. It is only the poor and hydraulic limes that are ground, as rich limes disintegrate so easily on hydration that there would be no object in grinding them. Ground hydraulic lime may be used for concrete without previous grinding.

Unlike cement, lime mortar may be worked again without serious detriment to its strength by the addition of more water, and a concrete cannot be rammed and beaten much. With these few differences, the points requiring care are the same whether using lime cement, and the same precautions and modes of manipulation are common to both. The quantity of sand which any particular lime requires to enable it to give the best results can only be determined by experiment; and the only guide for the determination of the amount of sand to use is by the plasticity of the compound. When too much sand is added the mortar works "short," and in that condition it is not economical to use,—from two to four parts of sand to one of lime is the proportion usually adopted. The proportion of sand to lime is always measured by so many struck measures of dry sand to one fair measure of mp unslacked lime.

A few words of caution are, perhaps, necessary respecting the bricks and other materials which are to be united by the mortar. It is assumed that the mortar, whether it be of lime or cement, has been made of good materials and with proper care. Now, if in this perfect condition it is laid on to dry bricks or stones as whole of the water in it is immediately absorbed by the hot porous surface; the lime cement is thus deprived of the water necessary to ensure a perfect set, and the mortar is reduced to a friable consistency of no adhesion or strength. It is, therefore, most important that all surfaces, more especially in hot dry weather, should be well wetted or even soaked with water before the mortar is put on to them. In stucco work all brick joints should be raked out to a good depth and the surface of the bricks well cleaned before the stucco is laid on in the same way when using old materials all

old mortar should be removed from the bricks before they are re-used, for new mortar will not adhere well to such friable and imperfect surfaces, added to which the strength of the structure would, in the event of the old mortar being left on the bricks, be reduced to the strength of the old mortar instead of, as it should be, the new.

In concluding these remarks the necessity of care in the choice of materials and in their manipulation cannot be too strongly enforced. The strength of the structure depends on the strength with which its parts are held together, and it is the mortar which has to exert this strength. Smeaton, when building the Eddystone Lighthouse, spent more time and trouble in the selection of the materials for his mortar than in selecting the stone, and with the satisfactory result that his work stood a strain which is seldom put on any building. While Smeaton was working here Vicat and others were working in France, and to these two must be given the honour of laying the foundation of all now known respecting the behaviour and proper treatment of limes, cements, and mortars. The works of Viruvius show the importance attached to the strength of limes and mortars two thousand years ago. In this century General Pasley spent half his life in making experiments having a similar object, the results of which are of the greatest value. When men like these thought it wise to make research into the nature of the materials they were using, it is surely worth the while of those who may have to use mortar every day of their life to make themselves, at all events, slightly acquainted with the materials of which it should be compounded and the best manner of its manufacture, and disabuse themselves of the opinion that road scrapings and other similar dirty materials make adequate mortars.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11. Fire-resisting Compound. W. Graham.

A refractory composition is used, either alone or mixed with other fire-resisting materials. With this the backs of stoves, furnaces, boilers, &c. are lined. The ingredients are four parts silica, one part siliceous calcinated clay, and one and two-thirds parts clay, which proportions may be varied according to requirements.

1,690. Sash-bars or Astragals. J. D. Mackenzie.

A development of a former invention. According to this method of glazing, the metal astragals are of a semicircular form, and are enclosed in a thin strip of some non-oxidisable metal. A strip of lead or other metal is bent over the top of the astragal to which it is secured by screws or bolts, to keep the sheets of glass in place. A strip of vulcanite, papier maché, or similar material, being sometimes interposed.

2,653. Chimney Tops. C. Riley.

These are formed with openings in the sides near the base. Flanges or ribs inclined upwards, and provided with slits to facilitate sweating, are connected with these openings, and project within the chimney-shaft: thus currents of air are deflected upwards, and draw out any smoke or foul air with them.

4,098. Ornamental Moulds and Frames. S. Alld.

Strips of velvet or plush are glued upon the bending of mouldings or picture-frames, rods being laid upon the strips until the glue has set. The juxtaposition of the velvet or plush with the gold mouldings of the frames gives a rich effect.

5,014. Venetian Blinds. J. Querre.

The laths are counterbalanced by weights. Two chains are fastened to the bottom lath, passing upward through slots in the laths turning over pulleys, and fixed to weights at the side. It is so arranged that some little force is required to pull the blind down, where it is kept in position by cords fastening at the sides of the frame.

13,841. Closet and Dust-bin combined. J. Ennals.

This structure resembles the ordinary privy without a cesspool. It is all above the ground-line, preventing any soakage, which is often the seat of much soil. The floor is raised one step. The bottom of the receptacle is 3 in. of concrete coated with cement, with a slight incline towards the front to encourage the moisture to draw where the dust falls, thus the urine is absorbed and the excreta deodorised. The seat forms a lid for the dust-bin, being hung with hutt hinges, and is firm as a fixed seat when closed. At the back is a door or flap hung on hinges to admit of its being easily emptied, as the contents (it is claimed) being quite innocuous can be taken out with a shovel and removed in a basket

or barrow. Over the door are louvre-boards, which, with a small opening above the plate at back between the rafters, will cause a free circulation of air overhead, and always keep the place perfectly sweet.

4,614. Improved Devices for Opening and Closing Window-sashes and Fan-lights. Tosh & Preston.

The improvements comprise a long screwed spindle, which is pivoted to the fixed framing of the window, near the opening edge of the movable sash, and a grooved pulley fitted to turn thereon as a nut. A cord is passed over the pulley by which it is turned on the screwed rod or spindle. The pulley in turning travels along the edge of the screw spindle, drawing with it the edge of the window-frame to which it is secured, thus opening the window or fan-light to any extent desired.

APPLICATIONS FOR LETTERS PATENT.

Jan. 9.—314, J. Lee, Improvements in the Intermediate or Junction Parts of Trowels, Spades, &c.—324, W. Stehbs, Construction of Kitchen-ranges and Cooking-stoves.—325, W. Beck, Instrument for Sotting-out Curtes.—331, M. Ismay, Latch or Device for retaining Doors in their Closed Position.—333, W. Heelis, Combination Cupboard, Wardrobe, or Bookcase.

Jan. 10.—339, J. Lorrain, Heating, Cooling, and Ventilating.—340, R. Roseborough, Manufacture of Faced or Coated Bricks, and Apparatus for same.—363, A. Reddie, Improvements in Bakers Ovens.—375, A. M. Lake, Improvements in Excavators.—375, A. M. Clark, Improved Process of Manufacturing Tools of Steel.

Jan. 12.—382, J. Snowdon and S. Swallow, Panelling and Pressing Bricks.—384, F. Silk, Fastening Windows and Casements.—387, J. Lucas and C. Hall, Combination Fliers.—389, D. Dickinson, Device for Preventing the Over-sliding of Drawers, Shelves, Sliding-doors, &c.—390, F. Kellow, Improvements in Bricks.—400, A. Andrews, Mouth-pieces and Dies used in the Manufacture of Clay Bricks, Earthen Pipes, &c.—406, M. Macleod, Laying Asphalte Pavements, Roofs, &c.—425, W. Wegner, Improved Staircase.

Jan. 13.—472, J. Imray, Air-Gas Apparatus.—488, J. Hancock, Producing Ornamental and other Devices in or between Sheets of Glass.

Jan. 14.—505, M. Syer, Syphon Water-waste Preventers.—515, D. Barclay, Removing and Replacing Earth-closets.—520, F. Botting, Smoke Test for Drains, &c.—533, R. Henry, Window-sash Liner-holder.

Jan. 15.—579, S. Graham, Combination Ladder, Folding-steps, or Trestle.—580, T. Brindley, Improved Bartel Lock.—582, H. Hughes, Telescopic Lattice Window Guard.—598, H. Newton, Tools and Tool-holders for Planing Machines.—609, E. Tomlinson, Ventilation.

PROVISIONAL SPECIFICATIONS ACCEPTED.

15,009, J. Hopkinson and R. Lapage, Improvements in Roller Blinds.—15,525, W. R. Lake, Water-closet Apparatus.—15,745, E. Reese, Decoration of Chimney-pieces, &c.—15,749, H. Whitaker, Fitting Wash Stands and Lavatories.—15,751, J. Howie, Improvements in Drain Traps.—15,750, T. Durran, Gully Traps.—15,857, H. Gardner, Surfacing Compound for Coating Buildings, &c.—15,871, W. Withington, Improvements in Water-closets.—16,111, J. Edwards, Unpickable Lock.—16,103, J. Dinmore, Band-saw Machines.—16,431, A. Myall, Grates and Stoves.—16,432, F. Knott, Apparatus for Drawing Ellipses.—16,523, R. Holmes, Fire Grates.—16,740, J. Bloomfield, Method and Material for Joining Earthenware Pipes.—16,889, H. Britton, Machine or Apparatus for Painting Walls or other Surfaces.—15,846 H. Besson and E. Kent, Locks or Fastenings.—15,993, W. R. Lake, Refractory Compound for the Manufacture of Bricks, &c.—16,225, J. Loftus and S. Baker, Locks for Fastening Hinged Lids and other Hinged Parts.—16,458, J. Dann, Construction of Step Ladders.—16,582, F. Stolze and E. Morgenroth, Apparatus for Cooking and Heating.—16,667, H. Bridge, Apparatus for Facilitating the Sharpening of Files, Irons, Chisels, &c.—16,821, J. Herbert and T. Colley, Sash-bar Cramp.—16,851, A. Emley, Cooking Ranges.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

2,368, H. Hargreaves, W. Beckett, and W. Cliff, Kilns and Ovens for Burning Bricks, Pipes, &c.—2,871, J. Duckett, Signal-indicating Letter Box and Door Bell.—4,631, T. Waller, Constructing and Ventilating Urinals.—4,561, A. Martin, Machines for Embossing Wood and other Surfaces.—4,569, S. Slater, Weather Strips for Doors and Windows.—5,327, J. Sibbald and W. Kinnes, Regulating the Supply of Water to Closets and Cisterns.—8,125, J. Smeaton, Heating, Cooling, and Ventilating Dwelling-houses and other Buildings.—13,391, J. Waller and P. Farrington, Bell Levers and Bell Pulls.—16,066, C. Clarke and A. Parsons, Sash-fasteners.—16,251, E. Brady, Substitute for Wood, Stone, or Iron.—4,286, F. Candy, Lavatories and Closets.—4,607, S. Guinery, Sash-frame Pulley.—4,855, W. J. Cornell, Ornamenting Bricks, Blocks, &c.—6,619, J. Kerr, Construction of Pavements.—7,899, S. Belham and J. Belham, Chimney Pot or Terminal.—16,530, W. Gwynn, Folding Steps.

RECENT SALES OF PROPERTY.
ESTATE EXCHANGE REPORT.

JANUARY 15.	
By NEWBON & HARDING.	
Enfield Highway—The Rose and Crown public-house, with six cottages and a plot of land, freehold	£2,500
St. George's-in-East—23, Cannon-street-road, freehold	450
Dalston—19, Abersham-road, 17 years, ground-rent 6s. 10s.	375
By Peto, Yettis, & Co.	
The Reversion to One-fourth Share of 1,078l. 3s. 6d. Bank Annuities, Life aged 54 years	170
The Reversion to 4s. Victoria road, Kennington, term 37 years, Life aged 80 years	800
JANUARY 16.	
By FRANK LEWIS & Co.	
Holloway—19, Hornsey-street, 73 years, ground-rent 7l.	330
By BAKER & SOXS.	
Battle, Sussex—The Residence called "The Wood-lod," and 254s. 3s. 37s., freehold	15,500
Sudbury—A plot of freehold land	105
Hyde—9 to 12, High Park-terrace, 2,000 years, ground-rent 34l.	10

MEETINGS.

SATURDAY, JAN. 24.
Architectural Association. — Visit to St. Marylebone Parish Church. 3 p.m.

MONDAY, JAN. 26.
Surveyors' Institution. — (1) Discussion on Mr. R. W. Mann's paper on "The Enfranchisement of Urban Leases" (2) Mr. H. Martin on "Recent Proposals for Leasehold Enfranchisement." 8 p.m.
Leeds and Yorkshire Architectural Society. — Mr. Samuel Vyle on "Lighting Conductors."
Edinburgh Architectural Association. — Mr. H. H. Gunn on "Geology in its Relation to Architecture." 8.30 p.m.
Society of Arts (Lecturer Lectures). — Dr. G. V. Poore on "Climate and its Relation to Health." (III.) "The Chief Sources of Atmospheric Impurities." 8 p.m.
Inventors' Institute. 8 p.m.

TUESDAY, JAN. 27.
Institution of Civil Engineers. — (1) Discussion on Mr. Hamilton-Smythe's paper on "A Comparison of British and Metric Measures for Engineering Purposes." (2) Mr. D. S. Smart on "The Modern Practice in the Design and Construction of Steam Boilers." 8 p.m.

WEDNESDAY, JAN. 28.
Society of Arts. — Mr. F. Brindell Carter, F.R.C.S., on "The Influence of Civilization upon Eyesight." 8 p.m.
Civil and Mechanical Engineers' Society. — Mr. R. Nelson Boyd on "The Petroleum Fields of Europe." 7.30 p.m.

THURSDAY, JAN. 29.
Institution of Mechanical Engineers. — Annual Meeting. Five papers to be read, including one by Mr. George Richards "On Recent Improvements in Wood-Cutting Machinery." 7 p.m.
Society of Antiquaries. — 8.30 p.m.
Parkes Museum. — Mr. James Cantle, F.R.C.S., on "Degeneration amongst Londoners." 8 p.m.
Society of Arts (Howard Lectures). — Mr. W. Anderson on "The Conversion of Heat into Useful Work." 7.30 p.m.
York Arts Guild. — Mr. B. Priestley Shires on "The Domestic Life of the Edwardian Period, as shown by its Architecture." 7.30 p.m.

FRIDAY, JAN. 30.
Institution of Civil Engineers. — (Students' Meeting). — Mr. F. W. Stokes on "The Iron Bridges on the Hull, Barnsley, and West Riding Junction Railway." 7.30 p.m.
Institution of Mechanical Engineers. — Annual Meeting continued. 7 p.m.

Miscellaneous.

The Cause of Soot-Clouds.—Stripped of its technicalities, and reduced to the common-sense level of average human brain-power, the discussion about soot and fuel economisers amounts to this: We want less of force and rapidity and more of volume in the air passing through our domestic fireplaces. They ought not to be so much like small blast-furnaces as they too generally are. The fuel, whatever it be, should burn quietly, consuming the combustible part of the fuel, allowing the gases, which are partly waste, unfortunately, and partly consumed,—to rise slowly and passively, and escape up the chimney without blowing up the residue of the carbon with them. A strong and rapid current of air through a fire must mean waste, and most probably will also mean soot or smoke. The air which supplies oxygen to a fire should be wafted gently between and over the coals in the grate, not blown with a rush from below through them. If this simple fact be mastered, it will be easy to secure the object with almost any grate and any fuel. If it be not understood, the search for a special apparatus and particularly good fuel must be futile. Let us begin by first learning and then teaching the A B C of the process, which is really very simple if it be only understood. As it is, the cloud of words is becoming almost as great a nuisance as the soot-cloud itself.—*Lancet.*

New Peabody Buildings at the West End.—The Peabody Trustees have just erected another range of buildings for the industrial classes, which are intended to be thrown open for occupation during the ensuing week. The buildings are situated on the west side of Little Cornam-street, and have been erected on the Foundling estate, covering an area of about 15,000 superficial feet. They consist of eight double blocks, and have been built on the east, west, north, and south sides of the site respectively, around a spacious open area and recreation-ground, about 220 ft. in length and 120 ft. in width. Each block has its separate entrance in the open area, the whole of the blocks being approached through two gateways in the Little Cornam-street frontage, which is upwards of 300 ft. long, occupying nearly the whole of the west side of the street. The several blocks contain five floors, at the top of each of which there are washhouses, fitted with coppers and every other requisite for their intended purpose. There are kitchen-ranges and register stoves in the different rooms in each block, with convenient fittings for domestic purposes. On each landing there are two water-closets, two main water-taps, and dust-hin. Like the rest of the buildings belonging to the Peabody Trustees, they are faced with stock brick, and stone facings, dressings, and entrances. They have been erected under the superintendence of Mr. H. A. Darbishire, architect to the trustees, Messrs. Cubitt & Co. being the contractors. The apartments on the different floors are arranged in one, two, and three rooms, according to the requirements of families. Six of the blocks are arranged to accommodate twenty-six families each, and the remaining two blocks twenty-four and twenty-five families each, the whole of the blocks being estimated to accommodate a population of about 1,000 persons.

The Continued Enlargement of the Waterloo Station.—During the present week another step has been taken in connexion with the enlargement of the London and South-Western Railway Company's Waterloo terminus, which has been in progress for upwards of four years, and which is now the largest passenger railway station in the metropolis, covering an area of something like twenty-five acres. The new roof to the station, as enlarged on the north side for the Windsor traffic, has just been completed, and this portion of the extended station is shortly to be opened for traffic. The enlargement is, however, about to be effected to a considerable length further northwards, extending to the York-road boundary; and with this view Messrs. Perry & Co., the company's contractors, are at present engaged in the construction of a series of arches on the large area of vacant land extending westward from the recently-erected offices off York-road, to Griffin-street, and northward from the new Windsor Station, just completed, to York-road, along which a retaining-wall, has just been erected. Parallel with this retaining wall, in the direction of Waterloo-road, a number of houses and shops, which the company purchased some time ago, are this week being taken down and on the site thus cleared a new block of offices will shortly be erected, in continuation of those which were recently built, the lower portion of which is now occupied by the Government for Parcels Post purposes, and the upper floors for the engineer's and other departments in the company's service.

"Climate in its Relation to Health."—Dr. Poore delivered his second lecture on this subject at the Society of Arts, on Monday evening. He began by alluding to the fact that the crew of the *Eira* enjoyed excellent health in the Arctic regions under conditions which, in this country, or still more in the tropical countries, would be considered most that in the Arctic regions putrefaction and allied changes were impossible, owing to the cold and dryness, and the diseases dependent on putrefaction were also impossible. Attention was drawn to the fact that most of the diseases which were fatal in tropical countries were connected with putrefaction and decay, and as instances of this, malarious diseases, yellow fever, and cholera, were brought forward. Since putrefaction depended upon the access of minute organisms to the putrescible matter, and since these organisms were found in the atmosphere as well as in the soil and water, a study of the floating matter in the air became most important.

Royal Meteorological Society.—annual general meeting of this Society held on Wednesday evening, the 21st inst. at the Institution of Civil Engineers, Mr. J. Scott, F.R.S., President, in the chair. The secretary read the report of the Council, which showed the Society to be in a very satisfactory condition. The council have appointed a committee to investigate the subjects of brilliant sunrises and sunsets of 1853-4, the local phenomenon known as Helm Wind of Cross Fell, Cumberland, observing stations of the Society now number eighty-five, the results from which are printed in the *Meteorological Record*. The whole of the stations in the south of England have been inspected during the year and found to be generally in a satisfactory state. The number of Fellows on the roll of the Society is 552, of whom 37 were elected in 1884. The President, Mr. H. Scott, then delivered his address, in which he treated of the general state of the science of meteorology over the globe, as compared with the programme sketched out by Prof. Forbes in the Report of the British Association, 1840. He said there were now six meteorological societies publishing journals, and in addition six periodicals almost exclusively devoted to the science. He went on to say, "all this wealth of literature there is very particular in which, in this country at least, science labours under a great disadvantage. So far as he was aware, no instruction is given in it, except at the Royal Naval College, Greenwich. The officers and council for the ensuing year were then elected, Mr. R. H. Scott being re-elected president.

Labour and Wages in America.—This was the subject of a paper read by Mr. W. Pidgeon before the Society of Arts on Wednesday evening last. The author first directed attention to the radical differences which a singular native American from alien labour, exemplifying the high condition of the factory by the Lowell of forty years ago, as described by Dickens, Miss Martineau, and others. Then sketched the social life of certain existing industrial towns, the "fastnesses" to which native American labour has, so to speak, been driven by immigrant operatives, who have imported into the States the lower conditions exhibited by their class in Europe. After considering the efforts which are now being made in America by the State, and by individuals, to raise the status of alien labour to the levels of the past, he concluded that it was doubtful whether or not it is now rising, sinking in the social balance. Passing next to economic considerations, he stated what was now being paid to factory operatives in the States, their relation to the cost of subsistence and to wages and cost of subsistence in this country, concluding that while an English mechanic might vastly better his social condition by residence in the States, he would probably find himself little richer, in money after paying the enhanced prices for subsistence, and conforming to the higher standard of life prevalent in America.

Ventilation of the Law Courts.—The following paragraph appeared in some of the daily papers on Wednesday:—"Mr. Baron Huddleston, while trying a case in one of the courts of the Queen's Bench Division yesterday, complained seriously of the defective ventilation of the draughts, in consequence of which his Lordship and others were suffering. The learned Judge requested that the engineer should be called before him, and when the engineer presented himself, ordered, by way of protest against the now-fangled system of ventilation, that the gratings through which the draughts came should at once be pasted up, remarking that if the consequence was to throw the whole system out of gear he should be very glad, as there was something in it that was radically wrong and must be remedied. The engineer promised to carry the order into effect, and at once proceeded to do so." The learned Judge may have been right; but it seems rather a questionable precedent that the efficacy of a system of ventilation of a court should be thus decided on according to the feelings of the presiding judge at the moment.

Liverpool Engineering Society.—At the ordinary meeting of this society, held on the 14th inst., at the Royal Institution, Colquhoun street, a paper was read by Mr. Ludwig Benjamin, M.I.N.A., on "The Different rules in use for ships' calculations."

Rochester Architectural Association.—One of this association, on Tuesday, January 20th, in the old Town-hall, King-street, John Brooke, A.R.I.B.A., read an interesting account of a ten days' tour in Belgium, illustrated by a number of drawings and slides. Having described the most interesting features of Antwerp, he observed that the architecture was remarkable for its old houses, with gables and dormer windows executed in fifteenth and sixteenth centuries. After his remarks on Brussels and Louvain, Mr. Brooke said he particularly noted the thorough construction and honest building of the modern style at Liège. He thought the colour effect of stone and brick at Bruges remarkable; this contained many interesting churches, and an excellent domestic work. Finally, he mentioned Ghent. He thought that quaint spires, gables, and flat façades formed the chief characteristics of the Belgian towns. Mr. T. H. Wick, A.R.I.B.A., thought that the study of Belgian architecture had already produced good results on buildings designed by many young English architects of the day, and would be more so in the future.

Obituary.—We announce with regret the death of Mr. Stephen Hayworth, builder and contractor, at his residence, No. 108, High-street, Kingsland, on the 11th inst., in his fifty-first year. He was well known in the north-east of London, where he had the control over some important estates. He had been actively employed by the Governors of the new Victuallers' Asylum, in maintaining repairs of their Institution, covering six acres of land, and consisting of 170 houses and 10 buildings in the Old Kent-road, for the fifteen years. Mr. Hayworth was, at the time of his demise, Churchwarden of West-kney Church, and on Saturday last, the 17th inst., a choral service was performed there on the occasion of the funeral, after which the body was conveyed to Abney Park Cemetery for interment. Many of the foremen and workmen of the deceased attended and paid a last tribute of respect at the grave.

Lectures on Sculpture and Architecture at the Royal Academy.—The following lectures are arranged for delivery.—Sculpture: "The School of Praxiteles," by Prof. C. T. Wilson, Feb. 16 and Feb. 23; "Medals," by Mr. R. Stuart Poole, Feb. 18; "Pisano as a Medalist," by Mr. R. S. Poole, Feb. 25; "Imitation as the Means, not the End of Art," by Hamo Thornycroft, A.R.A., Feb. 19; "Bronze Casting as Applied to Sculpture," by J. E. Boehm, R.A., Feb. 26.—Architecture: "The Cairo House," by Mr. R. Stuart Poole, Feb. 27; "Some Principles of Ancient Architecture and their Application to the Modern Practice of Art," by Mr. G. F. Bodley, A.R.A., Feb. 20; "Greek Architecture," by Mr. F. C. Penrose, Feb. 27; "Staircases," by Mr. G. Atchinson, A.R.A., March 2 and March 6; "Westminster Abbey," by Mr. A. Waterhouse, A.R.A., March 4.

School and Church Furniture.—Messrs. G. & Dean, who have been established in the north-west since the commencement of the present century, have lately opened a show-room at London-road, adjoining their steam factory at Barking. The "Southward" Convertible Bench, capable of being used (1) as a desk and seat for school use, (2) as a backed seat, and (3) as a table and seat, is a very good thing of its kind, and may be to some extent inferred from the statement that over 100,000 of them have been sold.

"Borough" School Board Dual Desks, tables and tables for Kindergarten teaching, and masters' and mistresses' desks and tables, special design and construction, are among many other school appliances exhibited in variety in the show-room, all characterised by excellence of material and workmanship.

The Bicycle Show on the Thames Embankment.—Messrs. Piggott Bros., of Finsbury, are erecting a large marquee on the vacant ground adjoining the Thames Embankment, until lately belonging to the Corporation, for the Bicycle and Tricycle Show which is to be held during the ensuing week, commencing on Wednesday next and continuing until Saturday. The marquee is 400 ft. long, ending from Tudor-street, southwards, to the embankment boundary. It is 40 ft. in width, and contains a ground area of 16,000 ft. The contractors are laying down a strong boarded floor, and providing facilities for bicycle and tricycle displays during the time of the exhibition.

The Ancient Church of St. Helen, Cliffe-at-Hoo, near Rochester, one of the most interesting in England, as the scene of the seven Saxon Councils of Cloveshoe, between A.D. 742 and 824, was re-opened, after restoration, on January 7th. The contract has been divided into six sections, the first of which is now complete. The flat roofs and plaster ceilings have been removed and replaced by high-pitched roofs. The portion over the chancel is of English oak, elaborately carved. In taking down the semicircular brick east window of 1732, sufficient remains were discovered to reproduce the magnificent Decorated window, erected in 1350 whilst Archbishop Whitlesey was rector of Cliffe. Many of the old members have been re-used, and the entire east gable has been rebuilt of coursed hands of flint and stone. From the old material found in the débris. The new roof to the north aisle forms the second contract, and is now in course of erection. Mr. Alderman Naylor, of Rochester, is the contractor, and Mr. V. Hibbins clerk of the works. The carving has been executed by Mr. Thomas Earp. The whole of the work is being carried out from the designs and under the superintendence of the architects, Messrs. Romaine-Walker & Tanner, of 19, Buckingham-street, Adelphi, W.C.

Provident Institution of Builders' Foremen and Clerks of Works.—The annual meeting for the election of officers, &c., was held at the Office, 9, Conduit-street, on Wednesday evening last, Mr. Cockrane in the chair. Among the other members present were Messrs. Court, Groom, Welch, Heathcote, Fraser, Brodie, Perrott, Lister, Brown, Elder, Bennett, Merfield, Goodwin, Mead, Hailes, Tooke, West, Ross, Turner, and Stapleton. The minutes of the previous meeting having been read, the decease was announced of Mrs. Bunnell, who had been a pensioner (as the widow of a deceased member) for the long period of

twenty-nine years. Among the letters read by the corresponding secretary (Mr. J. W. H. Bedford), was one from Messrs. Wilcocke & Co., of Burnantofts, Leeds, enclosing a cheque for 5l. as a donation to the funds of the Institution. The meeting then proceeded to the election of officers, Mr. George Plucknett, J.P., being unanimously re-elected as Governor. The retiring Directors were Messrs. Bunn, Heathcote, and Stapleton. Mr. Stapleton was re-elected, and Messrs. Mead & Fraser were appointed to fill the other vacancies. The following officers were re-elected, viz., Mr. J. Welch, Treasurer; Mr. G. Ross, Librarian; Mr. J. Derry, Financial Secretary; and Mr. J. W. H. Bedford, Corresponding Secretary. Mr. Thomas Lister was elected Vice-President; and Mr. T. H. Court, President. Mr. Derry, the Financial Secretary, presented a statement showing that during the past year the sum of 236l. had been paid in pensions to the widows or orphans of deceased members and towards the relief of afflicted members. It has been arranged to hold the annual dinner at the Holborn Restaurant on Saturday, Feb. 28. The Institution was established in 1842, and has done much useful work.

Society for the Encouragement of the Fine Arts.—At the first *conversazione* of this society, held in the new art-galleries in Piccadilly, on the 15th inst., a handsomely illuminated testimonial, signed by Sir John Ellis, Bart., and the Council, was presented to the Chairman, Mr. James Edmonstone, in recognition of his services in promoting the objects of the Society. Mr. Cave Thomas, the deputy-chairman, presented the address, accompanying the presentation by some remarks on the duties which the City of London, as a great commercial centre, owed to art, and the benefit which it should derive from the promotion of art, especially of monumental painting.

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Town-hall Alterations	Borough of Brecon Town Council.....	20l.	Feb. 9th	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Execution of Works	Hockney Board of Works	J. Lovegrove.....	Jan. 28th	ii.
Supply and Execution of Articles and Works for Twelve Months	Vestry of the Parish of Chelsea.....	G. R. Strachan.....	Jan. 29th	xviii.
New Boiler, &c., for the Steamer <i>Marguerite</i> Day and Jobbing Works, &c.	Met. Asylums Board ...	W. R. Oswald	Jan. 30th	ii.
Pulling-down Building	Vestry of the Parish of Chelsea.....	Official	Feb. 2d	ii.
New Boiler for the Steamer <i>Albert Victor</i>	Met. Asylums Board ...	J. W. Peggs	Feb. 3rd	xviii.
Works and Materials	Vestry, Parish of St. John, Hampstead.....	C. H. Lowe	Feb. 4th	xiii.
Kerb and Tar-Paving	Chiswick Local Board	Mr. Ramsden	do.	xiii.
Road-making and Paving Works	do.	do.	do.	ii.
Erection of School and Teacher's Residence, Excavating, &c., Beulah Park Estate	Fulham Board of Works	Official	do.	xiii.
Brick Sewers	Dagenham School Bldg.	Jno. Hudson	do.	ii.
Sewerage Works; Machinery	Not stated	W. Newton Dunn	do.	ii.
Ironwork for Bridges, Brooksbury	Met. Board of Works	Official	Feb. 5th	ii.
Ironwork for Bridges, Beaden	Wednesday Local Bldg.	E. Pritchard	do.	xviii.
Repairs, &c., to Premises, Whitecross-street	Midland Railway Co. ...	A. A. Langley	Feb. 6th	ii.
Male Lunatic Wards at the Workhouse, Poland-street, W.	do.	do.	do.	ii.
Fitting-up and Putting to Work Machinery, and Engineer's Work	Guardians of the Poor, Westminster Union ...	H. Saxon Snell & Sons	do.	ii.
Wrought-iron Lattice Girder Highway Bridge, &c.	Commissioners of Public Baths, &c., Bermsday Property Com., King's Lynn Corporation.....	G. Elkington & Son ...	do.	ii.
Making Roads and Paths, &c.	Union	E. G. Mawbey	Feb. 7th	ii.
Building Works	Graves of the Croydon Union	Berney & Monday	Feb. 8th	xviii.
Road Materials	Com. of Pub. Baths, &c. St. Mary, Whitechapel	J. Hudson	do.	ii.
Erector of Engine and Boiler Houses, Chimney-Shaft, &c.	Com. of H. M. Works, Proprietors of Barton Mills, Canterbury	Official	do.	i.
Bricklayer, Mason, Carpenter's, &c., work, Darlington	North Eastern Railway	J. G. Hall	Feb. 11th	ii.
Corporation Sewage Works	Bedford U. S. A.	W. Bell	Feb. 13th	ii.
		J. Lund	Feb. 24th	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
County Surveyor	Norfolk	500l.	Jan. 31st	xvi.
Surveyor and Inspector of Nuisances	Shepton Mallet Local Bd	100l.	Feb. 2nd	xvi.

TENDERS.

Table with 2 columns: Item description and Amount. Includes 'For rebuilding bank for Messrs. Cox & Co., Craig's court, Charing-cross, S.W.', 'Nightingale', 'Dove Bros', 'Patrick & Son', 'Manley', 'Bird', 'Bywaters', 'G. Shaw', 'L. & R. Roberts', 'Holland & Hannen', 'Ashby Bros', 'Pete Bros', 'Brass & Son'.

Table with 2 columns: Item description and Amount. Includes 'For alterations and additions at the Red Lion public-house, Waltham-green, S.W.', 'Lambie', 'Gadden', 'Cook', 'Walker', 'Burman & Son', 'Gibbs & Flew (accepted)'.

For additional reservoir, filter-beds, &c., at Bedford, for the Bedford Town Council, acting as the Bedford Urban Sanitary Authority. Mr. John Lund, engineer. Quantities supplied:—

Table with 2 columns: Item description and Amount. Includes 'S. Foster, Kempston', 'T. Laughlin, Bedford', 'Holtoms Bros, Battersca', 'Ambrose & Son, Bath', 'Cowdery & Sons, Newent, Gloucestershire', 'J. Dickson, St. Alban's', 'Cook & Co., Battersca', 'Clayson & Sons, Cooknoe, near Northampton', 'Pilling & Co., Manchester', 'B. Ward, Leicester', 'E. Twelvetrees, Biggleswade', 'J. P. Waite, Bedford'.

Table with 2 columns: Item description and Amount. Includes 'For house in Fowler-road, Forest Gate, Essex, for Mr. J. Sharp. Mr. H. F. Simmonds, architect, Cambridge Heath', 'Lipscomb', 'Wood', 'Beale', 'Barton', 'Noble', 'Hughes', 'Pollard', 'Preston', 'Edwards', 'Ling & Needham (accepted)'.

Table with 2 columns: Item description and Amount. Includes 'For the erection of small villa, for Mr. W. H. Higgins, in Castle street, Luton. Mr. John R. Brown, architect, Luton', 'D. Dunham, Luton', 'A. Eaton, Luton', 'S. Redhouse, Stafford', 'Joseph Robinson, Dunstable', 'T. Neville, Luton'.

Table with 2 columns: Item description and Amount. Includes 'For the erection of six shops in Chesapeake, Luton, for Mr. Wiseman. Mr. John R. Brown, architect, Luton', 'S. Redhouse, Stafford', 'T. Neville, Luton', 'D. Dunham, Luton', 'J. Robinson, Dunstable', 'Smart Bros, Luton (accepted)'.

Table with 2 columns: Item description and Amount. Includes 'For additions to ironmonger's shop, &c., High-street, Hounslow, for Mr. Ellalay. Mr. J. R. Morgan, architect. No quantities', 'Sawyer, Cranford', 'Hopkin, Hounslow', 'Daniels, Hounslow (accepted)', 'Billis, Hounslow', '[Architect's estimate, 175s.]'.

Table with 2 columns: Item description and Amount. Includes 'For converting three houses at Boves Park, Wood-green, into shops, for Mr. Geo. Sessile. Mr. D. Taylor, architect and surveyor, New Southgate', 'F. Yoller', 'Kirby & Chase', 'T. Scarborough (accepted)', '[Surveyor's estimate, 109s.]'.

For the construction of roads and sewers, Pegge, for the London and Suburban Land Company, Limited. Messrs. Hammaek & Lambert, architects and surveyors:— F. & P. J. Wood, J. G. Marsh, J. Cardus, J. Bloomfield, P. G. Pound, R. Mayo.

For the erection of an Out-patients' Department and Nurses' Home, for the Victoria Hospital for Children, Queen's-road, Chelsea. Messrs. H. Saxon Snell & Son, architects:— Carcase, Finishings, Total. Nightingale, Massey & Co., Mowlem & Co., Chas. Well.

For general alterations to 7, Newington Butts, and 6, Walworth-road, S.E., for Messrs. Freeman & Winthrop. Mr. Wm. Whiddington, architect, Finsbury-pavement, London, E.C.:— General Works, Plumbing and Gasfitting, Total. Emery, Fritchard, Wood, Harris & Co., Clapham-road.

For additional works in constructing new road and sewers, at the Regent's Park-road Estate, for the Directors of the Birkbeck Freehold Land Society. Mr. Sydney B. Grosvenor, surveyor:— P. Pound (accepted).

SPECIAL NOTICE.— Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS. E. H.—C. R. M. (received).—T. L. P. (should send amount).—A. P. (ditto). All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses. The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors. We cannot undertake to return rejected communications. Letters or communications (beyond 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.

PUBLISHER'S NOTICES.

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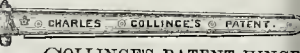
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The Builder.

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SATURDAY, JANUARY 31, 1880.

ILLUSTRATIONS.

Design for the Decoration of the Dome of St. Paul's Cathedral, By Mr. J. P. Seddon, Architect; Elaborated and Drawn by Mr. H. G. Murray, Artist	168-177
Additions to Holborn Restaurant: Elevations to Little's Queen-street and Holborn.—Messrs. Archer & Green, Architects	170-171, 174-175
Roofs of Suffolk Churches.—Sketched during the Architectural Association Excursion, 1884, by Mr. T. Garratt	178
Hôtel de Ville, Dinant.—Drawn by Mr. R. A. Briggs	179

CONTENTS.

Our Timber Supplies: Present and Future	157	The Surveyors' Institution Preliminary Examination, 1880	164	Non-Acceptance of Lowest Tender	183
Arab Art or Coptic? (Illustrated), By R. Stuart Poole, LL.D.	158	Westminster Hall: Mr. Ferguson's proposed Method of Treating the West Front (Illustrated)	181	Paint on Front Door	183
Notes	160	Surveyorship: Terms	181	The Connection of House Drains with Sewers: "What is a Pavement?"	183
The Geographical Society, and an Old Map of London	162	Peterborough Cathedral Tower	182	Light and Air Case: Rignold v. Mitchell and Others	183
Royal Badges	162	The Late Mr. Samuel Hughes	182	The Student's Column: Lessons in Perspective.—No. 3. (Illustrated)	184
Proposed Subways at the Mansion House (with Plan)	163	Fireproof Cloating of Openings in Party Walls	182	Books: Aiken's Abbots of Abingdon, Bismarck, and Lindores (Lang, Dundee); Gossault's and Garnier's French Pottery (Chapman & Hall); Varietia	186
The Parish Church of St. Marylebone: Visit of the Architectural Association	163	The Royal Arms	182	Recent Sales of Property	186
Design for the Decoration of the Dome of St. Paul's Cathedral: By John P. Seddon, Architect	164	"Architects' Club"	182	Meetings	186
The Holborn Restaurant	164	Sever Ventilation	183	Miscellaneous	188
Three Suffolk Roofs	164	Right of Way	183		
Hôtel de Ville, Dinant	164	Ventilators	183		
		New Streets	183		

Our Timber Supplies: Present and Future.



VERY able and exhaustive paper was recently read before the Society of Arts, on the "Present and Prospective Sources of the Timber Supplies of Great Britain," by Mr. P. L. Simmonds,

whose great technical knowledge of all industrial resources renders him thoroughly qualified to deal with the subject. Dependent as we are for our timber supplies from sources outside the country, and especially in our own particular needs for building industries, a résumé of the principal points indicated by Mr. Simmonds can hardly fail to be useful to the readers of the *Builder*. The magnitude of the timber imports into Great Britain is shown by the fact that for the last ten years they have exceeded 18,000,000*l.*, exclusive of some 4,000,000*l.* more for the imports of forest products, such as harks, dyewoods, pulp, rosin, fibres, vegetable ivory, &c. Our dependence, therefore, on foreign supplies is a very serious matter, which is emphasised by the knowledge that other countries, as well as ourselves, have very heavy calls upon their timber resources, and that it is only of late years that a general disposition has been shown to husband those resources, and control the reckless waste of wood that has been so prevalent. The railway interests alone have made deep inroads into the forests of the globe. Over 290,000 miles of railway are now in operation, and are being added to at the rate of 10,000 miles a year; for it must be remembered that railroad ties have to be periodically renewed. The American lines alone must have consumed over ninety million trees for this requisite, and one-seventh at least of the original number has to be renewed annually. As Mr. Simmonds correctly says, the consumption of timber in all densely-populated countries is out of all proportion to the natural growth of indigenous forests, and this disproportion must infallibly increase with the population, when denser settlements will be formed in those countries whence we obtain our supplies. We are living on our capital, as it were, and it becomes all the more necessary, not only that extreme care should be used, but that every available system of forest conservation and renewal be rigorously adopted.

Roughly speaking, the available forest ground of Europe may be placed at about 728 million acres, of which Russia counts for 527 millions (by far the largest proportion) and Great

Britain 2½ millions (the smallest except Belgium and Holland). Canada outstrips all Europe put together with 1,000 million acres, and the United States with a little less than that. Africa, Asia, South America, and Australasia are almost impossible to estimate with even approximate exactness, but their value can scarcely be over-rated, when we recollect that while Europe and North America are the forest supplies of what may be called the ordinary building woods,—pine, beech, fir, oak, &c.,—the other countries furnish us with inexhaustible quantities of the more decorative woods. Even in countries under the former category, such as Canada, those who are interested in forest growth are seriously alarmed at the condition to which it has been already brought by want of proper precautions. The timber industry there has for long been depressed and overstocked, while in New Brunswick it is considered that in from ten to fifteen years all the large and soft-wood timber will be exhausted, and the manufacturers will have to fall back on second growth and small woods. The principal woods shipped from Canada to Great Britain are oak, elm, ash, birch, maple, tamarac, white and red pine, the deals being both pine and spruce. The supply of foreign woods may be briefly summed up under four heads.

1. Ordinary soft woods of construction, chiefly pine and fir, furnished by North America and North Europe.
2. Shipbuilding woods, principally oak and teak, with small quantities of greenheart and mora from British Guiana, and a few Australian woods.
3. Hardwoods and furniture woods, which are at present very limited in number, although they might be largely increased by a little enterprise and judgment on the part of cabinet-makers and dealers.
4. Dyewoods, of less importance than they used to be, owing to the introduction of aniline dyes and chemical improvements.

Even amongst the shipbuilding woods we have a great deal to learn and much experimentalising to go through. Some Australian hardwoods, such as ironbark, are admitted by Lloyd's only into the ten years' classification of woods suitable for the timbering of ships, whilst mora is placed in the twelve years' grade; and yet reliable tests give to the former as good a character as the latter for shipbuilding. Jarrah, another valuable Australian shipbuilding wood, is ignored. These are examples of many instances where scientific inquiry and prolonged experience are essentially necessary.

To the third category, viz., the hard and furniture woods, we will now devote a little more attention, the rather since great and undeserved

neglect has hitherto been their fate. The chief timber exports from India are teak and sandal wood; the revenue derived from the latter in the State forests of Mysore being very large. The demand for sandal-wood in Europe is inexhaustible, but it is chiefly sent from Bombay to China, where it is used for ornamental work of all kinds. Another Indian furniture-wood, though not much in demand, is the Indian black-wood (*Dalbergia latifolia*), generally called rosewood amongst timber merchants and workmen. It is sound and runs large, so that excellent slabs and planks can be got from it. What is known as Moulmein cedar is the tonewood of India (*Cedrela toona*), a furniture-wood in great request, which fetches about 6*l.* per ton in Burnah. If sent in well-squared hewn logs, about 15 in. square, and 12 ft. and upwards in length, it would fetch nearly 3*s.* a cubic foot, as a substitute for mahogany. In Bengal, Assam, and Burnah it grows to a very large size, trees of 20 ft. girth, and from 80 ft. to 140 ft. of clear stem, being not uncommon in forests that have been little worked, like those in Dumsory and part of the Chittagong hill districts. The Sal timber (*Shorea robusta*), for which Bengal was so famous, still exists largely in some of the forests, though there have been unnecessary destruction and irreparable waste. The Soondri trees (*Heritiera*) of the Soonderbun furnish the best wood for boat-building. The Ceylon woods consist chiefly of ebony, sappan, satin, and sandal woods. The Cinglese forests are very extensive, and as yet practically untouched in the central province, and a proper system of conservation ought to render them permanent sources of income to the colony.

The approximated area occupied by forest trees in Victoria (Australia) is about 40,000 square miles, exclusive of 14,000 covered with Mallee "scrub," such as tea-tree and dwarf eucalypti. The principal forest trees are the large white and red gums (*Eucalyptus amygdalina* and *rostrata*) and stringy bark (*E. obliqua*). At present, however, Victoria is rather an importer than an exporter, and principally of soft woods, in which the colony is deficient. No country has been more favoured by nature than New South Wales in the variety and quality of its timber, there being twenty-seven species of the eucalyptus alone; and the durability is such that the vessels built in the colony never seem to grow old. Some descriptions of wood placed in wells and buried in the ground have been taken up after fifty years' time as sound as on the day when they were first put there. The reason why Australian timber has not met with the favour that it deserves is owing to the fact that it is so frequently felled at improper seasons, whilst the sap-vessels are full; still, moreover, sufficient

care is not exercised in sending the best sorts, or withdrawing faulty pieces from shipment. This is very much to be regretted, for a testing of seventy specimens of New South Wales woods in 1861 showed that for strength, durability, and elasticity, many of them were superior to English ash and oak. The black ironbark (*Eucalyptus eucozylon*) is a wood remarkable for its strength, very hard, and of good colour, but enormously heavy. It is principally used by wheelwrights and coach-makers, and for many purposes in shipbuilding. The black wood (*Acacia entanozylon*) is an exquisite cabinet wood, having a richly-marked grain, and taking polish freely. It is of high value in all cases where lightness, combined with strength and flexibility, are required. Tulip-wood (*Harpullia pendula*) is a large tree, from 50 ft. to 60 ft. high, with a strong timber, beautifully marked with different shades, from black to yellow, and in high esteem for cabinet work. Honeysuckle (*Banksia serrata*) is a wood of a dark red colour, taking a good polish, and is useful for boat-building, and also for veneers, and generally for furniture purposes.

Queensland possesses extensive districts of red cedar (*Cedria toana*), though of late years there has been such a wholesale destruction that the Government has passed a law with respect to the conservation of the forest. It is certainly singular that more logs of Australian cedar tree are not imported, for it is a most valuable wood, easily worked, and in dry situations very durable. Some trees have been cut on the Richmond river yielding 30,000 ft. of saleable timber. The junctions of the branches with the stem furnish those beautiful curled pieces of which the choicest veneers are made, while the root stock is also much valued by cabinet-makers for the same purpose. The market value in Queensland is from 20s. per 100 superficial feet, according to colour and size. The wood can be obtained in considerable quantities, but will soon become scarce, as it can only be procured from the open forest bushes on the coast of New South Wales, and on the Richmond, Bellinger, and Tweed rivers. In 1881-2 a few logs were received in London, and being sound and of good size, realised high prices, 4d. to 6d. per foot.

The cypress pine (*Frenela rhomboida*) is another Queensland wood from 50 ft. to 70 ft. high, with a diameter of 20 in. to 40 in. The timber is durable, fine-grained, fragrant, and capable of a high polish, being much used for wharfs and sheathing boats, as it resists the attacks of *Teredo navalis* and *Termites*. The market value in the colony is 10s. per 100 superficial feet. The brush, or bastard box (*Tristania conferta*), has a peculiar value from its immunity from attacks of white ants. The beef wood and swamp oak (*Casuarina torulosa* and *C. equisetifolia*) give close-grained woods and make handsome veneers, while rosewood (*Diospyros Fraxanum*) is much in favour for turning. Myall (*Acacia homalophylla*) is well adapted for cabinet-making, but is not large. The timber of the bastard sandal (*Eremophila Mitchellii*) is very fragrant and makes good veneers; but the fact is that cabinet-makers are so accustomed to mahogany and a few other woods, that they are reluctant to try any new ones.

Tasmania has not much to send us except small lots of musk-wood and the beautifully-marked Huon pine; and South Australia has so far destroyed the indigenous forests as to be obliged to plant largely. Western Australia, however, is rich in woods, particularly the white gum, eucalyptus, and jarrah, the toart, the red gum, and the sandal wood, a scentless variety of which, called *manitoh*, might be useful for wood engraving from the fineness of the grain. The indigenous forest of New Zealand is evergreen, and contains a large variety of valuable woods, though they are harder and more difficult to work than the European timber. The manuka (*Leptospermum ericoides*) has fine dark-coloured markings, and is very durable; and the birch totara (*Podocarpus totara*) is like cedar, and works with the same freedom. It is useful for piles and ship-building, and the Maoris make their largest canoes from it. The kamri is the finest forest tree in New Zealand,

though it only grows in the North Island. It forms the bulk of the timber exported, and is remarkable for its durability, some of the old mission-houses, built fifty years ago, being as sound now as then. It is a rich and valuable wood for house finishing and furniture, having beautifully-mottled shading. The principal trees in ordinary use are the tawhai or black birch, very strong but tough and hard to cut; the kowhai, a red wood, used chiefly for piles but good for furniture; the matai, of yellowish hue, largely used for bridge-building; the kawaka cypress, a noble tree, with fine-grained, reddish, and heavy wood; the rimu, marked like rosewood, greatly liked by cabinet-makers; the monono, or yellow pine, the most durable timber in the colony, posts made of it having been in use amongst the Maoris for over 100 years; the tankaha, the wood of which resists decay in moist situations most remarkably; the rata, or ironwood, dark red, splits freely, and would probably answer well for cogs and spur wheels; the pohutukawa, of which nearly all the ship frames in Auckland are built.

Quitting the subject of heavy building woods, we must now briefly note Mr. Simmonds's remarks on the furniture woods, the principal of which, of course, are mahogany (the average consumption of which in Great Britain is about 50,000 tons), walnut, boxwood, cedar, ebony, rosewood, maple, and satin: while of minor importance are zebra-wood, ziricote, snake or letter wood, partridge, and tulip. After 1870, veneers were summarised by the Board of Trade with the furniture woods. In the United States, the chief veneering woods are curled and bird's-eye maple, beech, birch, cherry, ash, and oak. The first and most costly is what is known as French walnut, but which, in reality, does not come from France, but from Asia Minor and Persia. The tree is crooked and dwarfed, and is solely valuable for the burr that can be obtained from it. In these large tough excrecences, the grain is twisted into the most singular and complicated figures, and the symmetry and intricacy of these is one of the elements determining the value of a burr. Formerly walnut burrs were in good demand, fetching from 100l. to 200l., but now they are in much less request, the competition being limited to pianoforte-makers. Occasionally burrs are met with in rosewood and mahogany, but they are of little value. Burrs which used to fetch from 10l. to 45l. are now only worth from 9l. to 30l.

Boxwood is chiefly used by the turner and wood-engraver, and is getting very scarce, so that continued efforts are being made to find a substitute. Rosewood is a term as generally applied as boxwood, and to as great a variety of trees in different countries, sometimes from the smell, and sometimes from the colour, of the wood. The cabinet rosewood imported from Brazil is the product of *Tacarcanda Braziliensis*, and the 3,000 planks or so that come annually to Liverpool seem amply sufficient for the demand. About 4,400 logs of cedar were imported in 1884 into Liverpool from Havana, Surinam, Mexico, and Honduras. Next to walnut, ebony is the most valuable of the cabinet woods, and for a particularly fine piece 20s. per lb. has been paid, the main difficulty being to get large pieces that can be used without cutting. Prime large logs from Ceylon readily fetch 14l. per ton and upwards. The ebony wood of commerce, so much used for inlaying, is the duramen of several species of *Diospyros*, natives of Africa and Asia. From its hardness, colour, durability, and susceptibility of polish, it has always been held in high estimation. The commercial descriptions are generally ranged under three kinds, of which the Mauritius is the finest-grained and the blackest, though it is the most costly and unsound. The East Indian is of inferior colour and coarser grained, while the African is the least wasteful, but the most porous.

The cabinet woods of Jamaica are of extreme beauty, and there is no doubt but that they would come into great demand if the difficulty of procuring them from the forests could be reduced. There are many close-grained woods,

suitable for small articles, such as the blood wood (*Laplacea hamatozylon*), of a deep red colour; the fiddle wood (*Citharexylum surretum*); the maboe (*Paritium datum*) of a blackish green colour, which makes a pretty contrast with lighter woods; the yellow sanders (*Bucida capitata*) of a light yellow with satin graining, which takes a high polish; the Brazil letto, of a bright red, and much in request for ornamental work; the Yacca, also very much prized and a denizen of the Blue Mountains, where it is crooked and magnificently cross-grained. Brazil is very rich in furniture woods, as may be imagined from the fact that Prof. Agassiz counted 117 different varieties, of which the most valuable is the tortoise-shell wood (*Omphalobium Lamberti*), found in large quantities on the Upper Amazon. Then there are the Pao Santo or holy-wood and the Saboarana, rivals of the most beautiful walnut, and of which enough is found on the Amazon to veneer all the palaces in Europe. Brazil also abounds in timber for construction, as durable as teak, and of splendid proportions. Dining-tables are often to be seen, 6 ft. in width, all made of one piece.

To sum up, it will be seen that the main sources from which we draw our main supplies of timber are the Northern States of Europe and the Dominion of Canada. From the United States and our colonial possessions we can only import in very limited quantities; and it behoves, therefore, all timber-producing countries to husband their resources, and by judicious forestry regulations to prepare increased supplies for the future demands of the world.

ARAB ART OR COPTIC?

BY REGINALD STUART POOLE, LL.D.



THE history of the art we call Arab is to be learned in its great centre Cairo.* There, and there alone, can we trace its growth, its maturity, and its decay, seeing how foreign elements came in from time to time, and were adopted and modified to suit the purposes of the Cairene architects and decorators. Its source is not to be looked for at Byzantium or in Persia, but in the ancient capitals of Egypt herself. Domestic, not religious architecture, supplies a ready proof. The models and pictures of old houses show the features of the Cairene style, which still flourished in the early years of this century. In one ancient fresco we see the stone doorway, the belvedere, the lattice-windows, the ventilators with their sloping roofs, and the inner court planted with trees, the characteristics of the modern Egyptian house, never complete without all of them. We need not, then, wonder if we find the art of Cairo to be the latest phase of the art of Egypt, which we may trace through a long series of developments, influenced in turn by Greece, by Rome, by Byzantium, by the Italy of the Renaissance, but always preserving that strong individuality which is almost as little disguised by outer forms as is the old Egyptian type of the modern Copt, although he wear the turban and ample robe of the Arab; being, indeed, far more the same man in religious conservatism, and in the subtle qualities of the official scribe.

It may be said that though the Cairo house is truly Egyptian, the mosque presents a new type. The usual ground-plan contradicts this view. The typical mosque so far is like the court of an Egyptian temple. The dome and the minaret are new features, and the constant use of the arch is a deviation, but the frequency of the arch in antiquity is to be noted, as the perishable buildings for which it was usually employed have rarely survived, and the dome is but its development. Moreover, closely connected with arch and dome are those beautiful pendentives which have their stiff prototype in the ancient "arch of approaching stones." The bell-towers of the Coptic desert-churches are not far removed from the type of the Egyptian propylea, and the oldest minaret links them with

* Cairo is here the city, with its environs, together including the early capitals: it has survived, and of which in and around it notable edifices yet stand.

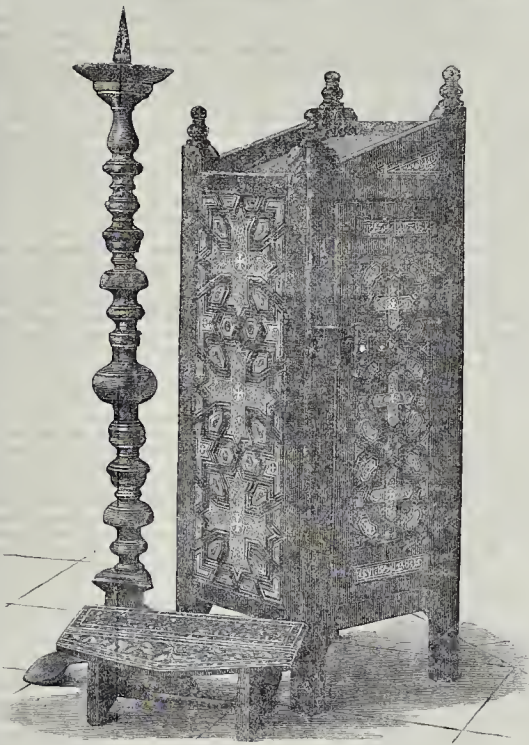


Fig. 1.

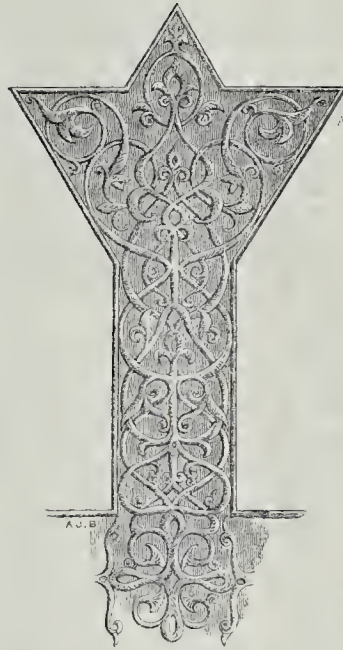


Fig. 2.



A. J. B.

Fig. 3.



A. J. C.

Fig. 4.

the later form. It is, however, a mistake to lay great stress upon structure, and even upon structural skill, when the essential quality of the ancient and modern art lies not in structure. That quality, so strong as to be its very character, is decorative felicity, in a harmonious use of the primitive colours for forms due to wood-carving and joiners' work, whatever the material. This is evident alike in the patterned ceilings of Theban tombs and Cairene houses, alike in the oldest and newest panelling. The ancient work, however rich in decoration, is far inferior to the modern in variety. Yet its root is the same. In the later style the lavish use of wood is as striking as its absence in what time has spared of the older, those great edifices whose very lattices were carved in stone. Yet these lattices represent woodwork. In ornament the stone panels represent wooden panels, and the stone walls of one of the earliest tombs were cased with wainscot. To trace the very patterns through the course of centuries may not be possible, and many are no doubt foreign; but any one who will compare the stone patterns of the oldest tombs with the wooden screens of Cairene mosques cannot fail to recognise certain leading outlines which have survived all internal changes.

Turning from theory to history, we note that the decorator of Cairo has always been a Copt; the architect, so far as we know, a Greek or a Copt. By the Copt the turner's work and the carving in wood and ivory have been made for generation after generation, the peculiar types fixed in the age between the fall of paganism and the Arab conquest.

To trace the history of Cairene art from the last great mosque, that of Mohammad Bey, a little more than a century old, and the fine series of houses closing fifty years later, is an easy and delightful work, which no one has yet been at the pains to do. All that is needed is to select a series of types and work back to the mosque of Ahmad ibn Tuloun, in the middle of the ninth century, taking care to find dated specimens of the obscure periods,

avoiding the exotic art of Constantinople and the far more interesting Tatar type of mosque architecture which appears about the beginning of the fourteenth century. The history of each building should be carefully studied, and the exotic elements again eliminated from a native work, or the native elements rescued from one of foreign type. Thus the fine Gothic door in the main street of the old city is not Cairene work, but the spoil of a church at Acre, carried away when the last stronghold of the Crusaders fell, and set up here as a trophy ("Modern Egyptians," fifth edition, p. 590. E. Stanley Poole's Essay on Arabian Architecture). The great dome of the mosque of Sultan Hasan, the one blemish in the magnificent Cairene sequence of domes, is distinctly Turkish. It was built by a Turkish Pasha, who replaced the original dome when it fell, adopting his national shape for structural purposes, whereas his fellow-countrymen have usually combined the finer Cairene type with their own unshapely minarets. Having thus carefully selected our typical buildings, we find in the eastern branch of Medieval art the law

of progress which the Westerns followed. We see the parallel to our own Norman, Early English, Decorated, Perpendicular, and Tudor or Jacobean, separated by times of transition. The periods are usually earlier in their beginnings, and many differ in length, yet the same law is obeyed. Until this is recognised the study of the art of Cairo or of any other Muslim centre must be not merely useless, but mischievous.

In the study of decoration we must be even more careful, first to fix the dates of later additions and next not to be misled by apparent resemblances. The floral arabesques of the mosque of Kalaoun have a strange air of the Classical Renaissance, and that at the close of the thirteenth century. This is a mere accident, just as the battlements of the same mosque repeat in modified form a well-known Assyrian type. The difference from Italian work is to be seen in the composition both as a whole and in its fineness of line. The true Renaissance influence is detected in the lack of purpose of later architectural forms, especially windows and ceilings, and in the want of

necessary fitness in the details of decoration.

It is a long step from the date of the Mosque of Tooloon, A.D. 879, to the age of the security and mostly not very characteristic Roman remains of Egypt. This earliest mosque was held to offer the last foothold in the journey into past time, unless, indeed, we could rest for a moment in 840 at the Nilometer of Roda, but beyond, all was darkness out of which the theorists evolved the birth of art, each according to his cosmogonic fancy.

An opportune book, Mr. Butler's "Ancient Coptic Churches of Egypt," has, by the natural but as yet unthought-of process of serious inquiry, filled up the chasm and discovered the links between the Pagan and the Arab periods.* It enables us to determine the sequence of Coptic architecture and the immediate origin of Cairene decoration. The first matter needs a very careful study before we can venture on positive conclusions. The dates of all Coptic art are hard to fix, partly because of the confusion caused by the use of the Era of the Martyrs three centuries later than ours, partly because of the absolute newness of the subject. Mr. Butler has clearly shown the presence in the churches of Byzantine elements which are unknown in the mosques, or only known like the semi-dome in Turkish mosques of Byzantine parentage. When these elements are of the essence of the structure, the architectural origin of the building is, without doubt, very early, though it may be historically of later construction. The churches of peculiarly Coptic style are next in date, but their distinctness in type from the mosques again marks an earlier origin. For instance, wagon-vaulting is neither Byzantine nor so-called Arab. It is, indeed, to be seen in Persia, where it may be a survival or an accident due to the abundant use of the arch and dome. This may be observed in the very curious view of Koom in M. Dicalafoy's "L'Art de la Perse," pt. ii., pl. 1, where wagon-vaulting is combined with domes. Thus in origin the Coptic style precedes that of the mosques, and springs from Byzantine-Coptic, itself derived from the art of the basilica-churches, well but scantily represented in Egypt. How far the Coptic period overlapped the so-called Arab is hard to determine. It is probable that nothing important was executed by the Copts in church architecture after the tenth or eleventh century. That they found a wide field for their genius in mosque architecture, however rivalled by the Greeks, we cannot doubt; but it does not follow that they showed the like activity in building for their own rite. This was not necessary; more than this, it was not possible. Persecution upon persecution narrowed their resources and limited their congregations. Thus they had no chance of raising any splendid works for themselves, and the instinct of the persecuted would make them cling to the old ecclesiastical types. The great building age of the Coptic rite was the age of its comparative freedom. Their largest churches were then built, and lavishly adorned. All later work was, in architecture, not restoration so much as the more wholesome reparation. Whatever is truly of these times is decoration; the new screens and other triumphs of carved and turned work which then appear are of distinctly late development.

In ornament the difficulty of finding the true date is yet greater than in architecture. Before the time of Tooloon we are in the dark as to the movement of decorative art. But a comparison of church with mosque decoration settles the question in favour of the prior antiquity of the church style. To determine this we need not go to the earliest examples, but may compare Coptic work of churches and of mosques of any period. It must be remembered that the decorators, simple craftsmen, worked with equal skill in church or mosque. Their art went on developing to its latest phase, when their work was but little touched by the corruption of the Classical Renaissance, even to its close in our own days, the

days of such of us as are old enough to have seen Cairo when she was still the most beautiful city of the East, to have lived in houses so decorated as to have needed no furniture but for use, fully furnished by the triumphs of the craftsman's skill.

Looking at Muslim decoration, whether geometric or floral, we are often struck by a want of purpose, as in the meaningless character of the centres of geometric work, even descending to a suggestion of engine-turning, and in the floral patterns, by the endless repetition of the fleur-de-lis, very charming on occasion. Sometimes the centre of a geometric pattern is a mere boss, sometimes it is empty, sometimes heavy. If we turn for a moment to church decoration, we see the centre of the geometric patterns to be the equal-armed Greek cross, and that the floral patterns spring from a cross flory. We now understand why the best centre of the mosque work is really a salient cross, and why we can perceive in delicate floral tracery the shadow of an almost effaced cross. The variety of the floral patterns in which the fleur-de-lis appears is now interpreted: they are the disconnected limbs of a cross. In the ivory-inlaid lectern at the cathedral of Cairo, reproduced in Mr. Butler's illustration (fig. 1), we note the admirable manner in which on the front, and not so strikingly on the side, the crosses form the central motives of the pattern, and render the surroundings necessary, instead of what we frequently note in work for Muslims, a severity of the centre to the surroundings in which the motive rather lies. In the portion of a carved floral pattern in ivory (fig. 2), exhibiting the decoration of the centre and one limb of a cross, everything springs from the cross which permits the use of the fleur-de-lis in a natural manner. Two other ivory carvings may be cited from the same work, one a delightful floral pattern (fig. 3), and the other a combination of geometric and floral (fig. 4), defective only in some of the minor details which are perfunctorily thrown in. If we thus find that in comparatively late times, perhaps about the fourteenth century, the ecclesiastical work shows the Christian origin of the mosque work, we cannot hesitate in concluding that the decoration of the mosques was not only by Coptic hands, but that it was of distinctly Coptic origin.

The great mosques of Cairo, the rarer private houses, and those of the kindred phase of the Delta, almost unknown, yet full of delightful hints, are fast perishing. Very soon it will be impossible to restore the history of the purest style of one half of Mediaeval art. All is handed over to the destroyer, or perishes for lack of love and care. Again and again I have pressed this subject as not unworthy, nay, most worthy, of the enterprise of our young architects and the generosity of our wealthy men. To the one, I would say, Do not be content with half a grammar, but learn all, and maybe out of your knowledge shall spring an art not unworthy of our great dominion; to the others, It lies with you to furnish our students with larger knowledge, if not with a greater career. Should you send an expedition to Cairo the results will amply reward the little outlay that is needed. The treasures of the past will be saved to make the future yet more rich.

NOTES.

THE wicked attempts at the destruction of public buildings which will make Saturday last a memorable day in the annals of such crimes in this country, though no doubt failing to create a title of the damage which was intended, have nevertheless been so nearly successful that the House of Commons has been partially wrecked, so far as a great portion of its interior fittings are concerned, while Westminster Hall itself has had a narrow escape of being blown up, and so disposing of some of the controversies of which it has been the subject within the last few months. Much of the costly woodwork of the House of Commons has been reduced to matchwood, but arrangements are in progress for temporarily repairing

the damage, so that the House may meet on the 19th prox. as appointed. The fine roof of Westminster Hall has not, we hope and believe, suffered any serious injury. That the damage done in the Hall was not greater is probably mainly due to the intrepid conduct of the policeman who carried the explosive from the vicinity of St. Stephen's Crypt up the steps into the hall, though unhappily he suffered severely for his bravery. We are glad to hear that his courage has met with recognition in high quarters, her Majesty having signified her intention of conferring upon him the Albert Medal.

WITH regard to the Tower, the damage done by the explosion there, though serious enough in itself, and though subsequently added to by fire and water, has happily had no material effect on the structure as a whole, and the White Tower still continues to stand "four-square to all the winds that blow." The explosion took place on the floor of what is still called the Banqueting-hall, near the north wall of St. John's Chapel, and close to the doorway leading from the hall into the chapel. A large hole was rent in the floor of the hall, and several stacks of rifles were thrown down and scattered in great confusion, some of the arms being twisted and broken in a remarkable manner. The force of the explosion raised the floor of the Council Chamber (which is the chamber immediately above the Banqueting-hall), and did much damage to the glass cases which contained specimens of ancient Oriental armour. The force of the explosion seems to have passed through the doorway before mentioned into St. John's Chapel, for it has blown out the whole of the lead-lights of the windows, though the iron cross-bars or stays for the lead-lights were violently forced *inwards*, carrying small masses of broken masonry with them, the explanation of this being that it was due to the violent rebelling of the vacuum caused by the explosion inside the building. Mr. John Taylor, of the Office of Works, informs us that, in the course of the minute examination which has been made of the walls since the perpetration of the outrage, a few slight cracks have been discovered in the masonry, but it is not certain that they did not exist before the explosion. It is earnestly to be hoped that the authors and instigators of these abominable deeds may be speedily brought to justice. In the meanwhile it is satisfactory to be assured that increased vigilance will be exercised by the guardians of our public buildings and historic monuments.

THE correspondence in the *Times* between Lord Bury and the solicitors for the Metropolitan District Railway Company, in regard to the subway under Prince's-gate, is amusing as an example of both parties putting themselves in the wrong. The subway is being made in order to facilitate access to the Exhibition building from the railway. Its effect will be to remove the crowd of persons streaming to the doors, from aboveground to underground, and thus to do away with a great nuisance to dwellers in Prince's-gate or "Exhibition-road" during Exhibition time. Yet Lord Bury writes as if the whole were a scheme for adding to the nuisance, instead of one which will do much towards reducing it. He compares the ventilators which the company are opening in the middle of the road to the "blowholes" which have caused such a nuisance in other places, quite forgetting that this is not a railway tunnel, whence the steam and smoke of locomotives would be given off, but merely a footway for passengers who want to breathe; and he talks of one of the widest streets in London as "our narrow thoroughfare." There could not be a more typical example of the unreasonableness which possesses English householders who fancy they have a grievance. On the other, the reply of the solicitors to the company, which is perfectly reasonable in itself, is obviously open to the objection of claiming a legal right (to deviate from the intended line of the subway, under the footwalk, to one under the centre of the road) which they have not. Lord Bury is

* "The Ancient Coptic Churches of Egypt." By Alfred J. Butler, M.A., F.S.A. Oxford: Clarendon Press, 1884.

right in law, but unreasonable in opinion; the company are wrong in law, but they are in this instance, at least, doing what will be a public benefit, and what among other advantages will probably put a natural stop to that congregation of low hawkers on the edge of the footway, to which we have before referred, and which ought to have been stopped by police interference in any case.

FROM a communication kindly sent to us by the Dean of Winchester we learn that it is proposed to restore the celebrated screen, as a memorial to the late Archdeacon Jacob. The work proposed to be done is grouped under three heads:—(1) The restoration of the stone-work throughout; (2) The restoration of the cross on the existing base; (3) The placing of statues in the niches. The first item comes, we presume, really under the head of what might properly be called "repair," the two latter are restoration. It is to be hoped that the work will be carried out so as to preserve all the ancient work that is in at all an intelligible state as intact as possible. The removal of West's picture from the centre of the screen is spoken of as a possibility, not yet decided on. West was not, from the present point of view, a very powerful artist, but he marks a phase in the history of art, and his aims at least were high. We should hardly advocate the removal of his work without better reason than we have heard yet. About 5,000*l.* is needed for the work. It is not stated what architect and sculptor are to be employed.

IN his second lecture at the Royal Institution last Saturday afternoon, Dr. Waldstein did not after all get as far as Praxiteles, a considerable portion of the time being occupied in an attempt to define the origin and nature of that peculiar state of feeling constantly recurring in the history of all art and literature, and vaguely termed "romanticism." Dr. Waldstein represents it as consisting in an attempt to escape from actuality to a sentimental ideal, an ideal based on sentiment, on what might be rather than on what is. The definition hardly seems quite to cover the ground as far as sculpture is concerned; some of the works which are recognised as of the romantic school, such as the "Apollo Sauroctonos," being in fact more realistic than the sculpture of the period of Pheidias. We doubt if any one ever will define "romanticism" in a logical and satisfactory manner. Those who have studied and compared the art of different epochs feel instinctively the difference, but it is so subtle that it would be difficult for those who felt it most strongly to lay their hands on the special qualities which constitute it. In architecture we should be inclined to say it is that which departs from rule and symmetry, and aims at effect somewhat independently of structural fact. Some of the comparisons which the lecturer instituted between the casts exhibited brought out the distinction plainly enough for those who have eyes to see. A very significant contrast was between the single figure in the Sala Chiamonti of the Vatican, believed to be either the original or a direct copy of one of the figures in the Niobe pediment of Skopas, and part of the drapery of the corresponding figure in the Græco-Roman reproduction of the Niobe group as familiar to us. The distinction is almost startling when the two are brought to juxtaposition; the later drapery is a regular piece of sculptor's "bravura." Dr. Waldstein made no allusion to Mr. Wood's sculptured column from Ephesus in the British Museum, so we presume he does not regard that as probably the work of Skopas, who is said to have sculptured some of the columns.* Dr. Waldstein concluded with an exhortation to breadth of sympathy in regard to various schools of art; difference did not necessarily imply inferiority. His third and concluding lecture takes place to-day (Saturday).

* Dr. Waldstein has since written to us to say that he considers the sculpture of the Ephesus drum to show at least the influence of Skopas, whether it be actually from his chisel or not.

A NEW danger threatens York House Water Gate at the bottom of Buckingham-street, Strand. A railway is proposed to be constructed from Charing Cross to Euston Station, which is to be carried, for the greater portion of its length, beneath the surface of the ground in the line of the proposed new street from Trafalgar-square to Oxford-street. In connexion with the railway a short street is proposed to be formed from St. Martin's-place to the Victoria Embankment, terminating near the Metropolitan District Railway Station at Charing Cross. The centre line of this street passes York Gate at a distance of about 30 ft. to the northward, and there is great reason to fear that if the street is carried out as proposed, York Gate will be destroyed. Several proposals have been recently made for the purpose of preserving the gate, and it is to be hoped that the railway company may not be permitted to sacrifice it to their zeal for increased dividends. The same railway proposes to take a portion of the disused burial-ground adjoining Whitefield's Chapel, Tottenham Court-road, and a portion of St. James's burial ground, St. Pancras.

THE Hôtel Salé, an interesting specimen of seventeenth-century work, at the corner of Rue de Thorigny, Paris, and until recently occupied by the Central School of Arts and Manufactures, is offered for sale, and it appears, runs some danger of being demolished. The staircase is engraved in "L'Encyclopédie d'Architecture," first series, 1855, and is a very charming composition. From an archaeological point of view the mansion is not without interest. The site formed a portion of the ancient *cultures*, or spade farms, of the Hospital St. Gervais, and was the last portion of the marshes of the Temple built over by Henry IV. The ground formerly belonged to the Convent of St. Anastasia, by whom it was sold, in 1656, to Aubert de Fontenay, a wealthy farmer of taxes, who built the present mansion. The arns of the founder may be seen in the balusters of the principal staircase. As the enormous wealth of the owner of the house was chiefly derived from a tax upon salt, the people nicknamed his residence the Hôtel Salé, by which name it is known to the present day. The Society of Friends of Parisian Monuments recently inspected the building, and recommended that it should be utilised as a museum, a library, or a school of art, for any of which purposes it appears to be adapted.

IT is to be feared that the ventilation of the Law Courts will never be satisfactory if each judge is to direct that his particular court is to be hotter or colder as he likes. We mentioned last week Baron Huddleston's remarks, and subsequently, as it appears, when Mr. Justice Grove joined his learned colleague there was a difference of opinion on the bench, Mr. Justice Grove complaining of the heat of the court and saying he preferred draughts to suffocation. The fact is that it is not so much the actual low temperature which vexes many of the judges as the draughts. These are a constant source of complaint, and if they were removed we should hear less of these judicial grievances. But raising a court to a very high temperature, as Baron Huddleston has done in the case of that in which he sits, is simply flying from the frying-pan into the fire. The consequence of such a high temperature is the liability to subsequent chills. If each court were kept at a certain stated temperature, as fixed by competent medical authorities, the judges and the public could not complain.

A COMMITTEE of the Glasgow Town Council appointed to revise the regulations for the construction of theatres, music-halls, and public buildings generally, have prepared a draft code of regulations which are under consideration. The regulations are loosely drawn, and are defective in an important particular, as no provision appears to have been made with a view to prevent a recurrence of the disaster which occurred at the Star Music Hall, Glasgow, by which several persons lost their lives. The loss of life was occasioned by the audience from two different

levels meeting together on one of the landings of the gallery staircase during a panic. The remedy for this would be to require that separate means of egress, conducting directly into the open air, should be provided from every tier or level, and that no emergency doors should be suffered to be formed between any one tier and the intermediate landings of a staircase. By these regulations it is proposed that no place of amusement capable of containing 1,000 persons and upwards shall be allowed to be built unless sufficient access can be obtained to it from at least two streets or lanes, and this rule is proposed to be made applicable to existing buildings. In this latter respect the Glasgow regulations go beyond the regulations in force in France and Russia with regard to theatres and music-halls. The Paris regulations permit a theatre to be built as a detached or an attached building; the St. Petersburg regulations require new theatres only to have an open space upon every side with doors and windows upon each of the four sides, and in neither case are the rules with regard to site made retrospective.

THE City of Paris recently resolved to demolish a number of houses in the Rue des Filles-Dieu and the vicinity, situated in one of the most unhealthy neighbourhoods of Paris, inhabited chiefly by rag-pickers and mendicants. The owners of the property claimed upwards of 9,000,000 francs (360,000*l.*) for their interest. The City offered nearly 3,000,000 francs (120,000*l.*), and the jury awarded a sum of 213,000*l.* One of the owners received as much as 15,500*l.* as compensation, from which we may infer that the owning of unwholesome houses is not less profitable in Paris than it is in London.

THE February number of the *Art Journal*, which at its now reduced price of 1*s.* 6*d.* is a wonderful "monthly" for the money, contains an interesting and well-illustrated article on "Grotesques," by Mr. Lewis F. Day. An article on "Art-Teaching at Rugby School" gives a pleasant idea of what is being done there to stimulate a taste for and knowledge of art among the boys. The schoolboys of this generation at Rugby, at all events, need not grow up in such entire artistic darkness as that which used to enclose the mind of the British schoolboy.

SEVERAL architects have sent us, with various indignant or sarcastic comments, the following circular, sent round by a firm of contractors:—

"Dear Sir,—We shall be pleased to tender for construction, alterations, joinery, and high-class decorations.

When unusual trouble is taken, we shall be pleased to remunerate.—We are, dear sir, your obedient servants,
W. B. & Co."

Such a circular is simply an insult to those to whom it is addressed, and we hope that the authors of it will have got a good many unmistakable "hack-handers" from those members of the profession whom they have taken the liberty to address in that fashion. The communication is marked "private," a sufficient indication that those who issued it knew very well they were doing what they, and any one who should accept their obliging offer, ought to be ashamed of.

Blackburn.—The new wing attached to the Blackburn and East Lancashire Infirmary was opened for the reception of patients a short time ago, without any formal ceremony. The Board of Management at their last meeting expressed themselves well pleased with the special features in ventilation and the sanitary arrangements generally. The cost of the new wing has been 3,950*l.*, inclusive of drainage and re-forming the ground, and the cost of the entrance-lodges, 350*l.* each. The architect for the work was Mr. A. W. R. Simpson, Blackburn; the builders being Messrs. Thomas Higson & Sons, also of Blackburn. The new wing gives additional accommodation for twenty patients, and sleeping accommodation for six nurses.

THE TOPOGRAPHICAL SOCIETY, AND AN OLD MAP OF LONDON.

"Μάψ, ἀνάφ' οὐ κατὰ εὐθυσίαν." Πόλις, Η., v. 759.

For the earliest recorded view of London taken as a whole, we must look, if happily indeed it might be found, in the Cathedral Library at Seville. Ferdinand, nephew to Christopher Columbus visited England with Charles V., and was at Winchester in the year 1521. Travelling through Europe during the period 1518-1525 he had leisure and means to exercise his tastes as a collector and bibliographer. Some of the books and maps he acquired, together with a catalogue in his own handwriting, are preserved in the Cathedral Library. One item in the catalogue reads thus: "Bought a map of London engraved on copper dated 1407." Until that map be recovered we have to accept as the oldest of its kind the freehand drawing which, whilst neither signed nor dated, is popularly attributed to Antony Van den Wynegaerde. That Flemish artist made several pen sketches, folio size, of notable buildings in Rome, Spain, and the Netherlands, and principally in England, when attached to the suite of Philip II. of Spain. His collected drawings first came into England about sixty years ago, to the care of Messrs. Harding, Triphook, & Lepard, the well-known booksellers, and subsequently passed to the Bodleian trustees. N. Whitlock made a reduced and finished copy of the London view, but sullied his work by introducing details at variance with the received date of the original.* Wynegaerde's work, when fully displayed, extends to more than 10 ft. in length, and is about 17 in. wide. The execution is not careful, whilst the very nature of the subject forbids accuracy of perspective or of relative distance. At the same time we there have a valuable presentment of London, ranging from Placentia (Greenwich Palace) to the King's Palace at Westminster, as it stood temp. Edward VI. Its most prominent features are the White Tower, the four angle turrets already capped with the incongruous cupolas retained by Wren; and the glorious spire of old St. Paul's, which as yet unstruck by the lightning of 1561, rises from the four-pinnacled tower and lifts its vane to an elevation exceeding that of any other Christian church. By the courtesy of the authorities at the Bodleian, the London Topographical Society was lately enabled to present its subscribers with a replica, in two parts, of Wynegaerde's view.

In the Crace collection at the British Museum may be found an uncoloured copy of the "Λονδίνιον Περαισιμί Ἀγγλικῆς Ἐβνῆς Μετροπόλις," taken from the "Civitates Orbis Terrarum," which George Braun and Francis Hogenburch dedicated in 1572 to Maximilian II., nephew of the Emperor Charles V. Within the same portfolio are filed a few later editions, one of them, a French issue, being cut out of Bellefleur's "Cosmography." Since these differ from the first, and from one another, it should be observed that the original, in dimensions 19½ in. by 13½ in., carries its title in a top central panel placed between the armorial bearings of the City and of Queen Elizabeth. At the sides are two tablets, containing descriptive matter in Latin, mainly relating to the Stillards, or Steelyard,† and below stand two male with two female figures. Remarking to its theme after an interval of repose, the Society, whose labours, by the way, seem to be devoted exclusively to a remote past, has just published a reprint of the Braun and Hogenburch, again availing itself of the process employed by the Typographic Etching Company.

Though the river's bend as it flows between Westminster and Lambeth Marshes is incorrectly set out, the bird's-eye view of 1572 can be regarded as generally authentic in essential particulars. The inhabited ground comprises Lambeth, Bankside, and Southwark along the south, forming a chord to the arc which is bounded by Westminster, St. Giles in the Fields,—we reproduce the names as they appear,—Clarkeuwell, Spitel fields, the Myrcories, and the Towne precincts. Through the open fields lying beyond run such main thoroughfares as Howle's hurne (the modern High Holborn), Bushoppe's gate strete, the Barres from near to the Gowne founders h^o (houses)

without Aldgate, and what at this day is known as the Borough. The Strand is shown as a continuous line of dwellings, but nearly all of London proper lies within the City wall. At the south-eastern corner of the map by the waterside is marked a "Beere howse." This is situated (a little below the later Pickle-herring stairs), exactly over against another house, also so named, upon the opposite bank of the river Thames just outside the Tower Iron Gate. In the corresponding corner to the west appear Lamberth and the Slawghter howse, this latter being the abattoir appertaining to the royal palace of Westminster, at the outlet of the former ditch or race, which, serving the Abbot's Mill, is now represented by an affluent of the Aye Bourne running in a sewer beneath Great Collego-street. A short distance down the Thames are marked the Queen's bridge (or stairs), Stehar Chamber, Chanoy row, the Corte, and another Beere howse. The last-named undoubtedly corresponds with the Battery at Whitehall, to whose dismantled remains we recently directed attention.* Barnard's Castle is styled Benam's Castle; in fact the whole nomenclature of this map is well worthy of study.

We have alluded to the comparatively small space covered by the ordinary dwellings. Not yet has begun that rapid outgrowth of buildings, principally to the northern and western quarters, against whose increase Queen Elizabeth herself and her successor on the throne issue their neglected edicts. Looking at Braun's and Hogenburch's picture one is forcibly reminded of the greatest crisis in the history, topographically speaking, of London. We at once see more graphically than mere words could demonstrate how, had the Great Fire then raged, very little of the town would have escaped. For laying waste a portion which is equal to the joint areas of the Green and Hyde Parks the conflagration consumed the whole heart of the city which is delineated in the picture under review. Again, we see at a glance how, with one or two notable exceptions,† poorly provided were the parish and conventual churches with towers or steeples. But with the Great Fire Sir Christopher Wren found an opportunity such as no architect had ever enjoyed before. What he might have done, unfettered and uncontrolled, it were idle to conjecture. What has been done since it were as painful to recall, but one thing is certain, that to him and him alone the City owes a charm and a beauty so distinctive and yet so varied that even the most vaunted of all other European capitals must acknowledge their inferiority.

Of other and even older views it will be sufficient to mention the illustrations in MS. copies of Matthew Paris's work, dated 1230, at the British Museum and at Corpus Christi, Cambridge; as well as the miniature painting (1418) which represents the Duke of Orleans as a captive in the Tower. These three views were produced in facsimile by J. West. There is also the co-eval painting at Lord Egmont's monastic seat of Cowdray, in Sussex, wherein is delineated the procession of King Edward VI. from the Tower to Westminster, on the 10th of February, 1547, previously to his coronation. That painting, 50½ in. by 22 in. in dimension, J. Basire engraved for the Society of Antiquaries in 1787. To them may be added the diminutive foreign map, only 4½ in. by 3½ in., by Francis Velazio, from a book entitled "The Cities of the World," formerly in the Wellesley Collection and now in the British Museum. These, however, are valuable rather by reason of their antiquity and intrinsic excellence than for the trustworthiness of their details.

British Museum Lectures.—Professor Hodgetts, whose lectures in the Anglo-Saxon room last year were noticed in our pages, will commence shortly a course of six lectures in the British Museum, on the following subjects:—"The Normans," "The English," "The Monk," "Armour," "Civil Dress," and "Sports and Pastimes." The lectures will be given at two p.m. on successive Friday afternoons, commencing February 20th.

* The Builder (Aug. 9th, 1881), vol. xvii., pp. 187-8.
 † For instance, the towers and spires of St. Lawrence Pountney and St. Dunstons-in-the-East, with the towers of St. Mary Somerset, St. Mary-le-Bow, St. Mary Spital, St. Mary Aldemary, and St. Michael Cornhill. These are still more conspicuous in Agge's map and in Hollar's delightful little etchings from the fields about New River Head.

ROYAL BADGES.

SECOND only in importance to the Royal Arms (of which we gave a slight sketch in a former number, p. 115, ante), come the personal emblems or crests and devices which each one adopted as his or she thought fit, as to any amount,—a liberty that some of our sovereigns freely availed themselves of taking a round dozen to their aid.

The derivation of the word "badge" is a moot point, and Mr. Lower has given the precedence in dispute in his "Curiosities of Heraldry" to which we cannot further refer.

The badge is at least as ancient as the shield of arms, and was borne on the breasts of retainers as the more simple device, and it furnished many a public-house sign; to wit, it is "White Hart" of Richard II.

In this brief article it would be impossible to enumerate all the royal badges, and we can only glance at a few of the more celebrated ones: those of York and Lancaster alone form two chapters in "Planché's Pursuivant," and are of great interest.

The "Plantagenista" is about one of the earliest that we are acquainted with, and, at the same time, one of the best known as a punning device of the Plantagenet kings, in our language it is the broom plant.

Richard I. used a star rising from a half-moon or crescent, to typify the triumph of the cross over the infidel, and this was retained by King John, his most unworthy brother.

The far-famed and most familiar Prince of Wales plume was first borne by the Black Prince but its origin is doubtful.

Richard II., in his better days, bore the "sun in splendour,"—too soon to be charged for the light of day behind a cloud; he also bore the well-known white hart, with several others.

The white swan of Henry IV. is equally familiar to us in its present use as a public-house sign. The bear of Richard III. is a notorious royal badge.

We now come to the portcullis of Henry VII. derived from the Beauforts, and perhaps no royal badge will be more familiar to an architect than this one, and, in our judgment, none seems better adapted as an ornament to a building, and it has certainly been made the most of in his chapel at Westminster, in conjunction with the Tudor rose. So profusely do the Tudor badges adorn the architecture of this period, that one writer claims for it the title of "the Heraldic period," instead of the Perpendicular style.

Henry VIII. appears to have continued to use his father's badges, and his numerous wives adopted their own devices, the pomegranate of Catherine of Arragon being the most familiar.

The next three sovereigns bore Tudor roses, to which Elizabeth added a crowned falcon and sceptre, with the motto, "Semper Eadem," and a most inappropriate one it was.

James I. introduced the Scottish thistle, and sometimes bore it in conjunction with a rose-crowned, and this appears to have been the last original badge borne by English monarchs, if we except the rose-branch and thistle (growing from one branch) of Queen Anne, and with this last of the Stuarts personal badges ceased to be used by the reigning monarchs, and the plume of the Princes of Wales is all that is left to us of the numerous tribe.

Some fine examples of this ostrich plume are to be met with at Peterborough, Worcester, Ludlow, Exeter, and St. Albans.

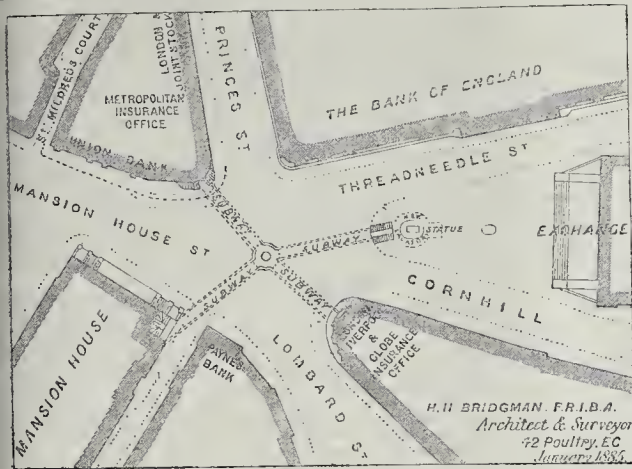
The "collar of essee," so constantly met with on the effigies in our old churches and cathedrals, is a badge of the house of Lancaster, and the origin of the S is a matter of dispute, but it is generally supposed to represent the word "Soveraygne," the favourite motto of Henry IV.

The corresponding collar of the House of York is made up of suns and roses alternate, but, perhaps, it is not so familiar as its rival.

With the extinction of the feudal system the bearing of badges has gone out, and with it a most important landmark in our country's history has disappeared, and the means of fixing the age of a building, and in many cases the determining the founder of it.

Liverpool.—The offices of the Toxteth Park Local Board, Liverpool, are being altered, from plans prepared by their surveyor, Mr. John Price, Assoc. M. Inst. C.E., the tender of Mr. John Carruthers, of Lucerne-street, Toxteth Park, having been accepted.

* Circa 1550. It distinguishes the Protector Somerset's mansion.
 † A corruption of Stalhof or Sta'thof, i.e., staple-house. Its site is covered by the Cannon-street terminus of the South-Eastern Railway.



Plan of Proposed Subways in the City.

PROPOSED SUBWAYS AT THE MANSION HOUSE.

The annexed cut shows the lines of the subways for foot-passengers which were proposed recently to the City Commissioners of Sewers, and which were referred to the Streets Committee for a report and estimate. The plan is devised by Mr. H. H. Bridgman. In regard to the advisability of the scheme it may be observed that for many years past it has been a very difficult matter for pedestrians to make progress at all in that immediate locality in consequence of the very large concentration of vehicular traffic from all directions, and where the pedestrian traffic is greater than at any other point in the metropolis. In 1860, during nine busy hours of the day, 56,235 people crossed over on foot between the vehicles and under horses' heads, a rather trying task for the strongest and bravest, but for a considerable number a matter of great difficulty and danger. King William-street, by the statue, comes next in this respect, where 42,935 crossed over. During the twenty-four hours of the day, however, a total number of 84,352 persons crossed over at the Mansion House intersection, and 63,592 at King William-street, which is equal to totals of 27,279,416 and 20,565,632 respectively, and the greater part of these enormous crowds have to cross over between the vehicular traffic, which is stopped every few minutes to let a stream of pedestrians across, and so on throughout the day. This necessarily causes considerable delay in the traffic, while at the same time foot-passengers are waiting in groups at every corner to cross when an opportunity occurs. There has been a general increase in the pedestrian traffic of the City during the past twenty-five years of 29 per cent., so that at the present time there is crossing over daily in the manner previously described at the Mansion House 108,814 people, or a total of 34,080,515 during the year, allowing for one-fifth of the traffic on Sundays. The vehicular traffic in the principal streets of the City has increased far more rapidly. From 1850 to 1865 it increased at the rate of 50 per cent., but the increase has not been so great in recent years. In the year 1873, 9,225 vehicles passed into and from the Bank through the Poultry alone, and at the present rate of increase 1,106 vehicles pass the Poultry daily. The total number of vehicles, however, passing the Mansion House and Bank centre daily is estimated at 51,989 or 17,222,555 per annum. It is difficult to understand figures without comparisons. In 1866, of vehicles passing along Oxford-street, over two-thirds of the same number (6,500) passed along Princes-street by the Bank daily, and whilst over Westminster Bridge (where there is a larger traffic than at any other point outside the City boundary) there passed 11,609 vehicles daily; yet the number passing along Cheap-side, by Milk-street, every day was 13,016. These figures speak volumes in favour of the urgent necessity of some greater facility for crossing

at that point. The proposal is to construct underground, in the centre of the several roadways in a line with Princes-street, a circular chamber, about 20 ft. in diameter, with an 8 ft. skylight at the top, for light and ventilation. Around such skylight, at the street level, would be a footway left, 6 ft. wide, as a refuge, protected by a kerb and posts, in lieu of the inadequate small refuges. From the circular chamber beneath would radiate subways (1) to the Union Bank corner, by Princes-street (the projecting property having been recently bought by the Commissioners of sewers, for the purpose of widening and improving Mansion House-street; (2) to the north-east corner of the Mansion House basement; (3) to the open space in front of the Exchange, by the Wellington statue; and (4) to the Globe Insurance Office corner. At each of these points access by means of a flight of steps would be gained to the several subways, all of which would be lined with white glazed bricks, with name-plates fixed to the walls at the central chamber, indicating where the subways lead to. The subways would be amply ventilated, and lighted by means of the electric light, a preliminary contract having been just entered into with one of the electric light companies for the purpose of lighting the immediate locality, so that the cost would not be great. Policemen would be stationed beneath, and gates be placed at the entrances, which would be closed at night.

The last suggestion does away with one objection to subways, the liability of their becoming lurking-places for dangerous or disreputable characters. The practical difficulty will be with regard to sewers and gas and water mains, and this is matter for special examination and report. That such an underground crossing would be an immense convenience, and remove what is to a certain extent a source of danger, there can be no doubt; and the removal of the pedestrian traffic from the surface would lead to some little acceleration of the vehicular traffic, as vehicles are stopped at intervals now by the police to allow of pedestrians crossing.

THE PARISH CHURCH OF ST. MARYLEBONE.

VISIT OF THE ARCHITECTURAL ASSOCIATION.

ST. MARYLEBONE (like St. Pancras) possesses two parish churches, the old and the new. When Tyburn Church was rebuilt in 1741 on the site of the former edifice, it was dedicated to the Virgin by the name of St. Mary-le-Bonne, now Marylebone. It is situated in the High-street, and is the mother church of the manor and parish. St. Mary-le-bone New Church is situated a little to the north of the old church, on the south side of the Marylebone-road, opposite York Gate, Regent's Park, and was designed by Mr. Thomas Hardwick, a pupil of Sir William Chambers, and father of Mr. Philip Hardwick, R.A. This was the church selected by the members of the Architectural Association

for their first Saturday afternoon's visit this session, on Saturday last, the 24th inst. The portico faces the north, "a peculiarity," says Peter Cunningham, "in some measure forced upon the architect by the nature of the ground selected for its erection." The first stone was laid July 5th, 1813, and the building consecrated February 4th, 1817. The total cost was about 60,000l. The altar-piece of the "Holy Family" was presented by the painter, Benjamin West, P.R.A.

The members assembled in the nave of the church at three p.m., and were received by Mr. Thomas Harris, architect, of Gray's Inn, who has been superintending the execution of very extensive alterations and additions, and also by Mr. G. Constantine, who has been officiating as clerk of the works. After explaining the drawings, Mr. Harris proceeded to show the members what is being done to the building. Some lithographic sketches of the interior were handed round, entitled "St. Marylebone Parish Church, as it appeared, May, 1883." At that time a contract was entered into with Mr. Edward Conder, builder, for 11,353l., who is executing the work; the contract for heating apparatus in the basement being completed by Mr. Stainton, of 26, Liverpool-street, King's cross. The whole of the stained glass and decorations are by Messrs. Campbell, Smith, & Campbell; and all the marble and mosaic work is by Messrs. Burke & Co., the wood carving being by Messrs. Daymond & Co. Altogether the several contracts and extra works when completed would, Mr. Harris said, cost about 24,000l. The principal alteration consists in taking down the south wall of the church, usually occupying the east end, and throwing out a large circular apse, at once giving the interior a bold and imposing effect. The old pews and seats have been removed, and new ones of Honduras mahogany substituted, French polished.

The sedilia and choir-stalls have been executed by Mr. Walden, of Maiden-lane, Covent-garden, and the reseating of the nave by Messrs. Lascelles & Co., of Bunhill-row, who have also executed the external concrete facings. The organ is by Messrs. Gray & Davison, of Enston-road; the carton-pierre work by Messrs. Jackson & Sons; and the lectern, gas-standards, and gas-fittings generally by Messrs. Richardson & Co., of Brownlow-street. The cushions and mats for the use of the sacarium have been embroidered in colours by ladies of the congregation from designs by the architect. Besides the addition of the semi-circular apse at the end of the nave, a new clergy vestry and a strong-room have been added. These works, Mr. Harris said, have been designed to harmonise with the old structure, and are so planned as not to alter or interfere with any of its main external features.

The whole of the upper side galleries have been removed. The old altar piece by Benjamin West is now placed in the new clergy vestry. The body of the church has been repaired with Comblanchien and Rouge Royal marbles in chequers, the old marble font being fixed in its former position. The iron columns supporting the lower galleries have been cased with wood, as Ionic columns on bases level with top of benches.

The new screen walls have a podium up to the gallery ceiling level; these are enriched with fluted Corinthian pilasters, and are pierced with openings into the wings. The large arched opening on the left contains the organ front and screen. An enriched Corinthian entablature, surmounting the pilasters of screen walls is carried all round the church in place of the old unsightly cove.

The ceiling has been enriched with moulded ribs. That portion over the choir and a wide border round the main ceiling being panelled, and the portion over the choir and elsewhere slightly relieved with carton-pierre enrichments. Adjustable flaps are arranged in the roof, in connexion with the pierced moulding round the large central space, to assist the ventilation.

In the left-hand wing the alteration consists of a rearrangement of the stairs from the vestibule to the gallery and to the vaults, and the formation of a verger's room.

The marbles used in the pulpit and screen are,—Pulpit, rouge royal, Siena, Joinville, Comblanchien, and alabaster; Screen, rouge royal and alabaster, circular panels, Joinville, inlaid with white marble.

The stalls are panelled and enriched with

carving, four of the ends having angels with musical instruments. The sacarium occupies the whole of the apse, and is raised two steps above the level of the choir, from which it is separated by a marble balustrade. The floor of the sacarium and choir is paved with mosaic, the altar-space being two steps higher than the adjoining floor level, and 2 ft. 4 in. higher than the floor of the nave. There are four windows to the apse, two on either side of the reredos. A domical roof surmounts the whole, ceiled with fibrous plaster, and divided into five compartments by moulded ribs.

A plumb and surface of marble lines the walls 5 ft. high, above and up to the window-sills being filled with marble mosaic, representing emblems of the four Evangelists, angels, cherub-heads, &c. The credence-table is of carved marble, and the sedilia panelled and carved. A prie-dieu is placed in front of the sedilia. The altar-table is of wood, having a mosaic frontal in marble frame. The subjects in the panels are connected with the Passover.

The reredos embraces the whole of the middle bay. The front plasters are carved in low relief, with arabesques symbolical of the Resurrection. The marble entablature continues round over the reredos with a carved pediment, the tympanum being enriched with cherub heads.

The four windows of the apse are filled with painted glass, forming, with the Crucifixion, a series of five subjects connected with our Lord's life on earth. The windows of the apse were presented by Mrs. Waller; six of the painted subjects between the nave windows by Mr. E. Armitage, R.A.

There was another meeting at the church on Wednesday last, when many members of the committee and the architect attended to point out to those invited the chief points in the alterations.

The reconsecration of the church will take place this day (Saturday, Jan. 31st) by the Bishop of Bedford.

Illustrations.

DESIGN FOR THE DECORATION OF THE DOME OF ST. PAUL'S CATHEDRAL.

BY JOHN P. SEDDON, ARCHITECT.

MR. SEDDON, in the course of the recent discussion upon the paper read about the decoration of the Dome of St. Paul's by Mr. Stannus, at the Royal Institute of British Architects, contended that all the designs yet brought before the public, being based upon an old-division of the dome by vertical ribs or circular panels, involving more or less sham architectural details beyond the real ones provided by Sir Christopher Wren, were wrong in principle. Such features, in themselves inadmissible, disturbed the serenity of the surface of the dome which Wren had not broken up; and, in the case of the vertical ribs, they introduced a Gothic aspiring tendency instead of the repose appropriate to the Classic architecture of St. Paul's, and, in the case of the circular panels, they produce a *petite* and confused effect. He called attention to the picture by Sandro Botticelli in the National Gallery as affording an example of fit and proper treatment for the decoration of such a dome by means of subdividing it by horizontal zones alone.

The accompanying drawing was made from Mr. Seddon's sketches and directions during the fortnight that had elapsed between the date of the reading of Mr. Stannus's paper and the adjourned discussion thereon, by Mr. H. G. Murray, an artist in the employ of Messrs. Bolham, of 155, Buckingham Palace-road, who had been his (Mr. Seddon's) pupil in decorative art.

In this design the surface of the dome is subdivided horizontally into three zones of figures representing seated saints, prophets, and martyrs, with attendant angels standing behind them. The disposition of these figures is in accord with the spacing of the architectural supports below, with groups of angels concentrated over the eight principal piers, so as to emphasise them and avoid monotony in the arrangement. This treatment would be further accentuated by colour; the figures above the piers being clad in white to render them more prominent than the rest.

In tone of colouring Botticelli's picture would afford much help, as in the lustrous subdued

golden hue of the cloud-background of the figures, from and upon which the stars and rays in brighter gold would detach themselves, while the several zones would be separated from each other and from the cornice below by the quiet greyish-blue which would be the proper contrast to the rest of the ground; the wings of the angels and dresses of the figures would supply the stronger colouring needed. In the upper zones the heavenly host and angelic choirs would be represented, and around the central circle or eye of the dome, symbolising light or the sun, golden rays would stream downwards towards the several groups below.

Of course the treatment thus somewhat hastily elaborated is open to modification and improvement; but as regards the general principles of design, and the predominance of horizontal zonal divisions which Mr. Seddon maintains to be appropriate, ample scope would be afforded for the talents of the able artists who have been engaged.

The question, at any rate, is one that must not be looked upon only from a painter's point of view, and certainly not from a false architectural one. It demands that proper combination of the arts which constitutes true decorative art, which, from the long severance of Architecture, Painting, and Sculpture, seems to have been lost sight of.

The illustration is reproduced from the coloured drawing by Messrs. Boussoad & Valadon's (late Goupil & Co.) phototype process.

THE HOLBORN RESTAURANT.

WE illustrate this week two views of this restaurant.

One view shows the front towards Holborn of the block which has now for some time been erected; the interior arrangement of which is so well known that we need not now describe it.

The other view shows the front towards Little Queen-street of the block now to be erected, forming as it does the eastern annex of the restaurant. The ground-floor will contain the new grill-room, 70 ft. by 60 ft., and the upper stories will be devoted to private dining-rooms to accommodate parties of from twenty to fifty persons. The upper part of this front has been set back to avoid litigation with the owners of property on the opposite side of Little Queen-street.

It will be seen that, to carry out the entire scheme of the promoters of this restaurant, the eastern corner of Little Queen-street must be taken in, and, as soon as the leases of that block fall in, the premises will be pulled down and the new work proceeded with, thus completing the building.

The buildings now illustrated have been and will be carried out from the designs of Messrs. Archer & Green, Mr. Holloway acting as the superintendent of works.

THREE SUFFOLK ROOFS.

THE three roofs illustrated in this week's issue were sketched during the Architectural Association's visit to Bury St. Edmunds and neighbourhood last August, and are certainly among the most interesting examples seen on the excursion. They all three have the alternating trusses varied, but with that single feature their similarity ends.

The roof at Ixworth is over the chancel, and the main truss is of a collar-braced construction, the arched brace coming down on to a small hammer-beam, the hammer-brace resting upon a small octagonal shaft with moulded cap and hase worked out of the wall-piece, and carried by a moulded and foliated stone corbel. The intermediate is collar-braced also, but has the hammer-beam omitted, the arched brace finishing directly on to the octagonal shaft and corbel. The spandrels, filled with delicate tracery, have a very rich and pleasing effect. The cornice has the usual square four-leaved flower in a hollow, and is embattled, but above that again is some effective pierced work. The ridges, purlin, and truss appear to be well moulded, but the rafters are left square.

Hawstead nave roof is of a flatter pitch, and has heavier timbers, giving it a much more substantial appearance. The main truss has a four-centre arched brace resting on a hammer-beam, carved as an angel, with wings slightly spread, and the hammer-brace finished on a stone corbel, moulded and carved as a head or mask. The intermediate has a larger four-centre arched brace coming down directly on to

a similar stone corbel. A curious feature in this truss is that, at the same level as the hammer-beam of the main truss, there is a row of hammer-beam carved on the arch brace, but not projecting beyond it. The cornice is unusually deep. At the bottom is a row of small shields separated by a continuous overlapping and zig-zag label or band; above this a row of quatrefoil and traaced pierced edged above and below with the strawberry-leaf enrichment, and above that again large four-leaved flowers in a hollow, these ornaments separated with moulding, and the wide crowned with the strawberry-leaf enrichment. The spandrels above the hammer-beam are filled with tracery. There are two purlins between the ridge and cornice, and all the large timbers are richly moulded.

If there were nothing but the roofs to see, the church of St. Andrew, Mildenhall, it would be worth the exertion of a long day's journey to pay it a visit. Those to the aisles are remarkable, if not altogether beautiful, that on the north for its bold and vigorous carving dragons and grotesques, that on the south for its richly-moulded timbers, traaced spandrels and carved angels, but the feature of the church is its glorious nave-roof. In this the alternating arrangement of the trusses is particularly happy, as the appearance of crowding, so noticeable in some of those elaborate roofs where the trusses are not far distant from each other, is here entirely absent; there is richness, but there is repose also, for, where the intermediates finish at the cornice spring out large and beautifully carved angels, "hovering" as it were, the wings outspreading and catching the play of light here and there from the windows which are directly under them. The roof itself rather flat-pitched, and the beam of the main truss cambered beneath it is a deep four-centre arched brace lying into the wall-piece and resting on a stone cap, the shaft coming down to the ground; over the centre of the beam and springing directly from it is an arch, the spandrels on either side being filled with tracery, as are those below also. The beam and cornice are similarly enriched with the square flower embattlements, small angels alternating with large carved paterae and the strawberry-leaf running all round as the crowning member. The lower edge of the intermediate and of the curved brace has a square flower in a flat hollow and all the larger timbers are well moulded. Neither sketch nor description expresses the beauty of this roof, but perhaps they may tempt one or another to make the long day's journey as opportunity occurs.

THOMAS GARRATT.

HÔTEL DE VILLE, DINANT.

THE Hôtel de Ville was erected in the commencement of the seventeenth century, on part of the walls and a turret which had escaped demolition in the sixteenth century when Dinant was taken by the French under the Duc de Noers. The bow-window, &c., and roof are evidently of later date, and were probably added after the unfortunate town was again taken by the French in 1673, when no doubt it again suffered partial demolition. The building is now entirely yellow-washed over.

R. A. BRIGGS.

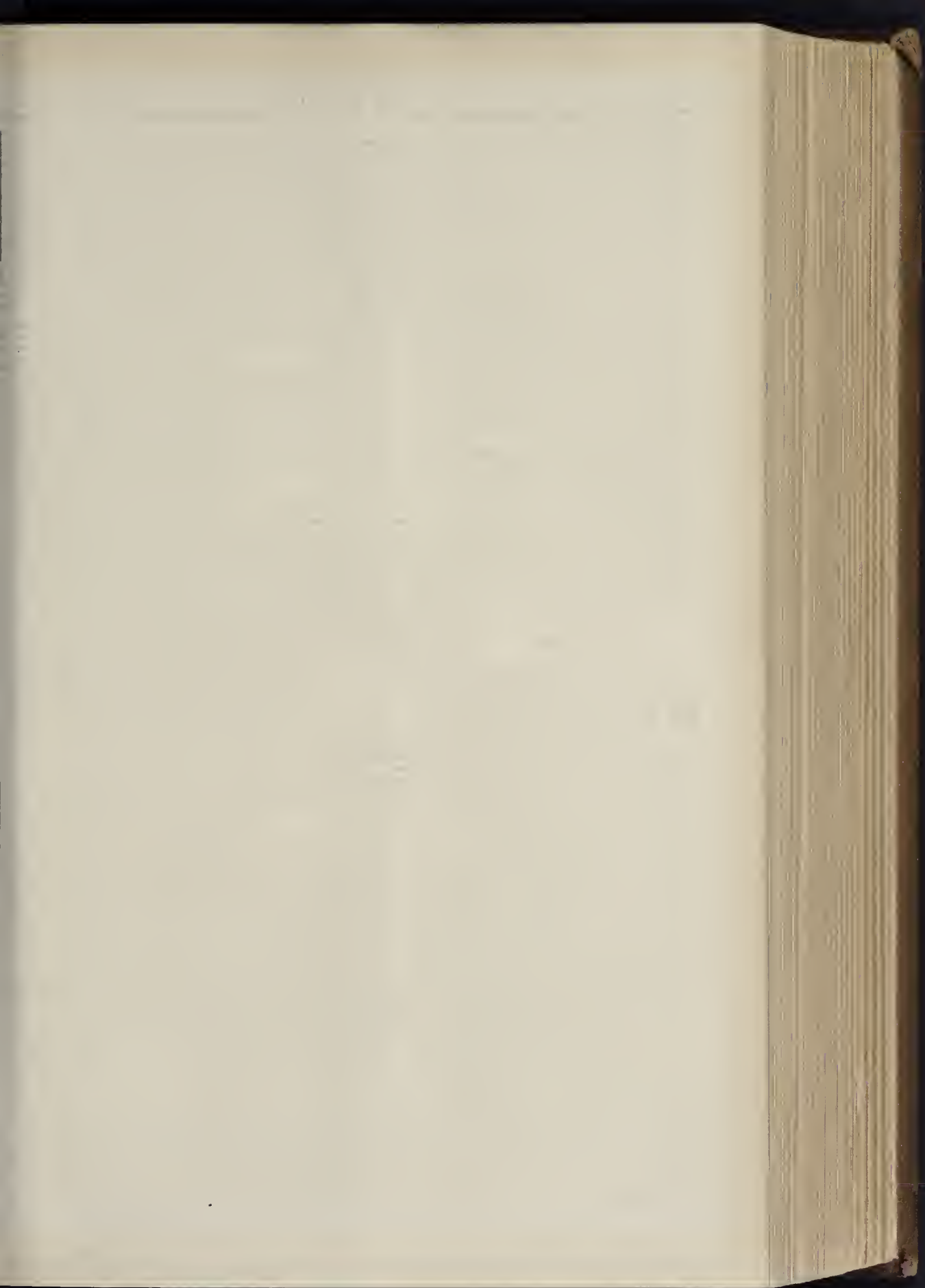
THE SURVEYORS' INSTITUTION.

PRELIMINARY EXAMINATION, 1885.

Of the Candidates who presented themselves at the Preliminary Examination of the Institution, held on the 20th and 21st inst., the following satisfied the Examiners:—

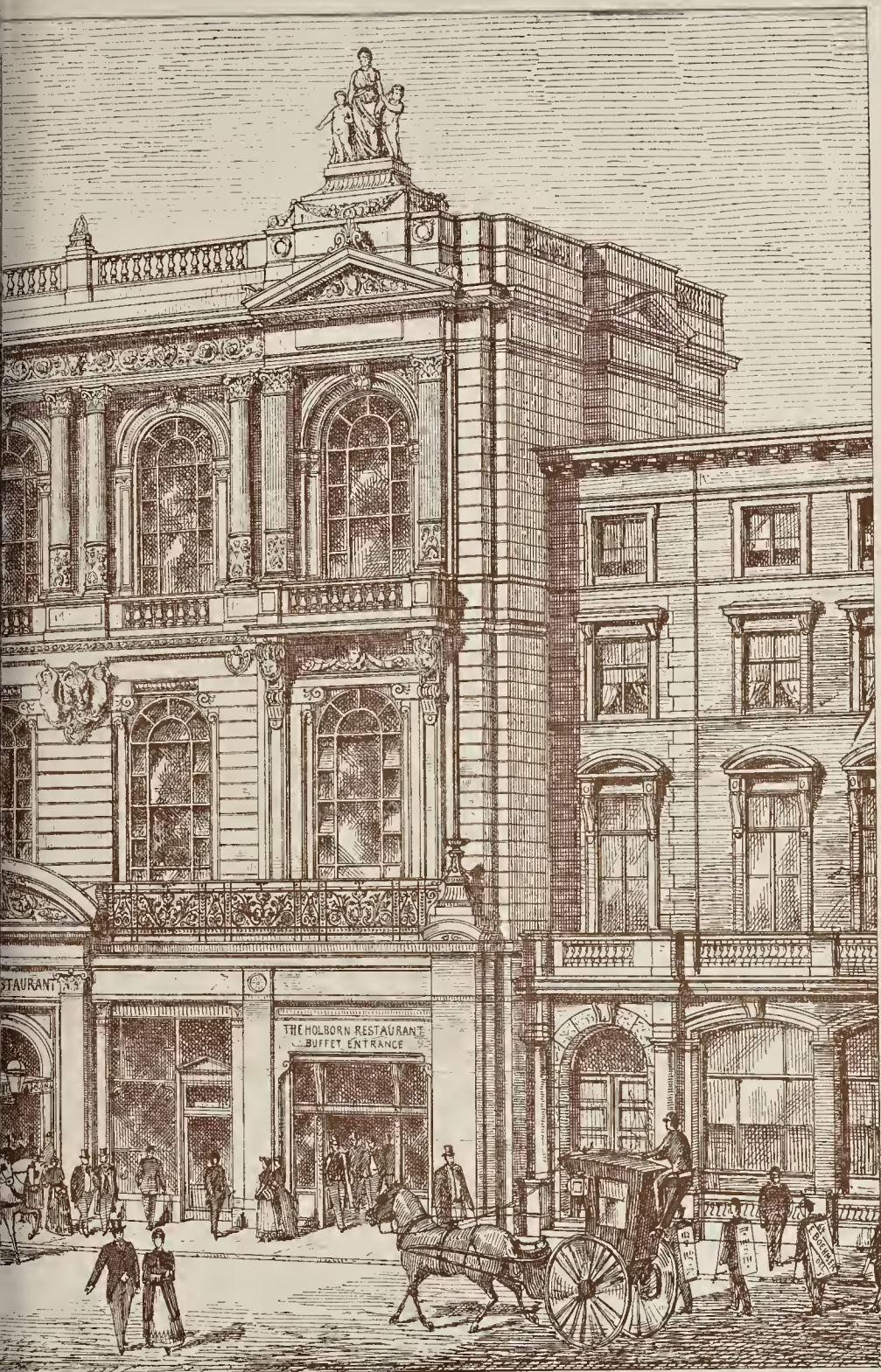
Archibald, C. F.	Lumley, J. A.
Beard, E. T.	Mann, J. B.
Bensley, O. E.	Mann, R. B.
Brown, W. E.	Mathews, J. M.
Buss, F. G. W.	Newton, F. J. C.
Champion, L. C.	Nicholson, E.
Crew, T. J.	Nockolds, M. C. P.
Coates, H. G.	Parry, R. E.
Crokat, E. A.	Patonson, H.
Eves, W. L.	Pratt, P.
Fitzhugh, W. R.	Rand, J.
Goodman, P.	Robinson, A. W.
Gough, G. S.	Solby, F.
Green, T. J.	Sauntwaite, W. J.
Harding, R. B.	Varley, R. E.
Jenkins, H. L.	Yankey, E. B.
Jonas, S. M.	Webb, F. N.
Jonas, F. H.	Wilkinson, G. H.
Lloyd, W. R.	

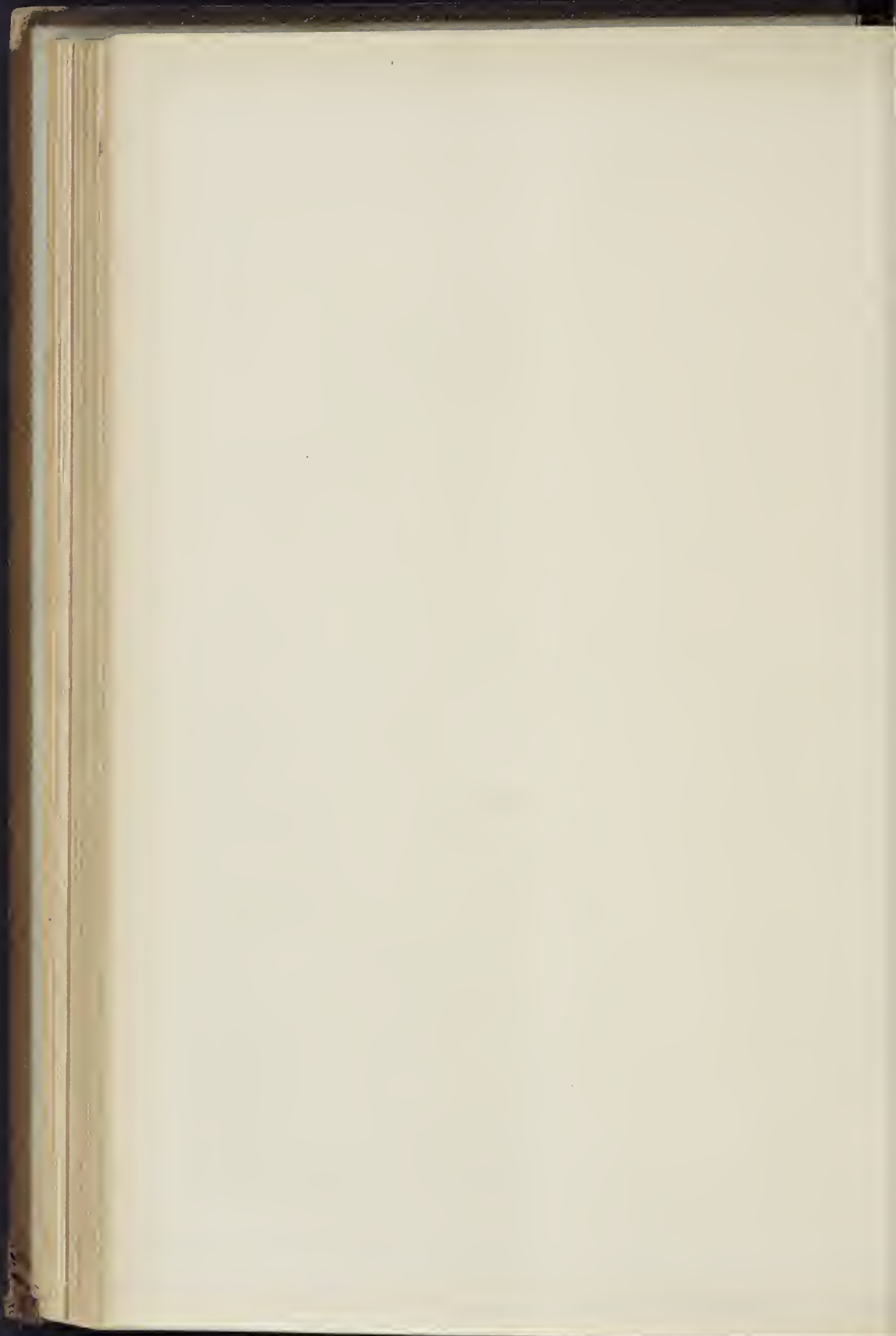
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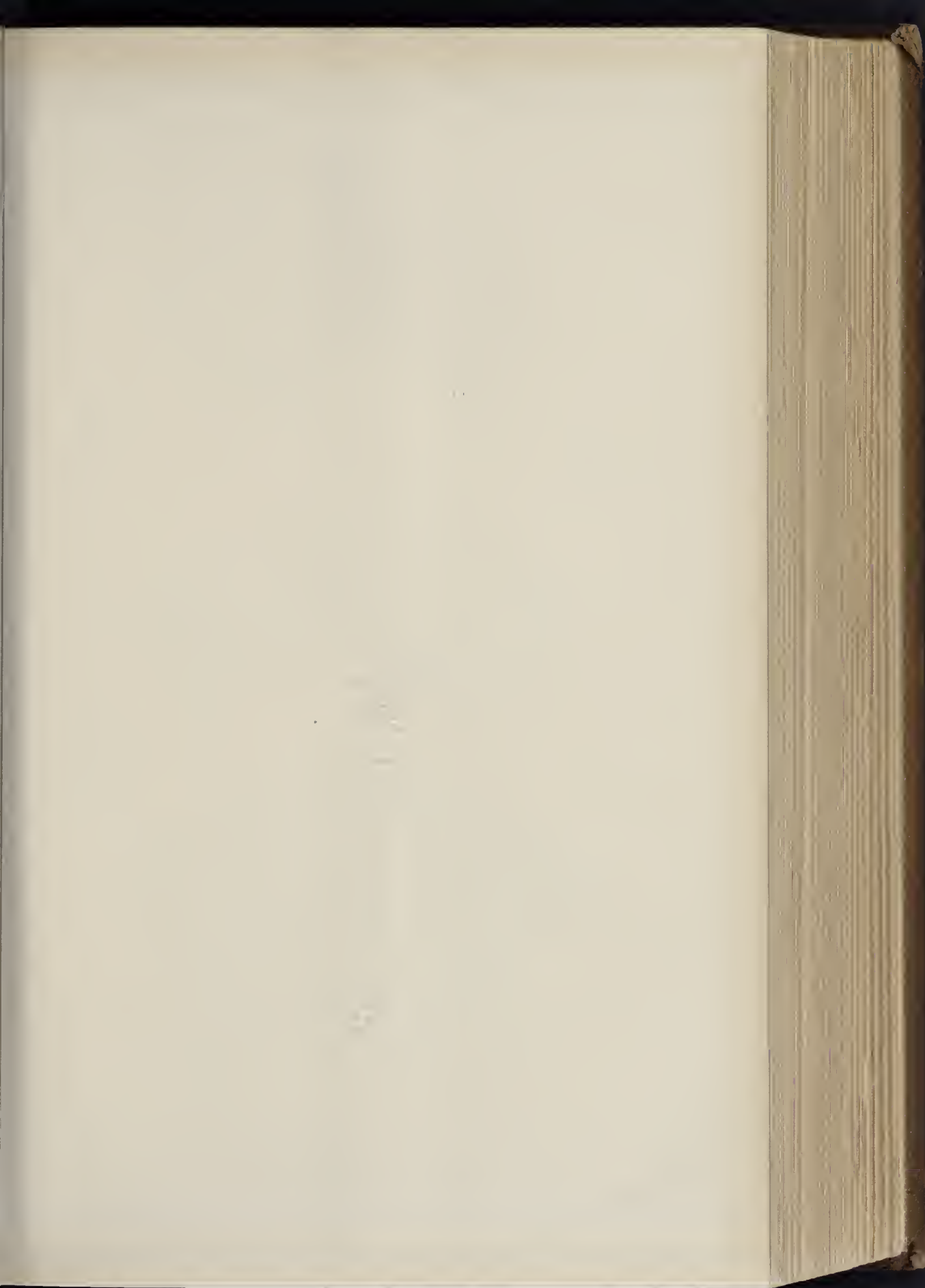




HOLBORN RESTAURANT
ELEVATION

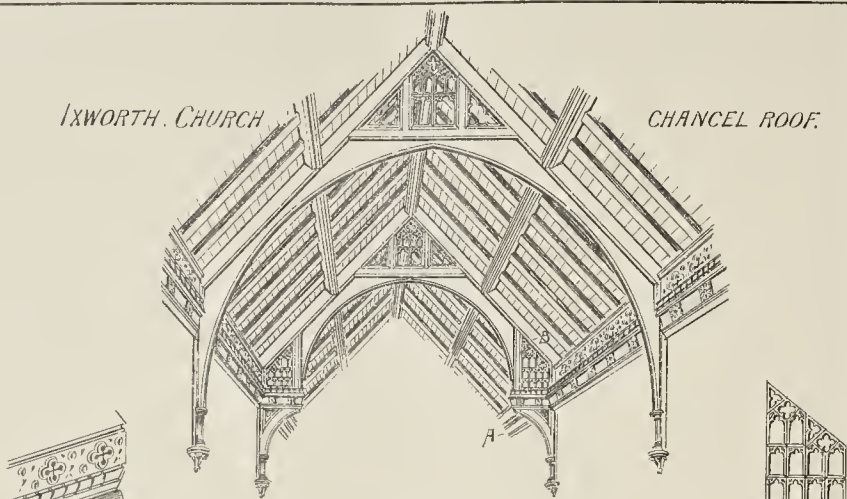






IXWORTH. CHURCH

CHANCEL ROOF.



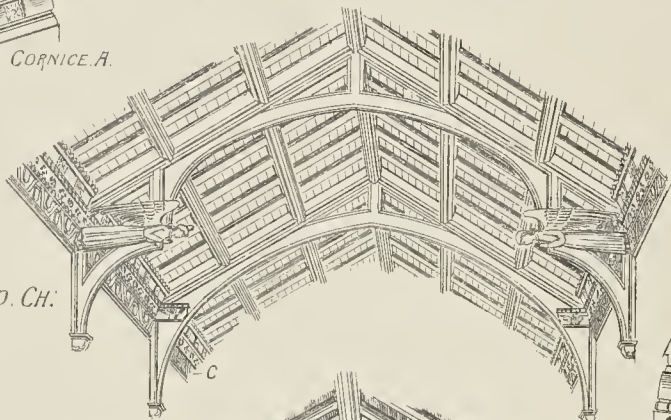
CORNICE A.



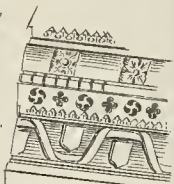
SPANDIL B.

HAWSTEAD. CH.

NAVE ROOF.



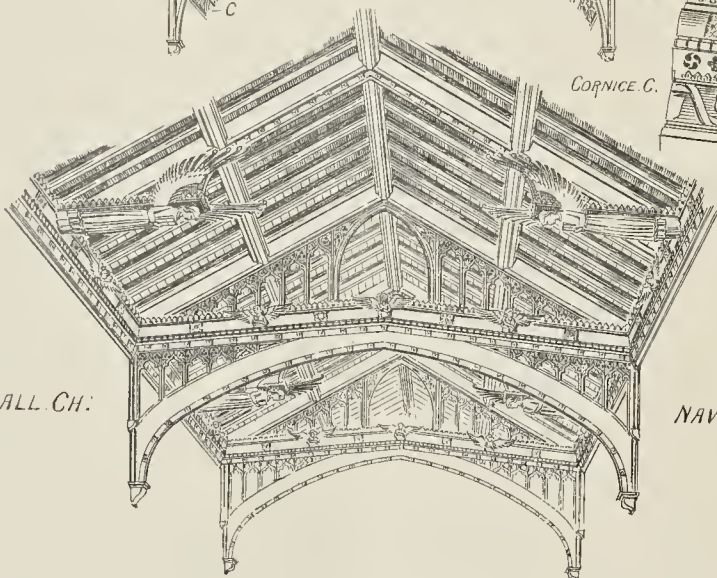
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CORNICE C.

MILDENHALL CH.

NAVE ROOF.

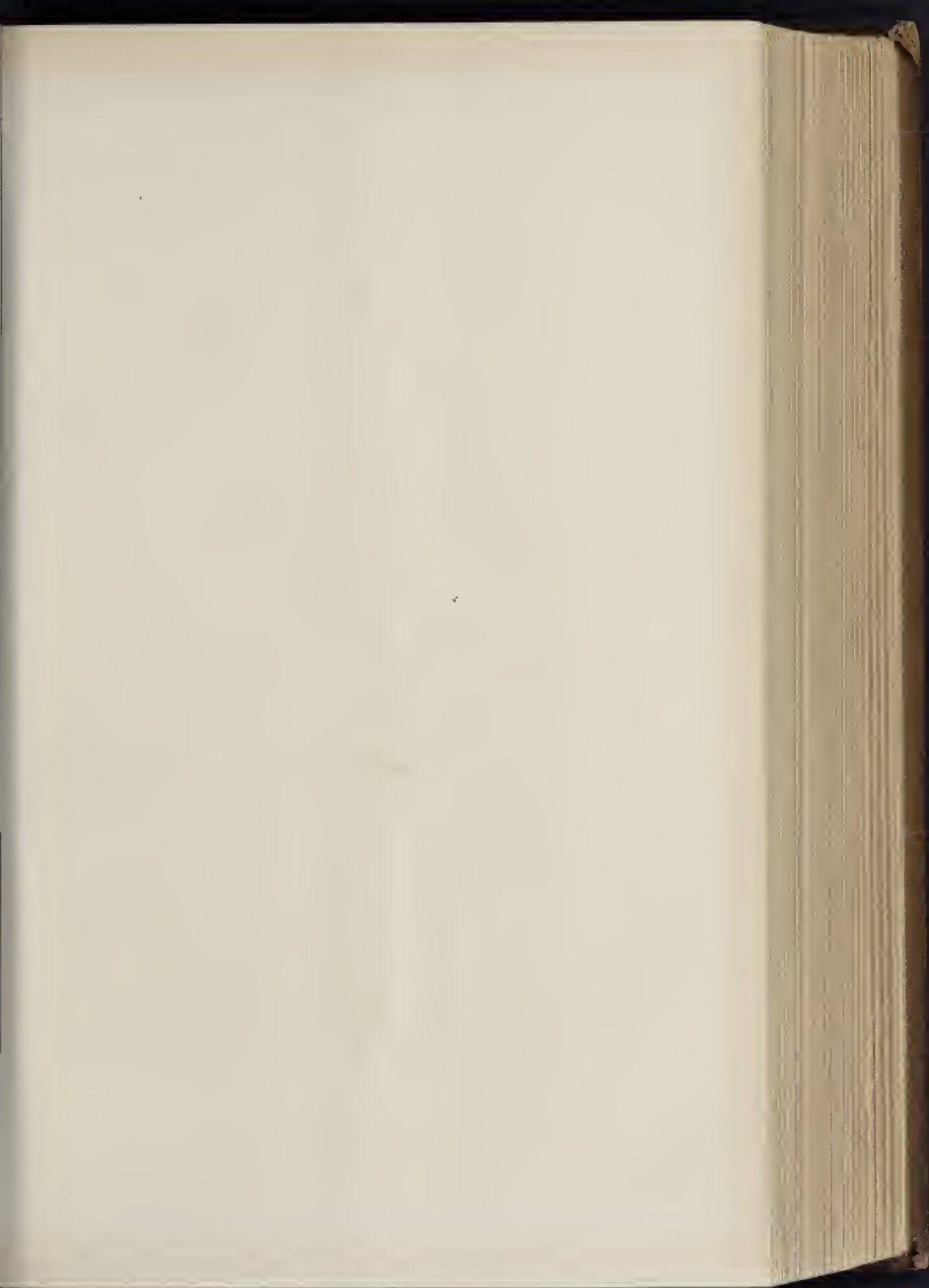


Wyman & Sons Photo-litho

THOS. GARRATT. DEL. 1884.
O'Queen St London, W.C.

ROOFS OF SUFFOLK CHURCHES.

Sketched during the Architectural Association Excursion, 1884, by MR. T. GARRATT.





DESIGN FOR THE DECORATION OF

FOUNDED ON THE PAINTING BY

BY JOHN

Elaborated and Drawn by H. G. MURRAY,



DOMES OF ST. PAUL'S CATHEDRAL,

DESIGNED BY PHILIP JOHNSON,

ARCHITECT.

CONSULTING ARCHITECT: BELHAM'S, 155, Buckingham Palace Road.



Wyman & Sons Photo Litho

HOTEL DE VILLE, DINANT.—DRAWN BY MR. R. A. BRIGGS.

© Queen, St. London, W.C.



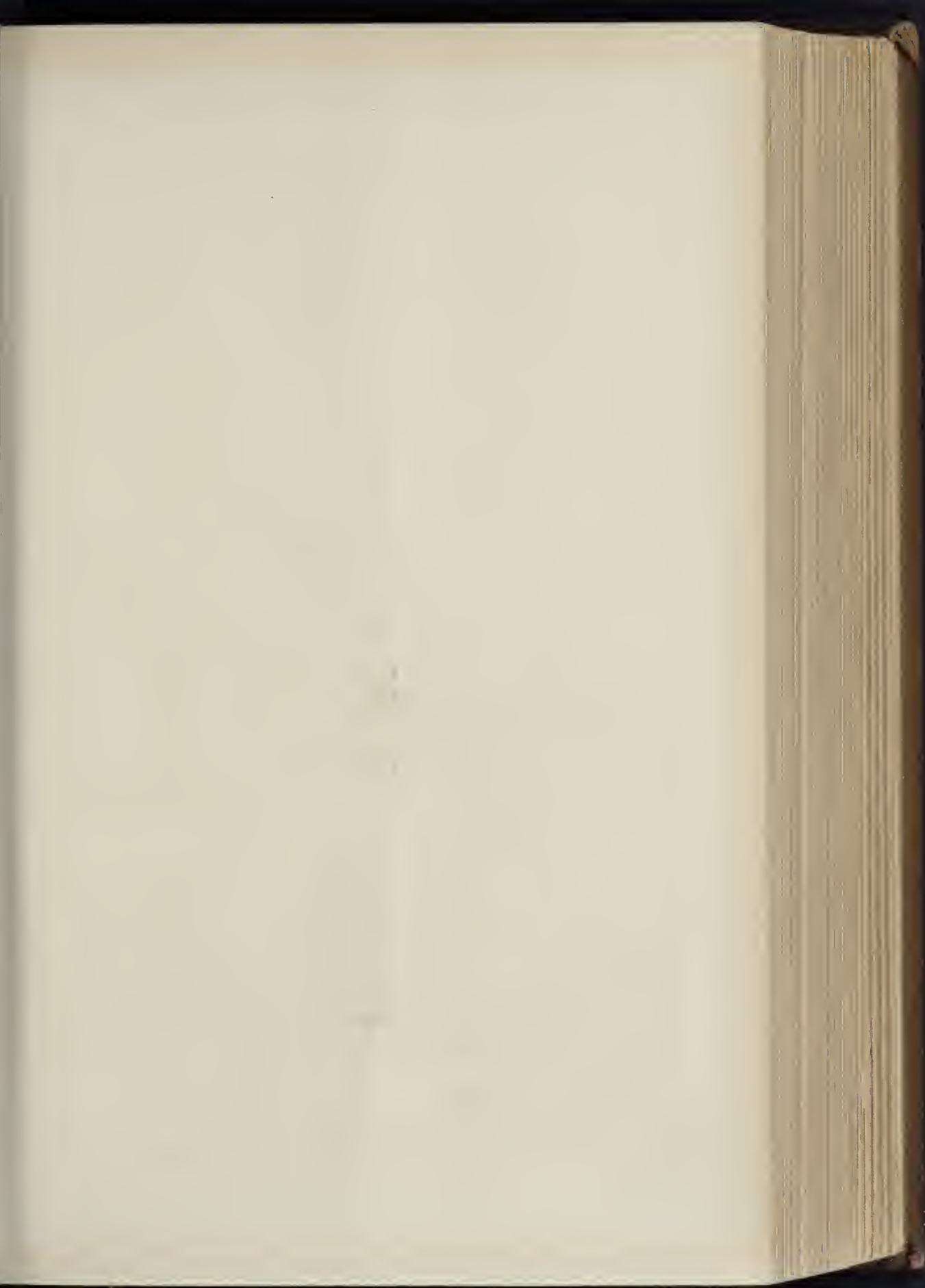
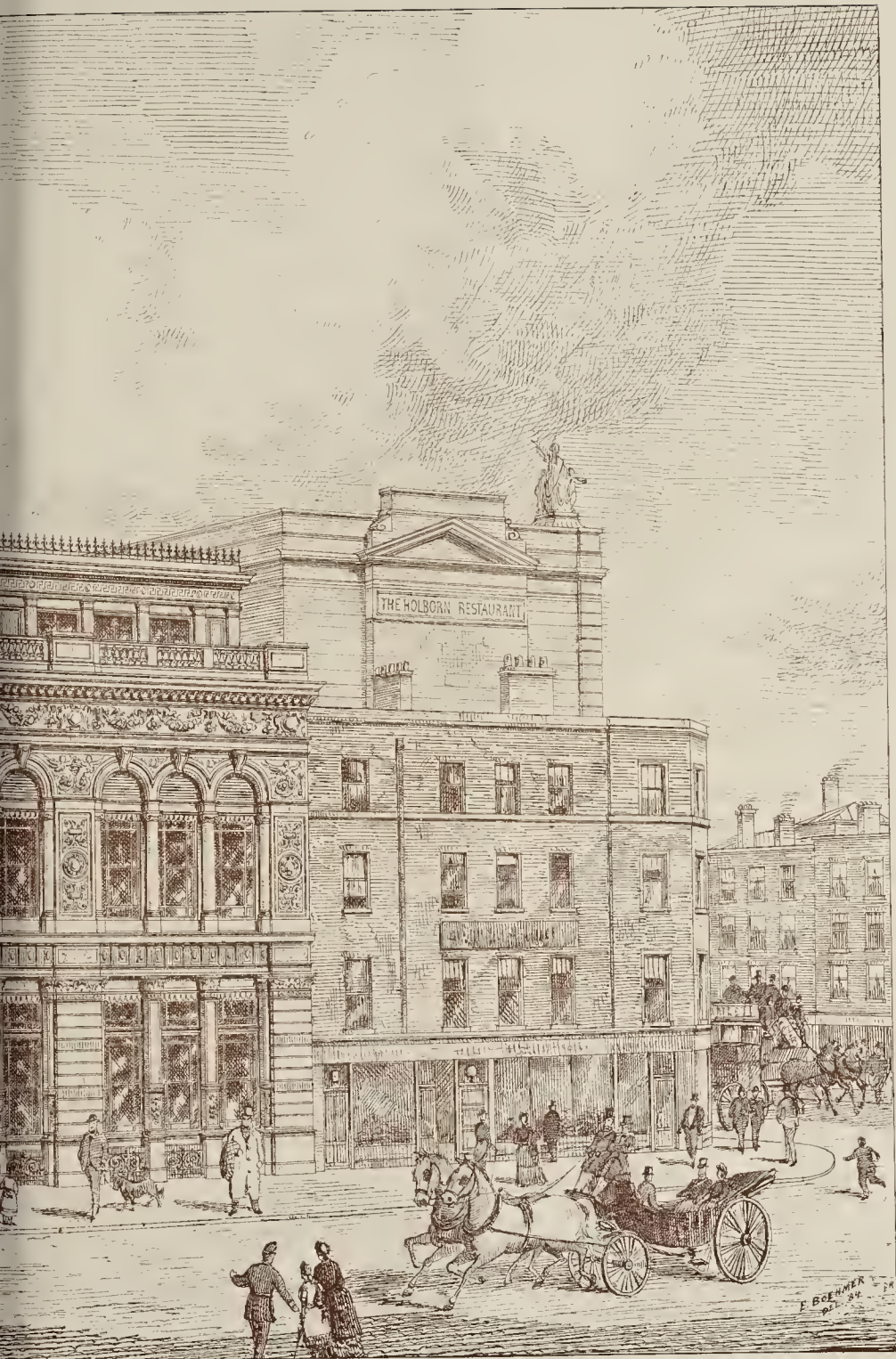




PHOTO-LITHO SPRACUE & CO LONDON

ADDITIONS TO HOLBORN RESTAURANT
ELEVATION



MESSRS. ARCHER & GREEN, ARCHITECTS.
QUEEN STREET.

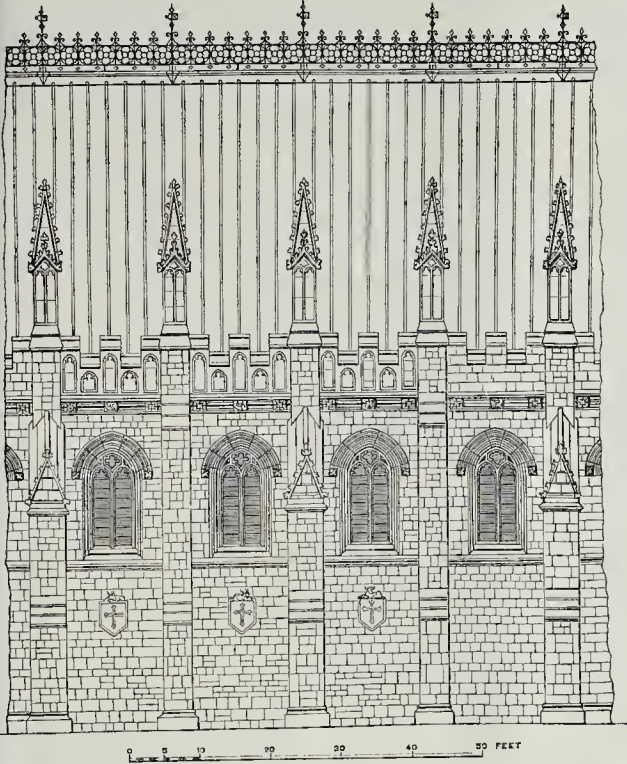


Diagram explanatory of Mr. Fergusson's Proposed Method of Treating the West Front of Westminster Hall.

WESTMINSTER HALL.

SIR,—The evidence already collected by the Committee of the House of Commons, together with the correspondence on the subject in the Times and other papers, have, at all events, made it quite clear that the west side of Westminster Hall was never seen or meant to be seen from without. It formed one side of the court, or series of courts, in which the domestic offices of the palace were situated; it, in fact, formed a good strong blank wall, which was, at all times, from its erection, utilised to support buildings or lean-tos of one or two stories, with sloping or flat roofs as convenience may have required. There is, however, absolutely no proof, either historical or material, that a cloister, or anything of the sort, ever existed there. The remains of traces of the external walls of the Hall of Rufus being still found *in situ* in itself is sufficient to prove that it never was intended to be seen. The architects of the time of Richard II. considered the Norman style as barbarous and exploded, and never would have allowed any fragments of it to remain had they not been covered up and concealed by some subsequent exertions. This, therefore, is a case in which archaeology may, for once, be safely thrown overboard. It is in vain and absurd to look at the wall of the Hall when it formed the unseen side of a private inner court for any hints as to the mode of treating it, when, by the recent demolitions, it has become the most prominent and important external feature of one of the most ornate buildings in Europe.

This being so, the one question that now remains to be solved is to try to ascertain how, under these altered circumstances, a Medieval architect would have treated the west flank of the Hall, and we may certainly answer, in the

first place,—Notas Mr. Pearson proposes to treat it. The great defect of the west wall as at present exposed, and it is a serious one, is that it is too low when seen in conjunction with the noble but colossal roof it was built to support. By cutting the height into two or three low stories, by dividing it into walls in two planes, and by strongly accentuating the horizontal lines, Mr. Pearson's design tends in every way to exaggerate this defect and to destroy the dignity that would result from a simpler treatment. What I, on the contrary, conceive a Medieval architect would have done under the circumstances would have been to accentuate the vertical lines of his design at the expense of the horizontal, and to introduce no prominent feature between the base and the coping. This could easily be effected by introducing an attached buttress between each of the flying ones, and crowning them all by pinnacles of appropriate height. Whether exactly as shown in the annexed woodcut or in any other form we need not now stop to discuss. It would certainly be on that principle. The woodcut, however, must not be considered as pretending to be a design fit for execution; it is in reality a diagram intended to illustrate two among the many modes which could be adopted for that purpose, but the details of which must be left to be designed by whoever is entrusted with the execution of the work. The special merit of the proposal shown in the woodcut, for the present purpose, is that its thirteen buttresses and pinnacles reproduce the thirteen trusses of the roof internally, and so bring the exterior and the interior into that harmony which is one of the important elements of all good architecture.

There are in England probably 100 halls of various sizes attached to palaces, colleges, or other public buildings, not one of which, I venture to assert, has its principal front encumbered by low mean buildings, such as it is proposed to add to this the greatest and most important of them all. In every one, so far as I know, the front wall rises from the ground and continues unbroken to the coping, and a battlement of more or less

importance is added with pinnacles and other ornaments to give it greater height and dignity.

Neither Mr. Pearson nor any of the architects consulted by the Government seem to have realised the glorious opportunity the recent demolitions afford of completing one of the most beautiful architectural combinations anywhere to be seen. The Hall, as a secular building, is the exact counterpart of the nave of the Abbey, as an ecclesiastical one, and the two seen together form a group, in combination with the Parliament Houses, which one might challenge the world to rival. On the whole, I am inclined to believe that the Hall,—if properly treated,—is the finest and grandest of the two, and to deform it, as it is proposed to do, by mean and incongruous adjuncts, would be,—to use the mildest form of expression applicable,—an unpardonable mistake.

The design by the late Sir Charles Barry, represented in your last issue, is too grandiose, and on too expensive a scale to be thought of, in these days of economy. If the Government want a building to accommodate commissions and committees, or residences for officers of the House, they can obtain it nearly as conveniently, and far more cheaply, by erecting a plainer building at the south end of the garden facing the Victoria Tower. It could easily be connected with the Houses by a corridor along the Embankment, and might be made a far more valuable metropolitan improvement than any building in New Palace-yard.

The great objection, however, to Sir Charles Barry's scheme, to my mind, is that it again covers up and hides the Hall. My impression is that if he had lived to see the Hall in the dignified position it now holds, he would have seized on its exterior, and made it the central and most important feature of his new buildings, in the same manner as he has made its interior the appropriate vestibule to the Houses, which thus forms the noblest feature in his design. With his taste and skill he could very easily have accomplished this. It remains to be seen whether his mantle has fallen on any of his successors, and if they are capable of making it externally, as it is avowedly internally, the most beautiful Hall in Europe.

JAS. FERGUSSON.

20, Langham-place, Jan. 27, 1885.

SURVEYORSHIP ITEMS.

Accrington.—Mr. E. Knowles, Borough Engineer and Surveyor of Accrington, has been appointed by the Accrington and Church Joint Sewerage Board as their Engineer, at a salary of 200*l.* per annum, in addition to his salary as Engineer to the Corporation.

Lynn.—The Lynn Town Council, at a special meeting on the 16th inst. convened for the consideration of the Borough Surveyor's duties and emoluments, unanimously resolved to employ Mr. E. G. Mawbey (the Borough Surveyor) to design their engineering and architectural works, and for such work, in addition to his salary for ordinary duties, to pay him 4*l.* per cent. if the works are carried out and if approved, but if not carried out, 2*l.* per cent. The architectural work now in hand consists of the restoration of the Town-hall, new Fire Brigade Station, stabling, stores, and cart-sheds. The latter are now being erected. The engineering work includes an iron bridge over the river Nar. The salary is 300*l.* a year, with house, rates, and coal free, for the appointments of borough surveyor, waterworks manager, chief officer of the fire brigade, and estate agent. The Corporation are the principal land and property owners in the borough, and own extensive estates beyond its boundaries.

Schools and Mission Church, Blackburn.—In response to an invitation from the Building Committee of St. Michael's Parish Schools, Blackburn, ten sets of drawings have been received in competition for the proposed Branch Schools and Mission Church at Little Harwood, Blackburn. After an examination by the committee, it was resolved that the whole of the drawings be submitted to an independent architect for adjudication (no one, excepting the vicar, the Rev. S. F. Harris, M.A., to become acquainted with the name of the referee). The four designs selected by the referee are two sets with the motto "Knowledge is Power," one each "Design by Study," and "Self-Help."

PETERBOROUGH CATHEDRAL TOWER.

SIR,—During the correspondence on this subject in the *Times*, reference was made by Professor Freeman to the new steeple of Chichester Cathedral, as "preserving the actual touch of the old building." This, though on the whole correct, seems to imply that the rebuilding was carried out *exactly* as before the fall in 1561. There was, however, an important alteration then made, in order to get over an ancient defect, much like that which existed at Peterborough.

At Chichester the roofs and clearstory walls of the body of the church had all been raised in the fourteenth century, and the pitch of the roofs slightly increased above that of the roofs of the preceding century, which were co-eval with the tower belfry stage then reconstructed on the Norman arches. The result was that the roofs, as raised, ran up against and covered the bases and lower part of the shafts of the belfry windows.

When the plans for the rebuilding of the steeple were prepared (from drawings of the old one) it was decided by the architects, the late Sir G. G. Scott and the late Mr. W. Slater, that this manifest defect should not be reproduced, and therefore they raised the lower arcaded stage sufficiently high to keep the string-course above the roofs, giving thereby an increased height to the tower of about 5 ft.

At the same time the window piers were constructed of sufficient strength to support the weight of the spire, thus making it unnecessary to reproduce the filling in (of the fourteenth century) of the belfry lancets.

Such judicious alterations are surely allowable in a nineteenth-century rebuilding, and may be cited as an example in the proposed reproduction of the Norman arcaded stage at Peterborough, and the consequent lifting of the fourteenth-century belfry stage above it.

I may add that the pinnacles and spire lights at Chichester had been repaired and altered by Sir Christopher Wren. The new ones are copies of these, as no other detail could be discovered. They had been repaired in Portland stone instead of in Beer stone, like the spire.

R. HERBERT CARPENTER.

THE LATE MR. SAMUEL HUGGINS.

SIR,—To your brief notice of the late Mr. Samuel Huggins [p. 129, *ante*] may be added that on one occasion, at least, he tried for success in the field of active professional work in the competition for the Liverpool Free Public Library and Museum. His design remains in my remembrance as one characterised by refinement and elegance.* During the last months of his life his mind was much occupied by the Liverpool Cathedral project, and I had several letters from him on the subject. In one dated October 4th he wrote,—"I was not one of the ninety-nine (original competitors), but I have made a design for a Protestant cathedral (Classic), which I intend to publish somehow or other, if possible." I strongly urged him to fulfil his intention in a sufficiently adequate manner, and cited for example Wordsworth's publishing of the "White Doe of Rylstone" in quarto, to show the world, as the poet said, his own opinion of it.

Besides the Chart of Architectural History you refer to, Mr. Huggins compiled a manuscript Chart of Philosophy, which is now in the Liverpool Reference Library.

JAMES HIBBERT.

FIREPROOF CLOSING OF OPENINGS IN PARTY-WALLS.

SIR,—In my paper at the Institute I spoke, it is true, of persons "acting in defiance of legislative enactment." This referred, however, not to the number of the openings (as implied by the first published abstract), but to the use of over-lapping sliding doors instead of doors fitted into a rebate.

I must confess that I had not, until after the reading of my paper, the very slightest notion that this deviation from the lines of the statute was accepted and acted upon by architects, by District Surveyors, or by members of the Metropolitan Board of Works as an improvement.

* I remember the design, which was a good one. An incident in it was the introduction of two colossal lions flanking the steps to the main entrance, which were put in by the architect's brother, the eminent animal painter, who was great in lions.—Ed.

ment upon the Act, justified by the necessities of the case and by the supposed impossibility of complying always with the letter of what is laid down. But even then no explanation was given, or in any way attempted, as to the mode in which this interpretation was supposed to be reconcilable with the Act. And what I pleaded was that, if the Act practically could not be followed or enforced, there was at least a call for immediate legislation, whether by altering it or by making it more clear and obligatory. It is most undesirable that a professedly stringent Act, the provisions of which are admittedly difficult of enforcement, should be set at naught in the daily practice of those who are bound to work in accordance with these provisions. It can only make other equally-important provisions all the more burdensome and impossible of observance. Still more so will this be the case if the Act is to be considered as "intended as a sort of advice rather than a dictation of what should be done."

As to the number of openings, I certainly expressed myself strongly upon the Act being capable of the interpretation of their strict limitation, though I could not insist upon it, especially as the interpretations of the authorities quoted by me were on the other side. But what I insisted upon was, that if no limitation were laid down in the Act, it ought to be laid down.

I have certainly no wish to make unbecoming charges against District Surveyors or others of my brethren. It may be better to leave admitted and prevalent abuses to be raked up by some valiant Saint Edmund, who can deal with them incisively, and without such offence. At the same time it may be, upon the whole, better that we should do what we can to reform our own abuses by a frank acknowledgment of them. And if, from the absence of all definition of a "rebate," the Act is so obscure that the magistrate in his density cannot penetrate the gloom, it is time that a little light should be admitted from some direction or other.

WILLIAM WHITE, F.R.A.

No. 30, Wimpole-street, W.

SIR,—The paper read on the above subject at the Royal Institute of British Architects, and the discussion arising therefrom, as reported by you on the 24th of January [p. 149], afford sufficient evidence that, as a rule, the provisions of the Metropolitan Buildings Act are inadequate to secure the protection desired. The reasons of failure are not difficult to trace. In the instances mentioned, the doors made merely according to the Act which are reported to have been successful, the success has arisen from the comparatively slight test to which they have been subjected. Whenever the full weight of the fire has been directed against the door by the direction of air-currents, there can be little doubt that in a fire of any magnitude they have invariably failed. The immediate causes of failure are these:—

1. The intense heat causes expansion and buckling of the door-plate.
2. The occasional openings between the door-plate and frame, and, in the case of sliding doors, between the door-plate and wall.
3. This, again, allows the fire to penetrate to the door fixed to the other side of the wall, which, in its turn, similarly succumbs, and allows the fire free passage from one compartment of the building to the other.
4. But in the case of sliding-doors, even without expansion and buckling by heat, a considerable space exists between the door and the face of the wall at the top, bottom, and sides of the door, as mentioned by Mr. Wyatt Papworth in the course of the discussion.

It follows, then, from these facts, that there can be no security in such doors (whether hinged or sliding) unless they be so firmly held in position all round their edges that no amount of expansion or buckling shall be able to draw their edges out of their rebates. This we claim to have effectually provided for by our patent of 1883.

In 1883 we were applied to by the late Mr. Thomas Chamberlain, architect, to design and supply, for Messrs. Faudel & Co.'s new premises in Newgate-street, a number of sliding iron doors, which, while complying with the terms of the Buildings Act, would also be really effective against a fire of the greatest magnitude, even when subjected by great wind-pressure carrying it directly against the door. In compliance with these instructions, doors were manufactured by us for four distinct openings. The efficiency of these doors was fully proved in the disastrous fire which occurred in April, 1884. On the rebuilding of the shop to supply doors throughout, constructed on the same principle as those which had been thus thoroughly tested.

HOBBS, HART, & CO.

SIR,—In your account of the debate upon Mr. White's paper, read at the Institute of British Architects, you refer [p. 150, *ante*] to statements made "by a visitor who did not give his name, but who said he had attended as a representative of the Fire Offices Committee." I beg to state that this is not correct. Not only did I give my name, but added that, "although a member of the Fire Office Committee, I did not attend there as a delegate from that body." G. W. COOKER, London Manager of West of England Fire and Life Office.

THE ROYAL ARMS.

SIR,—Your correspondent in to-day's issue has given an interesting fact in connexion with "supporters" being reversed north of the Tweed, and I venture to say, a fact very little known.

I have somewhere read that the quarterings are also reversed in Scotland, that is to say, the lion rampant occupies the first and fourth quarters (the "Lions of England" do with us), while the harp of Ireland take the second and third quarters respectively, but at this moment I cannot call to mind the authority for this assertion, and I write this in the hope that it may meet your correspondent's eye and induce him to say whether it is a fact or not. I should be most glad to have any information on the "supporters" would be almost sure to note the alteration in the quarterings, and this question is also of interest.

J. B.

SIR,—In the interesting article on this subject in your issue of the 17th inst. [p. 115], you inquire "Where is the beginning?" The following passage from Kobrasse's "History of Germany" may be information to some of your readers, as was to me:—"In 1235, Frederick II. of Germany held a Diet. Before the Diet assembled, he celebrated at Worms his espousal with his second consort, the English Princess Isabella. At the marriage feast, King, Queen, and thirty counts and many knights were present. The king made the most costly presents to the English ambassadors, among the rest he sent rich gifts of curiosities from the East to the king of England, as well as three leopards, the leopards being included in the English coat of arms." W. G.

SIR,—Permit me to supplement the concise and interesting notice that appeared in your pages of January 17th, by stating, firstly, that the shield of Richard I. bore two lions combatant before the *Crescent*. Secondly, the motto "Dieu et mon droit," was first adopted by the same monarch (Cour-de-Lion) after the battle of Gisors, A.D. 1198, it being his parole on that memorable day.

EDWD. A. HEPFER.

"ARCHITECTS' CLUB."

SIR,—I quite approve of Professor Kerr's proposal for the establishment of a club-room at the Institute and entirely agree with "No. 1" [p. 151, *ante*], that there is anything derogatory in the idea. The want of such a rendezvous has long been felt, and often talked about. It would be a great convenience to many town and country members, especially the latter, who would then have a recognised headquarters where they could make appointments, write and receive letters, and meet other members of their profession with whom they might be desirous of comparing notes on the many questions that are constantly cropping up in the architectural world.

The Institute premises are quite large enough in the meantime; there is a good library and reading room,—to the latter might be added a larger and more varied supply of papers; and the present arbitration-room would make a capital club-room *per se*.

The question of refreshments, and the hours during which the club would be open, may be safely left to a representative committee, every member of which would doubtless be as jealous of the dignity of the Institute as "No. 1" can possibly be.

I, for one, am quite ready to give Professor Kerr any assistance that may be in my power if he will take the matter up, as, if properly managed, I feel sure it will prove a success.

J. M. BRYDON.

SEWER VENTILATION.

SIR,—Some local authorities are urging,—and would, if they had the power, compel,—architects and builders to ventilate main sewers by running up the sides of houses pipes connected with the main sewer outside of the trap that separates the main from the house drains. I am neither an architect nor a builder, but as a layman I have a practical interest in this question. Where can I find the most recent and best arguments for and against this plan of ventilating main sewers? At present my mind is inclined to object to the plan as likely to fill the air round the upper windows not only with sewer gases, but also with disease germs. Most sewer gases become innocuous as soon as they are oxygenised by contact with the air; but the disease germs are not thus killed. The best argument in my sense of the importance of having the main sewers properly ventilated, but the above does not appear to me to be the proper plan. I ask for instruction.

LAITUS.

RIGHT OF WAY.

SIR,—In reply to "A. B." [p. 118, ante] I do not think there is any legal width for such a road as described by him. The width, if it came to trial or arbitration, would be decided by what users of such roads said on both sides was necessary.

I have just finished laying out a road for the conveyance of agricultural produce through a field to and from a farm-house and a main road, and, by consultation with the user, I made the metalling 8 ft. wide, commencing the metalling 5 ft. from the stools of the fence; there was no ditch. I may say the road skirted along one side of the field close to the fence, the object being to take as little a width of the field for the road as possible, the user of the road being also the occupier of the field. I should think if 3 ft. were also allowed on the side of the metalling farthest from the fence you would then get the minimum width for such a road,—namely, 16 ft. 6 in.

It should be borne in mind by "A. B." that if loads specially large,—the largest loads I ever saw were in London,—have to come along the road he asks about, 3 ft. more in width at least should be given; and if provision must be made for carts and wagons jacking each other, the metalling should be doubled in width, making total width 24 ft. 6 in.

W.

VENTILATORS.

SIR,—In your issue of January 24th [p. 129], you publish a paper on Ventilation, read by Mr. F. R. Farrow at the Architectural Association. We notice that Mr. Farrow spoke most favourably of our ventilating cowl, although in a qualified manner; for, whilst admitting that "nothing could be simpler, and nothing more effectual," he intimated that he personally preferred a fixed or stationary ventilator with no moving parts. Now, as we are makers of fixed or stationary ventilators, patented by us in 1877, which are made on the same principle as our movable cowl (the only difference being that in the fixed ventilator the action of the wind is utilised in a vertical direction instead of horizontally), we must ask your permission to call Mr. Farrow's and your numerous readers' attention to this fact.

Mr. Farrow's paper is a most interesting and sensible one, but we must ask you to insert this in your valuable publication, in order to remove what is evidently an erroneous impression on his part as well as some of the public.

BANNER BROS. & Co.

Builder-square, E.C.

NEW STREETS.

SIR,—It appears that at last some progress has been made with the new street in Piccadilly to Oxford-street, and your advertising columns show that the ground will soon be cleared; but what is intended as to St. Andrew's-reet and St. Martin's-lane,—a matter of great moment, and calling for immediate action!

You some little time ago gave an interesting account of the noted houses in the latter, but nothing seems in progress as to its improvement. Homing's-row, also, and the way to Leicester-square, much requires widening, the traffic being very great.

Perhaps you can furnish information, and give a sketch map of the alterations proposed.

ST. MARTIN'S.

NON-ACCEPTANCE OF LOWEST TENDER.

SIR,—After wading through plans and specification for the purpose of giving a *bona fide* tender, one naturally expects that if he is the lowest he will have the work, especially when he is asked to tender, and does not get his information through an advertisement. This, however, is not always the case, and in a recent instance a tender 20s. above mine was selected.

I consider this absolutely unfair, and calculated to prevent genuine tenders; but anyhow, some one should be responsible for the trouble and expense to which one has to go.

FAIRPLAY.

PAINT ON FRONT DOOR.

SIR,—Two or three weeks ago I asked if any of your readers could tell me how to stop the running of gum, or whatever it is, from a front door that has been hung about ten years. It causes the paint to peel off as soon as ever the sun has any power on it, though the paint has been burned off and the parts knocked and painted four or six more than once.

In asking this question I fear I have given a poser, but I should be very glad to get a reply. Will any of your practical readers kindly tackle it?

H. G.

The City Law Courts.—According to the *City Press*, the old law courts in Guildhall-yard are to be arranged for the use of the Chamberlain and the officers in his department.

ST. MATTHEW'S, BAYSWATER.

SIR,—In your impression of the 24th inst. [p. 132] I find a notice of the Baptistery of St. Matthew's Church, Bayswater, in which the carvings are attributed solely to Mr. Lawlor and Mr. Baird. Please allow me to request a correction of that statement, as the walnut font-cover, so prominent in your engraving, was executed by me, also the oak carvings in the chancel.

WILLIAM HAWES.

THE CONNEXION OF HOUSE DRAINS WITH SEWERS.

WHAT IS A "PAVEMENT"?

A CASE of some importance to builders interested in the development of building sites in new districts came before Mr. Mansfield at the Marylebone Police-court on Wednesday, when Mr. William Hooper, builder, of 17, Victoria-villas, Kilburn, appeared to answer two summonses, issued at the instance of the Vestry of St. John, Hampstead. The first summons was taken out under the Act 18 & 19 Vict., c. 20, s. 78, for that on the 26th of December the defendant did neglect and refuse to pay to the said Vestry the sum of 11l. 7s. 7d., being the expenses incurred by the Vestry in making and branching out in drains from four houses into the public sewer in D'Eresby-road, West Hampstead, it being necessary to open part of the pavement of the street for the purpose of doing the work. The other summons was taken out under the Act 25 & 26 Vict., c. 102, s. 61, that on the 12th of December last the defendant did unlawfully make an opening into the sewer in D'Eresby-road (which sewer is vested in the Vestry) without the consent of the Vestry.

Mr. Ricketts and Mr. Moore, solicitors, were for the Vestry; and Mr. E. B. Dennis, barrister, instructed by Mr. S. Tiley, appeared for the defendant. The case for the complainants was that a sewer constructed in any road within the metropolitan area became vested in the Vestry or District Board, and that any one entering it without proper consent was, according to act of Parliament, committing an offence for which he was liable to a 50l. penalty. The Act also gave the Vestry the right to claim to make all connexions of drains to the sewer, the expense to be charged to the owner. The defendant in this case had been refused permission to make the drains to his houses and connect them with the sewer, and the Vestry having carried out the work now claimed the cost of the work. In regard to the second summons, it was urged Mr. Hooper had clearly committed an offence by breaking into the sewer.

Mr. Chas. Harlow Lowe, Chief Surveyor to the Vestry of St. John, Hampstead, and Mr. F. Thompson, his assistant, gave evidence to the effect that prior to the Act of 1884, the Vestry had permitted builders, after having got proper sanction, to make the drains to their houses upon the payment of certain fees. The Vestry then adopted a new regulation, by which they claimed to do the work themselves and charge the owner with the costs. On the 12th of December, Mr. Thompson found a man putting in an "eye," connecting the drain of the defendant's houses with the sewer, and reported the matter. Under his supervision the parish workmen had made the drains to four of the defendant's houses, and a charge of 11l. 7s. 7d. for the work was made, which account the defendant refused to pay. In cross-examination, Mr. Lowe admitted that the roadway in the thoroughfare in question was what was known as a "builder's road." It lay between a street and a "builder's road," the footpath being of hogging and burnt ballast, and having a stone kerbing. The account was made up of time and material, and an addition of five per cent. for supervision. It was not denied that the defendant had tendered to the Vestry two sums of 14s. 8d. when asking permission to make the drains, and that they were refused.

Mr. Dennis, for the defence, asked the magistrate to dismiss the first summonses, as the complainants had not made out their case. First of all, they had not proved that any "pavement" had been removed, according to the wording of the summons, to carry out the work; and next he should contend that this D'Eresby-road was not a "street" within the meaning of the Act, and that what had been done was, in fact, an interference with private property; further that this was an attempt to set up a right, which, if well founded, had been possessed by the Vestry for the last twenty-nine years, and had never been assented unto now. The sewer, which defendant's predecessor had constructed, was, no doubt, by the Act, vested in the Vestry, and his claim did not rest on breaking into it. But it had been the practice of the Hampstead Vestry to allow Mr. Hooper to make the drains of his houses, and however much the Vestry might have control over the making of the drains of houses in roads vested in the parish, this was a private piece of land, and did not come within the meaning of the word "street" as defined by the Act.

Mr. Ricketts urged that the term "pavement" did not necessarily mean York stone, but any material used in the formation of a pavement. The sewer was clearly vested in the parish authorities, and it was equally clear that if the sewer needed to be repaired, the Vestry would have the right to take

up the road to do the work. He should submit that the formation of the pavement must be held to be the pavement.

Mr. Dennis quoted a case promoted by the Corporation of Manchester, in which it was held that a pavement must consist of stone, asphalt, or some material of a permanent character, not of the nature of gravel; also a decision of the late Sir Geo. Jessell, who ruled that no local authorities could take over a road which had not been paved, kerbed, channelled, and lighted.

Mr. Mansfield said that the action of the Vestry might involve a hardship upon the defendant, but as a matter of public policy he thought the Vestries should make the drains to all houses, and that would put a stop to the state of things often found in houses not properly constructed. The sections of the Act referring to the word "pavement" were very difficult to understand in the absence of any definitions, but he was inclined to absolve the construction put forward by the counsel for the defendant. As at present advised, he should decide against the Vestry as regards the claim of the cost of making the four drains, but against the defendant for breaking into the sewer, and should order him to pay a nominal penalty of 40s., with 2s. costs. He should give no decision as to the term "street."

Mr. Ricketts asked that a case might be stated for a Superior Court, and the application was granted.

LIGHT AND AIR CASE.

BIGNOLD T. MITCHELL AND OTHERS.

The plaintiff in this action (tried at the Norfolk and Norwich Assizes, before Lord Chief Justice Coleridge), Mr. E. S. Bignold, solicitor, brought an action against the defendants, Messrs. Mitchell, Burtou, & Barnes, trustees of the Norwich Medical Institute, for raising a building which interfered with and obstructed the ancient lights of his house. Defendants denied they were ancient lights, and claimed that if they were, the light had not been materially obstructed.

Mr. Balwer, Q.C., M.P., and Mr. Blefield appeared for the plaintiff, and Mr. Grantham, Q.C., M.P., and Mr. S. Reeves for the defendants.

The plaintiff complained that in front of the house occupied by the Medical Institute in Lady's-lane, a building 11 ft. 5 in. high had been erected as a dispensary at a distance of 25 ft. from plaintiff's dining-room windows. This building was 4 ft. or 5 ft. higher than the old ivy-covered wall which formerly existed. Plaintiff made no objection to the old wall being raised 1 ft. 6 in.; but when he saw the work was progressing higher he applied for an injunction. The Court of Chancery directed that a jury at these Assizes should try the case. The plaintiff, with others, gave evidence that his dining-room was much darkened by this wall, and Mr. E. Preston Willis, architect and surveyor, produced a model of the buildings in dispute, and deposed as to the loss of superficial light formerly enjoyed, and also as to how the building could have been constructed so as to avoid this difficulty.

The defendants called the builder of the place, and Mr. E. Boardman and Mr. J. H. Brown, architects, and Mr. Barnard, surveyor, who relied upon the angle of 45°, which the Judge directed the special jury was an exploded theory.

A verdict was given for the plaintiff for 40s., to carry costs; and the Lord Chief Justice granted an injunction in the terms prayed for,—that is, to pull down the whole of the wall in dispute.

The Wages of the Working Classes.—

It is satisfactory to be told by so good an authority as Professor Leone Levi that the earnings of the working classes amount to 521,000,000l. per annum, or, exclusive of food, &c., 470,000,000l.; yielding an average of 32s. per week per family, assuming each family to have 2 1/2 earners. Comparing the earnings of the working classes for the year 1867 with those of 1884, there is an increase from 38l. to 42l. 14s. With good health and good thrift the case of our working classes should not be so bad as it is. We may well believe with Professor Levi that in no other country are the working classes so well off. The next most important question is, How are the wages spent? It is useless to maintain that the answer to this question is satisfactory. Part of the untrifled is to be lightly condemned, but much of it is really culpable. The enormous amount spent on drink is not denied by any authority. It is said that while we as a nation spend on bread 70,000,000l., on milk 30,000,000l., on butter and cheese 25,000,000l., on house rent 70,000,000l., and on the rent of farms 60,000,000l., we spend on alcoholic liquors 136,000,000l. We want improvements in cooking for the working classes, so as to make the most of their food supplies. This is to be done partly by educating girls more practically, and partly by public arrangements.—*Lancet*.

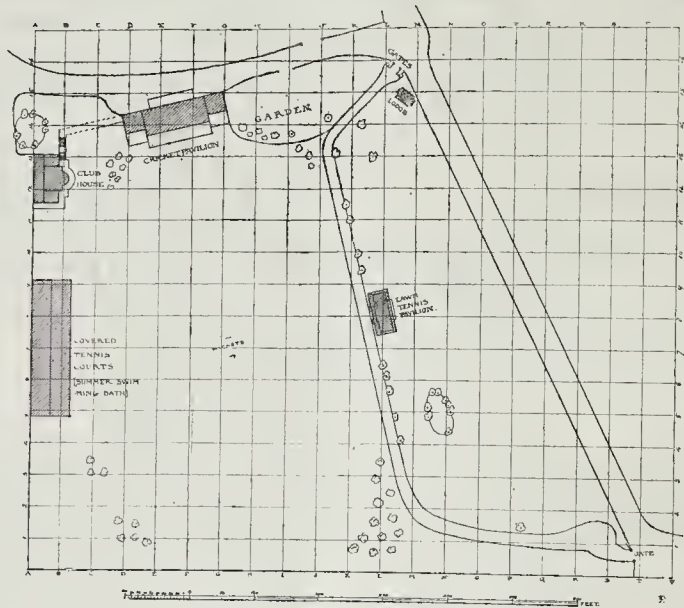


Fig. 2.

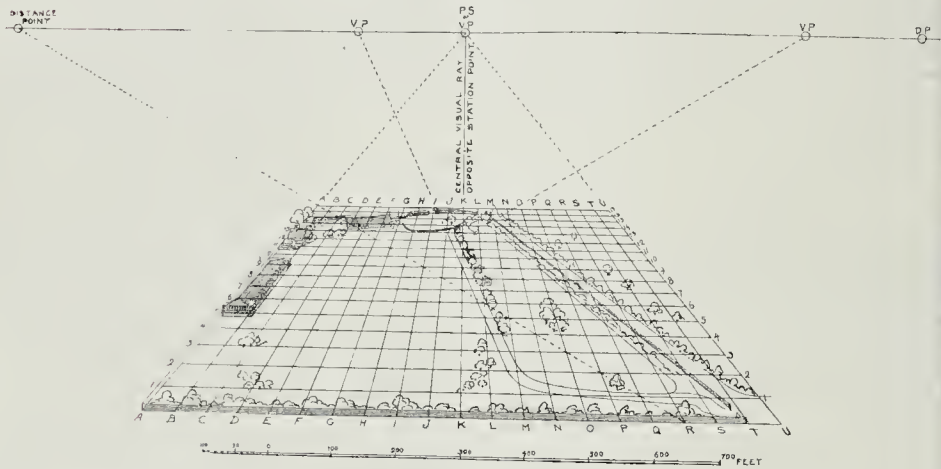


Fig. 3.

The Student's Column.

LESSONS IN PERSPECTIVE.—No. 3.

PARALLEL PERSPECTIVE AND BIRD'S-EYE VIEWS.

IN the former lessons, the object to be drawn was placed at an angle to the spectator, and was represented by the process known as *angular perspective*.

The same process may be applied to the representation of an object, such as the interior of a rectangular room, as seen by a spectator standing at one end of the room and looking straight at the other end, so that the central visual ray will be parallel to the side walls. He will next fix his picture-plane at a convenient place across the room.

The vanishing-point of these side walls will then, of course, be on the central visual ray, as any one will find by laying down the plan and vanishing-points,*

* There are refinements upon this rule to meet the distortion or exaggerated appearance of length sometimes produced by it; but it will be found to answer most purposes if the usual care be taken not to comprise too wide an angle of vision.

This one vanishing-point will serve for all the cornices, floor-boards, and all other lines that are parallel to the side walls, and when they are connected across from the end corners of the room, these connecting lines, representing the end of the floor and ceiling, will be found to be parallel to each other. In other words, all such lines will be horizontal.

Such a representation is said to be drawn in *parallel perspective*.

Now, some benefactor to the human race, or those members of it who make perspective this same result could be produced by simpler means, and that, instead of having to crowd a plan with an infinity of visual rays, the distance of any object beyond the picture-plane may be itself without touching the plan.

Indeed, the plan need not even be pinned down on a board, nor any preparation be made beyond laying down a sheet of paper for the perspective view, and setting up thereon a transverse section of the room (fig. 1).

Across this section draw a horizontal line at about 6 ft. above the floor, and draw a vertical

line to represent the central visual ray. This need not be in the centre of the room, as it is better to show a little more of one side of the room than of the other.

The point where these two lines intersect will be our old friend the *vanishing-point*, sometimes called the *point of sight*, and towards it all the lines of the side walls, &c., will converge.

Reverting to our first lesson (vol. xvii., p. 443) we will suppose that a huge sheet of glass is placed across the room and that we have to represent thereon what we see through it.

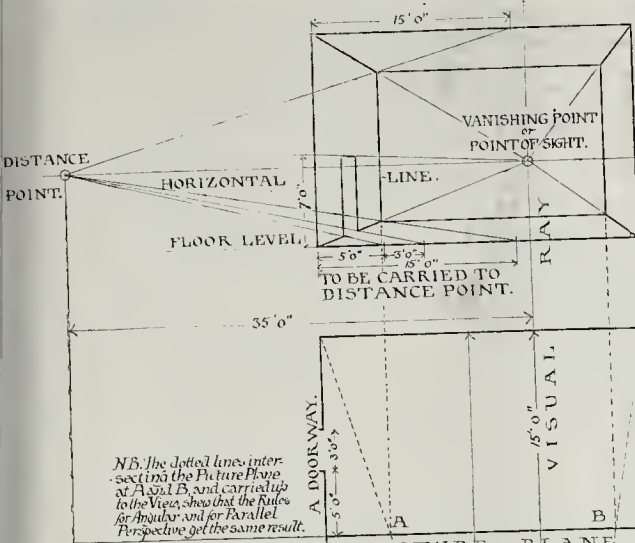
How far down the room shall we set up the imaginary sheet of glass?

This will be decided by the distance that we can stand back from it, so as to look through it comfortably.

Suppose the room to be 50 ft. long and 24 ft. wide. If we stand near one end wall and set up the glass 35 ft. down the room, we should see the remaining 15 ft. through it, which would form our perspective view.

Now, the transverse section that we have set up, as above described, is to correspond in position with the imaginary sheet of glass, or picture-plane.

THE VIEW.



N.B. The dotted lines intersecting the Picture Plane at A and B, and carried up to the View, show that the Rules for Angular and for Parallel Perspective get the same result.

We have next to see how far the lines representing the side walls, &c., travel towards the vanishing-point (or point of sight) before they are stopped or cut off by the end of the room.

In angular perspective this is done on a plan, by bringing visual rays from the corners of the room back to the picture-plane, and so also can be position of every object in the picture be found.

But the multiplicity of lines would be confusing and the picture-plane would bristle with them like quills upon the fretful porcupine, and the fretfulness might be conveyed to the draughtsman.

Here the angel and minister of light who sits upon the use of distance-points comes to our relief. We have settled the station-point to be 35 ft. distant from the picture-plane.

Now mark on the section of the room a distance of 35 ft., right or left, along the horizontal line from the vanishing-point (or point of sight), and the trick is done.

We want to find how far the left hand corner of the room appears in the picture at the floor level.

We know that it is 15 ft. beyond the picture-plane, and we have only to mark 15 ft. to the right of its position on the picture-plane at the floor level. A line drawn from this point to the left hand distance-point gives the required intersection.

In this manner the whole of the floor can be represented, and the best practice to begin with will be to divide the floor into squares, like a chess-board. Then repeat the same process on the ceiling.

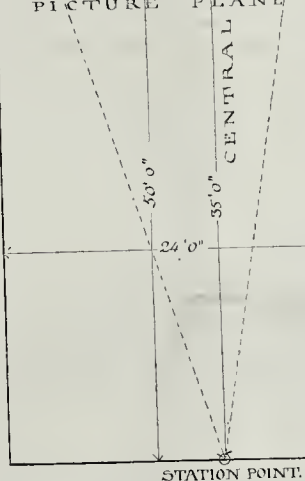
As to the walls, if a doorway occur, say 5 ft. beyond the picture-plane, and be 3 ft. wide, its position can be similarly found, and its height also, by marking, say 7 ft., up the side of the picture-plane. The intersection of height and position completes the doorway.

Now, what is true of the floor of a room is equally true of a field or tract of land, and the first time that the writer had occasion to draw a bird's-eye view of an estate, many years ago, it occurred to him to cover the plan with squares which could be easily put into parallel perspective, and that the perspective position of each object could then be readily ascertained (fig. 2).

The accompanying diagrams will explain this. One of them represents the plan of some recreation grounds that the writer has recently laid out. It is divided out into as many squares as will cover it. These are then distinguished by letters along the top and bottom, and by numbers along the sides.

A corresponding "chess-board," to any scale that may be convenient, is then put into perspective and duly lettered and numbered (fig. 3).

All that one has to do is to find, as it were, the latitude and longitude of each object on the plan and transfer the same to the perspective.



THE PLAN.

Fig. 1.

By continuing any line, such as the drive in front of the lawn tennis pavilion, up to the horizontal line, a vanishing-point is found for that and all lines parallel to it; and a little practice will soon enable one to find every position accurately.

The ground, in this case, is level, and the squares from 1 to 17 are found by cutting the lines from B to R, with one line from R to the distance-point. This saves the trouble of repeating the process for each square.

If the ground be undulating, the measurement of the hills and valleys can be set up above or below the proper points on the picture-plane and be carried into the picture.

It is not even necessary to disfigure the plan with a network of squares. A sheet of tracing paper so divided has simply to be pinned down over it in order to observe the positions.

In this manner the most tortuous and irregular plans of land and the buildings thereon may be put into very correct perspective.

* * * We are much obliged to our correspondents, "Alacius" and "Riser" for suggestions as to subjects to be treated in the "Student's Column"; their suggestions are duly noted for future attention. At present the "Student's Column" is filled up for some little time in advance.

Books.

The Abbeys of Arbroath, Balmerino, and Lindores, illustrated and described by GEORGE SHAW AITKEN, F.S.A. Scot., Architect. Dundee: John Leung & Co. 1884.

THE information we possess about the monastic buildings north of the Tweed is, if not more scanty, at any rate less accessible, than that which attaches to English foundations, and the interest felt in them is proportionately inferior. Of the thousands of tourists who yearly cross the Scottish border "in search of the picturesque" very few concern themselves with aught but the natural scenery, and we should doubt whether a score of them in any single season turn aside to look at the three abbeys which form the subject of Mr. Aitken's volume. With Melrose and Dryburgh, Holyrood and Jedburgh, most persons are, in some sense, familiar, but Arbroath, Balmerino, and Lindores are unknown names to the ordinary traveller, and the two latter are not even mentioned in the edition of *Black's Guide* which lies before us.

Mr. Aitken has, therefore, done good service in directing attention to these almost forgotten relics of an eventful past. He writes, however, as an architect rather than as an antiquary. The history of each house is, indeed, briefly given, but as no authorities are cited for the statements made, we cannot determine their precise value. Grose, Pennant, Sibbald, Turnbull, and others are mentioned in general terms, and the author tells us that he is under special obligations to Dr. Laing and Dr. Campbell for particular information. It would, we think, have been better if Mr. Aitken had added to his thirty-three pages of letterpress some references to original and other authorities in support of what he tells us.

Arhrath, the most important of the three abbeys described, was founded by William the Lion in 1178, and was one of the wealthiest religious houses north of the Tweed. It was dedicated to St. Thomas à Becket, and corresponded in width of nave and number of bays with his cathedral at Canterbury. Of course, the difference of arrangement was considerable, and the choir at Canterbury soon outstripped in magnificence that of the Northern house, though the fragments of moulding and carving which have been discovered proclaim the latter to have been no mean structure. Unfortunately these fragments have suffered greatly from exposure and neglect. The situation of the abbey, open alike to maritime attack and to the blasts that sweep across the Northern sea, must have rendered the maintenance of the fabric always a costly and difficult matter. Added to this, there was injury done by lightning and fire in three successive centuries, the second, occurring in 1380, having destroyed the roofs of choir, nave, and transept.

Mr. Aitken, however, has (so to speak) rebuilt the abbey, and by his ground-plans and careful drawings enabled us to realise its general character and main features. The style is partly Norman and partly Early English, and the unbroken continuity of the work shows itself in the conspicuous unity of design and uniform standard of excellence displayed by the abbey. The choir, nave, and transepts are represented by Mr. Aitken as unusually lofty and well lighted, the clearstory being double lancets. The central tower (which fell with destructive force in the eighteenth century) is low and massive, and of the two western towers one only is carried above the roof-line. Mr. Aitken says, "The first authentic [sic] change on the original structure appears to have been the addition of a story to the north-west tower, which, with the south-west, was probably intended to have been crowned with a spire. Uncertain foundations may have caused the abandonment of this idea, and the substitution of a safer, but less ambitious lantern, which, though aesthetically doubtful, would be available for a beacon-light in the event of approaching English or Norse invaders." We do not know all that may be meant by "aesthetically doubtful," but we have instances of spires being pulled down, e.g., at Southampton, because they served to attract pirates and other pillagers. The western front of the abbey, as reproduced by Mr. Aitken, may be regarded as a faithful representation of the original, for the recessed doorway,—a graceful

combination of Norman and Early English work,—yet remains, and there are sufficient traces of the noble circular window which filled the gable above it. The sacristy is in fair preservation, and within it are some interesting edifices well worth examining. Mr. Aitken has devoted no less than fifteen plates (executed in photo-lithography by Sprague & Co.) to the illustration of Arbroath, and they bear ample witness to his skill and taste.

Of Balmerino, which gave its name to the unhappy peer who took part in the Pretender's rising, and lost his head upon the scaffold in 1746, the remains are very scanty. The situation of the abbey, in the middle of the Carse of Gowrie, is the very opposite to that of Arbroath. Deep in the recesses of a dell, and overshadowed by lofty trees, the site suggested itself to Queen Elizabeth as a fit abode for religious recluses. To this sequestered spot her son, Alexander II., transported some Cistercian monks from Melrose in 1229. Here they erected a church, of which sufficient vestiges still remain to indicate that it followed the outline of a Latin Cross, with two or more aisles. But the road-maker having for centuries regarded the ruins as his most convenient quarry, has left little of the masonry untouched. The secular buildings have been more fortunate. The chapter-house, on the east side of the principal cloister, has survived through its adaptation to modern domestic uses, and the ancient granary required no changes to secure its preservation. Mr. Aitken is, perhaps, a little rash in attempting to make a ground-plan of the abbey out of the slender materials that have been left; he would certainly have done better had he omitted the drawing of the Balmerino Spanish chestnut, where he is obviously *ultra precipitum*.

Lindores is as rich in historic associations as it is poor in architectural remains. The abbey, founded in 1178 by David, Earl of Huntingdon, brother of William the Lion, was a richly-dowered house, and stood in the fertile plain east of the town of Newburgh. It was built in the form of a Greek cross, and the design may perhaps have been suggested to the founder by some church he had visited during the Third Crusade. Within its walls Wallace sought repose after the battle of Earnside, and the stone coffin which have been exhumed enclosed, it is thought, the remains of David, Duke of Rothesay, who was murdered in Falkland Palace, and of one whom Mr. Aitken rather vaguely terms "the monastic Brother and Peer of the realm, Earl Douglas." The walls themselves are too ruinous to exhibit any details of architectural interest, and the only part of the fabric in any state of preservation is the vaulted slype between the south transept and the chapter-house.

We hope Mr. Aitken will be encouraged to prosecute his labours in other quarters, and give the results to the world in a volume equal in interest and in other respects to that we have described.

French Pottery. By PAUL GASNAULT and E. GARNIER. London: Chapman & Hall.

This little handbook is one of a series published under the auspices of the Committee of Council on Education, and refers to specimens in the South Kensington Museum. It is in the main a chronological account of the manufacture of faience and porcelain in France, well written and admirably translated. We are a little surprised to find in the account of the Parisian manufactories no mention of Jacob Petit (1750—), whose modelling of fruit and flowers was certainly of distinctive excellence. And we think a word of gentle deprecation might have tempered the encomium on Lanfrey, the director of the Niederwittler manufactory, who certainly did not show good taste in inaugurating the "style of decoration which consisted in painting the whole surface to be decorated in imitation of veined pine-wood, upon which was figured an engraving fixed on the wood by a pin. In order to make the illusion more complete, one angle of the engraving is sometimes turned in, and projects a shadow on the wood." Surely the force of foolishness can do further good. The *amende* is, however, made by the authors of the book, in general terms, on p. 175, and we hope readers will not overlook it. The illustrations to this little book are both numerous and good, and the copious lists of "marks" are very serviceable, and, with the one exception above noted, so far as we know, complete.

VARIORUM.

In the third edition of "Hydropathy at Home," by Joseph Constantine (London: Simpkin, Marshall, & Co.; Manchester: John Heywood), there is a chapter on "Hydropathy for Horses," which will be read with interest by keepers of horses. The use of the Turkish bath for horses appears to have been found very satisfactory, during a period of eleven or twelve years, by Messrs. Pickford & Co., the well-known carriers, in their hospital for horses at Finchley. Encouraged by this success, the Great Northern Railway Company have fitted up a Turkish Bath at their new hospital for horses at Totteridge. A plan and description of this bath were given in the *Builder* for May 31st, 1881. The bath was fitted up by the author of the book now under notice. Mr. Constantine will be well known to many of our readers as the patentee of the Convoluted Stove, which is used for the heating. The work also includes a chapter on the ventilation of stables and cattle-sheds.—The tenth volume of "Proceedings of the Association of Municipal and Sanitary Engineers and Surveyors," edited by Mr. Thomas Cole, Secretary of the Association (London: E. & F. N. Spon), contains several important papers on subjects of great practical value to all concerned in town improvements and sanitation, including street-cleaning and maintenance. The Association includes among its members the borough engineers and surveyors of all the principal towns in the kingdom, and the value and usefulness of the Association in affording means for an interchange of their experiences is shown by this volume of "Transactions"; still more so by the Index which it contains to the previous nine volumes. This Index has been prepared by Mr. S. S. Platt, Assoc.-M.Inst. C.E., Borough Surveyor of Rochdale, and will be found very useful by those in search of practical information on any of the subjects which come within the purview of a borough surveyor.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

Table with columns for property location, agent, and price. Includes entries for Enfield Highway, St. Pancras, Highgate, and various other properties.

New Buildings for Gibraltar.—We understand that Messrs. W. H. Lascelles & Co., of Bunhill-row, are about to erect a large building at Gibraltar. The work will be carried out under the direction of the architect, Mr. C. H. Driver, of 5, Victoria-street, Westminster. A list of tenders for the work will be found in another column.

MEETINGS.

- SATURDAY, JAN. 31. Royal Institution.—Dr. Walsby on "Greek Art from Phidias to the Roman Era." 8 p.m. St. Paul's Bœtological Society.—Annual Meeting. 2.30 p.m. MONDAY, FEB. 2. Society of Engineers.—Address by the President, Charles Gordon. 7.3 p.m. Royal Institute of British Architects.—Mr. Adams on "Architectural Drawing." 8 p.m. Clerks of Works' Association (31), Spring Gardens.—Monthly Meeting. 7 p.m. Parkes Museum.—Meeting of Members only. Society of Arts (Lecturer Lectures).—Professor Forley on "The Distribution of Electricity." 10 p.m. TUESDAY, FEB. 3. Society of Biblical Archaeology.—(1) "Notes on Antiquities from Babylonia in the collection of Mr. Hilton Price, F.S.A." (2) Professor A. H. Sayce on "Kassian Inscriptions." 8 p.m. Institution of Civil Engineers.—Mr. D. S. Scott on "The Design and Construction of Steam Boilers." 8 p.m. WEDNESDAY, FEB. 4. British Archaeological Association.—(1) The Rev. F. Brown, M.A. on "The Interlaced Cross at Clapham Parish." 8 p.m. Society of Arts.—Mr. Charles G. Leland on "Lion in Industrial Art." 8 p.m. Ordinary meeting. 8.30 p.m. THURSDAY, FEB. 5. Royal Archaeological Institute.—(1) "Pierres de Balby by Adnair Fremitt." (2) "Notes on Screen of St. Andrew's Church, Herts." by Mr. Somers Clarke. 8 p.m. London Institution.—Sir John Lubbock on "Lion in Industry." 8.30 p.m. Society of Antiquaries.—8.30 p.m. St. Paul's Bœtological Society.—A paper by H. Roussee Gough. 7.30 p.m. Society of Arts (Lecturer Lectures).—Mr. W. Andrews on "The Conversion of Heat into Useful Work." 8 p.m. FRIDAY, FEB. 6. Architectural Association.—Mr. A. Young on "Buildings." 7.30 p.m. University College.—Professor C. T. Newton on "Cassian Inscriptions." 11.15 a.m. SATURDAY, FEB. 7. Association of Public Sanitary Inspectors.—Capt. Douglas Galton on "The Purity of Air in Towns." 6 p.m.

Miscellaneous.

Fresco Paintings at Fingringhoe.

Charles Golding writes to the Essex Standard.—Upon examination of the interior of Parish Church of St. Andrew, Fingringhoe since the earthquake, with the intention of re-seating and benching it, it has been found that the walls in many parts have been richly ornamented. I endeavoured last week to make a careful survey of them, and find that there in some instances at least three or four courses of Churchwarden's whitewash have been used to cover them up, yet by removing the same slowly and carefully much may be observed. Near the South Porch entrance, on each side of the arch from the south aisle to the nave, and exact in juxtaposition to where the font stands, at which formerly was probably the baptistery, the west arch is a full-length figure, apparently of the Blessed Virgin, with nimbus on head and holding an orb and cross in her hand. Above appears an angel or cherub, having two wings and holding above the Virgin's head a scroll bearing a sentence upon it, now partially indistinct, but evidently extending the width of the fresco. The letters are in some instances picked off. However, as near as I could read it is,—

"Thy... rous... ap... pit... ralo... fins."

But I would not undertake to say this is literally correct. Directly opposite, on the north arch is another fresco, apparently of St. John the Baptist,—evidently a person arising from what may be termed a pool or basin of water. In the centre aisle, immediately at entering is a rich and highly embellished fresco (or at least has been), the background bearing diaper-work of green and gold, interspersed alternately with spangles, stars, and initials "H" and this figure has been the representation of some saint, and on part of the scroll yet remaining I thought I could discern "LUCY," possibly for Saint Lucy the Virgin. Over the chancel arch, and in other parts of the church, is to be seen much decoration of the Jacobean period.

The Sanitary Assurance Association.

At a special meeting of the Executive Council of the Association, at the office, 5, Argyll-place, W., on Monday last, Sir Joseph Fayer, F.R.S., in the chair, a vote of condolence with the family and friends of the late Mr. John Whichcord, F.R.I.B.A., who was one of the earliest members of the Honorary Council of the Association, was passed.

lors-y.—The Church of the Holy Trinity, ... having been extended towards the west ...

British Archeological Association.—At ... meeting of this Association on the 21st inst. ...

The Parkes Museum.—The Council have ... received a number of interesting articles and ...

Steel Bridge in South Africa.—The first ... steel bridge in South Africa, and the first ...

sag caused by the weight of each span. This ... method worked admirably, and the structure ...

District Surveyorship, Deptford.—Mr. ... Angustus W. Tanner, District Surveyor for ...

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Table with columns: Nature of Work, By whom required, Premium, Design to be delivered, Page.

CONTRACTS.

Table with columns: Nature of Work, or Materials, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page.

TENDERS.

- For assembly and masonic rooms, Gibraltar. Mr. C. H. Driver, architect, & Victoria-street, Westminster.

- For new business premises on the Artillery Field Estate, Guildford, for Mr. Henry Stent. Messrs. Peak, Lunn, & Peak, architects.

- For additional class-rooms at the South Norwood School, for the Craydon School Board. Mr Robert Ridge, Surveyor to the Board, architect. Quantities by the architect.

For the erection of show-rooms and warehouses, King-street, Ramage, for Mr. W. P. Blackburn. Mr. E. L. Elgor, architect.

Miller	£1,875	0	0
Smith	1,799	0	0
Martin	1,391	0	0
Forsyth	1,285	0	0
Port	1,281	0	0
Newby Bros. (accepted)	1,188	0	0

For making and sewerage new roads, Cann Hill Estate, Stratford, E., for the Imperial Property Investment Company, Limited. Mr. G. H. L. Stephenson, surveyor.

Walker	£1,929	0	0
Nowell & Robson	4,613	0	0
Pizzev	4,375	0	0
Adams	4,100	0	0
Cook & Co.	3,820	0	0
Wilson (accepted)	3,785	0	0

For pulling down and rebuilding No. 19, Ivy-lane, Newgate street, for Mr. R. H. Abbott. Mr. William Smith, architect, 1, Gresham-buildings, E.C. Quantities by Mr. E. J. Pais:-

Goodman	£1,887	0	0
Shurmer	1,836	0	0
Woodward	1,793	0	0
Grover & Son	1,788	0	0
Dunford & Langham	1,749	0	0
Dixon & Co.	1,735	0	0
Stevens Bros.	1,725	0	0
Apley	1,704	0	0
Metcalf Bros.	1,691	0	0
Wilson	1,584	0	0
J. & J. Greenwood	1,583	0	0
Larke & Son	1,569	0	0
Richardson (accepted)	1,561	0	0

For the erection and completion of the new Thames Hotel at Maidenhead, for Messrs. Woodhouse & Deacon. Mr. R. E. Tyler, F.R.I.B.A., architect. Quantities supplied by Mr. Walter Barnett:-

Shurmer	£8,980	0	0
Boyc	8,883	0	0
Ayas & Co.	8,865	0	0
Silver, Son, & Filwood	8,854	0	0
Morter	8,180	0	0
Woodbridge	8,100	0	0
Adamson & Son	7,988	0	0
Bolding	7,984	0	0
Watson	7,936	0	0
Laurence & Sons	7,749	0	0
J. O. Richardson	7,607	0	0

For the erection and completion of a house and stables at Sunningdale, Berk, for Captain W. Oughton Giles. Mr. R. E. Tyler, architect. Quantities by Mr. W. Barnett:-

J. O. Richardson (accepted)	£2,129	0	0
[No competition]			

For private street works, for the Barking Town Local Board. Mr. C. J. Dawson, surveyor:-

Culley	£2,145	0	0
Beedle Bros.	1,913	13	0
G. Bell	1,807	14	0
Ratty	1,831	0	0
Mowlem & Co.	1,763	0	0
Cook & Co. (accepted)	1,745	10	0
[Surveyor's estimate, 1,787l. 12s. 1d.]			

Sir,—In your issue of January 17th you published a list of tenders for Egham Schools, Mr. E. Harner, A.R.I.B.A., No. 8, John-street, Adelphi. After publishing the tenders, the School Board Committee invited the builders sending in the three lowest tenders to send in a tender of the amount they would be prepared to reduce their original estimates if certain scheduled variations and reductions were carried out.

Original Estimate.	Final Estimate.
Hann & Co., Windsor	£3,479 .. £2 0 .. £3,275
Simpson, Egham	3,615 .. 400 .. 3,215
Osade & Sons, Egham	3,665 .. 305 .. 3,350

Windsor. HANN & Co.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.
J. M.—W. R.—E. B.—S. & C.—A. B. P. (thanks: it has been attended to).—W. W. B.—J. E. R.—R. H. C.—W. H. O.—R. P. (write to the Secretary of the Surveyors' Institution).—J. & Co.—G. R. C.—J. W. W.—G. H. B.—J. L. (we cannot answer such questions).—Conrad's solicitors.—S. Y. & Sons (should send amount).—A. W. R. S.—W. & B.
All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.
We are compelled to decline pointing out books and giving addresses.
Notes.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the author.
We cannot undertake to return rejected communications.
Letters or communications (beyond 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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CHARGES FOR ADVERTISEMENTS.
SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIP, TRADE, AND GENERAL ADVERTISEMENTS.
Six lines (about fifty words) or under..... 3s. 6d.
Each additional line (about ten words)..... 0s. 6d.
Terms for front page Competition, Contracts, and Advertisements on special conditions, published by Auction, &c. may be obtained on application to the Publisher.
FOUR LINES (about THIRTY words) or under..... 3s. 6d.
Each additional line (about ten words)..... 0s. 6d.
PREPARATION IS ABSOLUTELY NECESSARY.
* * * Stamps must not be sent, but all small orders should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent-garden, W.C. to DOUGLAS FOUNDRINER, Publisher.
Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.
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.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY MORNINGS.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent-garden, W.C. Free of charge. Letters will be forwarded if addressed in envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.
"THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 10s. per annum, **POST PAID.** To countries within the Postal Union, 5s. per annum. Resubscriptions payable to DOUGLAS FOUNDRINER, Publisher, No. 46, Catherine-street, W.C.

Still on Sale.—A few COPIES of the NEW YEAR'S NUMBER of "THE BUILDER," containing the following ILLUSTRATIONS, viz.—
THE CHAPEL, KEBLE COLLEGE (Mr. W. Butterfield, Architect). Interior and Exterior Views.
THE TOWER OF LONDON IN THE REIGN OF ELIZABETH. Drawn by H. Brewer.
NEW PUTNEY BRIDGE. Working Drawings.
ST. STEPHEN'S, WALBROOK. Measured and Drawn by E. H. Sedding; Royal Academic Prize Drawings.
PART OF STAINED-GLASS WINDOW, Salisbury Cathedral. Designed by Burnt Jones.
WEST FRONT OF TEWKESBURY ABBEY. Drawn by H. H. Esdaile.
CALLEDON HOUSE. Plan of CIRCULAR WARH HOUSE for Egypt. By Lady Strangford.
4d. by post 4d.
Publishing Office, 46, Catherine-street, W.C.

JUST PUBLISHED.
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UNIVERSAL ELECTRICAL DIRECTORY.
Price 10s. FOR 1885. [Price 10s.]
This book contains, amongst other trades, a very complete list of Manufacturers of Electric Bells, Alarms, and other Electrical Domestic Appliances.
WM. DAWSON & SONS,
Nos. 148-9, UPPER THAMES STREET, LONDON, E.C.

Best Bath Stone.
WESTWOOD GROUND,
Box Ground, Combe Down
Corsham Down,
And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limited
Corsham, Wilts. [A]

Dry Corsham Stone.
150,000 FEET CUBE
PICTOR & SONS,
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ILLUSTRATIONS.

Stained Glass Design, Triplet Window, Easthamstead Church.—By Mr. E. Burne Jones.....	200-201
St. Padarn Church, Llanberis, N. Wales.—Mr. Arthur Baker, Architect.....	204-205
New Premises, Kentish Town, for Messrs. Read Brothers.—Messrs. Theodore K. Green & Son, Architects.....	208
House and Shop, No. 321, Strand.—Mr. T. E. Knightley, Architect.....	209
Design for a Block of Three Houses, and Detail Elevation of One House: Royal Academy Travelling Studentship.—By Mr. Fred. M. Simpson.....	212, 213

CONTENTS.

Proportion in Theory and Proportion in Practice.....	189	House and Shop, No. 321, Strand.....	198	Fireproof Closing of Openings in Walls.....	217
Experimental Researches into the Strength of Building Materials.—By E. Wyndham Tarn, M. A.....	190	Design for a Block of Three Houses.....	198	Sewer Ventilation.....	217
Notes.....	193	Improvements at the Wimbledon Sewage Farm.....	198	Careless Nomenclature.....	217
Letter from Paris.....	194	West London School of Art.....	215	Non-acceptance of Lowest Tender.....	217
New and Birmingham Ship Canal.....	194	Society of Engineers: President's Address.....	215	Drawings in Lambeth Public Library.....	217
Royal Institute of British Architects: The Gold Medal for 1885.....	198	National Association of Master Builders.....	215	Paint on Front Door.....	217
"English Architecture Thirty Years Hence": Architectural Association.....	198	Architects' Commission.....	216	Church-Building News.....	217
St. Paul's Ecclesiological Society.....	198	Architects' Commission.....	216	The Student's Column: Descriptive Geometry.....	218
Stained Glass Windows, Easthamstead Church.....	198	Westminster Hall.....	216	"Education in Industrial Art".....	219
St. Padarn Church, Llanberis.....	198	The Domes of St. Paul's.....	217	Recent Patents.....	219
Bier-bottling Stores, Kentish Town.....	198	Competition Committee, R.I.B.A.: Borough of Croydon.....	217	Meetings.....	220
		Street Improvements Competition.....	217	Miscellaneous.....	220

Proportion in Theory and Proportion in Practice.



ENOUGH has probably been said in some previous articles in illustration of the thesis that proportion is as essential an element in the convenience and the beauty of works of

architecture as in the structure of the natural organisms to which these works have such direct analogy. But when we proceed to develop this principle as a matter of practical application, the very first question which presents itself is, to what degree of strictness are we bound. Proportion in general science, and also in some of the arts, we are well aware is fatally vitiated by disregard of even minute exactness. But is beauty in architecture dependent on conditions so exacting? In a broad sense, of course, and constructionally, proportion is not to be trifled with; the strength of supports must be duly responsive to weights, resistance to thrust, toughness to strain, and so forth. A daring architect at Beauvais, Amiens, or Salisbury may seem to adjust proportions to so strict a nicety as to approach the very ultimate margin consistent with stability. But this adventurousness is exceptional, and the vast majority of noble and beautiful effects are manifestly independent of it.

The engineer, with whom beauty is a secondary consideration,—if, indeed, he condescends to consider it at all,—only makes calculations of proportions for the sake of a limit in one direction, and then doubles them without hesitation in the direction of security, makes pier or arches twice as strong as any weight that they will ever have to bear could require, and chains capable of bearing double the strain they can ever be exposed to. The architect may likewise make a study of the strictly necessary proportions of the parts of his structure, but when he proceeds to modify these in practice he finds himself under obligations to which the engineer is a stranger. For him it is not sufficient that stability is real,—it must be manifest; and it must not only be manifest, but distinguished by some definite typical expression. The gradations of such expressions are infinite, but they tend in the direction of one or other cardinal type; they are varieties of an elegance which seems to avoid most carefully any suspicion of superfluous material, or of a solidity which has a semblance of tending in preference to display

a free employment and mastery control of abundant material.

All these varieties ultimately depend for consistent appropriateness upon certain pervading proportions, but the recognition of this fact and principle only brings us still again, and still closer, face to face with the problem,—how far are such proportions even in the best examples only loose and general, matters of there or thereabouts, or how far contingent on numerically accurate relative dimensions. Vitruvius lays down the rule that the height of the capital of a Corinthian capital, including its abacus, should be exactly equal to the lower diameter of the shaft. This is one of his rules which, unlike many others that he lays down with equal positiveness, is found to have been pretty generally observed in practice, and certainly with a successful result in effect. The effect is, of course, quite independent of any power in the eye to determine, by scanning the column as executed, that these two dimensions are in agreement, but the question is whether the fact of such exact agreement does or does not tell although unrecognised,—has it anything to do with the value of an impression of satisfaction which we may receive without knowing the cause? Some will say, Of course not, and why entertain such a question? But this, as we shall say, is to fly in the face of some authorities which it were presumption utterly to disregard.

Let us take the case, again, of the diminution of the shaft of a column. It is proved to be both appropriate and agreeable that the shaft should taper, and the question of proportion comes in to arbitrate between the too little and too much. Experience also proves that the difference of the *poco piu* and the *poco meno* may be very delicate indeed. Here, again, the Greeks of the best age observed very exact proportions, and such as were capable of being expressed in simple terms. By what necessity, we inquire, and with what justification? It is not easy to understand how a satisfactory proportionate diminution for a column of a certain lower diameter and given height could be discovered otherwise than by critical comparison of executed works as more or less approximately successful, or by experiment on full-sized models; mere drawing on the flat, or even resort to small-sized models, would be deceptive or nugatory. Let us say that we make such a variety of comparisons or changes, and, at last, arrive in a particular case at a certain degree of diminution which approves itself as decisively pleasing. In such a proceeding there is something analogous to that of a musician who, with two similar monochords before him, should strike a note upon one with the full string while he went on striking the other succes-

sively as he gradually shortened it till he arrived at a note which should give his ear assurance of consonance. We know that if he now measured the two sounding strings their lengths would be found to have a perfectly exact and very simple proportion. But will this or anything like this be the case, otherwise than accidentally, with the compared upper and lower diameters of our satisfactorily tapering column? There is every reason to believe that the Greek architects of the best age thought so, and that, having this conviction, if they proceeded in the experimental fashion they would have tried, not dimensions at random, but one proportion of low numbers after another between the upper and lower diameters, in full confidence that somewhere among these the truly satisfactory difference must certainly be included.

Experiments thus conducted have at least a limit assigned to them, and yet would be sufficiently numerous to cover the required solution of the problem. But for moderns they involve a principle which would be felt as a serious inconvenience; the dimensions brought out would be liable to involve fractional parts not coincident with the usual subdivisions of the foot-rule. So we are thrown again upon the question, Is such nicety of any practical value? Some differences of dimension have to be adopted, and some reason is required for adopting one rather than another, but it occurs to us to ask, Can it be necessary to have regard in regulating the relative height of two stories to the difference between the whole or the half thickness of a brick? Let all dimensions be determined by the uniform divisions of a certain standard measure, and then you have facility of execution combined with the aptness of different parts to coincide with each other.

This seems to disperse all speculations as to the value of minutely accurate architectural proportion to the winds. And the difficulties of the theory seem to increase with increase of scale. We have seen that the heights of the horizontal divisions of the nave bays are regulated by very simple serial proportion, and the beauty of the result is recognised with enthusiastic admiration; yet how are we to understand that these more or less accurate halves, thirds, and sixths, of the total height can, in truth, contribute to the admirable impression on the spectator? When his station point is in front of a bay, the dimensions come under view unequally modified by perspective. The upper half is seen under an angle much more acute than the lower, and the reduction of visible proportion is accordingly greater; as he looks down the nave obliquely this difference varies with every bay; for it to vanish entirely it would be necessary for him to be at a greater distance than the dimensions and plan of the abbey allow him to retire to.

Such perspective differences, whether of proportions of plan or elevation, will always be greater as the position of the spectator is nearer at hand, and near at hand comparatively he must be in the most important cases. The plan of an apartment may be a double square, but, whether it be exactly or only very nearly so will hardly be appreciable by the keenest sight from any position within it. The vibrations which produce musical notes that are in consonance travel at the same rate and strike the auditory organs together; the rays of light from the lines which define the length and breadth of an apartment also travel at the same rate, but are neither parallel nor convergent under equal angles, and, so far, the analogy entirely fails us. Nor can it, apparently, be fairly argued that precise proportions may affect us delightfully, though the secret of the charm escapes us, inasmuch as this is the case with the harmony of colours. The analogy is direct between harmony of colour and harmonies of sound; the relation of the stimulative excitement to the sensitive organ is much the same in both cases, and that colour harmonies have hitherto defied endeavour to reduce them, like vocal harmonies, to numerical estimates, experimentally does not alter the case. The sense of harmony in a combination of colours may safely be assumed to prove that it is due to some certain, however unknown, proportionate relations among the particular tints harmonised, and which affect the sense proportionately; but when we are concerned with impressions produced by comparative height, length, and breadth of an apartment, the senses are affected by these in proportions which vary with every change of position, and which in no one case accurately correspond with the proportions of the dimensions as executed.

There is something more in favour, it would seem, of the importance of exact proportions when exteriors are in question,—such exteriors, at least, as are exposed to favourable view from a considerable distance. The further we remove the more do the projecting rays approach parallelism, and the more nearly are different equal parts seen under the same angle. When Lichfield or Salisbury Cathedral is seen from a distance, the spire tells for its true height relatively to the height of the nave or tower below. But the distant views which tend to reduce differences of perspective projection to zero, are far less important than those aspects presented to spectators in the very precincts when such differences are at their maximum.

Perspective modification from the more important points of view near at hand has the special claim to be taken into account by the architect in the first instance, and neglect of it has serious consequences. As we approach St. Peter's, the stupendous cupola, its special glory, retires out of sight, and whatever of grandeur the approach possesses is due to the prolonged portico, and the fine open space with the majestic obelisk and perpetual fountains which they embrace. Wren, at whatever cost in some other respects, raised his cupola upon a plain drum to such a height that it composes beautifully with campaniles and portico as we approach the western front. It is possible, of course, that while his design was controlled by this as a leading consideration, he regulated the height of his structure at least in consistency with some simple and accurately respected proportion. But the question which is here mooted and discussed,—on which information and instruction are honestly desiderated,—is how far care for regulation on this principle had any value.

Perhaps it may be asked why, considering the objections and complications which seem to beset any such assumption, is it worth while beginning to bring forward the subject for discussion at all? The answer to this, on the broad principle, is not that merely connoisseurs, but the world at large, of those who have displayed a general sensitiveness to the impressions of fine art, have always been wont to recognise, as if intuitively, that Music and Architecture are as naturally to be associated as Painting and Sculpture. And, beyond this, to come to something more practical, if not on

that account necessarily more cogent, it is certain that the Greeks did study architecture very deeply and thoughtfully, and that their best masters held firmly and consistently to the importance of carefully-selected and exactly-executed proportions. This is not only recorded historically, but is to be certified most absolutely by examination of the remains of their finest works: they adhered to the principle at the cost of extraordinary enhancement of labour, and applied it as seriously to numerous subordinate members, as well as to the more comprehensive dimensions.

These observations are intended to open and provoke consideration of an important subject rather than to make a pretence of deciding upon it.

It will be in the remembrance of many that it came up in discussion, a year or two since, in connexion with a theory that the dimensions of the Parthenon were so designed as to tell as proportionate when seen from one particular point of view. The predominant feeling at the time seemed to be that not very much was to be made of this.

But if the elucidation of the question, which involves many collateral considerations of interest, is to make any progress at all, it cannot but be advantageous to follow up,—what has been attempted here,—a fair statement of its difficulties, with some illustrations of the system which, as can be proved from their works, was, at least, well thought out and systematically brought into practice by some of the greatest geniuses in architecture the world has known.

EXPERIMENTAL RESEARCHES INTO THE STRENGTH OF BUILDING MATERIALS.

BY E. WYNDHAM TARN, M.A.



WHEN we examine the construction of ancient buildings we find but little trace of the designers possessing any accurate knowledge of the amount of strain that could be safely borne by the materials used; for example, the strength of the columns of the Parthenon is out of all proportion to the load they have to support. From recent experiments, the crushing strength of white marble has been shown to be about 800 tons per square foot, so that each of the columns of the Parthenon would require a load of 14,000 tons to crush it. The actual load on each column would probably never exceed 100 tons, or about $\frac{1}{14}$ of the crushing strength. Taking the safe load at one-tenth of the crushing weight, we find that the actual strength of each column was 14 times greater than the circumstances required, or the quantity of material used was so much more than was necessary for the work to be done. Had the Greek architects been acquainted with the strength of materials, it seems probable that they would not have wasted so much valuable material unnecessarily.* With our present knowledge, however, there is no excuse for modern architects employing heavy masses of stone in order to carry trifling loads, merely because they find that the Greeks were in the habit of doing so.

Coming down to more modern times, we find in the timber roofs of the Middle Ages the same exaggerated massiveness in the beams used in their construction. The rafters also were generally laid with their thinner side vertical, and broader side horizontal, thereby diminishing in a great degree their power of resisting transverse strain, and causing them to sag under the heavy covering of lead which they had to support: whereas if they had been placed the other way their strength would have been ample for the purpose. Heavy balks of timber were often placed across to form tie-beams, their scantling being sufficient to carry the floor of a warehouse for heavy goods.

The accurate determination of the strength

* Of course this is leaving the æsthetic of architecture entirely on one side. Probably the Greeks did not regard such a work as the Parthenon from an engineering point of view at all.—Ed.

of materials by experiments and scientific deductions therefrom is a subject that has attracted the attention of modern architects and engineers, and it may be interesting to give a kind of summary or general view of the results which have been obtained; and the methods by which the probable strength of beam, column, or other important structural feature can be determined before-hand.

When we come to compare the results given by different experimentalists on the strength of various kinds of wood, we find an amount of variation that seems almost unaccountable. To some extent this may have arisen from the specimens having been cut from trees at different stages of growth, and also from some having been better seasoned than others. The size of the specimens also has something to do with the discrepancies, as large pieces generally exhibit less strength in proportion than small ones do. To take the crushing strength of wood, that of well-seasoned English oak was found by Professor Eaton Hodgkinson to be $4\frac{1}{2}$ tons per square inch, the specimens being cylinders 1 in. diameter and 2 in. long; while Mr. Laslett's experiments at Woolwich on 1-in. cubes, the strength was only 3.56 tons, the ratio being that of 5 to 4. For that of well-seasoned red pine the former finds the crushing strength to be $3\frac{1}{2}$ tons, and the latter $3\frac{1}{4}$ tons for 1-in. cubes and only $2\frac{1}{2}$ tons for 4-in. cubes. For yellow pine the results obtained on small cubes by both experimentalists agree in giving $2\frac{1}{2}$ tons per inch, but with 4-in. cubes Mr. Laslett obtained less than $1\frac{1}{2}$ tons. With pitch-pine the crushing strength is nearly 3 tons per inch from both experimentalists, while with English elm the divergence is very great, Mr. Hodgkinson giving 5 tons per inch, and Mr. Laslett little more than $2\frac{1}{2}$ tons. For the former obtains a crushing strength of nearly $5\frac{1}{2}$ tons, while the latter obtains less than 3 tons. The experiments of George Rennie gave much lower results than the above, while those of Rondelet nearly agree with Mr. Laslett's experiments.

As regards the tensile strength of wood, its resistance to a force pulling it asunder in the direction of the fibres, there is also a considerable difference in the results obtained by independent experimentalists, that of Riga having been found by the late Prof. Barlow of Woolwich, to be nearly $5\frac{1}{2}$ tons per square inch, while Mr. Laslett gives it as less than 2 tons. For English oak the former gives the tensile strength of $4\frac{1}{2}$ tons per inch, while the latter found it to be only $3\frac{1}{2}$ tons. Barlow found the strength of pitch pine to be over $3\frac{1}{2}$ tons, but Laslett obtained little more than 2 tons per square inch. The former experimentalist gives the strength of teak as $6\frac{1}{2}$ tons per inch, and the latter makes it only $1\frac{1}{2}$ tons. The strength of English elm was found by Barlow to exceed 6 tons per inch, while Laslett makes it only $2\frac{1}{2}$ tons.

The Modulus of Elasticity represents the force required to pull a rod of any material to twice its original length (supposing such a thing to be possible), and is obtained by measuring the extension of the rod when a gradually increasing stretching force is applied to it, as long as the extension increases in the same ratio as the load applied. Suppose, then, that e is the extension of a rod of length l inches for a load w , and that $\frac{w}{e}$ is constant for

any given material, and represented by C , then that E is the value of w when $e=l$, then E represents the modulus of elasticity of the particular material, and we have

$$E = C \times l$$

The modulus of elasticity is therefore the measure of the resistance of the material to stretching force, and in the case of Riga fir was found by Barlow to be $E=1,159,600$ lb., while Laslett's experiments gave $E=3,009,680$ lb. For English oak $E=1,172,000$ lb. according to Barlow, and $E=1,545,600$ lb. according to Laslett. The former also gives $E=1,325,600$ lb. for pitch-pine, and the latter $E=3,020,940$ lb. For Red Canadian pine he has $E=1,840,000$ from Barlow's experiments, $E=2,355,600$ from those of Laslett, and $E=1,102,000$ lb. from those of Lieut. Dennison. The values of E were calcu-

lated by Barlow from the deflexions observed of beams loaded with a transverse load, while those of Laslett were from experiments on the direct tensile strain upon rods.

When a beam is supported at both ends in a horizontal position and loaded with a weight (W) in the middle, the effect of the load may be considered either as producing or tending to produce rupture, in which case W is called the breaking-weight of the beam; or it may be considered as producing a deflexion or bending of the beam in the middle. The strength of the beam, or its resistance to rupture, follows a very different law to that of its stiffness or resistance to bending. In the former case, if we put W for the breaking-weight in pounds, L the length of hearing in feet, B the breadth, and D the depth in inches, we find from theoretical investigations that for any given material,—

$$\frac{W.L}{B.D^2} = \text{a constant number, say } c.$$

And the value of *c* is determined by experiments on beams of various sizes. For example, in a beam of oak 7½ feet long, having B=4·28 in., and D=4·28 in., Buffon found the breaking weight to be 3,756 lb., so that

$$\frac{W.L}{B.D^2} = \frac{5,756 \times 7.5}{(4.28)^2} = 550 = c.$$

The value of *c* for English oak was found by Tredgold to be 694 when taken from a young tree, and 436 from an old tree. For old oak Fincham gives *c*=547, and Laslett finds *c*=705. The average of several other experiments on English oak gives *c*=773. For Riga fir Tredgold gives *c*=530, Laslett puts it at 525, and Fincham at 593. Tredgold's value of *c* for Norway fir is 792, Fincham's 451. For Christiana deal Tredgold gives *c*=686. The value of *c* for red pine is 483 according to Fincham, and 572 from the experiments of Laslett. The same authorities give 421 and 471 as the values of *c* for yellow pine, and 461 and 769 respectively for pitch-pine. The breaking-weight of beams of any of the above kinds of wood can, therefore, be calculated from the formula,—

$$W = c \frac{B.D^2}{L}$$

when the load is at the centre of the beam; and, if uniformly distributed over its length, the breaking-weight will be double the above. The permanent load on a beam should not exceed one-fifth or one-sixth of the breaking-weight.

We can also determine the scantling of a beam by fixing, from experiment, the amount of strain per square inch of section to which it would be safe to subject any of its fibres. Suppose *f* to represent the resistance or strain per square inch at a distance of 1 inch from the middle of the beam, then

$$f \propto \frac{D}{2}$$

the resistance at the top or bottom edge of the beam per square inch, and we have

$$W = f \times \frac{D}{2} \times \frac{B.D^2}{18L}$$

the load in the middle that will produce this strain. Putting ½ *f* × D = ½ ton, or 1,120 lb. for fir, we have for the safe-load in pounds,—

$$W = 62 \frac{B.D^2}{L}$$

The stiffness of a beam, or its resistance to bending, is a matter of more importance than its strength to resist a strain, as it is necessary that there should be no perceptible bending or deflexion of the beams when used in a building. Tredgold has laid down the rule that the deflexion of a beam at the middle should not exceed ¼ in. for every foot of its length, or ¼ in. in a beam 40 ft. long. Now the deflexion *δ* in inches of a beam with a load W in the middle is

$$\delta = 432 \frac{W.L^3}{E.B.D^3} \text{ or } W = \frac{E.B.D^3}{432L^3} \times \frac{\delta}{L}$$

where E is the "modulus of elasticity," and if $\delta = \frac{1}{40}$ then we have

$$W = \frac{E.B.D^3}{17,280L^3}$$

Taking E = 1,159,600 for fir, we find

$$W = 67 \frac{B.D^3}{L^3}$$

which is the load in the middle (in pounds) that will produce a deflexion of ¼ in. for every foot length of the beam: L being in feet, B and D in inches.

The strength of long pillars of wood is found to be very nearly proportional to the fourth power of the diameter and inversely as the square of the length; so that, if W is the breaking-weight in pounds, we have

$$\frac{W.L^2}{d^4} = \text{some constant } a.$$

The value of *a* is found by experiments; those of Hodgkinson giving *a*=24,542 for oak where the length was at least 30 diameters, while those of Lamandé gave *a*=16,000. For shorter pillars this formula gives too high a result, as the resistance to crushing has to be taken into consideration. The formula which Hodgkinson deduced for shorter pillars was,—

$$W = \frac{c.d^2}{1 + \frac{3c.L^2}{4a.d^2}}$$

where *c* is the crushing strength per square inch of the timber, if short pieces are taken. Taking the load in tons, we may put *a*=9 as the mean of the above, and *c*=4 tons as the crushing strength of oak. Then, for short oak pillars, we have the breaking-weight W in tons,

$$W = \frac{4d^2}{1 + \frac{L^2}{3d^2}}$$

l being in feet and *d* in inches.

Some oak pillars 2½ in. square and 4 ft. 3 in. long, were found by Lamandé to have an average strength of 5·6 tons; the above formula, however, gives 7·7 tons. Another pillar, 3·18 in. square, and the same length as the former, was broken with 16 tons, but by the formula the breaking-weight should be 25 tons. When larger pillars are tested to breaking, there is generally found a still greater falling off in the strength, so that in using these formulae it is necessary to make a considerable allowance, one-tenth of the calculated breaking-weight being the utmost permanent strain to which a pillar should be subjected.

Iron is used for constructional purposes in three distinct forms, namely, cast iron, wrought or malleable iron, and steel. The first of these is a comparatively modern invention, and it differs very much in character from the second, having a high resistance to crushing combined with a low tensile strength. It is, therefore, more suitable for columns, stanchions, or other supports, which have to sustain a heavy compressive load, the crushing strength of short pieces varying from 25 up to 50 tons per square inch, while the tensile strength is from 6 to 10 tons per square inch. The resistance to crushing is generally greater in specimens of high specific gravity than in those in which it is low: thus Hodgkinson found the resistance to be 33 tons in one whose specific gravity was 6·989, and 43½ tons in another having a specific gravity of 7·119. When the crushing strength is high, the tensile strength is often proportionally low; thus, iron in which the former was 27 tons, had the ratio of crushing to tensile strength as 4·76 to 1; in another, in which it was 30 tons, the ratio was 4·8 to 1; and another, whose crushing strength was 40 tons, had the ratio 5·6 to 1; and where it was 43 tons, the ratio was 6·73 to 1.

The amount of extension and compression which is produced in cast-iron bars by heavy strains is very small as compared with that in wrought iron; cast-bars, 10 ft. long and 1 in. square, enclosed in an iron frame to prevent them from bending, were compressed ·0187 in. by 2,065 lb., and similar bars extended ·019 in. by 2,117 lb.; 4,130 lb. produced a compression of ·0388 in.; and 4,234 lb. an extension of ·0397 in.; 6,194 lb. a compression of ·0598 in., and 6,352 lb. an extension of ·0623 in.; 8,239 lb. a compression of ·0788 in., and 8,469 lb. an extension of ·0871 in. From which it appears that with a strain of less than 3½ tons per square inch the resistances to com-

pression and extension are nearly equal in cast iron. The total amount that cast-iron bars were stretched before fracture ensued varied from ⅓ to ⅔ of the length of the bar. The ratio of load to extension, as long as the latter increased in proportion to the former, or *w*:*e*, was found in Low Moor iron to be 110,301; putting *e* equal to 120 in., or the length of the bar, then *w*=*E*=the "modulus of elasticity," or *E*=110,301 × 120 = 13,236,120 lb. For Blaenavon iron, *w*:*e* was 110,651, or *E*=13,278,110 lb. In Gartsherrie iron, *w*:*e* was 110,251, and *E*=13,230,120 lb. In other Scotch irons, *w*:*e* was 111,109, and *E*=13,333,080 lb.

The experiments of Hodgkinson on wrought-iron bars give a tensile strength of nearly 24 tons per square inch. Some qualities of iron will stretch more than others under the same amount of strain. Taking bars 10 ft. long and 1 in. square, one was found to stretch ·022 in. with 2½ tons, the same extension being produced in another by 2½ tons; 4½ tons produced an extension of ·045 in. in the former, and 4½ tons stretched the latter ·043 in.; 9½ tons stretched the first bar ·092 in., and 9 tons stretched the second one ·087 in.; 12 tons produced an extension of ·122 in. in the first, and 11½ tons an extension of ·112 in. in the second; 14½ tons stretched the first bar ·283 in., and 13½ tons stretched the second one ·205 in., showing that the amount of extension is very nearly proportional to the load up to one-half the breaking-weight, beyond which it increased more rapidly. In the first case, *w*:*e* is 232,223, therefore *E*=232,223 × 120 = 27,866,760 lb.; in the second *w*:*e* is 230,760, and we have *E*=27,691,200 lb. The permanent set or elongation after the load is removed is an important point to be noticed in these experiments. In the first bar this was ·0004 in. with a strain of 4½ tons, ·0006 in. with 7½ tons, ·0008 in. with 8½, but with 9½ tons it amounted to ·0015 in., or nearly double that produced by 8½ tons. From this we gather that the iron might safely be strained with one-third its breaking-weight without injury to its elasticity. In the second bar the "set" was ·0006 in. with 2½ tons, ·0007 in. with 5½ tons, ·0013 in. with 8 tons, and ·0027 in. with 9 tons; so that this iron could not safely be strained with more than one-fourth its breaking-weight. One of these bars stretched ⅓ of its length before breaking.

Let us now consider the bearing that the above experiments have upon the proper form of iron beams subjected to transverse strains. It is well known that when a beam is supported in a horizontal position and loaded in the middle, a certain amount of deflexion is produced, so that the upper portion of the beam is compressed while the lower one is in a state of tension. It was argued by Hodgkinson that because the ultimate crushing strength of cast iron was about six times as great as the tensile strength, the parts in tension should be made six times the size of those in compression in order to equalise the strength of the beam and to utilise the metal to the greatest advantage. He also showed by numerous experiments with beams of equal depth and sectional area, that those in which the bottom flange was nearly six times the sectional area of the top flange required a greater weight to break them than those in which the flanges were more nearly equal. This form of beam, having the section like an inverted I, was consequently adopted for several years, the formula for its breaking-weight in tons being

$$W = \frac{2.166 a.D}{L}$$

where *a* is the sectional area of the bottom flange at the centre, and D the depth in inches, L being the bearing in feet.

It has been argued by other authorities that as we find by experiment the resistances to extension and compression to be nearly equal in cast iron, so long as the elasticity remains practically uninjured, that is to say, up to a strain of 3 tons per square inch; and the proper form of beam is the one in which the top and bottom flanges are nearly equal, having, as it is called, an I section. For in practice we do not allow the load to approach anything near

to the breaking-weight, and it should never be allowed to produce any injury to the elasticity of the metal. If we call f the resistance per square inch of section at a distance of 1 in. from the centre of the beam, B the breadth of the flanges in inches, b their breadth less the thickness of the vertical part of the web, D the total depth, d that between the flanges, L the length in feet, then the weight, W , which produces a given strain per square inch at top and bottom is

$$W = \frac{f}{36L} (B \cdot D^2 - b \cdot d^2)$$

If we put $f \times \frac{D}{2} = 3$ tons, as the strain at top and bottom which it is safe to put on the beam, then $f = \frac{6}{D}$, and

$$W = \frac{6 \cdot D^2 - b \cdot d^2}{6 \cdot D \cdot L}, \text{ in tons.}$$

A beam of this form, having $D = 5 \cdot 125$, $d = 4 \cdot 315$, $B = 1 \cdot 76$, $b = 1 \cdot 47$, $L = 4 \cdot 5$, was broken with a load at the centre of nearly 3 tons; the above formula gives $W = 77$ ton, or about one-fourth the breaking-weight, as the safe load that might be used. If we apply Hodgkinson's formula to a beam of the same sectional area and depth, but having two-thirds of the area in the bottom flange, we find 4.63 tons is the load that would produce fracture; but in this case, as the whole is supposed to be in tension, we ought not to use more than one-sixth of the breaking-weight for a safe load, which will, therefore, make the two beams equally strong for practical purposes. The difficulty of making perfect castings in beams having one part so much thicker than the others has led to the use of cast-iron beams having the flanges nearly equal.

The resistance to compression of wrought-iron bars, 10 ft. long and 1 in. square, which were kept from bending by being held in an iron frame, has been determined by several experiments. The average compression of two such bars was .0275 in. with a load of 2½ tons; .0495 in. with 4½ tons; .07 in. with 6½ tons; .0925 in. with 8½ tons; and .1035 in. with 9 tons. Comparing these results with those previously given for tensile strain we find that the resistance to extension is to that to compression as 6 : 5, as long as the elasticity remains uninjured, although the ultimate resistance to extension is to the ultimate resistance to compression nearly as 3 : 2. As the ratio of 6 : 5 does not materially differ from one of equality, we may make the top and bottom flanges equal in a beam of I section, and the same formula can be used as was given above for cast-iron beams, namely,

$$W = \frac{f}{36L} (B \cdot D^2 - b \cdot d^2)$$

With wrought iron, however, we may take $f \times \frac{D}{2} = 4$ tons as the safe strain at top and bottom, or $f = \frac{8}{D}$; therefore

$$W = \frac{8 \cdot D^2 - b \cdot d^2}{9 \cdot D \cdot L},$$

as the safe load at the middle in tons.

The tensile strength of iron plates appears to be less than that of bars, experiments by Kirkaldy on boiler-plate made by Krupp at Essen giving 26,190 lb. per square inch as the tensile strain when the elasticity begins to be impaired, and 27,477 lb. for the harder Yorkshire iron or about 9 per cent. more. The ultimate stress, however, of the Essen plates was 48,028 lb., while that of the Yorkshire plates was only 43,515 lb., or 5 per cent. less. The ultimate strength was, therefore, 21.8 and 20.3 tons, or an average of 21 tons, which is one-eighth less than the strength of bars.

In order to determine the laws which regulated the strength of long cast-iron columns, numerous experiments were made by Hodgkinson. To determine the power n of the diameter according to which the strength varies, we have 11,204 lb. as the breaking-weight of a pillar 10 ft. long and 1.53 in. diameter, while for one of the same length, but with 2.511 in. diameter,

the breaking-weight was 63,499 lb. Now, $2 \cdot 511 : 1 \cdot 53 :: 1 \cdot 64 : 1$; therefore

$$1^n : 1 \cdot 64^n :: 11,204 : 63,499, \text{ or } 1 \cdot 64^n = 5 \cdot 67.$$

Taking the logarithms of both sides, we have

$$n = \frac{\log. 5 \cdot 67}{\log. 1 \cdot 64} = 3 \cdot 5, \text{ very nearly.}$$

To find the power x of the length according to which the strength varies inversely, a comparison of ten pillars 2½ in. diameter, with lengths of 10 ft. and 7 ft. 6 in., gives $x = 1 \cdot 63$. Therefore the breaking-weight w is

$$w = m \frac{D^{3 \cdot 5}}{L^{1 \cdot 63}}$$

And to find the value of m , experiments give the strength of a pillar 10 ft. long and 1 in. diameter as 2,223 lb., which, multiplied by $10^{1 \cdot 63}$ gives that of a pillar 1 ft. long, namely, 94,858 lb., or 42.247 tons, for the value of m . Therefore the strength of a hollow pillar in which D is the external and d the internal diameter is

$$w = 42 \cdot 247 \frac{D^{3 \cdot 5} - d^{3 \cdot 5}}{L^{1 \cdot 63}}, \text{ in tons.}$$

For a solid pillar, $d = 0$. This formula only applies to columns whose length is at least thirty times the diameter, but gives too high a result for shorter ones; for, in long pillars, the resistance to crushing is not considered, while in short ones this is of more importance. If, then, w is the breaking-weight, as obtained from the above formula, and c is the crushing strength per square inch of a short piece of cast iron, a the area of section, we have for the correct breaking-weight of a short pillar,—

$$W = \frac{w \cdot c \cdot a}{w + \frac{2}{3} c \cdot a}$$

The value of c varies from 25 tons up to 49 tons, the mean being about 37 tons, so that in a solid round pillar we shall have $c \cdot a = 29 \cdot D^2$, which gives

$$W = \frac{29 \cdot D^2}{1 + 514 \frac{L^{1 \cdot 63}}{D^{3 \cdot 5}}}$$

$D^{1 \cdot 63}$ being the same as the square-root of the cube of D .

The law of the strength of long pillars of wrought iron appears to be somewhat different to that of cast, being

$$w = a \frac{D^{2 \cdot 55}}{L^2}$$

and to determine the value of the constant a , we find that a pillar, 7 ft. 6½ in. long, and 1.02 in. diameter, broke with 5,280 lb., which gives $a = 281,475$; and another, whose length was 5.0423 ft., and diameter 1.03 in., broke with 12,990 lb., giving $a = 307,850$; the mean of the two values of a being 294,662 if w is in pounds, and 131.5 if in tons. The strength of short pillars of wrought iron is found in the same way as those of cast iron, except that the value of c will be 16 tons instead of 37, as in the latter.

The effect of great heat upon iron is to reduce its strength very appreciably, iron losing half its strength when heated to redness, as is often the case when a building in which it is used takes fire. Consequently it should always be protected by some non-conducting and non-combustible material.

Steel is a material which is beginning to supersede both cast and wrought iron for many constructional purposes. The tensile strength of Swedish steel was found by Kirkaldy to average 25½ tons per square inch for elastic stress, and 40 tons for ultimate stress. Taking the average of a large number of specimens of English steel, the ultimate tensile strength was 44 tons for bars, and 38½ tons for plates per square inch.

The compressive strength of short pieces of Swedish steel was found to average 25 tons for elastic stress and 70 tons for ultimate stress per square inch; while for pieces whose length was four diameters the ultimate stress averaged only 37 tons per square inch. From which it appears that when steel beams are strained so as not to impair their elasticity the resistances to compression and extension are nearly equal, so that the same formula as was

used for iron beams will apply to steel beam of I section having equal flanges, namely,

$$W = \frac{f}{36L} (B \cdot D^2 - b \cdot d^2)$$

Putting $f \times \frac{D}{2} = 12$ tons, or rather less than

half the elastic stress, we have $f = \frac{24}{D}$

$$\therefore W = \frac{2 \cdot B \cdot D^2 - b \cdot d^2}{3 \cdot D \cdot L}$$

is the safe load on a steel beam in tons.

For long pillars of steel, Hodgkinson gives the breaking-weight as

$$W = a \frac{D^4}{L^2}$$

and as a pillar .87 in. in diameter, and 2.5 ft. long broke with 26,059 lb., we get $a = 281,863$ lb. or 126 tons. For short pillars the same rules will apply as in the case of short iron ones, only the value of c must be taken a 70 tons.

The modulus of elasticity (E) for steel can be found by experiments on its extension under tensile strain. Kirkaldy's experiments on unannealed plates of Swedish steel, 100 in. long, give $w = 335,518$, where w is the load in pounds producing the extension e in inches so that $w = E$ when $e = 100$, or $E = 33,551,800$. The ultimate tensile strength, however, averaged only 23 tons per square inch. The same steel, when annealed, gives $E = 32,014,800$ the tensile strength being only 21.3 tons.

The resistance of various building stones to crushing has been tested by numerous experiments, and it is generally found that the strength is greater in those of a high specific gravity than in the lighter stones. The Cornish granite, whose specific gravity is 2.6 has a crushing strength of 2.9 tons per inch and that of Aberdeen, with a specific gravity of 2.7, has a crushing strength of from 4 to 5 tons. The "grits" of Yorkshire are strong and heavy stones, the crushing strength being from 2 to 3 tons, and the specific gravity about 2.4. Red Mansfield stone, whose specific gravity is 2.38, has a crushing strength of 3 tons per square inch. Portland stone, with a specific gravity of 2.2, has a crushing strength of 1½ ton; while that of Bath stone, whose specific gravity is 2.0, is only ¾ ton per inch.

Very few experiments have been made either on the cohesive strength of stone when subjected to a pulling stress, or upon their strength when used as beams and strained transversely, as in lintels, brackets, corbels, steps, landings, &c. This is the direction in which all stones offer the least resistance; thus Chilmark limestone, which has a crushing strength of 2½ tons per inch, has a cohesive strength of only 500 lb. when subjected to tensile strain, and the red Mansfield, which requires 3½ tons per inch to crush it, is torn asunder by a tensile strain of only ½ ton per square inch. It is this low cohesive strength that makes stone very liable to crack across when subjected to a transverse strain.

The transverse strength of red Mansfield stone, when used as a beam with a load at the middle, has been determined by Kirkaldy's testing-machine. A piece, 1 ft. long, 5.7 in. broad, and 5.97 in. deep, broke with 110.4 cwt. at the middle; so that if we assume the formula

$$W = S \frac{B \cdot D^2}{L}$$

to hold good in the case of stone, then we find $S = 544$. Another specimen, whose breadth was 5.91 in., and depth 5.9 in., broke with 93.6 cwt., which gives $S = 455$; and another whose breadth was 5.66, and depth 6 in., broke with 93 cwt., which gives $S = 456$. The average value from these three specimens is $S = 485$, when W is the breaking-weight at the centre in cwt. In Riga fir we find $S = 5$, or ten times as much.

Similar experiments were tried on beams of Carrara marble 6 in. square, two kinds of marble being used, one of a bluish tint, and the other white. With a span of 4 ft. the bluish broke with 447 cwt., and the white with 37½ cwt., giving $S = 83$, and $S = 106$ respectively. With a span of 3 ft., the blue broke

with 67 cwt., and the white with 80 cwt., giving $S=9.44$ and $S=1.11$. With a span of 2 ft. the blue broke with 99.3 cwt., and the white with 117.3 cwt., from which we get $S=92$ and $S=109$. The mean value for blue marble is $S=898$, and for white $S=1087$. The crushing strength of the blue was $5\frac{1}{2}$ tons per square inch, and of the white 5 tons, where the height did not exceed four times the diameter.

Beams of Yorkshire paving stone, 10 in. span, 1 in. deep, and $2\frac{1}{2}$ in. wide, were broken by Mr. G. Rennie with 3 cwt. at the middle, from which we get $S=1$. A similar beam of Caithness stone broke with 7.65 cwt., giving $S=2.55$. Stock bricks laid horizontally on two supports, 8 in. apart, and having a depth of $2\frac{1}{2}$ in., and breadth 4 in., broke with 4 cwt. at the centre, which gives $S=107$. The crushing strength of ordinary brick is from 5 to 7 cwt. per square inch.

The cohesive strength of the best Portland cement is found to increase with the length of time it has been mixed; neat cement weighing 123 lb. per bushel being found by Mr. Henry Reid to have a cohesion of 3.7 cwt. per square inch at the end of a month and of $5\frac{1}{2}$ cwt. at the end of two years. If mixed with an equal quantity of sand, the strength at the end of a month was 1.8 cwt., and 3.13 cwt. at the end of two years. The crushing strength also increases with age, bricks made of neat cement being crushed with 1.7 ton per square inch at the end of three months, 2.4 tons at the end of six months, and with three tons at the end of nine months. The strength of cement also depends very much on its weight per bushel, that with a weight of 106 lb. having little more than half the cohesive strength of that which weighs 130 lb. to the bushel, the light cement setting more rapidly than the heavy. Cement which weighs about 1 cwt. per bushel is generally preferred for building purposes.

The late Professor Rankine gave the following ratios of ultimate to working stress as usually adopted in different materials: steel and wrought iron, 3 to 1; cast iron, 3 or 4 to 1; timber, 10 to 1; stone and brick, 8 to 1. Having found the breaking-weight in any case, divide by the numbers given above and you have the safe-load to be laid on the material.

NOTES.

THE meeting in Albermarle-street, on Monday last, of the general committee and subscribers for the promotion of the proposed British School of Archaeology at Athens, marks, we hope, an epoch in the history of modern English archaeological study. As we have before mentioned, the Greek Government have presented a site for the proposed building, — a site, on the southern slope of Mount Lycabettus, commanding a view of Mount Hymettus in front and of the Bay of Phaleron and the Island of Ægina on the right, names in themselves enough to stir the imagination and vivify the ardour of students eager, in Herbert's words, to

"Copy fair what time hath blurr'd,"

and penetrate further into the remains, and through them into the spirit, of Greek art and Greek history. The funds subscribed or promised only amount as yet, however, to something over 4,000l. This will suffice, however, to provide the building required for the school, for which Mr. Penrose, who unlocked for us the most interesting secrets of the Parthenon architecture, is appropriately to be the architect. What the committee now want, as the Chairman (the Bishop of Durham) informed the meeting was a regular income of 600l. a year, or a capital sum of 15,000l., for the establishment and support of the school. Ought it, he asked, to be very difficult to collect that sum? We hope not; it seems to us extraordinary and discreditable that there should be any doubt of it, in a country containing so much culture and so much wealth at once as this. Yet when we see the first Greek archaeologist among us giving lectures on Greek inscriptions, to audiences which may

pretty nearly be counted on the fingers, the prospect from English enthusiasm, apart from that of the small band of "those who know," does not seem very bright.

"WHY should we raise subscriptions for the study of Greek archaeology?" Well, to put it briefly, because among the Greeks the union of beautiful life with bright and beautiful art was more complete and full than with any other people who have left a record on the globe; because their architecture is the foundation of all architecture which has been evolved since; their literature the highest and purest in form which has been achieved; their language the most finished and artistic form in which thought has been crystallised into speech; their sculpture the most noble and complete that has ever existed; their decorative art presenting the highest combination of execution with intellectual perception of the fitness of things. These be reasons enough, surely, for saving all that can be saved from decay, for unearthing what has never yet seen the light, for learning all we can know further about a people and a period so full of interest to all who do not, like Sir Andrew Agnecheek, regard life as consisting of eating and drinking. Others at least think so, if we do not. The announcement of the formation of an English school has been received, we are assured, with great interest and enthusiasm in Athens and throughout Greece, and it was remarked by the Chairman that when he wanted his difficulties solved in any question of classical archaeology he had to go, not to any English source, but to a monograph in German, or French, or sometimes Italian. When a new "find" turns up anywhere on Grecian soil, it is from the archaeological schools of Germany, France, or America, established in Athens, that delegates go to investigate, measure, and produce materials for restoration and for monographs. Let us hope it will not be much longer thus, and that our own hand of students at Athens will ere long be actively engaged in this competition of research and intellect on the elucidation of so fascinating a subject.

THE objects of the school were thus stated in a resolution moved by Mr. C. T. Newton at the meeting:—

1. The first aim of the school shall be to promote the study of Greek archaeology in all its departments. Among these shall be (1) the study of Greek art and architecture in their remains of every period; (2) the study of inscriptions; (3) the exploration of ancient sites; (4) the tracing of ancient roads and routes of traffic.
2. Besides being a school of archaeology, it shall be also, in the most comprehensive sense, a school of classical studies. Every period of the Greek language and literature, from the earliest age to the present day, shall be considered as coming within the province of the school.
3. The school shall be under the care of a director, whose primary duties shall be (1) to guide the studies of the members, and to exercise a general supervision over the researches undertaken by them; (2) to report at least once a year on the work of the school, to record from time to time for the information of scholars at home any important discoveries which may come to his knowledge, and to edit any publications of the school.
4. It shall further be the duty of the director to afford information and advice to all properly accredited British travellers in Greece who may apply to him."

In advertising to the amount of archaeological work still to be done, Professor Newton remarked that there was still room for many more workers. "One single ancient city would take years to explore thoroughly. It would be a regret to him for the rest of his life that he had been called away from Cnidus after considerable exploration, but without having explored a tenth part of the city. At Halicarnassus, again, he had made what he might call a house-to-house visitation to see where there might be any inscriptions, and yet since he had left inscriptions of the highest value had been discovered."

THE Industrial Remuneration Conference, which has just been held, was chiefly remarkable for the flood of contradictory statements and inconsistent proposals, and has, we suspect, left matters very much in the same

position as they were before. The fact is that real usefulness in such subjects as these is not to be attained by bringing together the crude and undigested theories of every enthusiastic dreamer, but rather by carefully getting together the retrospective conditions of past years from which practical results may be deduced. As an instance of such, a paper recently read before the Manchester Statistical Society by Mr. Montgomery is worth a ton of theories, for it proves beyond doubt that the average wages of the working classes in Manchester have increased at least 40 per cent. in fifty years, the increase showing most markedly in the case of women and boys, though it was in varying proportions through all the trades in the following scale:—

Trade.	Increase per cent.	Trade.	Increase per cent.
Spinning	63	Mechanical Engineer- ing	18
Weaving	33	Glass Making	40
Dyeing	16	Silk Trade	37
Calico Printing	48	Building Trades	46
Calendering	47	Tailoring	53
Bleaching	32	Police	46

Not only have the wages increased, but the purchasing power of the money has likewise increased, at about the rate of 18 per cent. If persons would study dispassionately the condition of industrial and social matters in "the good old times," they would probably modify the frantic denunciations which appear to find such favour at the present day.

AMONG the papers which were at least suggestive in matter and elevated in tone, may be mentioned that by Professor Beesley. His views, stated on behalf of the Positivist Society, may be Utopian as regarded our present position, but it is a Utopianism to which it is to be hoped every generation will come a step nearer as time goes on. He has no ready-made panacea for distributing wealth equally. He looks to the progress of public opinion and of religion (in the widest sense of the word) in developing the feeling which, without actually interfering between the capitalist and his gains when made by his own energy and ability, will regard those gains more and more as a fund held in trust to be exercised for the general good of society. There have already been individuals who rose to that height; Professor Beesley hopes that what is now the exception may some day be the rule. It is a high aspiration: but "aim high and you strike high." Mr. Sedley Taylor advocated strongly the principle of co-operation of the workman in the profits of the employer, as we have often done; but some troublesome facts were brought forward on the other side. It was said that in some cases the employes had been very willing to receive a percentage on their wages when times were prosperous, but objected to a percentage the other way when times were bad: "Heads I win, tails you lose," in fact. Possibly the employes in such an instance were not taken sufficiently into the confidence of the firm. Some wonderful things were to be heard at the Conference. We predicted that a good deal of nonsense would be talked, but hardly expected it to go so far as to have a speaker getting up and gravely observing that "all private property in things must be done away with!"

FIGURES, we find from the Annual Report of Captain Shaw, are on the increase in London. It is hard to see what else to expect. There are now rather more than six fires per day in the metropolis. The population of Inner London, which in 1881 was 3,815,000 persons, increased by 17.2 per cent. between 1871 and 1881. If this rate of increase has been continued, the numbers cannot now be less than 4,080,000 individuals; so that 2,000 fires in a year would only be at the rate of one fire-causing piece of carelessness among 2,000 persons in a year. Considering how easy are the oversights which, even in the most careful families, may wrap a house in flames, this is not a high fire-rate. It is only at the rate of one fire in 260 houses in a year. Apart from the growth of actual numbers of population and of houses, there are other causes that tend, from time to time, to increase or to diminish the danger of accident

from fire. It will be beyond the remembrance of most of our readers to rank among the latter causes the disuse of thatch. But we can well remember, years ago, the alarm caused by the outbreak of fire in a country town, where most of the houses were thatched. The effect of the disuse of wood in house-building, again, which must long have been appreciable, is now possibly reversed. There is now much more visible wood in our house-fronts than was the case twenty years ago. Then the experience and prompt courage of the Fire Brigade are constantly increasing. The facility of warming supplied by telegraphic appliances is of the utmost value when safety is a question of seconds; and both the steam fire-engines, and the hydrants that yield water for their supply, are steadily undergoing improvement, decade after decade. On the other hand, the increasing size of warehouses tends to make a fire, when it occurs, more destructive to property; and it is said that insurance rates are rising, not alone in London, but also in Manchester, and elsewhere. The question is now to the fore, whether it is not desirable to organise a special branch of the Fire Brigade for the daily watch of London. A cost of 500*l.* a week, which this would require, would probably be an economical and remunerative outlay.

RECENT advices from Pittsburg, in the United States, inform us that by a new arrangement the use of coal is about to be, — indeed, has been, — superseded by the utilisation of the natural coal-gas with which the earth in that region abounds. A severe competition of long duration has set the iron and steel makers on the *qui vive*, and they have for a long time past turned their attention to the use of gas, and now at last their efforts are crowned with success. The gas is obtained by digging artesian wells deep enough to tap the stratum, and tubes convey it from these wells to the furnaces. In one case reported the tube is twenty miles long. It is not only cheaper than the cheapest bituminous coal, but in large iron works saves the labour of 100 men. The supply is believed to be practically inexhaustible. Its effect upon our own iron and steel manufacture in England will probably be to still further reduce prices, which are now too low to yield any but the barest profit.

IT was hardly to be expected that the railway companies should passively allow the attacks of the various trade associations upon their Bills to pass unnoticed, and we have now heard a little of the other side of the question. The *Times* and the *Standard* have published several letters condemning the Bills, and, through the medium of the first-named journal, the companies have made their reply. The letter published on January 31 from Mr. Oakley, the able secretary of the Railway Companies' Association, is an emphatic denial of the traders' allegation that the companies have combined to raise rates all round, thus aggravating the already depressed commerce of the country. He contends that their motives and objects are entirely misunderstood, and says, — "The companies disclaim emphatically any intention of acting adversely to the general interests of trade and agriculture. They recognise that their own well-being is dependent upon the national prosperity, and they claim from Parliament and from their opponents a counter-recognition of the public advantage of settling upon a fair and equitable basis the conditions upon which the railway service of the country may be best conducted." He deals with the objections to the Bills under four heads, viz. — 1. That the companies are seeking a general increase of their rates. 2. That the proposed classification is unjust to traders. 3. That preferential rates for foreign produce will be legalised and extended. 4. That the right of the companies to charge "station terminals" will be recognised. These are all replied to *seriatim*, and forcible arguments used in favour of the measures. We have previously remarked upon the immense amount of labour which must have been involved in the compilation of the Bills. Mr.

Oakley also makes a brief reference to this, and pleads for a fair and full discussion in Parliament of all the points involved.

WE hear on good authority that Lord Bramwell will, early in the session, introduce the Code of Arbitration Law Bill which was read a first time last session. Various changes and alterations have been made in this Bill since last year, and it is much to be hoped it may become law before the expiration of the present year. So much of the litigation in connexion with buildings takes the form of arbitration, that an Act such as this will be of value to a large number of our readers. We hope to comment on the Bill as soon as it is laid on the table of the House of Lords.

THE recent decision by Mr. Justice Kay in the case of Lord Jersey v. The Uxbridge Rural Sanitary Authority is one that should be taken to heart by other similar public bodies. It appears that Lord Jersey complained that the Uxbridge authorities were polluting Osterley stream and lake, by means of a sewer which drained a considerable number of houses and communicated directly with the stream, the property on the banks of which belong to his lordship. Associated in the action with the Sanitary Authority was a Mr. Woodward, who had made a communication between his house and the sewer, but as this had been done before the commencement of the action, it was dismissed, as against him, with costs. Not so, however, in the case of the Sanitary Authority, for the Judge has granted a perpetual injunction (with costs), restraining them from making further connexions with the sewer. All houses at present unconnected must remain so, and no connexion can be made with the existing sewer from houses now being built or which may hereafter be built, so long as the sewage continues to pollute the Osterley stream and lake. Although this decision must act as a considerable deadlock to those who have house property in this position, and will, at all events, check house-building for a time, it cannot but be regarded as a wholesome proceeding if it tends, as it must do, to force on the development of a general system of drainage.

AT the annual meeting of the Institution of Mechanical Engineers a paper, by Mr. George Richards, of Manchester, on wood-working machinery, was read on the second day (Friday, January 30th) of the meeting, being, in fact, the last paper dealt with. In consequence of the late hour, the discussion was postponed until the next meeting. A large number of specimens were, however, exhibited, showing the work the machines described in the paper would turn out. Some shavings several feet in length, and some as much as 10 in. and 12 in. wide, taken off by the scraping-machine described, were especially noticeable. Specimens representing parts of founders' patterns and other articles of a like nature were likewise shown. Some of these were of a very intricate description, and it was difficult at first to believe, — what, however, was an undoubted fact, — that they were entirely formed by machine tools without being finished by hand. The usefulness of the saw-setting apparatus was well illustrated by the beautiful surface of the specimens cut, which had the appearance of being highly finished by hand.

THE first number of the *Manx Note Book*, published at Douglas, Isle of Man, should not go unnoticed. These local publications do good service by preserving local traditions and facts, which often prove of great value in later years. The Isle of Man is especially a place where such a journal as this is of value, retaining as it does so many marked and unique characteristics of a semi-independence which has lasted for centuries. Already traces are visible of a nearer approach to English systems, for the insular Courts have now been amalgamated into a High Court of Justice, with a Common Law and a Chancery Division, as in England. Something more picturesque and characteristic of this sea-girt island might, indeed, have been found for a frontispiece than the old chapel in the Market-place,

Douglas, as unsightly a building as can well be seen. Castle Rushen, or the ruins of the cathedral at Peel, would have been a better beginning for this journal than a building in the worst style of the eighteenth century.

THE series of engravings illustrative of eighteenth-century art, to be seen at the rooms of the Fine Art Society, is of great interest, both historical and artistic. Some of the engravings, as engravings, are exquisite; among these may be noticed especially the first in the catalogue, Watteau's "Bosquet de Bacchus," engraved by Cochin. The scenes by Watteau, Lancret, Saint Aubin, Lavreince, and others are almost pathetically interesting in their portrayal of the life of artificial yet graceful luxury which belonged to the period. Fragonard's figure, again, of a young girl engraving a name on the trunk of a tree, "Le Chiffre d'Amour" (43), shows an exquisite combination of Nature and Art in this artificially dressed, but not by any means artificial, young personage. Fragonard's more *risqué* subjects, of which there were plenty and very clever, are not represented. Chardin strikes a more serious note than the rest in such things as "Etude de Dessen" (23) and others, which are more distinctly governed by an artistic ideal. The engraving of the "Coronnement de Voltaire," by Gaucher, after Moreau, is a masterpiece of minute engraving, but the head of Voltaire wants character, and is not thin enough for representation of the "inspired skelton."

WE understand that the Council of the Royal Institute of British Architects intend to recommend that the Gold Medal for this year should be given to Dr. Schliehmann in recognition of his remarkable archaeological work. This is an award about which we may presume there will be absolutely no difference of opinion. It may be thought by some that it comes rather late in the day; but the medal is only available for awards to foreigners once in three years, and the two last foreign recipients, the Marquis de Vogüé and Baron von Ferstel, had both prior claims to Dr. Schliehmann in point of time; besides that their distinction was gained in work more distinctly and specially architectural.

LETTER FROM PARIS.

THE artistic and literary world of France has suffered cruel losses of late. The record of death closed our last letter, and it is with the record of a death not less unexpected that we commence this one. Just after Bastien-Lepage, the earnest and picturesque painter, we have lost Idrac, the nervous and talented sculptor; — both dead in the prime of life and in the possession of powers which had given promise of still more brilliant future.

Jean Idrac, son-in-law of M. Ballu, the eminent architect, was the son of a poor mason of Tonlouse. A pupil of MM. Cavalier, Falguière, and Guillaume, he gained the *prix de Rome* in 1873. Two statues, "L'Amour piqué," and "Salambo," had placed him quickly in the foremost rank, and death came upon him, at the age of thirty-nine, at the moment when he had finished, for the Hôtel de Ville, the equestrian statue of Étienne Marcel, of which we spoke in our letter of January 3rd.

After Idrac, we have lost Edmund About, a firm and delicate genius who unhappily got astray in the field of political conflict. We speak here only of his success as a romance-writer and a art-critic. His last will shortly be executed by the sculptor Crank, who is at present engaged in completing, for the Rue de Rivoli, the monument of Admiral Coligny.

Another well-known sculptor, M. Franceschi has nearly completed the bust of a gifted man of letters whose tragic end in a distant country painfully impressed the Parisian public last year. We allude to Commandant Henry Rivière, killed at Tonkin; who, as far as his leisure time allowed, was a distinguished *littérateur*. The monument erected to his memory in the cemetery of Montmartre, by the "Société des Gens de Lettres," was inaugurated last week.

This obituary subject leads us to mention also the exhibition of the works of Ev. Gonzales, a young artist also taken away prematurely in the height of her talent. Mme

Gouzaïe, whose works have been collected in "Salons de la Vie moderne," Place St. Georges, was successively the pupil of Chaplin and of Manet. Among the eighty-eight pastels and oil-paintings there exhibited are some very remarkable works, revealing in piquant fashion the strife between the influence of the easy and rather affected execution of her first master, and the strange tones and often intentional exaggerations of the second; but all corrected by her own strongly-marked individual taste.

We are just entering on the period of private gallery exhibitions, which in Paris succeed each other almost uninterruptedly till the opening of the *Salon*. The Artistic and Literary Club of the Rue Volney opened first. Some works of great merit are there, drowned among a crowd of mediocrities. This exhibition, which closed on the 4th, will be, we believe, advantageously replaced, from the artistic point of view, by that of the "Union Artistique" (Place Vendôme), known under the eccentric name of the "Cercle des Mirilitons," and which will remain open till March 9th. We will speak again of this exhibition, which constitutes every year an event in the world of higher aestheticism. The same may be said of the exhibition of the Society of French Water-Colour Artists, which opened on the 2nd, in the Galerie Georges Petit, Rue de Sèze. The names of such exhibitors as Eugène Lami, Eugène Isabey, Heilbuth, Le Blanc, John Lewis Brown, Cazin, Vibert, Detaille, and De Neuville, gave great attraction to the opening *soirée*, which was a gathering of the whole fashionable, literary, and artistic world of Paris, and where even politicians met without distinction of parties.

Another exhibition of exceptional interest, already announced, is that of the works of Delacroix, which are to be collected at the École des Beaux Arts from the 1st of March to the 30th of April, by the exertions of M. Georges Petit. If, as the committee hope, the French and foreign collectors consent to lend the works which they possess, one may predict the success of the exhibition, the proceeds of which are to be expended in raising a monument to the illustrious master. In reference to this subject, we may add that, thanks to the Conseil Municipal of Paris, one of the finest works of Delacroix,—the "Pieta," a fresco in the church of St. Denis du Sacrament in the Rue du Turenne,—which was lost in the darkness of a chapel, is to be placed, by the opening of new windows for the purpose, in the full light of day.

To complete the information given in our last in regard to the removal of the collections of the Luxembourg in the ancient Orangerie, we may add that the new Museum, which is nearly completed, will include an immense sculpture-gallery in which the marbles will be arranged in four ranks. The bronzes will be placed on an exterior terrace. A large *salon d'honneur* of 210 square metres in extent, and ten smaller rooms, will be devoted to paintings, water-colours, and drawings. Lastly, a special space will be reserved for engraving, which is not represented in the existing museum. Speaking of the Luxembourg, we must bestow a word also on its neighbour, the new École de Pharmacie, the artistic decoration of which has been entrusted to M. Besnard. This includes two new compositions of great originality, which will figure in the next *Salon*.

The general stagnation of business continues, and the absence of any large works in progress gives little promise of any amelioration of the crisis in the building trades, which the severity of the season has caused to be the more keenly felt. The distress in Paris is unhappily very great, and seems to be lying idle instead of putting in motion any private enterprise. There is more and more talk of a loan to be negotiated by the Municipality, in order to furnish work to those who are out of work. While we are waiting for the International Exhibition, large workshops might be thus opened, especially if the Government consent at last to suppress the fortifications of Paris, now become completely useless, if not dangerous. The project of the Government would consist, in the first place, in demolishing all that portion of the fortified *ceinture* which extends from the Porte St. Cloud to the Porte de Clichy, which would offer an immense site for private buildings, and would give opportunity for an experiment in the project of cheap dwelling-houses (*logements à bon marché*), which the Municipal Council is still desiring to realise. This great operation would

put in direct communication with the capital the Communes of Boulogne, Neuilly, and Levallois-Perret; that is to say, the most elegant, populous, and richest suburbs. Another operation which suggests itself strongly, in view of the approaching Exposition Universelle, is the construction of a metropolitan railway. There would be occupation for thousands of workmen for some time in such a project. But the question does not seem likely to settle itself soon, although the Municipal Council has given its approval to the principle of that great subterranean work.

In regard to the Exposition Universelle, it may be added that according to the plans approved by the committee of organisation at their last sitting, the buildings will consist of two palaces placed at the entrance of the Champ-de-Mars, immediately adjoining the square of the Ville de Paris; the one intended for the Arts and placed on the side next to Avenue Labroulaye; the other, for the Sciences, adjoining the Avenue Sauffren. These two portions of the palace will communicate by a gallery. These palaces, which will each cover a space of 24,000 metres, will be placed in communication with temporary structures ranging over an extent of 228,000 metres. An avenue 60 metres wide will be left through the midst of these constructions and the axis of the Ecole Militaire. The Commission has decided that the exhibition must have an entrance at the Champs Élysées to the Palais d'Industrie, partly in view of a grand industrial and commercial congress. The constructions will encroach also on a part of the Cours la Reine; the Seine will be crossed opposite the front of the Invalides, by the aid of a covered bridge; the esplanade of the Invalides will be reserved for the Colonial exhibits; a space of 70,000 metres on the Quai will be given up to Agriculture; and, lastly, the garden of the Trocadéro will be in part utilised for an exhibition of horticulture.

This perspective of the Exhibition of 1889, and yet brought so near by the vast scale of the preparations to be made for it, has already excited a crowd of projects more or less realisable. We have already referred in a "Note" to that of the well-known builder, M. Eiffel, who proposes a monumental tower 300 metres in height. He has charged M. Sauvestre, the architect, with the plans of this colossal annexe to the Exhibition.

M. Bourdais, the architect of the Trocadéro, on his part, is spurred to emulation, and in a paper which he is to read to the Société Centrale des Architectes, he has developed a project for the construction of a tower of the same height, but in which masonry will be associated with metal. At the summit will be a lantern measuring more than 17 square metres, and enclosing a lighting apparatus of the power of more than two million gas-burners. For the site of this tower, M. Bourdais proposes the esplanade of the Invalides, whence he would easily light not only all Paris, but the Bois de Boulogne, Neuilly, and Le Vallois. We mention this as a record of a project which seems likely to be classed in the category Utopian; and which, at the best, can only be regarded as a *tour de force* supplying no seriously demonstrated need.

We cannot say so of the very interesting Museum of Casts which the Minister of Public Instruction has formed at the Palace of the Trocadéro, and which is at the same time an object of interest for strangers, and a precious centre of study for sculptors and architects. This museum is about to be enriched by a new collection of bas-reliefs intended to form a kind of history of antique art. The two first rooms will be open to the public in April.

Let us close this rather long letter by announcing that there is at last some question of putting the Palace of the Popes at Avignon to a use more conformable to its origin and its great historic and artistic interest. It is given out, in fact, that the Department de Vaucluse and the town of Avignon, in order to re-enter on the possession of that ancient abode which has been so long occupied as a garrison, have offered to construct new barracks at their own expense. If the Ministry of War accepts this combination, the municipality of Avignon, with some financial assistance from the State, will restore the Papal palace in accordance with a project formerly prepared by Viollet-le-Duc, and will install there its archives, a school of art, and its museum. There is a fine piece of news for all tourists who have visited our fair

Provence, and admired that marvellous specimen of the military architecture of the Middle Ages.

IPSWICH AND BIRMINGHAM SHIP CANAL.

It was observed in a recent issue of the *Builder* that symptoms were not wanting of public dissatisfaction with the railway policy in the matter of tariffs, and of a growing conviction on the part of the trading community of the necessity for re-establishing the ancient water routes of this country on an improved basis. The most recent instance of such a conviction is a pamphlet by Mr. Joseph Robinson, of Ipswich, addressed "to the Traders, Manufacturers, and Shippers of England," in which he advocates a scheme for "a steam-ship route from Harwich to Liverpool by means of a canal 200 miles long, at an estimated cost of fifty millions of pounds. The arguments he advances in support of his scheme are plainly and tersely put, and, though familiar to those who have studied the relative possibilities and merits of rail and water carriage, are probably known to but a very small section of those most interested in the question, viz., the trading community.

Quoting from the Board of Trade Returns, Mr. Robinson states that during the year 1883 the English railways carried 184,485,600 tons of minerals and 76,897,356 tons of goods and merchandise, and that their receipts on all accounts were as follow:—

For goods and merchandise.....	£38,701,319
Miscellaneous receipts.....	2,852,218
Passengers.....	29,609,733
Total receipts.....	71,063,270
Deduct working expenses.....	37,368,562
Balance of profit.....	33,694,708

Assuming that one-half of the goods and minerals moved in 1883 might and would be carried by canal at a charge of one-third the present railway rates, he asserts that there would be a total annual national saving of 12,900,440*l.*, which large sum, he observes, is at present "lost to the country for want of the adoption of the most economical method of heavy goods transport." This is a clear way of stating his case, and is possibly quite within the mark; but, of course, it is open to the reply that it is based on an assumption of the relative quantity of goods which would be diverted from the railway. The matter simply resolves itself into a question of economy, not only of actual transport between two given places, but of the various additional charges involved in the collection and delivery of goods from dépôt to dépôt, or between warehouse and warehouse. But Mr. Robinson's case is strengthened by a fact which he has omitted to notice, and that is, that a number of articles of bulk and low value, which now cannot be moved at all, owing to the high cost of carriage, would, by the provision of cheap water transit, be immediately set in motion. That "the mixing up of express and slow traffic on railways is nothing short of a public calamity as being the cause, direct or indirect, of a large amount of delay, and a number of railway accidents involving loss of life," is certainly true, and has been practically acknowledged by such of our practical lines as have provided an additional track for the separate conveyance of minerals and goods; but even with this arrangement it has not been found possible to reduce the mileage charge for goods, while the Railway Bills, of which notice has been given in Parliament, indicate an increase rather than a diminution of charges, and have led to the recent conferences of the Traders' Associations for protesting against them. At the meeting held at the Cannon-street Hotel, presided over by Lord Henniker, Mr. Adamson, the chairman of the Manchester Ship Canal, pointed out "That the protection of traders and agriculturists lay not so much in fighting the railway companies as in the development of the waterways of the country which had done so much service before the former were invented; also, that water was the cheapest transport in the world, and its economy might be greatly increased by the use of steam." The development of the existing canals in England is, however, a different measure to the scheme put forth by Mr. Robinson. A costly project like that of a ship canal across England, estimated at fifty millions, can scarcely be said to be one of the pressing needs of the day, or to be capable by itself of

attaining the object advocated by Mr. Adamson, which, according to the evidence laid before the Select Committee on Canals in 1883, could probably be accomplished for one-fourth of that sum. Nevertheless Mr. Robinson has done good service in bringing the advantages of water carriage so prominently and clearly before the traders and manufacturers of this country, as, without doubt, the foreign competition from which they are now suffering is aggravated by the high cost of internal transit which the railway companies apparently are unable, even if willing, to reduce.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.
THE GOLD MEDAL FOR 1885.

The ordinary meeting of the Institute was held on Monday evening last, Mr. Ewan Christian, President, in the chair.

The Chairman announced that the Council had awarded the Pugin Travelling Studentship for the current year to Mr. William Henry Bidlake, B.A., Leicester; and a medal of merit to Mr. Herbert Osborn Cresswell, 10, Queen Anne's Gate, Westminster. The Chairman further announced that the Council had awarded the Godwin Bursary to Mr. John Bradshaw Gass, of Silverstreet, Bolton, who purposed visiting certain cities in Canada and the United States of America. Mr. Gass's written application for the Bursary showed evidence of unusual industry and variety of professional study, and we have no doubt he will bring some solid results from his expedition.

With regard to the Royal Gold Medal, the Chairman said that the Council proposed to submit to her Majesty the Queen, as the recipient of the Royal Gold Medal for the current year, the name of Dr. Henry Schliemann, Honorary Corresponding Member (Athens), Hon. D.C.L. Oxon, Hon. Fellow of Queen's College, Oxford, for his excavations at Hissarlik, Mycenae, Orchomeus, and Tiryns, and for his various works describing his discoveries.

Professor Kerr said that the drawings for the Pugin Studentship were this year of exceedingly high character, and he was gratified to find that the Council had awarded a special medal to the second in order of merit. He was going to ask the Council to award another medal to the author of the drawings which were third in merit, who was a Scotchman, and therefore laboured under disadvantage as compared with his fellows in London. It would be only fair to award this medal, as Mr. MacLaren came so very near to the second in merit.

Mr. R. Phené Spiers seconded Professor Kerr's proposition.

Mr. Charles Barry thought the better course would be not to put it to the meeting in the form of a resolution, but to leave it as a recommendation to the Council.

Professor Kerr said he would be quite satisfied with that.

Mr. Henry Curry remarked that as a member of the Committee he might say that Mr. MacLaren's drawings were included in the three sets selected for further inspection. They had the greatest difficulty in deciding which should be second and third.

Obituary.—Mr. Henry Rydon, well known for his building and brick-making operations at Highbury and in adjacent localities, died on the 14th ult. at Brighton, where he had resided of late years. He had acquired a handsome fortune.—Mr. Edmund Reddin, the well-known contractor, of Bankside and the Grove, Southwark, and of Shot Tower Wharf, Lambeth, died at his residence, Albury House, Clapham Rise, on the 28th ult., of bronchitis, in his seventy-fourth year. He commenced his successful career in partnership with his brother Michael at Bankside, nearly fifty years ago. On the death of Mr. Michael Reddin, in 1847, he largely increased his business, which was still further extended on the death of his father, Mr. Daniel Reddin, of Castle-yard and the Grove, Southwark, in the year 1854. For several years after this date a great many of the large excavation and sewer jobs in London, as well as a large number of parish contracts for dusting, slopping, &c., were executed by him. He is spoken of in high terms by those who knew him. The funeral obsequies took place on Tuesday last, when a requiem was sung at St. George's (R.C.) Cathedral, Southwark. The interment took place at Norwood Cemetery.

"ENGLISH ARCHITECTURE THIRTY YEARS HENCE."

ARCHITECTURAL ASSOCIATION.

A discussion upon the paper bearing this title, read by Professor Kerr at the Architectural Conference last year,* took place at the meeting of the Architectural Association on Friday, the 30th ult.

The Chairman (Mr. Hampden W. Pratt, Vice-President) said that most of the members had either heard or read Professor Kerr's lecture, which was to be the subject of the evening's discussion. The Professor had favoured them with his presence, and had kindly undertaken to offer some introductory remarks.

Professor Kerr said he had great pleasure in being present to hear a discussion on the paper read by him at last year's Architectural Conference. Not that he wished to interfere in the slightest degree with that perfect freedom of debate which he admired in all societies, and particularly in a society composed of young men who had the world all before them, and who need not be afraid of expressing their opinions; but he wished to avail himself of the opportunity of making a few preliminary remarks, inasmuch as some of the criticisms which had been passed on his paper seemed to have missed the mark intended by him. He would tell them, in the first place, how it came about that his paper was written and read. Some of his critics had spoken as if he had come forward almost presumptuously with prognostications which promised much and fulfilled little. That was scarcely fair, however. When arrangements were being made for the Conference, the Committee conceived the idea that it might be well to include in the programme a discussion on the immediate future of the profession, and a gentleman well known to them all, but whose name he would not mention, asked him whether he would undertake to open a discussion on the subject. He replied that he believed he could do so. For many years, in the leading articles of one of the journals, he had taken a peculiar view of the position of art in England. He had altogether discontinued the idea of our being backward, nationally or essentially, in any way. He had, of course, admitted our backwardness in certain points and our inferiority generally in genius to the French, but he contended that we were advancing now, by some means, no matter what, in a certain course which was highly honourable to the nation; and he saw no reason to doubt that in a future generation, perhaps the next or the one following, England, instead of being behind-hand, might take the lead in the world of art. His doctrine involved the assertion of the abandonment of Academicism, the adoption of great freedom of thought, and what would be called universalism in art—perfect liberty and equality of all the arts, perfect magnanimity and generosity of all artists towards each other. Upon this basis he had contended, and was still prepared to contend, that England had now assumed a very noble position in the face of the whole world, which it was well for every member of a society like the Association to understand, and to speculate upon for his own advantage, and for the advantage of his art. Looking at our country as compared with other European nations, they might safely acknowledge that it was too plain to be disputed that we are not a sentimental race, but prefer practical views of everything, and a substantial outcome rather than anything that might be called visionary, transcendental, or illusive. The French, on the other hand, were a different race, actuated by a universal sentiment of artistic feeling, which in this country it would be difficult to appreciate, but which was patent to all who understood what art was, and who could enjoy art in its finest and most elegant forms. Germany, again, was like England, liable to be considered an inartistic nation. We were both Teutonic peoples, and devoid of the *esprit* which is characteristic of the French. In Italy the position of art was entirely traditional. There was not much genius of a novel kind, but there was an inheritance of the forms and the works of genius that have come down from past ages. Turning, then, from Europe to America, one of the most promising nationalities of modern times, they found art, as it were, in a condition of adolescence, imitating and aspiring to succeed Europe when

Europe should be effete, and to represent all the conditions of Europe, perhaps many centuries hence, in a more brilliant development of civilisation. Those who had not beyond fifty years of age knew it was idle to dispute that during the last thirty-five years a very remarkable change had come over the minds of the people of this country in regard to art. The sluggish intelligence of the period before the Exhibition of 1851 must, to most of the members of the Association, be a thing not to be intensely understood. Indeed, there was no much to be read about it, because it was not commented on as it ought to be, but those who could remember what it really was from their own experience could testify that the state of things at the present day, regarded the arts universally, was as different from the state of things at that time as one thing could reasonably be different from another. It seemed as if the English intelligence were now acquiring a national purpose peculiar to itself in the domains of art; a purpose essentially identified with that broad basis upon which English operations in modern times are universally performed, and which was recognised in the allusion contained in the phrase that "England is the workshop of the world." Thus, industrial art in its widest sense was the thing which particularly commended itself to the minds of Englishmen, and what he contended for was the probability that this industrial art in the hands of Englishmen would, and must, in course of time, develop into art of altogether a different kind from anything exhibited in modern or in ancient times, and in such a form that we or our successors might expect to take the lead in it. He would ask those who could carry their minds back for a few years,—ten years would be sufficient,—to observe how what used to be called the sacred circle of the academical artists had been losing its virtue. When he was at their age he was told there were three arts for their recognition,—painting, sculpture, architecture, and no more. To some the enunciation of that proposition might seem somewhat strange, so different had the public view of the matter already become, and this circumstance was what he spoke of when he said that art was becoming non-academical. The exclusiveness of the Royal Academy was gradually beginning to be undermined, and the time had come, and could not be avoided, when the Royal Academicians, or whoever might take their place, would no longer be mere painters, and sculptors, and architects, with a few engravers thrown in, one knew not why, but would be the representatives of all that that was the true art of the nation. Now, in those circumstances, architecture came to the front, and it was remarkable how it had done so in this country within the last ten or twenty years. The reason was not far to seek; it was in the rise of the minor arts into a position of public recognition, whereby they now formed a galaxy around architecture. He ought to say that architecture as a demonstrative art was in this position,—that it combined, as no other profession did, three elements seldom found to be combined at all. The first was art, meaning artistic design; the second, science, meaning the mathematical contrivance of construction; and the third element was trade, or commerce. Painters and sculptors might profess to repudiate connexion with trade and commerce; architecture never did. Every house built by the architect, however carefully designed, was never considered in such a light as to be forgetful of commercial considerations; and in these times it was commercial considerations which must to a great and paramount extent be the ultimate effect of the industrial arts. Now, the question which had been dictated to them for discussion was this, what was coming? There was one way of discerning what was coming better than by any other course. When as little boys at school, they wanted to take a leap forward, they went backward a little, took a run, and by getting momentum they were carried forward with an acquired force. Now, if they wished to foretell the future in such a matter as the progress of art in England, the best course was to go back for a sufficient distance to get a run, to keep steadily on the course which public taste and policy had been taking, and having acquired as much momentum as possible, to let it carry them forward where it would, which was likely to be the course which the future would take. It was in that view of the case that he adopted a line of retrospection, which he

* For full text of the paper, and for a report of the discussion on it at the Conference, see *Builder*, May 17, 1884, pp. 713, 726-731.

had plainly enough pointed out to be adopted for the mere purpose he had now explained. What, then, was coming? Young men were apt in answering this question to consider what ought to be coming. But that was of no use, because what ought to be coming was matter of opinion; what was to be was matter of fact. In this way the idea of what ought to be was generally a mere individual fancy, often what was called a crocheted, very often delusive in one form or another, but what would be was a matter of calculation, calm and dispassionate, upon sufficient data and by sufficient means. The question, then, of what was coming within the next few years might, in the matter of architecture, be put in another form. What direction was the general national taste now taking; what might they, as young men, gather for their own sake and profit out of a studious contemplation of the course pursued for so many years past; and what was the probability of its being pursued in a certain direction for many years to come? There was an expression of his which he had made use of for a good many years, and which some had thought was a laughable expression,—“the Modern European style of architecture.” When they considered what modern Europe was, and reflected on the history of architecture and the other arts, through every development of civilisation, during many centuries, it must be perfectly plain in the minds of judgmental men, that the idea of modern Europe, existing without its own style of architecture, was, on the face of it, impossible. What, then, was the modern style of European architecture? Modern Europe had its rise in the fifteenth century in Italy, and they all knew that a style of architecture had its rise at the same time. Modern Europe had pursued a course devious, but still persistent, from that time to the present; and, for good or ill, in examples which might be admired, and in others which could not be admired, that style of architecture had been continuously practised throughout the length and breadth of Europe. This was what was called the Modern Classic, and whatever might be said of its merits, do not let them pretend to mystify the matter by denying the fact that Modern Classic architecture so-called,—Italian Classic if they chose to call it so,—was the modern European style. Now in that they had a basis on which to stand, and, having mastered that fact, he would refer to another remarkable incident, which many of them appreciated with great force, viz., the Gothic Revival. Without entering into the merits of the Gothic Revival, which was quite unnecessary in this particular connexion, it was enough to understand that, regarding it as an episode, more particularly in this country, among those whose minds were calculated to accept the idea, cherish it, and carry it forward, it introduced the element of vigour. It was said that the modern European style, pure and simple, had become effete; that it lacked muscularity and manliness. The Gothic style in this revival, on the other hand, in the form in which Englishmen took it up, was characterised by vigour, truthfulness, straightforwardness, determination to deviate neither to the right hand nor to the left; and this idea getting thoroughly into their minds was what he signified by the term “vigour.” He would next turn to another incident,—the Exhibition of 1851. Some people were accustomed to sneer at that Exhibition, but it was a vain and futile sneer. Like all other human enterprises, it had its misadventures, and its weak sides; but no enterprise in the whole history of art had, in his humble judgment, produced, in so short a time, such marvellous effects as that simple act of English enterprise had produced in England. As far as they were concerned, what did it produce? It brought into prominence the universality of the minor arts, and the Academicism of Royal Academies was swept away. He need not go into any description of what he meant by the minor arts; they were rising into greater distinction and eminence in England every day. Another term used was “the industrial arts,” but the meaning was pretty much the same, though the latter term might be the more expressive. Liberty now became established as the right of artists, and he could speak from his own recollection of how criticism had changed from what it was thirty or forty years ago,—how much more respectful it was even in this country, where a disregard for art seemed

to be the deliberate pastime of penny-a-liners; how much more respectful criticism on even small efforts of art now was compared to what it used to be. A new gospel had sprung up within his recollection. They were no longer confined to the hallucinations of dignitaries. Small men, of small minds, could discuss in their small way small efforts of art. With this popularity of universal art, there had come to attach itself to the liberty of artists that equality which he had mentioned,—that fraternity which time must develop in a common-sense country like this, and in the development of which, he contended, the future of England lay along a path of great distinction. This being so, they had been taking their walk back and their run forward; but had they acquired sufficient momentum to carry them a little into the future? He thought they had. Was it likely that a course of intellectual development such as he had been endeavouring to describe, was to suddenly stop there, or take another direction? Certainly not. What, then, were the young men encouraged to look forward to as the probabilities of the immediate future? They had been taught,—and he did not disapprove of the teaching, for what it was worth,—that in Mediæval art generally was to be found the sole field of meritorious design. He would ask them to dismiss that from their minds altogether, as a contracted and narrow opinion quite unworthy of Englishmen. Everything which constituted a development of human intellect was like the tree,—first the seed, then vigour of growth, ripeness, decay, and disappearance; and when the Gothic revival finally disappeared, as all things must, it would have to be acknowledged that it had done good service to this country, and that was enough. Then if they wished to look a little into the future they should not allow their minds to be distracted from the facts of the case, by any undue appreciation of this episode of local architectural development, but should bear in mind that the Modern European style not only survived, but must be, until the end of its own age, paramount. The one element which the modern or Italian style endeavoured to encourage and to rely upon was grace; not that the Mediæval artists were lacking in grace, but vigour had been the leading feature of the Gothic revival. The popular idiosyncrasy of the people of this country encouraged him to expect that they might combine grace with vigour in a way which should be more or less successful. If they pursued this line, remembering the universality of art, and the dogma of the equality of artists, while looking strictly at the peculiarity of the English character, the prospects of architecture in this country were as follows:—Pursuing the current style belonging to the age and to the whole of Europe, adding to that style the peculiar elements which had come to the front in the Gothic episode, and hearing in mind also the elements of universality, equality, and perfect liberty, he believed that the progress of architecture in England during the next generation was a thing of great promise. Painting and sculpture, as old academical allies of architecture, were descending from the high pinnacle on which they had been set of old. Their high position was pronounced to savour much of affectation and assumption. And while these were descending, all the industrial arts were ascending and meeting on the level of architecture, the first and greatest of all industrial arts! Let every one of them then consider, for his own sake, that where there was this universality of art recognised, there would also be an increasing competition, and that he who understood the future best, contemplating it most calmly in the right direction, would have the advantage over his brethren.

The Chairman said that Professor Kerr had laid great stress upon the modern European architecture, but would only lead them to look upon the Gothic Revival as a mere episode. Now the Gothic Revival was surely to be regarded as something more than a mere episode, as it had taken such deep root in the architecture of this country. It would be long before ecclesiastical architecture would be transformed from the Gothic work to any other style or development. In a few instances Wren's work had been taken as a model or style which might be developed in churches, but he believed that Gothic was so deeply rooted in the minds of the English people that it would die a very hard death, if it died at all.

He believed that the architecture of the next thirty years would principally depend upon what leaders they might have in the profession, and, of course, within the last few years they had lost their leaders amongst the Gothicists. Materials had a good deal to do with style; much would doubtless be done with iron and concrete in the next thirty years, and architects would follow in the direction of using manufactured materials.

Mr. A. B. Pite did not think they were yet out of the wood. The question was, what sort of work should they be doing thirty years hence? and would it be different to what it had always been? They could hardly be expected to answer this, although Professor Kerr had so brilliantly drawn their minds back to the rise of the Italian Renaissance, telling them they must run back, run forward, and then jump,—and see where they were. Had they done this a century ago would any such jump have brought them to the Gothic Revival? Or had they jumped fifty years ago, would it have landed them in the present state of Queen Anneism? Experience did not give truth to the doctrine, for architecture did not go forward in jumps. They seemed to be entirely at the disposal of genius, and art was really at the mercy of a few minds strong enough to take the lead, influenced, of course, by surrounding circumstances. He had no fear as to the position which the nineteenth century would hold in future. Since the opening of the century there had been a number of revivals, the Greek, the Gothic, and the Queen Anne. This would stand out in centuries to come as a most eccentric age, and yet one as powerful in the history of art as the fifteenth and sixteenth centuries. He was inclined to think that Classic art as the national art of England had been worked to death at the end of the last century. There was little to be proud of in the modern London streets. Moorgate and King William streets were works of the Greek Revival, and did not belong to the line of design termed by the Professor the architecture of the future. Suppose they had a town-hall to design next week, how should it be done? Classic work was said to be dead or antiquated; “Queen Anne” work was ignominious for a public building; and Gothic also was said to have died. One of our greatest ecclesiastical architects had been advocating a return to the Renaissance, but this must be an “artistic gambol!” Their attention should be turned to the study of plain building without archaeological style, seeing what could be done simply by the use of pure sculpture, or by the application of colour. Mr. Pite concluded by proposing a vote of thanks to Professor Kerr.

Mr. G. H. Blagrove contended that no living style had been developed from its predecessor since the Elizabethan era. In the future there should be one style for all buildings, which might be so modified as to meet all requirements. The question was what the style should be. The construction of the present day was essentially iron construction, and everything else was secondary in all our greatest buildings. The leading feature in iron construction was the lintel, and the style of the future must depend for its main features upon horizontal or Classic, rather than on vertical or Gothic. He seconded the vote of thanks.

Mr. Thomas Blashill remarked that even after his long run and jump, the Professor was not able to go so far as they might have wished. If he were firing at a mark without anything to consider but the direction of the barrel, the thing would be extremely simple, and this was about as far as analogy could go between the line of argument taken by the Professor and the act of firing at a mark. But other things had to be considered, such as the earth's attraction, wind, and the resistance of the atmosphere, which had to be calculated before-hand. The things necessary to take into consideration in completing the Professor's argument were things which were to take place in the future. There lay the difficulty, and it was not to be imputed to the Professor that he was unsuccessful because he had not got over it. Professor Kerr considered that the style with which long experience had made him familiar, and which was most to his taste, was the most likely to be followed in the future. The Professor seemed to forget that the Renaissance was the result of an art movement in a great measure artificial. The question had been treated too much as if it were a matter of designing the

outside of buildings. They should find out what their clients desired, and be able to tell them if they did not know, the height of the stories, the shape and size of the openings, and the best kind of roof. By combining this with a knowledge of the materials at their disposal, they would arrive at the best forms and composition generally. He was not prepared to say that anything like the pure Italian would get the better of everything else; in fact, he was decidedly of opinion that it would not. At the same time, looking at the works perpetrated nowadays under the name of "Queen Anne," which was a debased form of architecture, the more the students could get to Italy, and enliven their minds by the study of the great Italian works, the better it would be for them, and the less would people be satisfied with crude and unsatisfactory forms, and wretched mouldings.

Mr. Hooper said that as wet blankets had been thrown upon the youngsters of the profession by the addresses of the President and Mr. Sedding,* it was pleasant to find that Mr. Aitchison had given them some encouragement,† and that Professor Kerr had lent his eloquence in the same direction.

Mr. H. D. Appleton (hon. secretary) remarked that nearly all the movements in art had been preceded by movements in literature. The Gothic revival had been generally referred to the romantic school started by Sir Walter Scott, and he believed the "Queen Anne" revival had some beginning among the aesthetes at Oxford before it was translated into brick and mortar.

Mr. W. H. Wood thought the Professor had not gone back far enough. If they went back to ancient Greece they found a learned democracy in vogue, with every one taking an interest in public affairs, and knowing something of art, so that it was impossible to have bad architectural works. The Romans, again, although not themselves artists, yet employed them, and their organisation was perfect; while in Mediaeval times the religious fervour was the great and ruling power. In our own times there was nothing to compare with this, unless it were the fervour at the time of the Gothic revival. Since then there had been a rise of scepticism; the public were split into sections, and public buildings did not please the whole people as in the old Greek times. The industrial arts were now much before the people, and would become more and more generally adopted. There would be a desire on the part of the public to have something which was logical in style,—not mere affectations, but the outcome of the times.

After a few remarks from Mr. T. Ellison, Mr. Johnson said there was a tendency nowadays towards too much fussiness and elaboration of detail, while many lost sight of the grand principles which should be prominently borne in mind. Generalism was a mistake; and it would be much better to devote originality in one's favourite style, than to look up the past volumes of the professional journals before commencing to design. By working out their own ideas in the most suitable form they would arrive at much better results. The architect was too apt to pander to the craze of the moment, instead of having a preconceived set of ideas, and working them out as best he could, according to the subject placed before him.

The vote of thanks was then carried by acclamation.

Professor Kerr, without replying, complimented the members on the discussion which had taken place.

St. Paul's Ecclesiological Society.—The sixth annual report of this society, presented by the council to the annual meeting of members on Saturday last, states that the position and prospects of the society are highly satisfactory. During the past year ten meetings have been held at the Chapter House, and visits were made during the season to various churches in Town and country. A day was spent in Winchester, Mr. Somers Clarke conducting the members over the Cathedral and the Hospital of St. Cross. There are now 322 names on the register of members, twenty-nine having been elected and eight having resigned during the year.

* See *Builder*, vol. xlvii, pp. 547, 687, 620, 650, 653; and p. 65, ante.

† *Ibid.*, p. 721.

Illustrations.

STAINED-GLASS WINDOWS, EAST-HAMPSTEAD CHURCH.

THIS three-light design, representing the Resurrection, was carried out by Messrs. Morris & Co., from the designs of Mr. E. Burne Jones.

ST. PADARN CHURCH, LLANBERIS.

The present Church of St. Padarn affords a striking and melancholy instance of cheap church building. Only erected eleven years ago, it was found to be not only too small, but in such a sad state of dilapidation as to be beyond repair, its walls being cracked and porous, the roof leaking and spreading, and the Bath stone dressings in a crumbling state.

To take the place of the ruinous structure the church we now illustrate was designed by Mr. Arthur Baker, and the first section,—consisting of the chancel, transepts, central tower, and a part of the nave, seating 500 persons in chairs,—will be completed by Easter.

The church stands on the rock, and the walls are built and faced, inside and out, with the local green stone quarried near the site. The dressings are of Rancorn stone.

Owing to the exposed position, extraordinary precautions, involving a cost of 500*l.*, have been taken to keep the walls watertight. The cost of the first section of the church, exclusive of the chancel, fittings, and heating, will be about 5,800*l.* The work is being executed by Mr. R. R. Williams, of Carnarvon.

BEER-BOTTLING STORES, KENTISH TOWN.

THESE premises have been erected for Messrs. Read Bros., upon an extensive site adjoining the Midland Railway, and have been arranged so that each department has an entrance from the railway siding as well as from the roadway.

The architects were instructed to design a building in the early Scottish baronial style, and the materials originally proposed were bright red Leicestershire bricks and buff terra-cotta dressings.

The whole of the basement, having an area of 13,000 square feet, is arranged as a cool cellage, and has about a quarter of a mile of raised staging for the 2,400 bblts of beer usually kept to season. It is entirely covered with a concrete floor on iron columns. Behind the main building is the store for cleaning and storing bottles, with an area of 7,900 ft.

The stock of bottles kept is over 70,000. The high-pressure washing-apparatus is supplied from a tank in the main tower.

The greater part of the upper floor is used for labelling and packing. It is well lighted by continuous skylights facing the north. It communicates with the stores below by a lift worked by a gas-engine. The entrance from the road is under the central gable.

The remainder of this floor is occupied by the offices, laboratory, &c., which are fitted up with pitch-pine ceilings, dados, &c. The private office in the tower has oriel windows overlooking all the entrances.

The greater portion of the work was executed by Mr. W. Brass. The terra-cotta work is by Messrs. Donlton; the ironwork by Messrs. Homan & Rodgers; the office-fittings by Mr. Avis of Putney; and the mosaic floor by Mr. Burke. The quantities were prepared by Mr. D. Campbell, and the whole was erected from the designs and under the superintendence of Messrs. T. K. Green & Son, architects.

No. 321, STRAND.

THESE premises are now being rebuilt for an old-established business of confectioner, &c.

The basement contains bakeries with three ovens, bread-lift, flour and other stores, ice-well, coal-cellars, &c. The bakeries are to be paved with cement concrete, the walls lined with glazed bricks, the lower 3 ft., in brown glazed bricks, and the upper white. The ceilings are to be in Keene's cement, each bake-house to have a large air-shaft with gas-tight ventilators. On the ground-floor will be the shop, luncheon-room, kitchen, and offices, the men in the rear. There is to be a refreshment-room on the first floor, with a water-closet, lavatory, and lift. The upper

part of the house will be occupied privately by the proprietress, and contains dining and drawing rooms, seven bedrooms, bath-lavatory and water-closet. There will be a dinner-lift from the second floor to the first floor, on which is the private kitchen, ventilated and lighted by large skylight, with scull, larder, coals, &c. The back part of building will be roofed in by a fireproof flat roof with asphalt, enclosed by iron railings; convenience of shaking mats, &c., and to serve as a fire-escape.

The front will be built of concrete mould blocks, coloured red by the incorporation of pounded red bricks, the ornaments being cast with the blocks.

The tender of Messrs. Ashby Bros. for 32 was accepted for the erection of the building. The quantities were by Messrs. Batterbury, Maxley, 29, John-street, Bedford-row, V. The architect is Mr. T. E. Knightley.

DESIGN FOR A BLOCK OF THREE HOUSES.

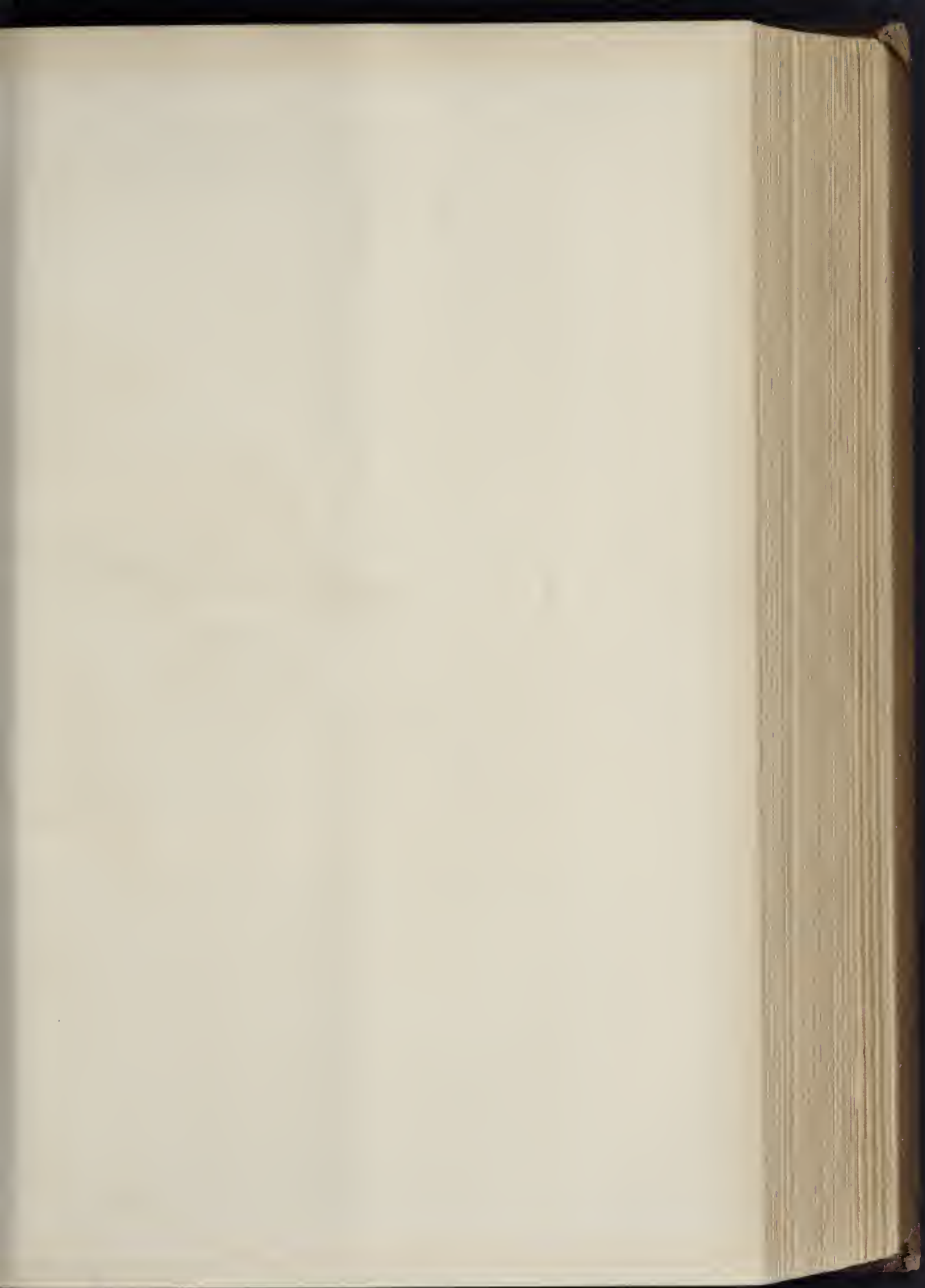
THIS design has gained for its author, F. M. Simpson, the R.A. travelling students at the last distribution of prizes at the Academy, as already mentioned by us (p. 755, vol. xlv). Mr. Simpson has shown much spirit and freedom in his varied treatment of the separate houses, though, when regarded as a block of three, there is perhaps not quite sufficient unity and connexion in the design. It looks rather like the commencement of a series which might be indefinitely continued. The separate buildings shown to a larger scale is effectively and consistently treated in the main. As a matter of detail, we should object to the manner in which the rather oddly-shaped crockets (if they may be so called) are placed on the gable coping. They look too much as if liable to be easily knocked off. Such features should appear rather to grow from the coping than to be stuck on to it, as these appear.

In regard to the plan, Mr. Simpson takes exception to a sentence in our former notice that the newly-arrived guests would have to deposit their hats and cloaks. He points out that there is a hat closet adjoining the entrance (this is shown in only one of the three plans) and we presume he regards the vestibule as "neutral ground" for guests who have not yet prepared themselves for the "reception-room." The position of the door between this and the vestibule is not the best that could be desired. On the whole, however, the plan makes good use of the available space.

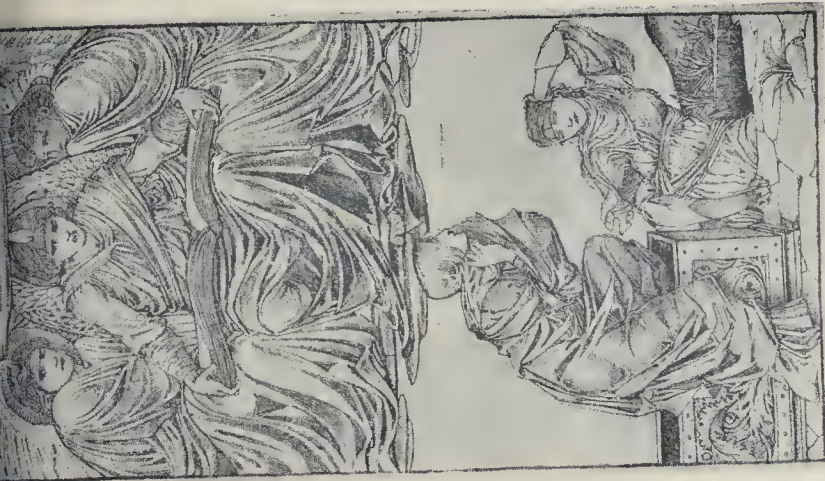
IMPROVEMENTS AT THE WIMBLEDOY SEWAGE FARM.

THE Wimbledon sewage farm has recently been extended and improved to a considerable extent, so much so that in giving judgment recently in the action against the Local Board, Mr. Justice Denman observed, that with the appliances now possessed by the Board the need be no nuisance in future, if proper care be exercised in disposing of the sewage. The most important improvement, however, has been the construction of filter-presses for the reduction of the sludge. This most offensive material, used formerly to run into drying-pits, which necessarily were situated close to the main road and also close to habitations. In hot weather, therefore, complaints of foul smells were often heard. In March, 1884, the surveyor to the Board, Mr. Santo Crimp, recommended the adoption of filter presses for the treatment of the sludge. His plans have been carried out at a cost of 1,600*l.*, and the presses are now in successful operation. The daily production of wet sludge, with 90 per cent. of moisture, amounts to about 16 tons, and this is at once reduced to 3½ tons of sludge cake, containing 50 per cent. of moisture, and in an inoffensive condition. The working expenses amount to about 3s. 9d. per ton of cake, or 9d. per ton of wet sludge. The old sludge-pits, which formerly occupied nearly an acre of ground, are being rapidly filled in. The presses and other machinery are by Johnson & Co., of Stratford. The two machines at Wimbledon have each twenty-four chambers and are fully capable of dealing with 40 tons of wet sludge per working-day. We hear that the whole arrangement has proved to be most satisfactory so far.

The contractors for all the works were Messrs. Cooke & Co., of Battersea.



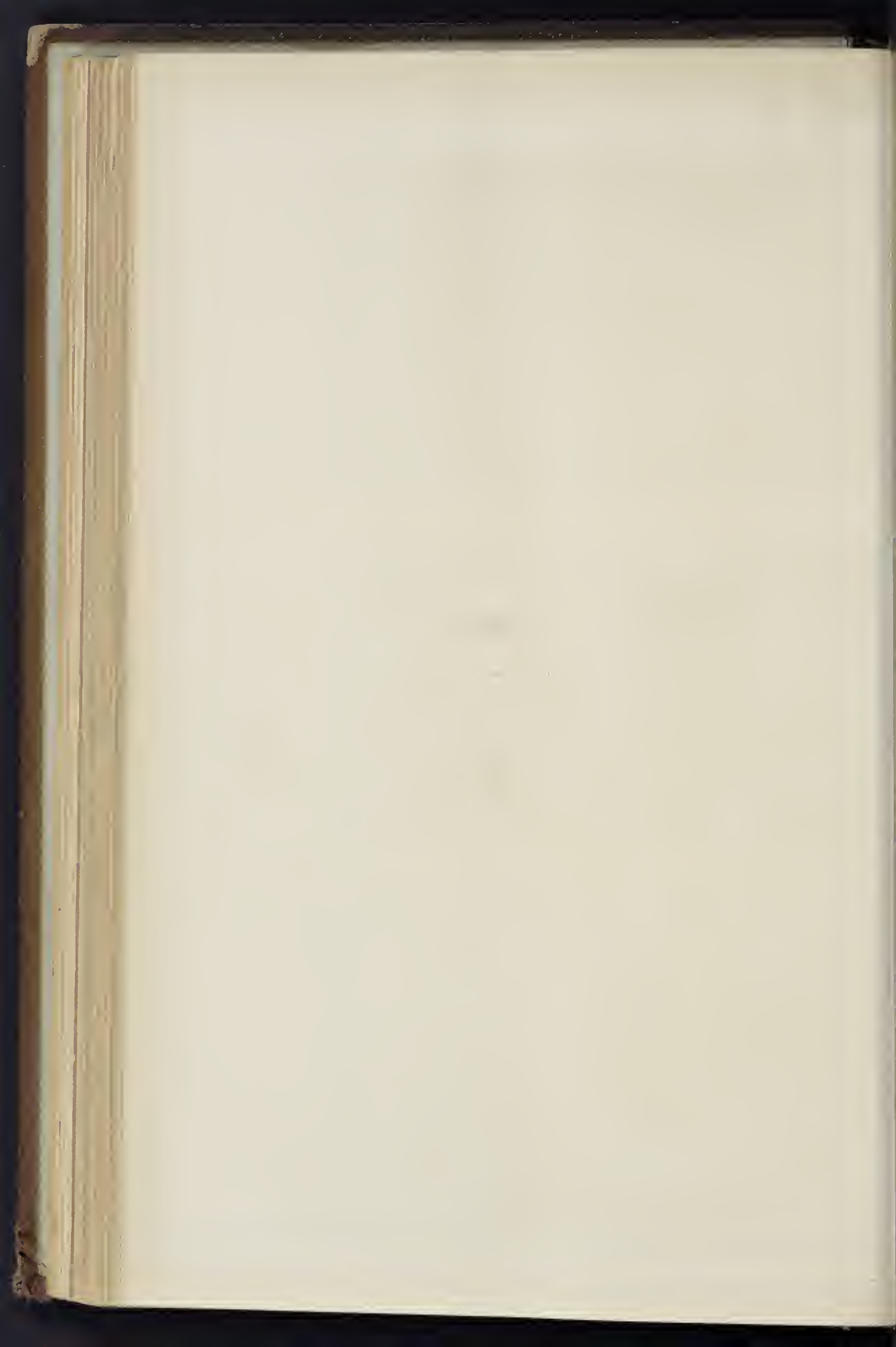


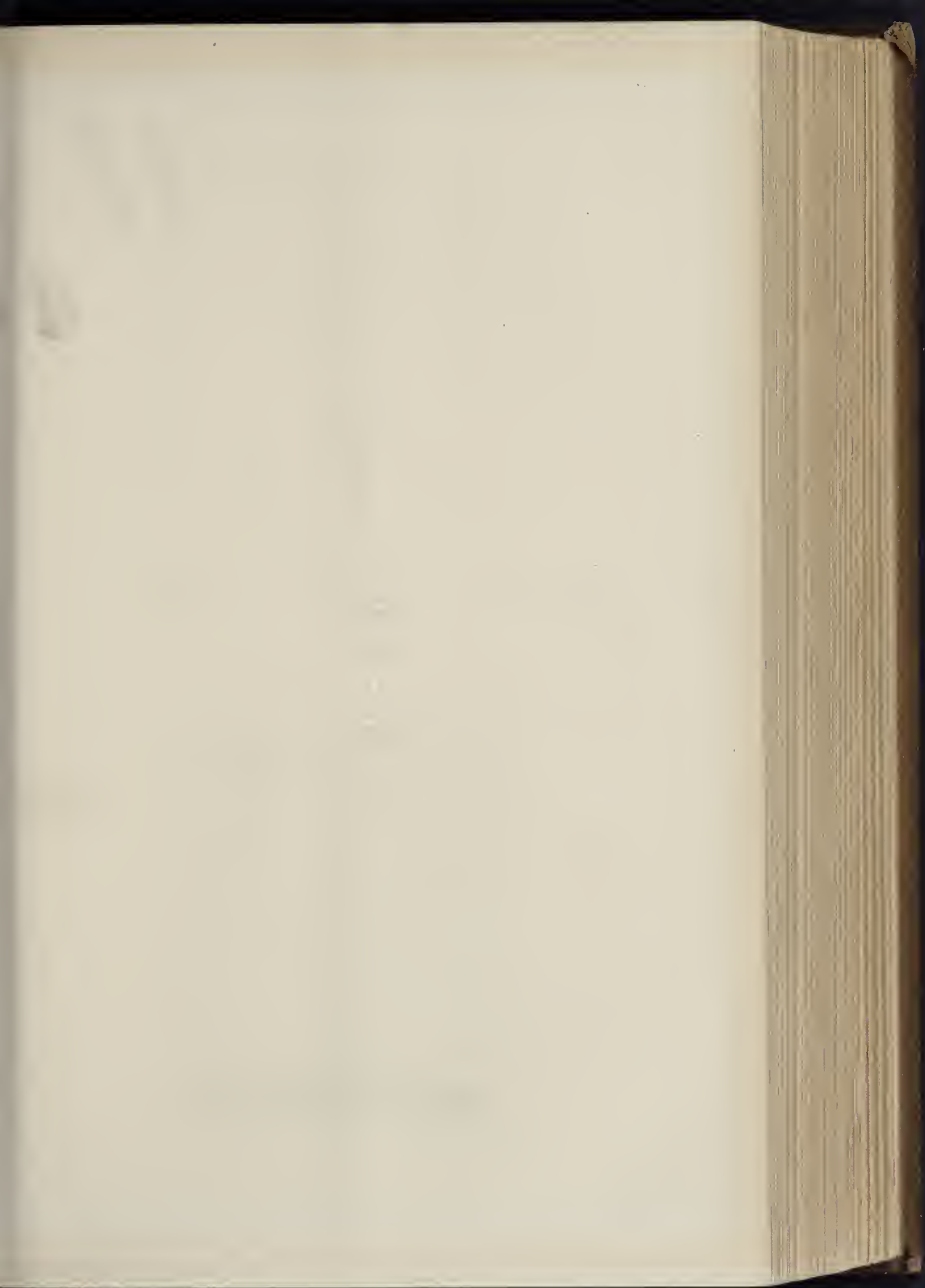


STAINED GLASS DESIGN,

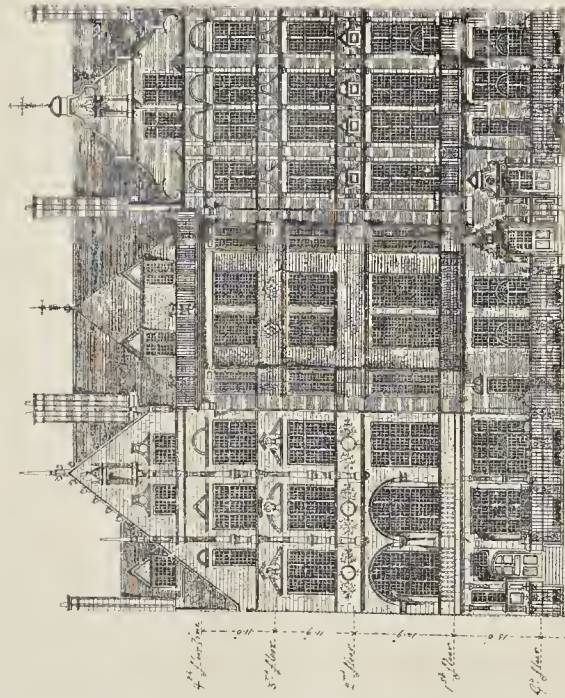
By Mr. E. BURNE JONES.

TRIPLET WINDOW, EASTHAMPTON CHURCH

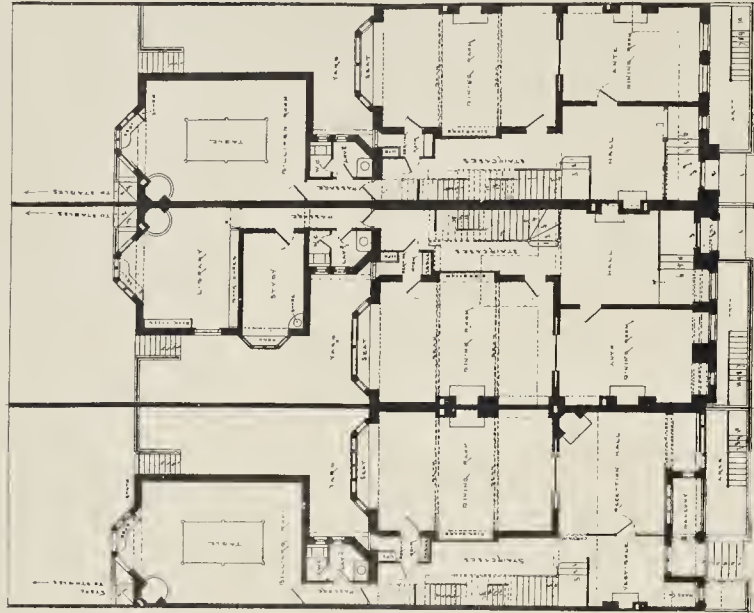




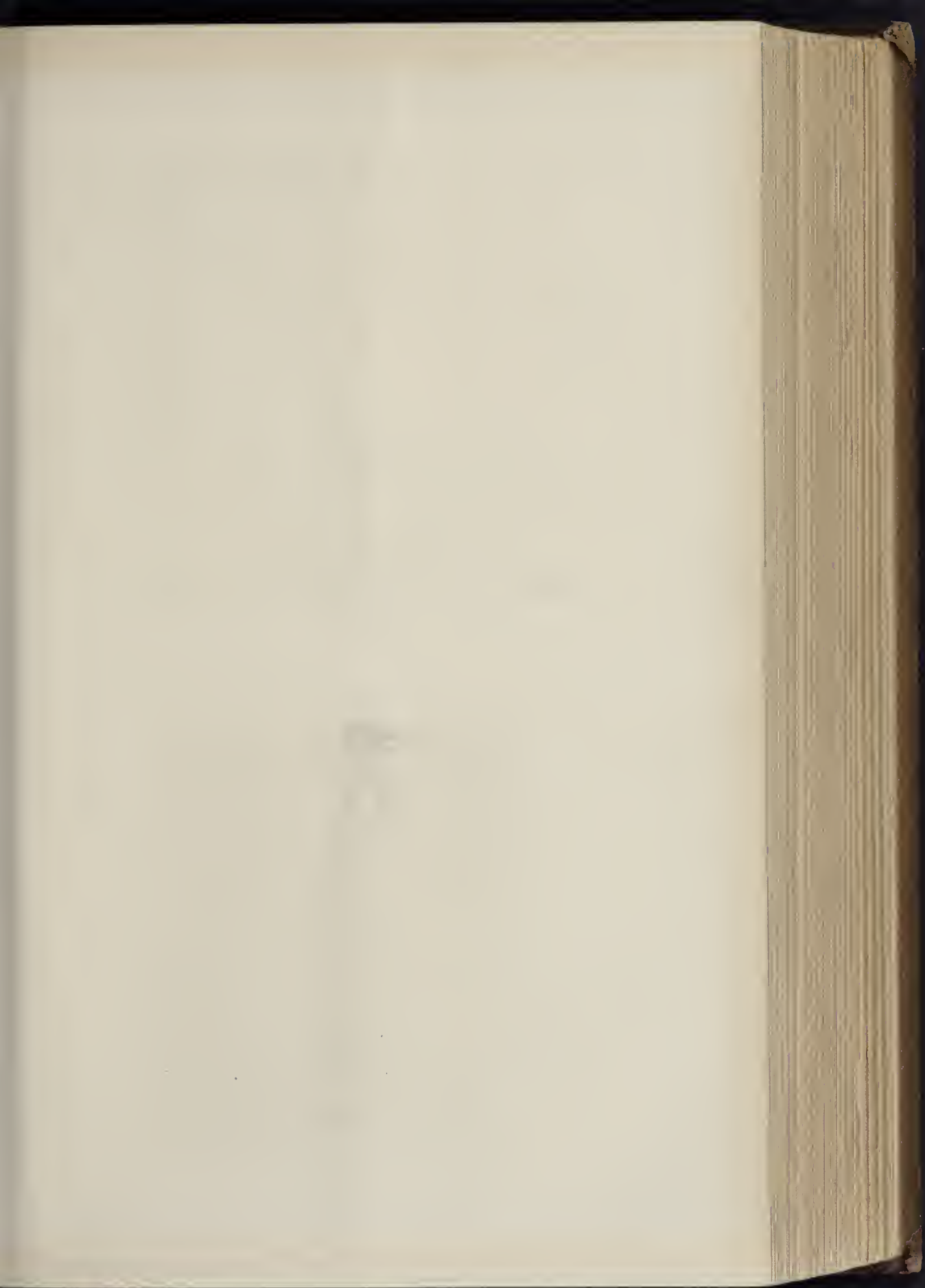
THE BUILDER, FEBRUARY 7, 1885.



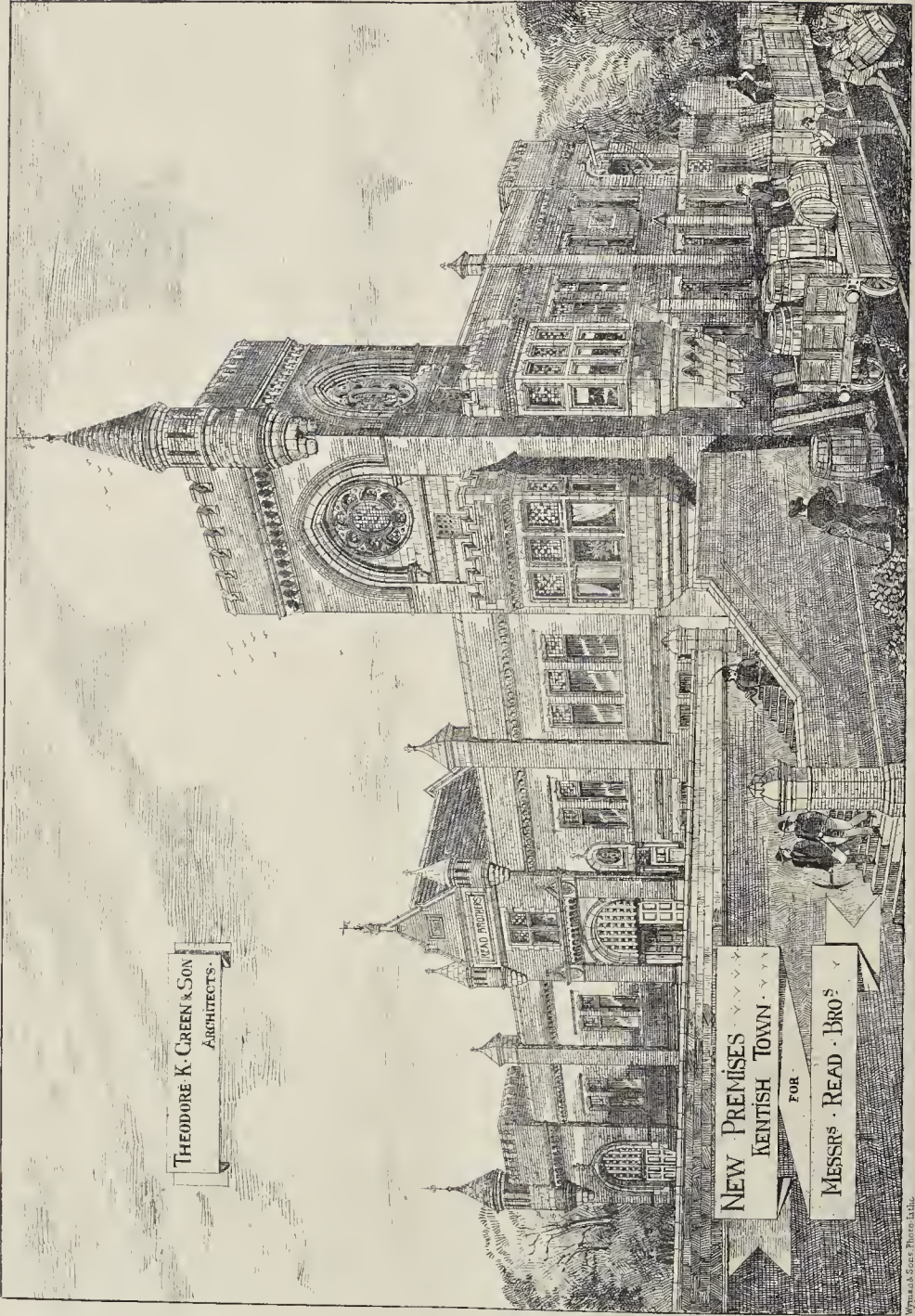
ELEVATION



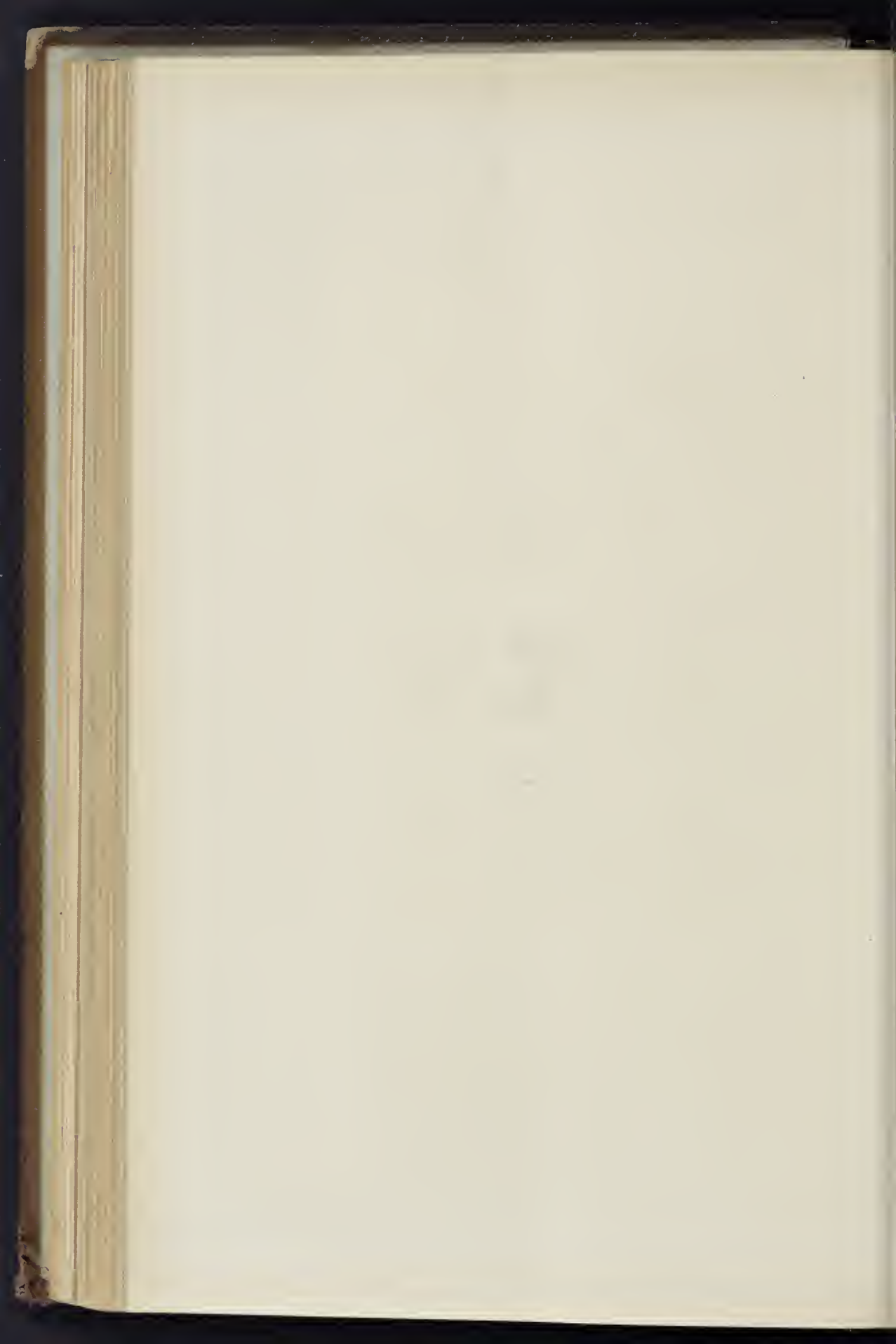
GROUND FLOOR PLAN

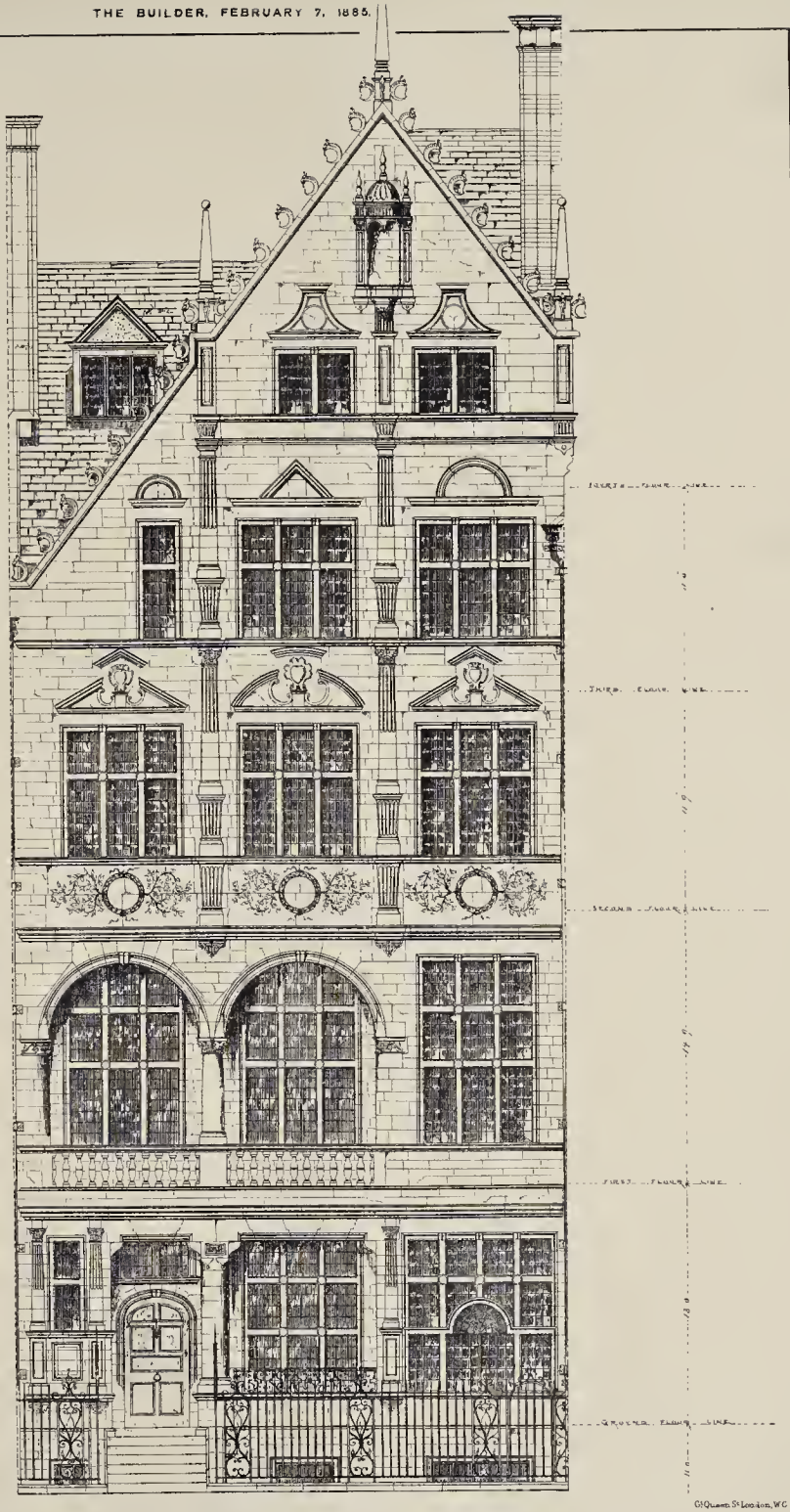


THE BUILDER, FEBRUARY 7, 1885.



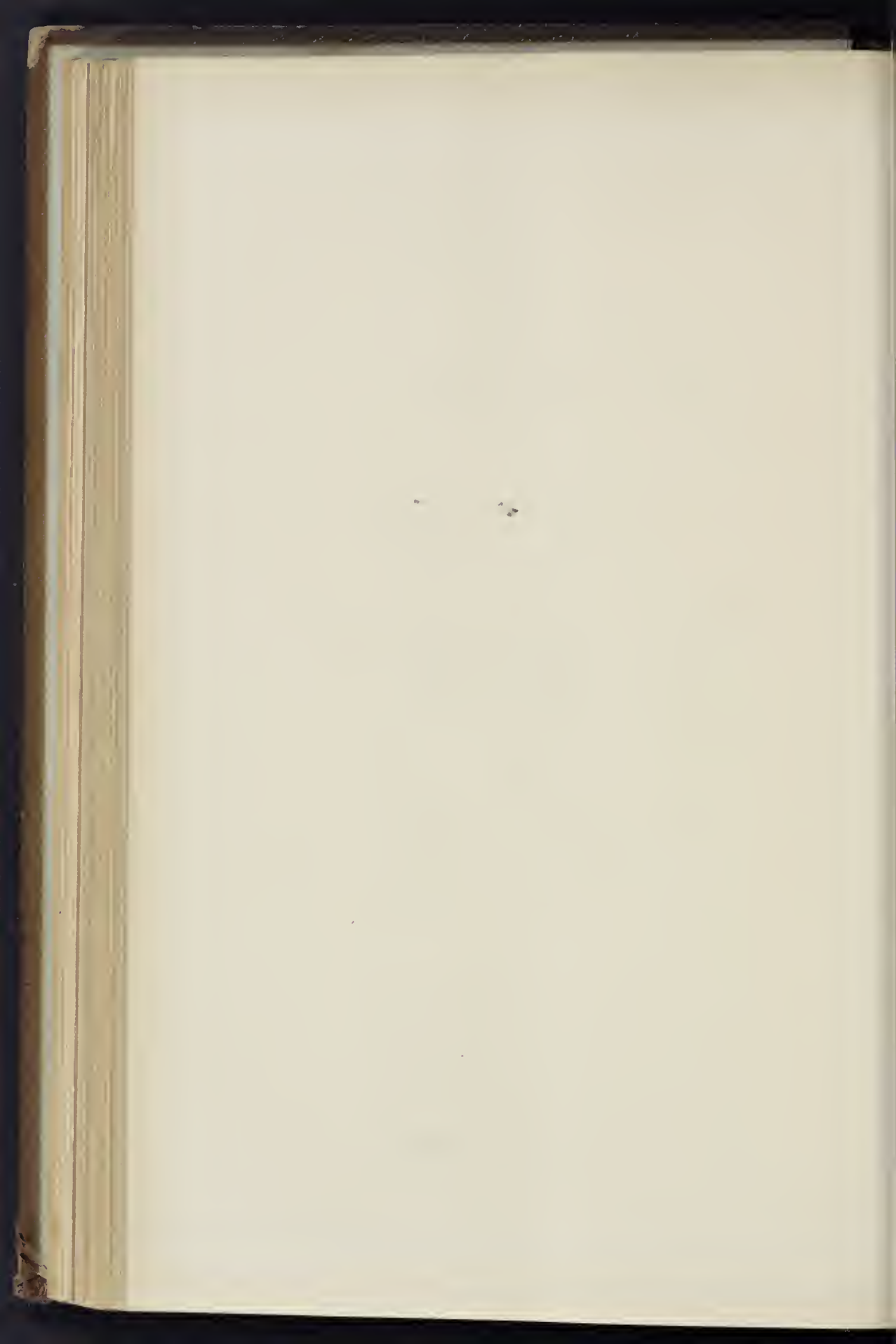


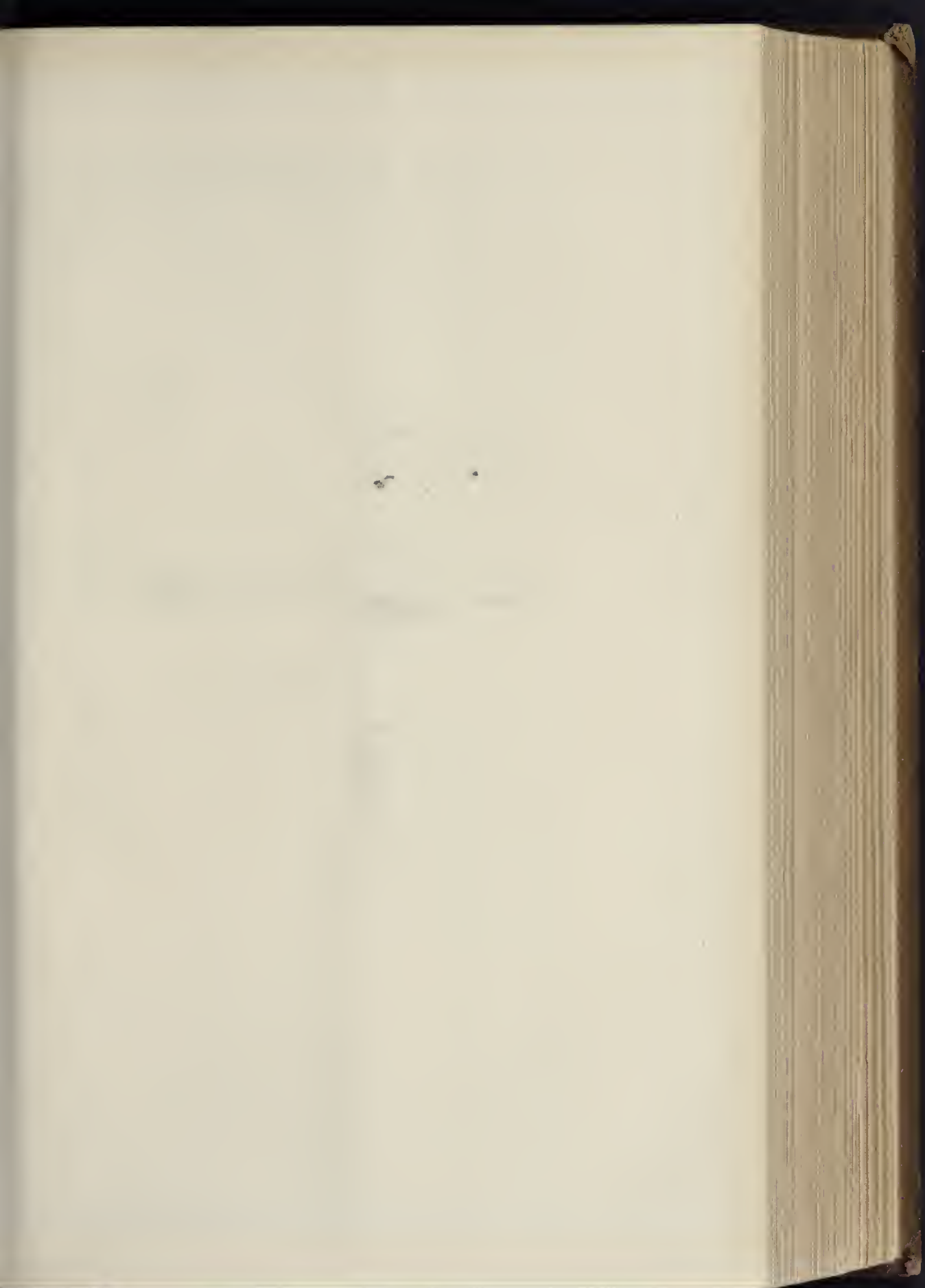




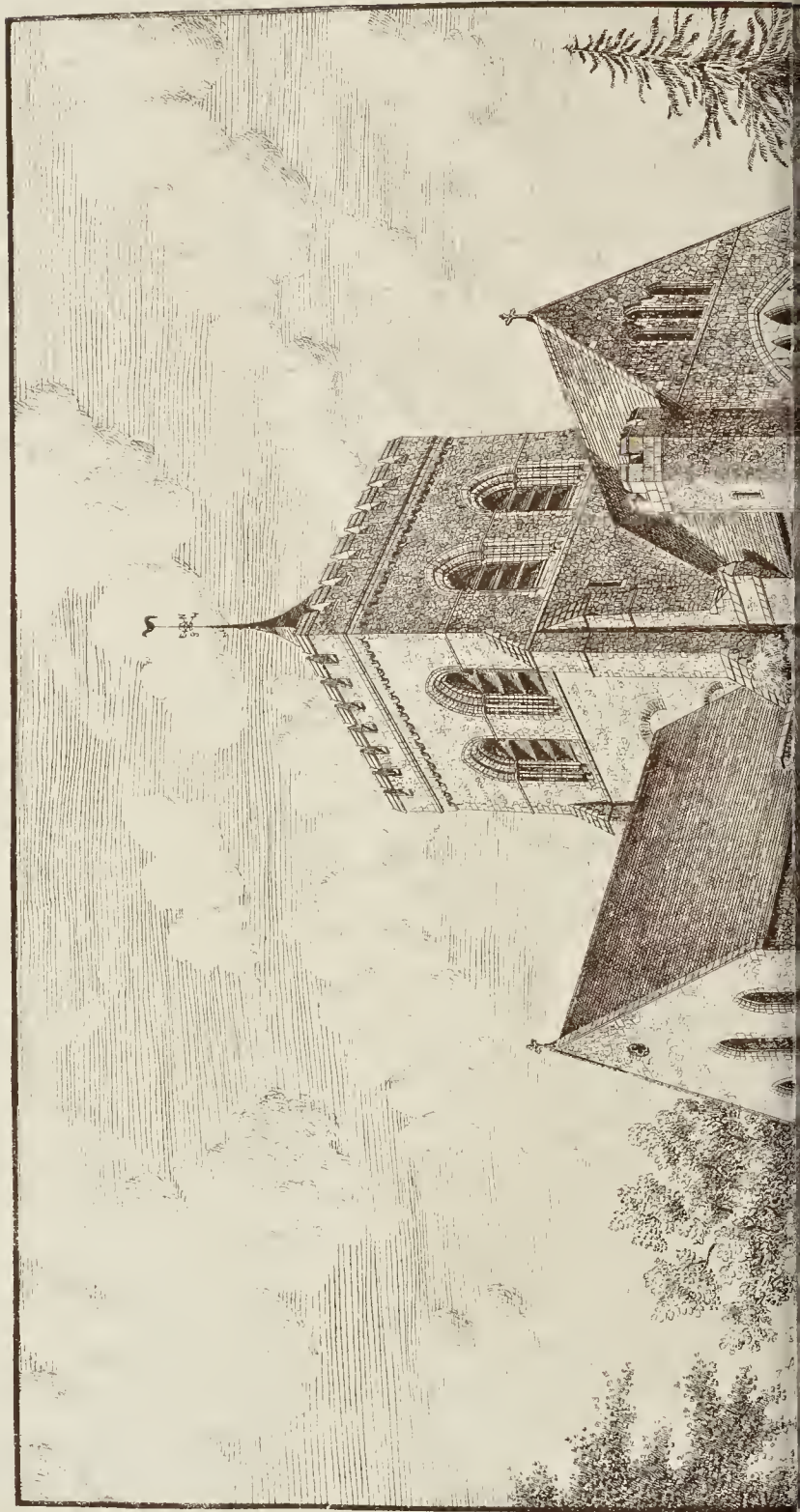
DETAIL ELEVATION OF ONE HOUSE, FROM DESIGN FOR A BLOCK OF THREE

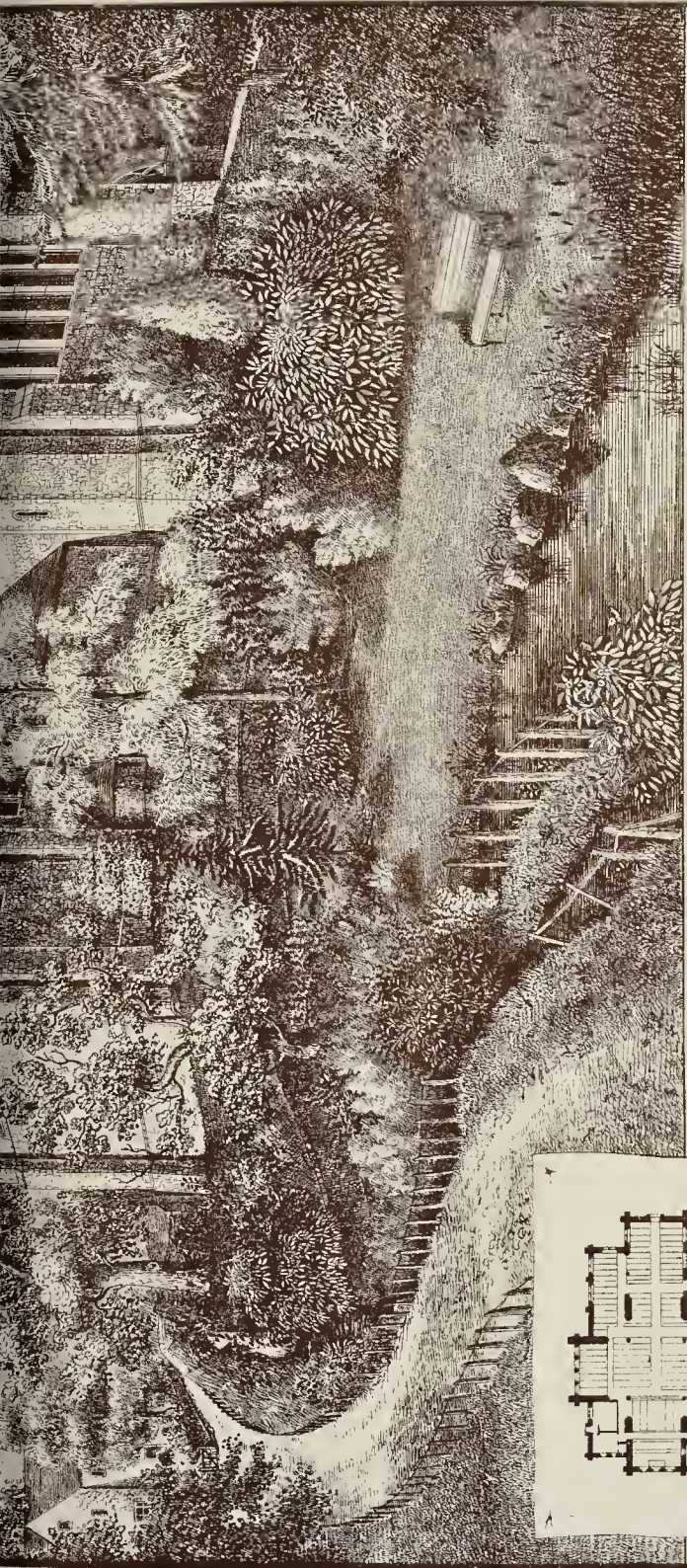
ROYAL ACADEMY TRAVELLING STUDENTSHIP.—AWARDED TO MR. FRED. M. SIMPSON.





THE BUILDER, FEBRUARY 7, 1885



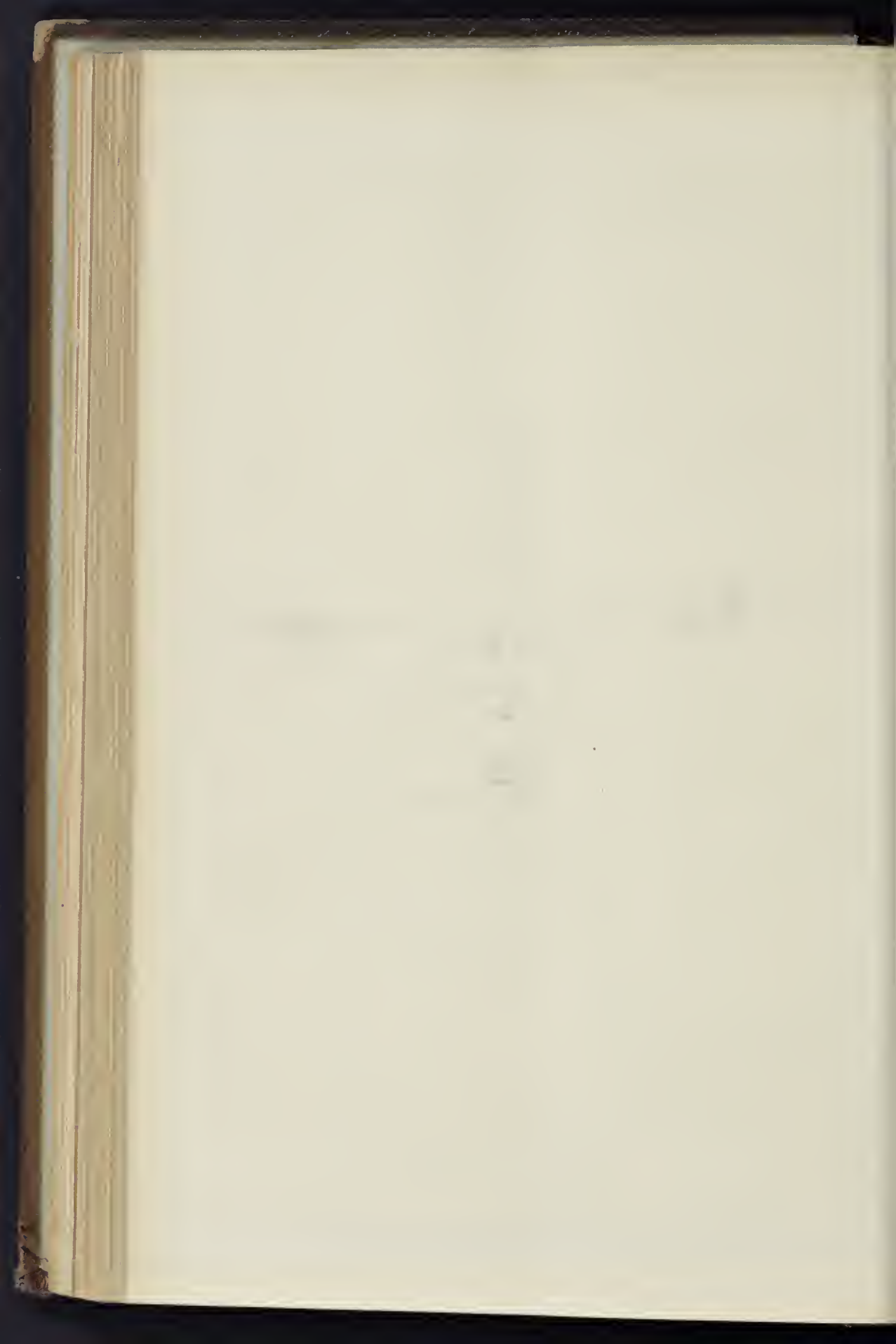


S. P. ADARN CHURCH. LLANBERIS. N. WALES.

MR. ARTHUR BAKER. ARCHT.

HERBERT BAKER. DELT.

W. G. LONDON



WEST LONDON SCHOOL OF ART.

The annual distribution of prizes to the students of this school took place on the 30th in the Steinway Hall, Lower Seymour-street, Mr. George A. Thrupp in the chair. After an introductory address from the Chairman, Mr. John S. Rawle, the Head Master, read an annual report, from which it appears that, during the year 1884, 420 students attended the school. The Government grant on results was £1,858 7s. 7d., which is the highest sum ever yet received by this school. In April last the school was taken up to South Kensington, for examination, an unprecedented number of 5,700 works, which had been executed during the previous twelve months. In the National Art Competition the school gained one Gold Medal, five Bronze Medals, and thirteen Queen's Prizes; total nineteen awards. The Gold Medal was gained by Alfred C. Weatherstone, for a set of designs for decorative treatment of a room. The remaining awards were for studies from the life, the antique, modelling, design, &c. The school obtained nearly 26 per cent. of the entire number of national awards, gained by the nineteen Metropolitan District Schools of Art in London. In the highest, or Government Third-class Examinations in drawing from the living, design, anatomy, and still-life painting, the school obtained ten successes, including two Queen's Prizes. In the Government Second-class Examinations the school had 139 successes, including sixty-two prizes. Thirty-one students also obtained full second-grade certificates, for having passed in all the subjects of the second-grade. The school also obtained eight Government Free Studentships; and in the Entrance Examinations, in building construction, there were four candidates, all of whom were successful.* A National Scholarship, worth £21 a annum, which may be increased in value to £40, was gained by W. Kellock Brown. He is now devoting his whole time, at South Kensington, to the study of modelling as applied to decorative purposes. He was the only London student, among fifteen candidates, who succeeded in obtaining one of the five vacant scholarships. In the Owen Jones Competition, the Council of the Society of Arts awarded a gold medal and a bronze medal to Alfred C. Weatherstone, for his designs, which obtained the Gold Medal at South Kensington; and the travelling studentship, of the value of 50*l.*, so generously conferred for competition in this school by Mr. George Menace-Smith, through the Painters' Company of London, has also been gained by Alfred Weatherstone, who is now in Italy, engaged in the study of decorative art. The West London Etching Club, composed of past and present students of the school, and numbering ninety members, continues to make satisfactory progress. The Royal Institute of Painters in Water Colours has established schools, to be conducted on a similar principle to those of the Royal Academy, but for the teaching of water-colour painting only. Five out of the twenty-five successful candidates for admission were West London students. In conclusion, Mr. Rawle expresses his consciousness that much of the success of the school is due to the friendly and constant support he has always received from his colleagues, especial mention being made of Mr. Thompson, for his assistance in the general work of the school, and of Mr. Townroe and Mr. Wilson.

Before presenting the prizes, Mr. Owen Roberts, F.S.A., addressed a few words to the students, expressing the hope that the time was not at hand when drawing would be taught in connexion with the three Rs. in all our elementary schools. Such was the case in France, and several members of the School Board for London were determined to cultivate it in this country. Reviewing his twenty-five years' anxiety with educational measures, he said he was surprised to note the great progress which our schools had made. At the end of the last century the art productions of England received due check, owing to the Peninsular wars. At the commencement of the reign of Victoria came a period of renaissance, but it was not till the Exhibition of 1851, through the exertions of the Prince Consort, that the proper position of schools of art was duly recognised. Since then there had been an annual progress, mainly due to the art influence of South Kensington, and

of this the West London School was one of the most conspicuous instances.

Mr. J. S. Rawle, F.S.A., the Head Master, in the course of some remarks upon architecture, sculpture, &c., said we saw how the architect, with the rough and uncouth stones from the quarry, erected edifices which, under the inspiration of his genius, oft became the pride and glory of his time, and which proved to after ages "a thing of beauty" and "a joy for ever." Again, the sculptor had before him a rude, shapeless piece of marble, which by his genius he converted into an almost living being, and which aroused the admiration of men thousands of years after the sculptor had rested in his tomb. The painter, again, with a piece of canvas and a few simple colours, could create a scene of the most vivid beauty; and, with powers such as these, who could refuse to admit that artists were priests and priestesses in the temple of humanity?

Votes of thanks were passed to the headmaster and Mr. Owen Roberts for distributing the prizes, and to the chairman, and the meeting terminated with the announcement that the students' works would be on exhibition at the school premises, 155, Great Titchfield-street, on Friday and Saturday, February 6th and 7th.

SOCIETY OF ENGINEERS.

PRESIDENT'S ADDRESS.

The first ordinary meeting, for the present year, of the members of the Society of Engineers was held on Monday evening last, at the Town-hall, Westminster.

The statement of accounts for 1884 was read, after which the President for the past year, Mr. Arthur Rigg, presented the premiums of books awarded for papers read during that year. These were to Mr. A. C. Engert, for his paper on "Defects in Steam Boilers and their Remedy," and to Mr. J. Corry Fell, for his paper on "Hard v. Soft Water for Manufacturing Purposes."

Mr. Charles Gandon, M.Inst. C.E., &c., the President for 1885, then delivered his inaugural address. After referring to the papers read at the meetings of the society during the last session, and the summer visits to the Midland Railway Company's Locomotive Works at Derby, the South Metropolitan Gas Company's new Works at East Greenwich, and Messrs. Siemens Brothers' Works at Charlton, the President reviewed the present position of the profession, especially referring to the increasing use of steel in place of iron for structural and other purposes, as well as for heavy ordnance and armour-plating. Mention was then made of the Severn and Mersey Tunnels, the completion of the Inner Circle of the Metropolitan Railway, the Forth and Tay Bridges, and also of improvements in the steam engine. The address then dealt with water engineering, and pointed out that quantity is not the only essential of a good water-supply, but that quality and pressure are also important elements. Rivers are, as a rule, objectionable as a source of supply, on account of the danger of pollution, unless the supply can be drawn from or near the source. Water from the chalk formation, such as underlies London, is preferable, although recent authorities have stated that such water is not always free from pollution. One important advantage of a good supply of water at high pressure is the protection it affords against fire; high-level reservoirs supplying by gravitation being preferred for this. Reference was also made to the assessment of water-rates on the rental value of house property, and its merits considered as compared with sale by measure, which would necessitate an expensive system of meters, increasing the cost of distribution and collection, and inducing the poor to exercise undue economy in the use of water. On the vexed question of the monopoly of gas and water supply, it was contended that it is doubtful whether any advantage arises from its being undertaken by local authorities. Water being a necessary of life, there is, perhaps, less to be argued against its being so supplied; but in the case of gas, it was thought there was no more reason for the supply being in the hands of local authorities, than for such bodies to acquire railways, or to undertake the exclusive supply of bread or meat. Some statistics were then given of the capital employed in the United Kingdom on gas supply, as well as the consumption of coal, the quantity of gas supplied,

and the rental derived from it. Great economies have been effected in the details of gas manufacture, resulting in considerable reductions in prices, although great differences still exist between various gas undertakings, both in cost of plant and manufacture. Sanitary engineering was referred to as another branch of the profession belonging comparatively to recent times, and, if taken to comprise sewerage, drainage, and the warming and ventilating of buildings, still requiring much attention; the state of the Thames and other large rivers being a reflection on the failure to utilise what should be a valuable fertiliser, instead of allowing it to become a nuisance. It was pointed out how frequently ventilation was a failure in large buildings, while in ordinary dwellings the defects were still more apparent. Defects also exist in house drainage in most cases, and no general improvement can be looked for without legislative supervision. The pollution of air in towns was also alluded to, as the engineer may largely aid in preventing it by the abatement of smoke. In this connexion the experiments made by Dr. H. J. Russell on the atmosphere of London were referred to, as including other evils besides those arising from visible impurities of the air. Mr. Lowthian Bell's estimates of the coal output of Great Britain in 1882 were quoted to show that, with the exception of iron and steel works, the greatest consumption of coal is for domestic purposes, and it is, consequently, in this direction that reform is most urgently needed. The last subject touched upon by the address was electrical engineering, both in its application to telegraphy and its further development to electric lighting. That the electric light is at present somewhat under a cloud is due to unprincipled speculations of company-mongers and inventors, but there can be no doubt that there is a vast field for its use. In referring to telegraphy, attention was called to the great increase in the speed of transmission, and it was said that, by a system in use in Canada, as many as three thousand words had been transmitted per minute.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The fourth ordinary meeting of the current session was held at Queen's College on Tuesday evening last. The Vice-President, Mr. W. H. Kendrick, was in the chair. Mr. J. Goodman was elected as an ordinary member. The secretary read a letter he had received from Mr. A. M. Mowbray concerning "an Architectural Diploma," and asking the assistance of the Birmingham Architectural Association in endeavouring to obtain a compulsory examination for architects, and embodying the same in the new charter of the Royal Institute of British Architects. A paper was then read by Mr. Victor Scruton (hon. sec.) on the "Necessity and Use of Architectural Associations," in which the lecturer dealt somewhat fully with the systems of architectural education abroad as compared with those of our own country. A discussion ensued, in which the Vice-President remarked that he intended dealing with several of the points treated by Mr. Scruton in his annual address to be given on February 17th. A hearty vote of thanks, proposed by Mr. H. H. McConnal, and seconded by Mr. W. G. Mantle, was accorded to the author for his paper.

Manchester Architectural Association.—At a meeting held at the Old Town Hall, Manchester, on the 3rd inst., Mr. J. Spencer Hodgson, in the chair, Mr. T. L. Worthington read a paper on "Aspects of Old Manchester," illustrated by drawings, sketches, and engravings. Having described the extent and aspects of Manchester during the British, Roman, and Saxon rules, he depicted and commented upon the appearance and progress of the town during the 11th, 12th, 13th, 14th, 15th, and 16th centuries, and gave a history of the Cathedral Church and Cbatham College. Speaking of Manchester in the seventeenth century he described the few remnants of the old half-timbered houses of that time. A discussion followed, in which Messrs. Chadwick, Hodgson, Mee, Harrison, and Woodhouse took part.

Edinburgh Architectural Association.—At the meeting of this Association on the 26th ult., Mr. Henry H. Gunn delivered an interesting lecture on "Geology in its Relation to Architecture." Mr. J. Washington Brown, President of the Association, was in the chair.

* Their names are Alexander Ford and Frederick A. Mills, who take first-class certificates; and Frank Mesler and John F. Wetherell, second-class certificates.

NATIONAL ASSOCIATION OF MASTER BUILDERS.

The National Association of Master Builders of Great Britain held its half-yearly meeting on the 28th ult., at the Saracen's Head Hotel, Lincoln, and local Associations at London, Manchester and Salford, Liverpool, Birmingham, Bristol, Bradford, Hull, Lancaster, Doncaster, Bolton, Walsall, Northampton, Lincoln, Warrington, Ashton-under-Lyne, and Stalybridge, were represented.

The report and accounts for the past half-year were read and adopted. Mr. W. H. Cowlin, junr., of Manchester, and Mr. J. Howard Colls, of London, were elected Vice-Presidents. Mr. Stanley G. Bird, of London, was re-elected Vice-President, Mr. J. C. White was re-elected Treasurer, and Mr. Joseph Stevenson Jones, of Liverpool, was elected Hon. Auditor and Representatives of the local Associations of Birmingham, Bolton, Bradford, Edinburgh, Huddersfield, Hull, Lancaster, Leeds, Lincoln, Liverpool, London, Manchester and Salford, Northampton, Nottingham, St. Helen's, Wigan, and Wolverhampton.

The Chairman explained the various clauses in the form of contract suggested by the special committee, to be laid before the Committee of the Royal Institute of British Architects, and it was resolved to leave the matter in the hands of the special committee appointed.

The Secretary was instructed to obtain statistics from the members of the local Association, as to the fires they have had upon their premises and buildings in course of erection, and what damage has been done during the last five years.

It was resolved that the best thanks of the Association be embodied in an illuminated address, and presented to Mr. Stanley G. Bird, for his valuable services as President during the last four years.

The Association decided to hold its next half-yearly meeting at Bristol.

COMPETITIONS.

Independent Church, Stand.—Four architects having been invited to submit designs for the new Stand Independent Church, near Manchester, the committee have selected that sent in by Mr. J. P. Pritchett, of Darlington, who is to carry it out at once.

Ventnor Pier.—The committee appointed to examine the twenty-seven plans sent in, in the first place selected the seven sent by the following gentlemen, viz. Messrs. J. Forrest Branton, F. E. Robinson, E. G. Stead and J. J. Potts (joint design), H. O. Baldry, H. E. Wallis, G. N. Abernethy, and Dawson & Fyson. These were again reduced to three, viz., those by Mr. G. N. Abernethy, C.E., Delahay-street, Westminster, Mr. F. E. Robinson, A.M.I.C.E., 7, Westminster Chambers, Victoria-street, S.W., and Mr. H. E. Wallis, M.I.C.E., 9, Bridge-street, Westminster. Eventually Mr. Wallis's design was selected, and the Board have retained him to carry out the works.

ARCHITECTS' COMMISSION.

BELL v. MOSS.

The plaintiff in this action, which was tried before Mr. Justice Day and a special jury at the Manchester Assizes on the 28th ult., was Mr. Asahel P. Bell, an architect practising his profession in Manchester. He sued the Rev. R. Moss, D.D., Vicar of Christ Church, Blackburn, and the owner of certain property at Bowdon, to recover 157l. 2s. balance of an account for professional services, damages for a wrongful termination of a contract, and, in the alternative, to recover payment for work and labour done.

Mr. Addison, Q.C., and Mr. Sutton appeared for the plaintiff, and Mr. Ambrose, Q.C., and Mr. Rotch, for the defendant, who set up a counter-claim for moneys which he alleged the plaintiff had received on his behalf and failed to account for.

Mr. Addison, in opening the case for the plaintiff, said it was not disputed that the plaintiff did the work for which he charged, but the defendant sought to defeat the claim by raising a series of the most unseemly defences which were ever laid before a jury. First of all he charged the plaintiff with fraud, but some of these charges were subsequently withdrawn and others not persisted in, but he still put forward a number of sordid and preposterous claims in order to defeat Mr. Bell's just claim.

The jury returned a verdict for the plaintiff upon the claim and counter-claim; damages, 175l.

The Judge refused an application from Mr. Rotch to withhold payment of costs.

MITCHELL V. FIELDING.

This was an action (tried at the Manchester Assizes on the 30th ult., before Mr. Justice Day and a common jury) to recover commission for work and services rendered to the defendants in connexion with the erection of the Winter Gardens, Blackpool.

Mr. Bradbury was for the plaintiff; Mr. Yates for the defendants.

Mr. Bradbury said the plaintiff was an architect, and designed the Blackpool Winter Gardens. The defendants were the contractors for the masonry work, and carried on business in Blackpool. Two contracts were entered into by them,—one for the basement, and one for the story above, and it was with regard to the second contract that the present action related. They were to have 3,939l. for the work, with the usual clause as to additions and reductions. The work was completed, and the plaintiff took the measurements. By custom he was entitled to 5 per cent. commission on architect's work, and, if he measured and adjusted the accounts, to a further commission of 1 1/2 per cent. Two and a half per cent. was the usual charge, and was so in this case, one half being charged to the employer and a half to the contractor. The defendants had paid the charge on the first contract without demur. There had been additions and deductions in the contract, and it was in the measuring up of these that the present action arose. In cross-examination plaintiff said his agreement with the company, which specified "adjustment of accounts," did not include the measurement of defendants' work.

Mr. James Murgatroyd, architect, Manchester, said an architect who measured up variations and additions on a contract charged 2 1/2 per cent., which was borne equally by the builder and proprietor.

Mr. George Clay, builder, Manchester, corroborated the statement as to the custom of dividing the 2 1/2 per cent. commission for measuring up variations between the contractor and the proprietor, though, he said, it was a great hardship upon a contractor, and the cost ought to be borne by the employer.

Mr. Dawes, architect, Manchester, gave like testimony, and further corroborative evidence was given.

Mr. Yates, for the defendants, said the Winter Gardens were completed in 1875. The defendants' original contract was 5,900l. Deductions and additions were made to it, amounting to a considerable sum, and he contended that the alleged custom was absurd, and further, that it was not the universal custom.

Mr. Fielding, one of the defendants, said he had never done work outside the Blackpool district, and denied that there was such a custom as alleged by plaintiff and his witnesses. His firm assisted plaintiff in the measurement of the work, but he had never heard of such a custom.

Mr. Benjamin Sykes, architect, Preston, said there was no such universal custom.

The learned Judge said the material question was whether the custom as alleged by the plaintiff and his witnesses, had been made out. Was it plaintiff employed by the defendants? If so, then it would certainly have to pay him. There was conflicting testimony as to the custom, upon which the jury would have to decide.

The jury gave a verdict for 1 1/2 per cent. on alterations amounting to 488l.

Judgment for plaintiff for 5l.

WESTMINSTER HALL.

Sir,—I have read Mr. Fergusson's letter in your last number [p. 181] with all the respect due to any communication coming from him.

If the problem were simply how best to treat the west front of Westminster Hall on the assumption that it was henceforth to be exposed to view, I think Mr. Fergusson's proposed treatment more satisfactory than that proposed by Mr. Pearson, but I strongly insist that this is not the question.

Any treatment of Westminster Hall of the severe simplicity which is demanded must be incongruous with the style of the great building of which it now forms a part, and therefore in my opinion it should not be exposed to view. Mr. Fergusson is convinced, as most people are who have studied the subject, that it was never intended to be so seen, and was, in fact, not so seen. Thus, the original design and its actual condition for many years thoroughly justify my father's scheme, to interpose a structure between it and St. Margaret's-street which should be in harmony with his great work, and enable us to obtain a land front as river front, and as fine architecturally, as his river front.

Mr. Fergusson gives, as he says, not a studied design, but only a suggestive diagram; and he does not touch at all the important question

how such diagram design would take up St. Stephen's porch, nor the still more important one of how to deal with the space at the north adjacent to the entrance front of Westminster Hall as seen from New Palace-yard.

He terms my father's design "too grand and too costly"; quite overlooking the fact (a) That my father's plan would utilise a valuable building area now wasted; (b) That the interest on 500,000l., which my father's complete design (including enclosing New Palace-yard with buildings) would cost, would at the per cent. be only 15,000l. a year, and would accommodate public departments now inconveniently located in private houses, for which rental estimated at about 40,000l. a year paid; so that a public saving of 25,000l. a year would appear to result, which, in these economical days, is surely a matter worthy of the fullest consideration, to say nothing of the convenience of having these departments concentrated and under one control instead of being dispersed as at present.

Without for one moment denying the interest and importance of such an historical building as Westminster Hall, I do think that it is fairly urged that the importance of the larger and grander building of the New Palace at Westminster claims the primary consideration, and that its due completion (as its architect would have had it done) is a matter which the English public may be expected to take more interest than the precise mode of restoration or alteration of one side of Westminster Hall considered by itself.

The drawing in the *Builder* of the 17th January is evidence of what would be lost to the world unless the present opportunity were taken to fittingly complete this important building, of which, by common consent, the nineteenth century may well be proud, and in which nature take most intense interest.

CHARLES BARRY.

Sir,—It seems to be agreed on all sides that the "west front" (or flank) of Westminster Hall was never intended to be seen, except from some small courtyards, and Sir Charles Barry, in his design for the completion of the Houses of Parliament, published in your issue of January 24th, conceals this flank.

Now, surely, in face of the two facts, that the original builders of the Hall, and the architect of the modern palace, both agreed in this treatment, there ought to be no question about the matter. They were certainly the best judges as to how their works ought to be seen. The original builders of the Hall never contemplated this portion of the Hall being seen, and Sir Charles Barry considered the complete "land front" to his building as a necessary portion of his design, yet the proposed schemes for the "Restoration of Westminster Hall" simply ignore both the original builders of the Hall and Sir Charles Barry.

I do not think that any one has yet called attention to the fact that the Great Hall at the Hague, which bears such a remarkable resemblance to that of Westminster, has always had its flanks concealed by buildings. The same treatment may be noticed at the "Ladisscheschen saal" in the Palace of the Hradschine in Prague, and has been repeated in the case of the Grand Hall of the New Law Courts in London. The argument that Sir Charles Barry's design ought to be set aside "because of its expense" should not be allowed to pass, because there is no necessity for carrying it out just at present; and, however much we may be wedded to economical schemes, we ought not to condemn future ages to an incomplete or mutilated design. Why could not Westminster Hall be simply "repaired" without the addition of new features? and, if extra accommodation be necessary, why could not as much of Sir Charles Barry's design be carried out as is absolutely required, so as to leave to future ages the possibility of completing the noblest building of the nineteenth century?

H. W. BREWER.

Building Partnership.—Mr. William Brass, the well-known builder, of 47, Old-street, St. Luke's, and 18, Silver-street, Wood-street, City, has taken his son, Mr. William Brass, junr., who for several years has taken an active part in the management of the business, into partnership, and henceforth the business will be carried on in the name of "William Brass & Son."

THE DOME OF ST. PAUL'S.

Sir,—Having received the accompanying letter, I called to see the engraving, which Mr. Blake describes it. All I can remark on subject is that it is so much the worse for it. It records, as I take it, with Thorne's paintings, and the architectural features, these are only painted ones.

JOHN P. SEDDON.

"New River Office, Clerkenwell, E.C., January 30th, 1885.

John P. Seddon, esq., Dear Sir,—In this day's issue of the Builder, with reference to your remarks at the Royal Institute of British Architects, on the decoration of the dome of St. Paul's, I notice the following:—"Mr. Seddon . . . contended that all the signs yet brought before the public, being based on the subdivision of the dome by vertical ribs and circular panels. . . were wrong in principle, and that the panels themselves inadmissible, disturbed the serenity of the surface of the dome, which when not broken up; and in the case of vertical ribs, they introduced a Gothic aspiring tendency, instead of the repose appropriate to the Classic architecture of St. Paul's, &c.

Now I have in my possession an engraving of an entire section (north to south) of St. Paul's, bearing the following inscription:—"To his Royal Highness George, Prince of Wales, his section of St. Paul's Cathedral, decorated exactly to the original intention of Sir Christopher Wren, is with all humility inscribed by his Royal Highness's most devoted and most obedient humble servants,

SAM'L WALE, } Proprietors. JNO. GWIN, }

(Size of sheet, 34 in. by 25 in.) Published May 27th, 1755.

This design shows the dome to be divided into eight panels, by double pilasters, each pair of which is divided by a recess, and surmounted by an abuttable; these carry a series of arches round the upper part of the dome. The recesses between the pilasters are filled in with a conventional ornament, while the panels themselves are decorated with paintings of various subjects. I cannot reconcile the existence of this engraving with your remarks, as the design appears to me to combine the very two defects you most strongly denounce, and of which you hold Wren altogether innocent. It has occurred to me that you might possibly like to see the engraving; if so, and you will favour me with a call, I shall be most happy to show it you.

I am, dear Sir, yours faithfully, WALTER EDWARD BLAKE, Surveyor, New River Company."

COMPETITIONS COMMITTEE, R.I.B.A. BOROUGH OF CROYDON STREET IMPROVEMENTS COMPETITION.

Sir,—We have been asked by some architects who signed the agreement not to compete unless an assessor was appointed, as to whether the above competition came under the terms of that agreement.

After careful consideration of the published conditions, we are of opinion that it is architectural in character, and that architects who signed the said agreement cannot, consistently with the terms of it, compete in this one, as we are officially informed that no assessor will be appointed.

(Signed) HENRY CURREY, Chairman. COLE A. ADAMS } Hon. Secs. ASTON WEBB }

FIREPROOF CLOSING OF OPENINGS IN PARTY WALLS.

Sir,—I have only just been able to read Mr. White's paper, and the discussion thereon [p. 14, ante]. Permit me to state that in 1865, when I further altered and enlarged No. 119, Cannon-street, E.C. (a building consisting about 300 offices), I adopted a double revolving wrought-iron shutters, in wrought-iron rebated frames, to the corridors on each floor. These shutters are placed above the openings, and by a few turns of a lever handle they are both immediately pulled down and closed at the same time.

Folding doors are frequently in the way, and unfortunately sliding doors will not always slide, and require too many parts.

I forgot who made these shutters, but Messrs. Bywaters, of King-street, Regent-street, carried out the additions under my directions. I may add all the floors are all fireproof.

It is not much use, however, to put any kind of doors, unless they are frequently examined and kept in working order, and the insurance companies should insert a clause in their policies that periodical inspection will be made by their surveyor, and if the doors are not found in a proper state, the insurer is to pay the surveyor's fee, and to at once remedy the defect. PHILIP B. LEE.

SEWER VENTILATION.

Sir,—In reply to "Laicus" [p. 182, ante], I think he will find this matter discussed in the back pages of the Builder. If the sewer blow-off pipes are placed high enough, I think it is safer to have the sewer air above the houses than in the middle of the streets and close to the edge of the pavements, below our noses and mouths. In many cases it would be just as easy or easier for the sewer air to blow in at open windows from the gutter gratings as from the mouth of the proposed pipes. Generally speaking it should not be difficult to so put up the sewer blow-off pipes as that the sewer air could not easily get in through windows; while at a high level the disease germs have greater chance of being carried away by the wind. The pipes should be of iron, and at least 1/2 in. thick, and red-leaded or coated inside to prevent rusting up, otherwise they would be useless in a short time. I have advocated the high-level system of sewer ventilation for many years. W. F. BUCHAN.

CARELESS NOMENCLATURE.

Sir,—In a description of some Northampton churches published in Church Bells, the spire of St. Sepulchre's is described as a "pyramidal spire," and the roof of the round nave is called a "cupola." The spire is hexagonal, and the roof of the nave is similar to those on many of our cathedral chapter-houses.

The description appears to me to be neither lucid nor architecturally correct. The term "pyramidal" is usually applied to short spires with four sides, and then they are generally called a "capping." All spires may, of course, be defined as pyramids, but it is not usual thus to describe them. A cupola must surely be curvilinear. N. M. Medway, Feb. 3, 1885.

NON-ACCEPTANCE OF LOWEST TENDER.

Sir,—"Fairplay" [p. 183, ante] may be glad to know that he has a case for damages if he has been invited to tender for a work and another tender, higher than his, has been accepted. I cannot quote the case, for it was tried many years ago. In several cases where this has been attempted by a committee, I have refused to sanction it, offering rather to throw up the work. I should not expect to get respectable men to tender for my work if this were done. But committees often are not ashamed of doing what private individuals would be afraid to attempt.

WILLIAM WHITE, F.S.A.

DRAWINGS IN LAMBETH PALACE LIBRARY.

Sir,—As a matter of interest to architects, I should like to state that the working drawings of Lambeth Palace made by Mr. Blore are preserved in the Archiepiscopal Library, which is open daily, Saturdays excepted. There are also two fine water-colours by Paul Sandby, R.A., of the old gates of Canterbury, among the Kentish collection of prints and drawings to which notice is invited.

As an example of the unexpected whereabouts of art, there is here, in the margin of MS. 1166, a pen-and-ink sketch of the west end of St. Paul's Cathedral in the fourteenth century.

S. W. KERSHAW, F.S.A.

PAINT ON FRONT DOOR.

Sir,—Did "H. G." [p. 183] try the usual plan of covering the places where the gum runs with gold leaf? If so, and this did not answer, I should recommend covering the panels with tinfoil. It should be put on with a mixture of white-lead and oil run through a painter's sieve to take away all lumps, &c. I have seen panels of front doors formed with rubbed slate, 1/2 in. thick.

On referring to "H. G.'s" previous letter [p. 876, vol. xviii.], I see he speaks of the sun bringing up blisters. White paint blisters less than any.

Of course, "H. G." is aware that one coat of paint should not be put upon another till the underneath coat is quite hard. Any paint would blister if so. Doors which I have found blister when painted green, even although the greatest care was taken in the work, have not blistered when painted with good white-lead and oil. C. F. M.

Sir,—In reply to "H. G." the following is the method in such cases:—Burn off all paint, then heat your salamander or hot iron, and burn out the heart of the knots to a depth of 1/2 in. below the surface of the door, until you have extracted all the resinous matter, knot, and fill up as usual, with spirit stopping, keeping all coats sharp to finish. S. W.

Sir,—I would advise "H. G." to give the door a coating of gold leaf (if he does not mind the expense). I have used this with success when other plans have failed. THOMAS DUCKETT.

* Unquestionably.—Ed.

CHURCH-BUILDING NEWS.

Mistley.—The chancel of St. Mary's Church, Mistley, Essex, has been reopened, after decoration. The roof is divided into panels by curved ribs. These panels are richly gilded, and bear on the gold surface various sacred emblems, painted in a warm chocolate tint, while the ribs and cornice are coloured to match. The space beneath the windows is covered with a diapered pattern in olive-green, surmounted by a broad gold band, on which is inscribed in red letters,—"Sanctus, Sanctus, Sanctus, Dominus Deus Sabaoth," room being left for a reredos, which will complete the whole. The walls of the chancel above the string-course running under the windows are painted with a subdued red tint, and ornamented with conventional foliage. Five of the seven lancet windows with which the walls of the apse are pierced are filled with stained glass by Messrs. Clayton & Bell, two having been recently inserted in memory of Mr. Thomas G. Kensit and his wife. In the nave, the space over the chancel arch, which in so many churches is now left bare since the times when the lion and unicorn disappeared, is filled with figures representing angels, with instruments of music, rising towards the Lamb of God, encircled with the emblematical vesica over the crown of the arch. These are on a dull blue ground. The spandrel spaces between the arches are ornamented with twelve medallions, bearing busts of the twelve Apostles, each accompanied by his appropriate emblem. The large window at the west end is intended ere long to be filled with stained glass, a design having been prepared for the same by Messrs. Clayton & Bell. The decorative work has been executed by Messrs. Simpson & Sons, St. Martin's-lane, London, from the designs and under the direction of Messrs. Wadmore & Baker, architects, of London. A brass eagle has been presented to the church by members of the Kensit and Norman families. It was supplied by Messrs. Jones & Willis. The cost of the decoration of the church has been defrayed by the Rev. C. F. Norman.

Moseley.—A font has been presented to the new church of St. Agnes, Moseley, near Birmingham. It is of Caen stone, with quatrefoil marble columns, the carving of the capitals and that round the bowl being in the Early English style, in harmony with the architecture of the church. The work has been carried out by Messrs. Jones & Willis, of Birmingham and London, who also supplied the choir stalls, chancel rails, and gas standards.

Ventilation Abolished Altogether.—Mr. Baron Huddleston is trying a great sanitary experiment at the Royal Courts of Justice. It is one which will interest everybody, and we hope to be duly kept informed of the results obtained; indeed, we shall look for information with considerable impatience. The late Lord Derby is reported to have said in reference to some wine recommended to him as a preventive against the gout, that he preferred that disease to the beverage that promised immunity. Mr. Baron Huddleston prefers to be unventilated rather than have cool air blown on him from every quarter under pretence of purifying the chamber in which he is doomed to sit. The engineer is enjoined, on peril of contempt of court, not to ventilate Mr. Baron Huddleston's court any more. It will be curious to note whether the strictly local death-rate of that particular court rises or falls. We should like to receive a weekly bulletin of health and mortality, countersigned by the Judge himself. Will he oblige us? It is a pity the idea is not to be carried a little further, and that a portion of the Royal Courts of Justice cannot be freed from the nuisance of drains, artificial water-supply, artificial lighting appliances, and so on. At the Health Exhibition insanitary houses were exhibited for comparison with the sanitary buildings and appliances which the public were to be incited to emulate. In olden times wise men made their slaves drink to excess as a warning to their sons. It has, however, been left to Mr. Baron Huddleston to exhibit a court of law in the Royal Courts of Justice in which "ventilation is to be altogether abolished."—Lancet.

Royal Architectural Museum and School of Art.—The annual public distribution of medals and prizes will take place at the Museum on Monday, the 16th inst., when Mr. Philip R. Morris, A.R.A., will preside.

The Student's Column.

DESCRIPTIVE GEOMETRY.—I.

REPRESENTATION OF OBJECTS, INTERSECTION OF SURFACES, DELINEATION OF SHADOWS, STEREO-TOMY OR THE SETTING OUT OF MASONRY, CARPENTRY, AND JOINERS' WORK.

IN treating of this subject, our object is to endeavour to open the eyes of architectural students to the great advantages they would gain by a scientific knowledge of the system of drawing they use. There are buildings for which designs, harmonious in every part, have been mutilated by architects or builders not possessing the knowledge to set out the work thereof.

When a man is quite insensible to beauty of form and is utterly ignorant of anything beyond the everyday routine of building with bricks and mortar, he is called a *practical man*. An experience a friend of ours had many years ago will show you which is really the more practical: science or ignorance.

"I had for the first time," said he, "entered an architect's office after finishing my studies at a foreign polytechnic school. I was crammed with many sciences, including differential and integral calculus, but I had never seen a four-panel door put together. My principal was completing a large hall with a gallery running round it according to the section here given (Fig. 1), and having in plan three straight lines connected by quadrants. Our builder, emphatically a *practical man*, came to the office one day in an agony of despair. He had succeeded, without trouble, in nailing the boards on the straight parts of the gallery, but when he came to the quadrants he found it utterly impossible to get the boards to fit in. He had been trying to get them down by bending them with steam and powerful presses for more than three days, but all to no purpose. Time was pressing, the hall was wanted in a great hurry; what should he do? My principal was absent on business for two or three weeks, and it was not possible to take upon ourselves to change such an important feature of the design as replacing the quadrants by straight pieces; besides, the floor and the ribs of the gallery were all fixed. Happily I saw at once where the shoe pinched. In the quadrant each board was evidently but a zone or ring of a cone, such as the one which has its apex at *a'*, very much like a lamp-shade turned upside down. I had only to develop for each board the cone to which it belonged and I could draw the pattern of the boards. I did so; the builder cut out his planks according to my drawings, and they fell in their places without the slightest effort. Thus the raw student pulled the practical man out of the mire."

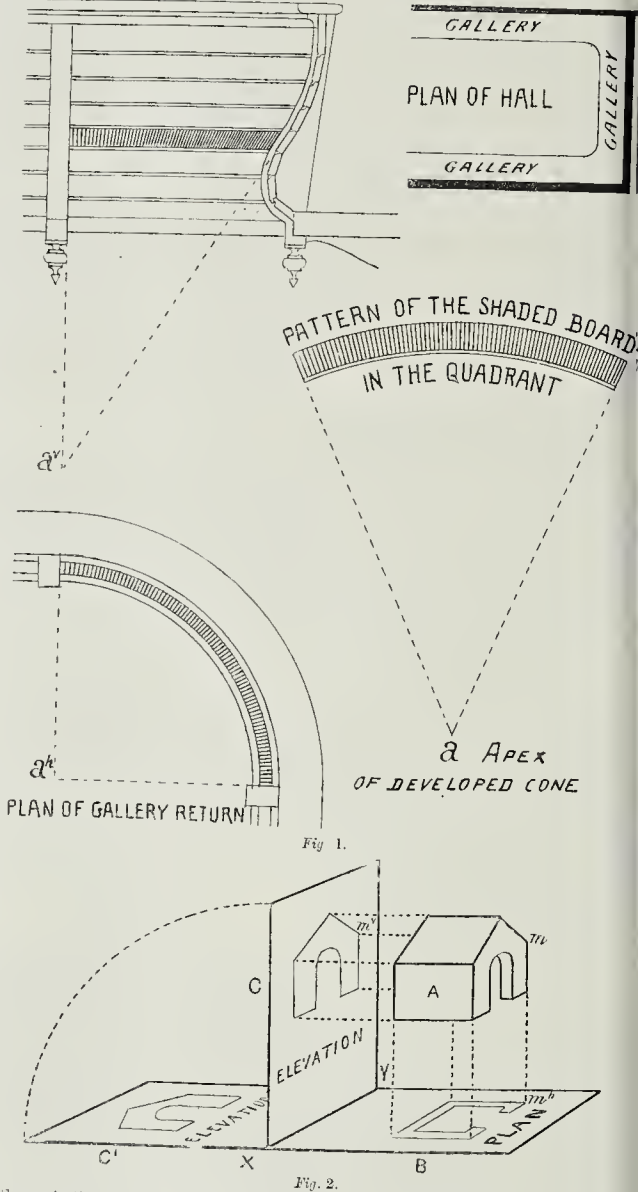
It would be absurd to conclude from this story that science can dispense with practical experience, but we mean to say that science renders the acquirement of practical knowledge much easier and much surer. The well-trained student has his eyes donly open to everything he sees, either in his master's office or on the works; he critically examines the parts of the structure, and sees whether they are justified by the requirements or whether they are only the outcome of routine, and by the intelligent questions he will put to his master he will learn more in a few days than the ordinary run of pupils in a year. Besides, you must remember that if a builder or a workman can rest contented with doing what he has seen done before, the architect is often called upon to solve new problems; *novens volens* he must invent, sometimes on the spur of the moment; this he can only do by applying general principles to each special case. Moreover, the architect must be able to set out the work in full-size details when the routine knowledge of the foreman proves insufficient, otherwise he may find himself obliged to cripple his designs to suit the workmen's ignorance, and his own.

In architecture, all questions of style, art, or taste are debatable, they rest on nothing absolute; but not so the sciences which bear on construction, and especially descriptive geometry, which must be learned somehow; for it is the method of drawing used by architects and engineers,—in fact, it is their language. The study of descriptive geometry should be the backbone of an architect's education: the more thoroughly he is trained in this science, the more thoroughly he will master his business, both as a constructor and an artist.

There is a kind of drawing we seldom employ in this country, or, at least, seldom well. We allude to *correctly-shaded drawings* such as the French architects make. Now, mathematically shaded drawings have the great *practical* advantage over line drawings of giving correctly the projections and recesses of a building,—a very important element of architecture. We make, it is true, perspective drawings, but we do not get thereby the exact amount in feet and inches

and find out at the same time, in a complete diagram, lines and points which have not been sought both in elevation and in plan. In this paper we only wish to introduce the subject to architectural students, and will, therefore, as much as possible any complicated problem, but try to solve only such questions as can arise in the practice of building.

We recommend students to draw on a scale the diagrams accompanying this paper.



of the projections and recesses; besides which, to make a *correct* perspective drawing is always a long job, whereas to shade a drawing with mathematical exactness is relatively a very short affair, and, therefore, can be done on the roughest sketches as well as on the finished drawings.

By far the easiest way of learning descriptive geometry is to follow the lessons of a lecturer; the problems are worked out before your eyes, and the word of the master accompanies his pencil. In a book it is very hard to keep the thread of the explanation in your mind

We shall define descriptive geometry as the methods of representing objects in space, and solving all questions appertaining thereto.

In maps and land surveys the objects are projected on to a horizontal picture-plane, and the height of each object above that plane is given in figures.

In architectural drawings, two picture-planes are used at right angles with one another: the one is horizontal, and is called the *plan*; the other is vertical, and is called the *elevation*.

DESCRIPTIVE GEOMETRY.

accompanying diagram (fig. 2) will give a clear notion of the convention on which architectural drawing is based.

A is a model of a house at a given scale: on a sheet of paper B we have its plan; on the vertical sheet C its elevation: such are the relative positions plans and elevations are assumed to occupy, although, for convenience sake, they are often drawn on the same sheet of paper; in which case the sheet C is supposed to have been turned down on the table, as shown in C.

We call ground line the line X Y, where the two picture-planes of plan and elevation meet. The plan of the point, m, is the foot m' of a perpendicular line drawn through the point m in the horizontal plane of the plan.

The elevation of the point m is the foot m'' of a perpendicular line drawn through the point m to the vertical plane of the elevation.

The plan of a line is the line formed by the plans of all the points of that line. The elevation of a line is the line formed by the elevations of all the points of that line.

A plane can be given by three of its points, or by two straight lines thereof intersecting one another, or by two parallel lines, or by one horizontal line belonging to the plane and by the inclination of the plane; that is, the angle which the plane forms with the horizontal picture plane or plan. For instance, the surface of a roof is determined by its ridge and hip, or by its ridge and eaves, or by its eaves and its inclination, given either by a section or in degrees. For working out many problems in setting out masonry and carpentry it is found convenient to determine planes by their traces, these are the lines where the planes intersect the two picture surfaces of elevation and plan.

Signs used in making Working Drawings.

Points are indicated in these diagrams by small letters; their projections are marked by the signs 'a' or 'b' tacked on, meaning horizontal or vertical projection, that is, plan or elevation of.

- m is a point in space.
m' is the plan of m.
m'' is the elevation of m.
A line is indicated by a capital letter taken from the beginning of the alphabet:—
B is a line in space.
B' is the plan of B.
B'' is the elevation of B.

Note.—If a right line be perpendicular to either of the picture planes, its projection on that plane, that is, either its elevation or its plan, will be only a point; but we shall still mark it by a capital letter, as the projection of a line. A straight line may be defined also by two of its points, say, m, n. We shall use either way, according to which is most convenient in each special case.

A plane is indicated by a capital letter taken from the end of the alphabet.

- P is a plane in space.
P' is the trace of P on the plan.
P'' is the trace of P on the elevation.

Full lines and dotted lines are used for both the lines given, and the results of the problem; the dotted lines are supposed to be hidden.

Lines formed of strokes refer only to the construction of the diagrams.

Lines formed of strokes and dots represent real lines in space, used as auxiliaries for the working out of the problem.

The ground-line is marked by L T for lines terre.

“Education in Industrial Art.”—This was the title of an interesting paper read by Mr. C. G. Leland at the meeting of the Society of Arts on Wednesday evening last. Mr. Leland, in the course of his lecture, said the principle on which he would base instruction was that a child not as yet capable of learning a trade, or a serious or severe branch of industry, could easily master all branches of decorative art, and that these formed a fit introduction to more practical work. In his native city of Philadelphia he laid his theory of industrial art education before the School Board, and ultimately he was given a suite of large, well-lighted rooms, properly furnished, and began with 150 children, which number soon increased to 200. There were two classes of 100 in each, to which every public grammar school had the privilege,—which was greatly prized,—of sending two or more pupils.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,371, Brick Moulds. J. T. Bower.
Plain sheet metal head-pieces are riveted to inside flanges of cast metal sides. The sides between the outside top and bottom flanges are cased with wood attached to screws, and are replaceable without taking the mould to pieces. Angle-iron may be used instead of the form of flanges prescribed, but this is not recommended.

1,379, Pumps. J. Keogh.
The object is to save power in pumping. From the upper part of the barrel of a force-pump is carried a vertical pipe, with an outlet preferably half-way between the discharge level and the suction level. On opposite sides of the piston there are valves, which are connected together, so that when one is open, the other is shut: hence at every stroke a small quantity of water passes to the upper side of the piston, and a column of water half the height of the discharge column is thereby retained to balance the pump.

1,736, Refractory Material for Lining Furnaces, &c. E. Brooke.
This material, intended for use in furnace linings, or for fire-bricks, blocks, tuyeres, pipes, &c., is made by mixing ganister, quartz, or other siliceous stone with fire-clay, boiled tar and oil, and water, in suitable proportions, and ground in a mortar-mill.

2,571, Valves. J. Pritchard.
This improvement is adapted for sluice and similar valves, and the object is to avoid the loss of time occupied in surfacing the faces of such valves and the liability of the same to be spoiled by grit. This is effected by the employment of leather or asbestos set into a groove in the valve seat. The lower edge of the valve face is hvelled to prevent it from cutting the packing.

3,006, Glazing Roofs, &c. G. Deacon.
The sheets of glass are laid upon flat astragals and are fixed by means of indiarubber washers tightened down by bolts of galvanised iron or brass. The washers are placed at the corners of the plates, which are rounded off to allow the bolts to pass. There is a drip channel down the centre of the astragals.

3,725, Ventilating Drains. G. Crapper.
An air-heating chamber is fixed in the flue at the back of the kitchen-range or other fireplace, and is connected by a pipe with the drain. A ventilating or upcast pipe is carried from the air-heating chamber through the flue and out above the eaves of the roof. The usual system of soil-pipes is retained, but the cowl at the top is dispensed with, the soil-pipe is utilised as a downcast pipe. The inspection-chamber of the syphon-trap between the drain and the sewer is fitted with a mica valve for inlet for fresh air. For ventilating apartments an air-heating chamber is connected by a pipe with the open air, and a constant stream of pure air is delivered by it into any apartment, the vitiated air passing out by an outlet-pipe.

394, Improvements in Bricks for Preventing Wet from Penetrating Walls. Wm. Parry.

This invention has for its object a brick that will shed the rain, and that will catch the percolating water, and deliver it to the outside. The front of the brick projects, and is cut at an angle, and is 1/4 in. longer than the bedding portion of the brick. A vertical cut or groove is made in each brick, forming together a tunnel or hole that intercepts and detours off the water. In laying the bricks, mortar is only used for the bedding portion of the bricks, but not for the outside joints. Any rain that falls on the brick will drain off, as it cannot run up the sloping part; any that falls on the vertical crack can get no farther than the cut or groove, but runs down that, and out into the sloping portion of the brick below. The front portion being from 1/4 in. to 1/2 in. long, and thicker than the body of the brick, will lie close together, even when there is a good bed of mortar between the bricks, while if the mortar squeezes into the grooves, and fills it, no harm is done, as it cannot do that without making a good joint at the back of the groove.

2,816, Improvements in Fire-places. E. Taylor.

A hot air-box of metal is made with a top opening into the flue. This box is placed at the chimney bottom, over the back part of the fireplace. Into the front side of this box are fixed a number of tubes of metal or other material, which project across the chimney flue till they nearly reach the opposite or front of the chimney, nearly level with the bottom of the chimney-piece. The object of this range of tubes, which are open at both ends, is to draw up any foul air as the tubes get heated, and a greater draught is created. If the draught is too strong, a metal trap closes the tubes. Another part of the invention is the fixing of a metal plate in a diagonal position at the back of the fire. This radiates the heat, and serves also for letting down the fire when wanted for cooking.

APPLICATIONS FOR LETTERS PATENT.

Jan. 16.—617, W. H. Briggs, Improved Screen for Dividing Rooms into Sections.—618, A. Barr, Combination Furniture Piece.—621, E. Bailey, G. Mackoy, and N. Brough, Rack Pullays.—623, E. V. Bailey, Securing Door and other Knobs and Handles.—631, R. Rowbottom, Coal Savers for Kitchen Ranges and other Grates.—642, J. Budd, Imitating Marble, Malachite, or other Stone on Glass.

Jan. 17.—660, T. S. Clapham, Improvements in Kitchen and other Fire Grates.—664, T. H. Ward, Hoisting Apparatus.—669, P. Walker, Manufacture of Tiles, &c., from Portland or other Cement.—679, T. Fletcher, Joints for Gas, Water, and other Pipes.—685, S. Von Kosinski, Ventilating, Heating, Drying, and Disinfecting Buildings.—695, W. Hacking, Portable Soldering Apparatus.

Jan. 19.—713, J. Herbert, Fret or Piercing Saw Frames.—725, C. Tothutt, Bricks for Paving Cattle Markets, Sheds, Yards, &c.—728, T. Grimbleby and H. Grimbleby, Apparatus for Shaping Lock-wing and other Roofing Tiles.—743, W. Baylis, Construction of Silos.—746, G. Pickett and G. A. Skinner, Curing Smoky Chimneys.

Jan. 20.—787, A. Brookes, Nailing Machinery.—796, B. Banks, W. Phillips, and E. Verity, Pivot and Weather Bar Arrangement for Swing and Reversible Windows.—813, F. Heales, an Improved Awl.—833, W. R. Lake, Process for the Preservation of Wood.—840, W. R. Lake, Heating Apparatus for Warming Houses, &c.

Jan. 21.—880, J. Gillespie, Appliances for Repairing and Binding Chimneys.—884, B. Mills, Hardening Stone, Cement, and other Materials.—896, A. Boulton, Improvements in Mallets.

Jan. 22.—910, J. Graham, Drying Bricks and Apparatus for same.—948, C. Longbottom, Improvements in Door Knobs or Handles, and Attaching same to their Spindles.—950, H. Walker and G. Clark, Improvements in Fire Grates.

PROVISIONAL SPECIFICATIONS ACCEPTED.

14,805, A. De Bourbon and C. De Bourbon, Embossed Wood-grained Paper to Imitate Carved Wood or Stone.—15,483, J. Egan, Water-closed Cisterns.—16,023, T. Durran, Traps for Sinks, Basins, &c.—16,097, J. Saunders, D. Davies, and J. Macdonald, Sash Fasteners.—16,203, R. Smallman, Apparatus for Supplying Lubricant to Bricks during their Manufacture.—17,018, J. Jones, Manufacture of Hinges.—145, J. Tulloch and T. Tulloch, Incombustible Composition for Finishing the Interiors of Buildings.—15,775, J. McKean, Machines for Boring and Tunneling Rocks, Stone, &c.—16,866, J. Craven, Cranes or Hoists.—16,966, F. Grosvenor, Shaping Clayware.—17,031, W. P. Thompson, Apparatus for Drawing Ellipses.—229, T. Birtwistle, Unions or Joints for Connecting Metallic Pipes, &c.—472, J. Inray, Air-Gas Apparatus.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

2,397, J. Finnie, Apparatus for Forming Hooks and similar Fastenings for Roof-gutters, Pipes, and Ridges.—3,113, J. Woolven and W. Eade, Circular Fire-stoves and Ranges.—4,360, J. Mackenzie and W. Atchison, Glazing Roofs and other Structures.—4,374, E. Edwards, Metal Roofing Tiles.—4,763, G. Macfarlane, Pushing Apparatus.—4,853, J. Parker, Stoves for Drying or Heating Bricks.—6,692, W. Campbell, Braced Girder.—16,709, J. White, Chimney Cows and Ventilators.—16,712, H. Lake, Flooring Clamps.—5,338, A. Harrison, Lathe Carriers.—6,457, H. Garner, Automatic Fastener for Double Doors.—7,783, C. Price, Kilns for Burning Bricks.—15,199, D. Figgott, Private or Domestic Fireplaces.—16,820, N. Paulson, Blowers and Heat Regulators for Fireplaces.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

Table with columns for location, description, and price. Includes entries for Enfield, Edmonton, Lambeth, Whitechapel, and Fulham, with various ground-rent and area details.

By NEWSON & HARDING.	
Holloway—23 to 35 odd, Wraycross-st, 63 years, ground-rent 8l.	£2,375
Hackney—214, Amhurst-road, 62 years, ground-rent 7l. 10s.	825
Holloway—45, Medina-street, 70 years, ground-rent 5l.	320
By SINCLAIR & SON.	
Kingsland—1 and 3, Motlinier-road, 45 years, ground-rent 12l.	1,470
Hounslow—Bath-road, "The Cedars," freehold	755
Mimico—16, Elizabeth-street, 37 years, ground-rent 5l.	660
By G. B. SWALEPICK.	
Leytonstone—Fairlop-road, &c., 15 plots of freehold land	1,680
The residence, "Albany Villa," freehold	438
By E. STRASS.	
Camberwell—28, Grosvenor-st, 10 years, ground-rent 9l.	170
Walworth—13, 14, and 15, Selam-street, 65 years, ground-rent 11l.	643
Southwark—Ground-rents of 140l. a year, term 8 years.	400
Bernamsey—19, 20 and 22, Salisbury-street, freehold	700
Brixton—52, Cornwall-road, 86 years, ground-rent 9l.	410
Hyde Park—49, Seymour-st, 23 years, ground-rent 8l. 12s. 6d.	940
Regent's Park—31, Mornington-road, 64 years, ground-rent 7l.	830
JONES, LANG, & CO.	
Commercial-road, E.—31-49 even, Taring-street, and 39, Spencer-street, 7 years, ground-rent 32l. 19s.	200

MEETINGS.

SATURDAY, FEB. 7.	
Association of Public Sanitary Inspectors.—Captain Douglas Galton on "The Purity of Air in Towns." 6 p.m.	
MONDAY, FEB. 9.	
Surveyors' Institution.—Mr. H. Robinson on "Some Recent Phases of the Sewage Question." 8 p.m.	
Leeds and Yorkshire Architectural Society.—Mr. G. Beaumont on "An American Frame House."	
Edinburgh Architectural Association.—Professor G. Baldwin Brown on "Gottfried Semper and his Theory of Architecture." 8.30 p.m.	
Society of Arts (Lecture Lectures).—Professor George Forbes on "The Distribution of Electricity." 11. 8 p.m.	
TUESDAY, FEB. 10.	
Institution of Civil Engineers.—(1) Discussion on Mr. Smart's paper on "The Construction of Steam Boilers" and (line permitting) Mr. B. Baker on "The Metropolitan and Metropolitan District Railways," and Mr. J. W. Barry on "The City Lines and Extensions of the Metropolitan and District Railways." 8 p.m.	
London and Middlesex Archaeological Society.—(1) Mr. Charles Roach Smith on "The Late Discoveries in the Wall of London." (2) Mr. E. Walford on "Thomas Park, and his History of Hampstead." 8 p.m.	
WEDNESDAY, FEB. 11.	
Corporation's Hall, London Wall (Free Lectures to Artisans).—Professor Kerr on "The Comparative Anatomy of Beams, Trusses, and Arches." 8 p.m.	
Royal Academy.—Mr. R. Stuart Poole on "The Cairene House." 8 p.m.	
Society of Arts.—Captain Douglas Galton on "The Report of the Royal Commission on Metropolitan Sewage." 8 p.m.	
Civil and Mechanical Engineers' Society.—Mr. B. Haughton on "Indian Railway Network, 1851." 7.30 p.m.	
THURSDAY, FEB. 12.	
Society for the Encouragement of the Fine Arts.—Mr. G. C. Hallé on "Wall-papers and their Manufacture." 8 p.m.	
Parkes Museum.—Dr. Perry Frankland, F.R.S., on "The Selection of Water for Domestic Supply." 8 p.m.	
Society of Telegraph-Engineers and Electricians.—(1) Captain H. R. Sankey, R.E., on "Some Recent Experiments in Electroplying with a Dynamo-Electric Machine." (2) Mr. J. A. Timmins on "The Working of Railway Signals and Points by Electro-Magnets." 8 p.m.	
FRIDAY, FEB. 13.	
Royal Institution.—Sir John Lubbock on "The Forms of Leaves." 8 p.m.	
Institution of Civil Engineers.—(Students Meeting).—Mr. Gilbert Hunter on "The Maybole Waterworks." 7.30 p.m.	
SATURDAY, FEB. 14.	
Architectural Association.—Visit to 16, Carlton House-terrace. 3 p.m.	

Miscellaneous.

Greek Epigraphy.—Professor C. T. Newton, C.B., is now delivering an interesting course of lectures on ancient Greek inscriptions. In his first lecture he observed that in the present state of our knowledge of Greek epigraphy we may confidently assert that inscribed monuments of equal interest to those of Athens, and Hellenic city of any political importance, and there is good ground for supposing that a considerable salvage of their remains will be accomplished as systematic excavations on ancient sites are carried on on a more extended scale. In his second lecture he traced the descent of the Greek alphabet from that of the Phœnicians, and pointed out the local varieties of the characters or letters in early inscriptions.

A Floating Breakwater for the Sussex Coast.

According to the *Sussex Advertiser*, a floating breakwater of an altogether novel type is shortly to be put up experimentally on the Sussex coast. The greater part of the funds required are already subscribed. There is no harbour of refuge between Dover and Portsmouth, and notwithstanding many official recommendations,—some of them urgent,—in favour of the construction of such, nothing has yet been done in this direction except the works now in progress at Newhaven. According to the old principle of solid stone walls carried down to the bottom, the expense of erecting breakwaters is very considerable. At Dover, where there is exceptionally deep water, the cost is 415l. per lineal foot, at Plymouth 300l., at Alderney 284l. Even at Portsmouth the employment of convict labour has reduced it only to 120l. By the adoption of the modern system of building upon huge months of concrete,—thus far applied only at Aberdeen and Newhaven,—the cost has been reduced to 72l. at Aberdeen and 52l. at Newhaven. For the system now advocated it is claimed by its inventors, Messrs. A. E. Carey and E. Latham, that the initial cost will amount to only 18l. per lineal foot. The construction of the new breakwater was fully explained by Mr. Carey at a public meeting held at Eastbourne the other day. Messrs. Carey & Latham's contrivance consists of a double row of empty iron boxes (to be possibly filled with cork to maintain buoyancy in case of damage by accidental collision or hostile acts in war) running out into sea in parallel lines. The front facing the sea tide-walls has a wedge-like shape, presenting to the oncoming waves its tolerably sharp edge, which is intended to divide the mass of water the underwave is first to be broken by a lattice framing carried 12 ft. below the pontoon (a depth sufficiently for all practical purposes), which will,—especially when overgrown with seaweed,—help to render the pontoon as heavy and steady as a waterlogged vessel. At the back of the wedge-shaped pontoon is another pontoon, also constructed of an iron box composed of water-tight compartments, which acts simply as a wall. The intervening space is to serve as a "wave trap," in which the waves passing the wedge will spend their force. The breakwater is to be moored, by means of an endless cable made of non-corrodible phosphor-bronze.

Steam-worked Tramways in London.

The long-cherished hope of advanced practical minds of seeing tramways within the metropolitan area worked by steam is about to be realised after a protracted struggle, and the North London Tramways system will have the credit of inaugurating the reign of common sense in this connexion. Seventeen engines have been built by Messrs. Merryweather & Sons for that system, and one of these made its first run on the line on Wednesday evening, January 28. This engine has 7½-in. cylinders, and is fitted with all the requirements as directed to those by the same firm which are in work on the Stockton and the Batley lines, where it has been shown that steam haulage costs but 3d. per mile as compared with horse traction previously employed on the same routes, and costing as nearly as possible 6d. per mile. The condenser, with which the engine is fitted, is so arranged that it is impossible for the exhaust steam to show in the least degree; this being collected in a feed cistern is sufficiently cool to be returned to the boiler by the feed-pump or injector. Within the next three weeks the line from Stamford-hill to Edmonton will be fully worked by these improved motors, a circumstance upon which we congratulate all parties concerned.—*Iron.*

The Improved Industrial Dwellings Company.

The half-yearly report of the Improved Industrial Dwellings Company, Limited, has been issued. The Company now possesses thirty-four estates in various parts of the metropolis, on which 4,586 dwellings have been built and are in occupation, and 355 are in course of erection and completion, making a total of 4,971 tenements. When these are completed, the number of persons residing on the Company's estates will be upwards of 25,000. The expenditure on capital account has reached 899,157l. The usual dividend of 5 per cent. is recommended for payment, after carrying 1,000l. to the reserve fund for the equalisation of dividends.

The "Chelsea" Centre-bit Moulding Lock.

The "Chelsea" patent reversible centre-bit mortise lock, which has been introduced by Messrs. Broughton & Co., of 169, Q. Victoria-street, has been already briefly noticed by us with commendation when shown in one of the numerous exhibitions of the past year, and it is so good a thing that some of our readers who have not yet seen it may thank us for calling attention to its merits. The leading feature of its construction is that its working parts are so arranged that the lock can be fixed in ordinary centre-bit borings, in a very short time, and without any knocking about of door with mallet and chisel. The mortise-hole is cut by a centre-bit (Jennings's 1-in. screw pointed centre-bit being used), the spindle key-holes being made with a ½-in. bit. W inserted into the mortise-holes, the lock can be withdrawn from the door by simply unscrewing the fixing screw, which pulls the lock out of the door. The furniture "roses" can be secured by screws which go nearly through the door and by the side of the barrel of the lock.

Clock at Kintbury Church, Berks.

The tower of this church has been recently fitted with a new clock by Mr. J. W. Benson, of Luton. The dial is 4 ft. 6 in. in diameter, copper painted black, with figures and hands of gold, well displayed. All the wheels are of hard brass, the teeth being divided, cut, and polished by steam machinery, which gives accuracy and immunity from the corrosion and rust inseparable from iron are secured. The escapement is "Graham's" dead beat, with special improvements introduced. For striking part the rack repeating principle used instead of the old-fashioned and unreliable locking plate, much given to strike the wrong hours.

Surveyors of Ecclesiastical Dilapidations, Diocese of Norwich.

A meeting of the Archdeacons and Rural Deans, under the presidency of the Bishop of the Diocese, was held on the 31st of January, for the purpose of electing a surveyor for Ecclesiastical Dilapidations in the place of the late Mr. R. M. Phipson, F.S.A. It was unanimously decided to have two surveyors in the place of one, Mr. Herbert Green, of Norwich, and Mr. E. F. Bishopp, of Ipswich, being elected, Mr. Gree obtaining twenty-five votes and Mr. Bishopp eleven votes. There were seven other candidates.

Exhibition of Meteorological Instruments.

The Council of the Royal Meteorological Society have arranged to hold, at 25, Great George-street, S.W. (by permission of the President and Council of the Institution of Civil Engineers), on the evenings of March 18th and 19th next, an exhibition of sunshine recorders and solar and terrestrial radiating instruments. The committee will also be glad to show any new meteorological apparatus invented or first constructed since last March as well as photographs and drawings possessing meteorological interest.

Alfreton Sewerage.

The Belper Rural Sanitary Authority have approved the recommendation of the Alfreton Sanitary Parochial Committee that Mr. W. H. Radford, Assoc. M.Inst.C.E. (late Assistant Engineer to the Nottingham Corporation), should be engaged to report on the present Sewage Works at Swanwick Delves, and advise as to the future disposal of the sewage, and as to the adaptability to that purpose of certain land now owned by the Local Authority.

London and County Banking Company.

The report adopted at the annual general meeting, held on the 5th inst., will be found in our advertisement columns. The net profits for the half-year ending 31st of December last amounted to 185,000l. This sum, added to 33,000l. balance brought forward from last account, produces a total of 218,000l. A dividend of 10 per cent. for the half-year has been declared, making 21 per cent. for the year 1884.

Dispensary and Relief Offices, Wandsworth Union.

The Guardians of the Wandsworth and Clapham Union have instructed their architect, Mr. Thos. W. Aldwinckle, to prepare plans for new Dispensary and Relief Offices, together with separate residences for two relieving Officers, to be built upon a piece of land acquired for that purpose at Battersea.

Deptford District Surveyorship.

Mr. Hugh MacLachlan, who obtained the Godwin Bursary in 1883, and thereby proved himself to have devoted considerable study to the practical side of building, is a candidate for the vacant post of Surveyor for the Deptford District.

The National Health Society.—The annual meeting of the members of this society was held on the 3rd inst., Mr. Ernest Hart in the chair. The annual report showed that 100,000 copies of the second report had been issued during the year to large audiences of working people and others in London and the provinces; and that the committee for investigating venereal and other poisons had been actively at work; that about 35,000 of the society's useful publications had been sold at the International Exhibition, where a successful conference school hygiene had been held under its auspices, and that several new pamphlets and leaflets had been issued, including one entitled "How to avoid and prevent the cholera," of which 10,000 copies had been sold and distributed. The chairman urged the members to make the fulfilment of the society known among their friends, increased funds being much needed to carry it on.

The Metropolitan Sewage Question.—The meeting of the Society of Arts, on Wednesday next, there will be a discussion on the recent Report of the Royal Commission on Metropolitan Sewage. It will be commenced by a paper by Captain Douglas Galton, F.R.S. Mr. Frederick Abel will be in the chair.

"Illicit Commissions."—In reference to a "Note" in our issue of last week [p. 161, ante], referring to a circular signed "W. B. — & Co.," we are asked to state that the circular was not issued by the well-known firm of William Bangs & Co., builders and contractors, Bow.

Ewerby.—Mr. W. F. Dixon, of University-street, London, has just erected a large five-light stained-glass window in Ewerby parish church as a memorial to the late Earl Winchelsea, of Nottingham. The work is the gift of the Hon. Finch Hatton, M.P., and his family.

Rainford Hall, near Liverpool. is undergoing alteration and enlargement, at a cost of about 11,000*l.*, from the designs and under the direction of Mr. Medland Taylor, architect, Manchester.

Royal Cambrian Academy of Arts.—At a general meeting of members of the Royal Cambrian Academy of Arts, Mr. Henry Clarence White, R.W.S., was selected their first president.

Great Barr.—A two-light Munich window has lately been placed in Great Barr Church, near Birmingham, representing the delivery of St. Peter from prison. The artists are Messrs. Mayer & Co.

For roughing-out a road and removing part of a hill on the Beulah Park Estate, Norwood. Mr. Newton Dunn, surveyor, Beckenbury, E.C. —

H. Hill, High Wycombe	£3,600 0 0
J. Hare, Clapham	3,440 0 0
W. J. Botterill, Cannon-street, E.C.	2,410 0 0
Woodham & Fry, Greenwich	2,054 0 0
Harris, Camberwell	2,000 0 0
Bottoms Bros., Battersea	1,985 0 0
W. Langridge, Croydon	1,950 0 0
Marshall, Brighton	1,900 0 0
Pizzey, Hornsey	1,850 0 0
Prowse & Lee, Liverpool-street	1,780 0 0
Green & Burling, Upper Thames-street	1,737 18 0
Jessup, Watford, Herts	1,622 0 0
W. Nicholl, Wood Green	1,599 0 0
Pell & Son, Bromley	1,595 0 0
J. Sharp, Fencham	1,450 0 0
J. F. Meston, Spring-gardens	1,390 0 0
W. J. Woodham, Sydenham	1,350 0 0
Bell, Tottenham	1,298 0 0
Fayman, Hackney	1,285 0 0
Greenwood, Mansfield	1,285 0 0
H. Putter, Clapton	1,250 0 0
Bendie Bros., Eritch	1,237 0 0
J. Quiltenon, Warringtonham	1,125 0 0
Saunders, Fulham	1,117 0 0
Thompson & Son, Fencham	1,066 0 0
A. Oliver, Harewood	1,000 0 0
J. Billingham, Northampton	950 0 0
Cooke & Co., Battersea	934 0 0
A. Blake, Sydenham	927 0 0
A. T. Catley, Lloyd-quadrant	849 0 0

Accepted, conditionally.

For alterations to Heath Villa, Leighton Buzzard. Mr. Frederick Gotto, architect, Leighton Buzzard—

W. Whiting, Heath, Leighton Buzzard	£439 0 0
A. Miles, Heath, Leighton Buzzard	387 10 0
E. Dawson, Linslade, Leighton Buzzard	385 0 0
Tutt & Sons, Leighton Buzzard	374 0 0
G. Grande, Leighton Buzzard	368 13 0
H. Edwards, Eggington, Leighton Buzzard	359 0 0
T. Webb, Leighton Buzzard (accepted)	329 0 0

For district stabling, office, and two dwellings in flats, &c., at Brixton, in connexion with the Parcels Post. Mr. Chas. J. Gladman, architect —

T. & F. Drake	£3,999 0 0
Patman & Fotheringham	3,873 0 0
J. W. Falkner	3,667 0 0
H. Bessley	3,660 0 0
H. D. Evans	3,600 0 0
J. Garlick	3,600 0 0
J. Marsland	3,565 0 0
G. Parker	3,339 0 0
Pack Bros.	3,309 0 0
Richens & Mount (accepted)	3,127 0 0

For rebuilding No. 32, Wigmore-street, W., and alterations and new show-room to No. 34. Mr. Alexander Payne, architect, 4, Storey's-gate, St. James's Park. Quantities supplied:—

T. L. Green	£3,547 0 0
T. Messon	3,100 0 0
H. Boyle	3,034 0 0
C. Cox	2,819 0 0
Perry & Co.	2,738 0 0
Longmair & Bargo	2,650 0 0
T. Boyce	2,630 0 0
Macey & Sons (accepted)	2,598 0 0
J. Simpson & Son	2,398 0 0

Accepted for the erection of new club premises for the Royal Southampton Yacht Club, Above-bar-street, Southampton. Mr. W. H. Mitchell, architect, 5, Portland-street, Southampton. —

Without Tower	£3,987	£312	£4,299
J. Crook, Southampton	£3,987	£312	£4,299

[For full list, see p. 122, ante.]

For new mission-room, Christ Church, Upper Clapton. Mr. F. T. Dolman, architect:—

T. Boyce	£1,333 0 0
B. T. Nightingale	1,077 0 0
Abby Bros.	1,073 0 0
W. Shurmur	999 0 0
Dova Bros.	995 0 0

For workshops, Lea Valley Works, Upper Clapton. Mr. J. Hamilton, architect:—

Woolveridge Bros.	£487 0 0
J. J. Barton	480 0 0
S. Hayworth	414 0 0
W. Shurmur	378 0 0
S. J. Scott	339 0 0
H. Harper	307 0 0

For alterations in Ship Tavern-passage, Leadenhall Market, E.C. Mr. E. B. P'Anson, architect:—

W. McGregor	£425 0 0
A. W. Hammond	348 0 0
Cobbs & Son	321 0 0
J. Morter	320 0 0
W. Brass	317 0 0
B. E. Nightingale	276 0 0
Rider & Son	270 0 0
W. Shurmur (accepted)	270 0 0

For rebuilding the Steamship public-house, Naval-row, Blackwall. Mr. Edward Brown, architect, Hanbury-street, Spitalfields:—

J. Anley	£2,445 0 0
R. Marr	2,293 0 0
J. Morter	2,314 0 0
W. Shurmur	2,215 0 0
S. W. Hawkins	2,175 0 0
Jackson & Todd	2,175 0 0

For the erection of two warehouses, Chiswell-street, Finsbury. Mr. J. Groom, architect:—

Dove Bros.	£5,225 0 0
W. Shurmur	5,163 0 0
S. W. Hawkins	5,025 0 0
J. Marsland	4,920 0 0
W. Braddon	4,867 0 0
Mattcock Bros.	4,867 0 0
J. Grover	4,833 0 0
Lawrance & Sons	4,807 0 0
J. Morter	4,183 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Modelling, &c., Cups Hotel, Colchester	Colchester New Corn Exchange, &c., Co.	30 guineas, 20 " 10 "	March 25th	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Draining and Sewerage Works	Willisden Local Board	O. Claude Robson	Feb. 10th	ii.
Granite Curb	East Ham Local Board	W. H. Savage	do.	ii.
Taking-up Margins of Roads	Tottenham Local Board	De Pape	Feb. 11th	xxvii.
Draining Works	Vestry of St. Luke's	Official	do.	ii.
Supply of Materials, and Execution of Paving Works	St. George-in-the-East Vestry	do.	Feb. 12th	ii.
Erection of Artisans' Dwellings	Great Western Ry. Co.	C. A. Legg	Feb. 13th	xxvii.
Construction and Completion of New Chapel	Stepping Union	W. F. Williams	Feb. 14th	ii.
Gravel Paving and Sewer Works	Vestry of St. Mary Abbot's, Kensington	Official	Feb. 16th	ii.
Draining and Scavenging	Wandsworth B. of Wks. Com. of H.M. Works	do.	Feb. 17th	xxviii.
Enlargement of Crown Post-Office, Canterbury	do.	do.	do.	ii.
Completion of Industrial Museum, Edinburgh	do.	do.	do.	ii.
Paving Footways	Greenwich Bd. of Wks. do.	do.	do.	ii.
Smith's, Engineer's, & Work	Midland Railway Co.	A. A. Langley	Feb. 19th	ii.
Ironwork for Widening a Bridge	Wiesbach Watrifs Co.	E. Easton & Co.	Feb. 20th	xviii.
Pipe-laying, &c.	Com. of H.M. Works	Official	do.	ii.
Erection of New Engine House, Liverpool	Ventnor Local Board	H. E. Wallis	Feb. 23rd	ii.
Construction of Promenade Pier, &c. Ventnor Works and Materials	Vestry of the Parish of St. Pancras	W. B. Scott	do.	xviii.
Erection of New Building, Southampton	Com. of H.M. Works	Official	do.	ii.
Removal of Dust	Vestry of St. Giles, Camberwell	do.	Feb. 24th	xviii.
Erection of Infirmary	St. Saviour's Union	Jarvis & Son	Feb. 26th	xvii.
Works, Materials, &c.	Vestry of St. Mary Abbott's, Kensington	Official	March 2nd	xviii.
Works and Materials	Surbiton Impr. Com.	do.	do.	xxvii.
Law Courts and Offices	Nottingham Corporation	Verity & Hunt	March 4th	ii.
Additions and Alterations to Asylum	Com. of Lunatic Asylum Gds. Fordingbridge Un.	Giles & Gough	March 6th	ii.
Erection of New Warehouse	Fred. Bath	Fred. Bath	March 16th	ii.
Glazed Stoneware Drain Pipes	Norwich Corporation	P. P. Marshall	Not stated	i.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor	Hendon Local Board	150 <i>l.</i>	Feb. 21st	xvi.

TENDERS.

For the restoration of All Saints' Church, Maidstone. Mr. J. L. Pearson, E.A., architect. Quantities not supplied:—

Fryer & Co., Maidstone	£18,990 0 0
Elmore, Maidstone	11,325 0 0
Nayler & Son, Rochester	10,325 0 0
Shillitoe	10,795 0 0
Vaughan, Maidstone	9,847 0 0
Combs & Gaymer	9,330 0 0
Walls & Clements, Maidstone	9,212 0 0
Bunning (accepted)	8,250 0 0

For alterations to the Three Pigeons public-house, Romford-road, Stratford, E., for Mr. R. Kemp. Mr. Frederick A. Ashton, architect:—

Mayhew	£208 0 0
Buckle	185 0 0
J. & F. Bane	175 0 0
Nichols (accepted)	135 0 0

For alterations and additions to the Duke of Edinburgh public-house, Upton Park, E., for Mr. W. Langman. Mr. Frederick A. Ashton, architect:—

Wyles	£1,655 0 0
Russell	1,629 0 0
Scott	1,475 0 0
Jackson & Todd	1,445 0 0
Scottney	1,398 0 0
Simpsen	1,389 0 0
Buckle	1,380 0 0
Brickell	1,300 0 0
Nichols	1,246 0 0
Heard & Son (accepted)	1,225 0 0
J. & F. Bane	1,217 0 0
Hall & Co.	1,200 0 0

For completion of warehouse in Crown-street, Soho, W., for Messrs. Cross & Blackwell, designed by the late H. L. Roumieu. Messrs. Roumieu & Aitchison, architects, 10, Lancaster-place, Strand:—

J. M. Macey & Sons (accepted)	£2,399 4 3
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For a pair of horizontal engines, pumps, and boilers, to be erected at Farnham, Surrey. Mr. James Lemon, M.Inst.C.E., engineer.—

Balcock, Wilcox, & Worthington, London	£2,650 0 0
S. Stott & Son, Manchester	2,270 0 0
The Sarsfield-street Engineering Company, Sheffield	2,255 0 0
The Grange Iron Company, Durham	1,975 0 0
J. Watt & Co., London	1,975 0 0
George Scott & Son, London	1,973 0 0
Steele & Dodson, Horsham	1,874 0 0
W. & J. Yates, Blackburn	1,814 0 0
T. Ashbury & Son, Birmingham	1,749 0 0
The Coalbrookdale Company, Shropshire	1,733 0 0
Manlove, Alliott, Fyler, & Co., Nottingham	1,712 0 0
T. Horn & Son, London	1,677 0 0
Cawser, Smith, & Co., Birmingham	1,675 0 0
Mason & Weyman, Guildford	1,650 0 0
W. Abell, Derby	1,655 0 0
Pollock & Menall, Manchester	1,649 0 0
Kirk & Co., Stoke-upon-Trent	1,640 0 0
Tangye & Co., Birmingham	1,639 0 0
J. Fernibough, Stalybridge	1,610 0 0
Naylor & Co., Hereford	1,580 0 0
H. Balfour & Co., London	1,570 0 0
J. Wolstenholme, Radcliffe	1,550 0 0
Napier & Son, Southampton	1,490 0 0
F. Fern & Co., Manchester	1,450 0 0
Guy & Stephens, Kingston-on-Thames	1,439 15 0
W. Hanson, Bradford	1,437 0 0
Spencer & Co., Wilts	1,400 0 0
Hanna, Donald, & Wilson, Paisley	1,400 0 0
The Glenfield Company, Kilmarnock	1,357 10 0
Bradley & Craven, Wakefield	1,301 0 0
Gimson & Co., Leicester	1,187 0 0
J. Richmond & Co., London	1,150 0 0
F. Silvester & Co., Newcastle, Staff.	1,137 10 0
J. E. Hainsworth, Dewsbury	1,132 0 0
Roush & Co., Kidsgrove	1,119 0 0
R. Laidlaw & Son, London	794 0 0

Accepted. † Withdrawn.

Accepted for building new shops in Broad-street, Reading, on site of Green Girls' School, for Mr. Galt, Messrs. Cooper, Son, & Miller, architects.—

J. Bottrill, Reading	£3,171 8 4
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[No competition.]

For the erection of a depot in Elthorne-road, Upper Holloway, for Messrs. Carter, Paterson, & Co. Mr. Wm. Eve, architect.—

Aldridge & Jenvey	£3,644 0 0
W. Downs	3,587 0 0
Potter	3,573 0 0
F. Higgs	3,439 0 0
Mortet	3,428 0 0
Perry & Co.	3,416 0 0
Harris & Waidrop (accepted)	3,383 0 0

For works in making additions, &c., at the Westcott Manor House, Swindon, for Mr. Thomas Turner, Mr. William Drew, architect, Swindon. Materials supplied.—

Barratt, Swindon (accepted)	£325 10 10
Williams, Swindon	306 0 0

For new house, to be called Cranwell House, at Lower Green, Tunbridge Wells, for Mrs. Mills. Mr. H. M. Caley, architect, Broadway-chambers, Tunbridge Wells.—

E. Thurbon, Tunbridge Wells	£3,154 0 0
Strange & Son, Tunbridge Wells	3,129 0 0
G. H. Dence & Son, Deal	2,966 0 0
Oakley & Drake, Tunbridge Wells	2,912 0 0
J. Jarvis, Tunbridge Wells	2,910 0 0
Deale & Son, Tunbridge Wells	2,777 0 0
Charwood Bros., East Grinstead	2,769 0 0

Accepted for a detached residence, St. John's, Wakefield. Mr. William Watson, architect.—

Flower Bros. (Excavating, Brick and Stonework), C. F. Rydoff (Slatting Work), C. Driver (Plastering Work), J. Lloyd (Carpenter and Joiner's Work), J. Brooke (Plumbing, Glazing, Ironwork, and Gasfitting), J. Naylor (Painting Work)	£2,913 5 0
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Accepted for the erection of house and stabling at Clacton-on-Sea, for Mr. G. H. T. Gooding. Mr. J. T. Browne, architect.—

Pilgrim & Riley, Clacton-on-Sea	£1,785 0 0
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[No competition.]

For the erection of cemetery chapel, caretaker's house, boundary walls, &c., at Blaina, Monmouthshire, for the Bedwelly Union Rural Sanitary Authority. Mr. G. A. Lantier, architect, Cardiff.—

Fickhail & Son, Merthyr Tydfil	£3,093 8 3
A. P. Williams, Blaina	2,979 9 7
J. McKay, Newport, Mon.	2,713 4 0
S. Morgan, Tredegar	2,529 0 0
J. Jenkins Bros., Swansea	2,410 0 0

[Architect's estimate, 2,633*l.* 8*s.* 6*d.*]

SPECIAL NOTICE—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., not later than *Four p.m.* on **THURSDAYS**.

TO CORRESPONDENTS.

W. T. B.—J. N. C.—J. M.—H. L. B. quite unsuitable for our columns.—W. R.—E. S.—R. D. & Co.—Centaur.—W. W.—E. R.—L. C. D.—& Elsewhere: we are disposed to think your statement of the case is much exaggerated.—S. and T.—E. R. C. C. (such appointments are only to be obtained through the Indian Public Works Department).—L. P.—D. & Son (see later).

All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

None.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond 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.

Still on Sale.—A few COPIES of the **NEW YEAR'S NUMBER** of "THE BUILDER," containing the following ILLUSTRATIONS, viz.—

THE CHAPEL, KEEBLE COLLEGE (Mr. W. Butterfield, Architect); Interior and Exterior Views.
 THE TOWER OF LONDON IN THE REIGN OF ELIZABETH. Drawn by H. W. Brewer.
 NEW PUTNEY BRIDGE. Working Drawings.
 ST. STEPHEN'S, WIMBORNE. Drawn by E. H. Sedding. Royal Academy Prize Drawing.
 THE STAINED-GLASS WINDOW, Salisbury Cathedral. Designed by E. Burge. Engraved by J. G. Burge.
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Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.
 Advertisements to be requisite for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of this latter COPIES ONLY should be sent.

SPECIAL—ALTERATIONS in STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE ADVERTISEMENTS must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent-garden, W.C. free of charge. Letters will be forwarded if addressed in envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.
 "THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 1*s.* per annum, Post-free. To countries within the Postal Union, 5*s.* per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 46, Catherine-street, W.C.

Best Bath Stone.
WESTWOOD GROUND,
 Box Ground, Combe Down
 Corsham Down,
 And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limited
 Corsham, Wilts. [Ad.]

Dry Corsham Stone.
 150,000 FEET CUBE.
PICTOR & SONS,
 BOX, WILTS. [Ad.]

Douling Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Douling Quartz is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to **CHARLES TRASK & SONS,** Norton-emb-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAM No. 16, Craven-street, Strand, W.C. [Ad.]

Douling Free Stone For prices, &c., a dress S. & J. STAPLE, Quarry Owners, Stone and Lime Merchant, Stoke - under - Ham (Ground or Lump), Ilminster. [Ad.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 3 Poultry, E.C.—The best and cheapest material for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and mill rooms, granaries, tan-rooms, and terraces. [Adv.]

Asphalte.
 Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
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SATURDAY, FEBRUARY 14, 1923.

ILLUSTRATIONS.

Wood Panel (Renaissance): In the Museum of the Louvre	234
Reredos, St. Andrew's Church, Aberdeen.—Messrs. Pirie & Clyde, Architects	235
The Cathedral of Notre Dame, Paris, as Restored with its Spires by M. Viollet-le-Duc, arranged upon the Site for a Cathedral at Liverpool, as suggested by Mr. John P. Seldon, F.R.I.B.A.	238-239
Houses in Cairo: Front of House on Court, showing Mak'ad, after Priase; Barber's Shop, after Coste, corrected	242, 243
Toynbee Hall, Commercial-street, Whitechapel.—Mr. E. Hoole, Architect	246
New Farm Buildings for Messrs. Threave.—Mr. Arthur Young, Architect	247

CONTENTS.

Phœnician Art	223	Reredos, St. Andrew's Church, Aberdeen	232	Mansion House Subway (with Plan)	251
The Cathedral Site for Liverpool.—By John P. Seldon	224	Houses in Cairo	232	Ventilation and Ventilators	251
Notes	225	Toynbee Hall	232	Kilnabrig Castle	251
Provision for Housing the Working Classes in Italy	227	Wiley Church, Warwickshire	242	Government Tendons	252
The Calene House	227	The Purity of Air in Towns	243	"Non-acceptance of Lowest Tender"	252
Parva Buildings (with Plan)	228	Temporary or Movable Wooden Structures	250	Damp Dwellings	252
Endless Wire Saw	230	The Powers of Water Companies	250	Caution to Architects, Surveyors, and Others	252
Architectural Association	230	House Decorators' Club and Institute	250	Impermeable Surfaces	252
The Pupin Travelling Staircase	231	Light and Air Cases; Buller's, Dickinson	250	The Student's Column: Descriptive Geometry—II	252
Mr. C. Rosch-Smith, F.S.A., on the Roman Wall of London: London and Middlesex Archaeological Society	231	Width of Streets	250	Variorum	253
Architectural Societies	232	Who Writes the Specifications?	250	Recent Sales of Property	253
Carved Wooden Panel (Renaissance)	232	Esthetic Proportion	251	Meetings	253
		Thames Sewage Scheme	251	Miscellaneous	254

Phœnician Art.



TO write the history of the art of Phœnicia is, at the present date, no easy task. About the arts of Egypt and Assyria, which, in his two preceding volumes, M. Perrot has so

ably treated, there exists, and has long existed, a vast store of indisputable facts, and a body of received opinion which has become canonical; but with respect to Phœnicia the material is but of yesterday, and opinion still in flux. M. Perrot's third volume* has, therefore, been eagerly looked for; he, if any one, would bring, we feel sure, order into this chaos,—would utter, if it were possible, some "clear disposing word" which should at least point out the way to some future conclusive theory. Nor does he disappoint us. In his usual luminous convincing way he states the difficulties of the case in such simple straightforward fashion that they seem at the outset half cleared away. His mind is of that delightful constructive sort that his material seems only to exist as part of the theory he is building. There is no lumber of useless detail; each fact falls into its fitting place. He is also such a finished workman that he never lets us see the process of his work; he is not all tools and scaffolding, as is the too common fashion of learned writers; he sweeps up all his chips, leaving behind no litter of useless learning; and, best of all, the walls of his theory rise up, as though Apollo built them, to the music of a perfect style.

We are haunted by a feeling of what a terrible book this history of Phœnicia might have been had it fallen into hands less capable. What dreary and puzzle-headed wanderings among scattered material,—what accumulation and comparison of fruitless theory,—what doubt, what learned and exhaustive weariness, what caution, and what fencing, to avoid the uttering of an opinion. Of all this M. Perrot knows nothing. His method for Phœnicia is as clear and sure as for Egypt and Assyria, though it has to be modified to suit the altered character of the material. He begins, as before in the case of Egypt and Assyria, with a sketch of the civilisation of the Phœnicians, and first with the topography of the mother country itself. Phœnicia was predestined to be the intermediary between the East and the West, between the old civilisations of Egypt and

Assyria on the one hand, and the young land of Hellas struggling into existence in the West. Egypt was no country to spread her influence by sea, rigid, conservative, monotonous, as the ebb and flow of her Nile river; she shrank from trusting herself to the perilous Mediterranean and to the still more perilous intercourse with foreign nations beyond the sea. Assyria was far distant, removed from Greece by thousands of miles of desert and mountain country. But between those two stable and hoary civilisations lay the narrow strip of sea-coast land we know as Phœnicia, a link between the two, trading from early times with both, and destined to carry their influence to the far-off West. And why destined? For the simple reason that the peculiar configuration of their country, where land-communication is difficult and often impossible, drove them to a coast trade, and that coast trade predestined them to commerce. "Partout et toujours, le cabotage a été l'école où se sont préparés et formés par degrés les peuples de commerçants," in Tsidon (Sidon) the "fishery," and Tsor (Tyre) the rock-promontory, were upreared the nation of sea-faring folk who were to be the traders of the world. Trade is the secret of the politics of Phœnicia, and trade, as we shall see, the main impulse to her art. "Anything, everything that will sell," was the motto of her artists. We cannot, of course, follow M. Perrot in his delightful voyage in the wake of Phœnician traders, "mariners renowned," as Homer calls them, "greedy merchantmen with all manner of gauds in a black ship," who passed from the mainland to Cyprus, from Cyprus to Rhodes, step by step from island to island, till they touched the coast of Hellas. Once they carried with them a goodly mixing-bowl for Achilles, the son of Peleus, and he set it for a racing prize at the funeral games of Patroklos. "Six measures it held, and in beauty it was far the best in all the earth, for artificers of Sidon wrought it cunningly and men of the Phœnicians brought it over the misty sea and landed it in harbour." Perhaps the secret of the fascination of this Phœnician art, the otherwise dull art of copyists and tradesmen, is that it was the art of Homer's days, that his heroes did about them Phœnician armour when they went forth to war, and clasped their mantles at home with brooches of Phœnician workmanship.

To the nature of this work it is time to pass. In his chapter on the method of study in dealing with Phœnician art, M. Perrot clearly states his plan of procedure. From the outset we have to understand that we must look for our materials far beyond the limits of Phœnicia itself. In studying Egyptian art we had but to transport ourselves to the valley of the Nile; all was clear and compact. The

same with Assyria. In studying Phœnician art, it is far otherwise; owing to Phœnicia's extensive trade, we are, so to speak, turned loose on the whole basin of the Mediterranean, from Tyre to Tarshish,—nay, even to Egypt and Assyria. It was in a Phœnician ship bound for Tarshish that the prophet Jonah sought to fly from the presence of the Lord, and that ship was no doubt carrying a cargo of rich stuffs, carved ivories, bronze bowls, amber beads, anything and everything that might cultivate the fancy of the half-savage dweller in distant Spain. Indeed, it is in the colonies and factories and trading-posts of Phœnicia, far more than in the mother country itself, that monuments of her art are to be found, in Carthage and Sardinia and Cyprus, in Thera and Melos, rather than in Tyre and Sidon, Aradus and Berytus. Of Phœnician inscriptions now known, nine only came from Syria; Athens and the Piræus have yielded seven; Cyprus alone eighty-four; Malta and Gaul, twelve; Sardinia, twenty-four; Carthage counts her thousands. "L'Antiquité Phœnicienne," says M. Rénan, "est de toutes les antiquités la plus émietlée," and the reason, he adds, is that the country has also been densely populated; successive waves of peoples have passed over it, each doing their share in the work of destruction, Greeks, Romans, Byzantines, Crusaders, Mussulmans. The coast trade of Phœnicia, so advantageous to her development, has also favoured her destruction, and finally her monuments have been exposed to centuries of Christian iconoclastic zeal. When the geographical distribution of monuments is so wide, naturally the doubt as to their authenticity is perplexing. How do we know that this or that object found in Cyprus, in Sardinia, at Præneste, is or is not Phœnician. It is almost entirely a question of style, not of provenance.* Happily as regards style we have a few certain criteria to go by, and these M. Perrot is careful to indicate. We have a few signed monuments with unmistakable, decipherable inscriptions in the Phœnician language, and these form a standard by which to judge of others; noticeably we have the famous bronze bowl found at Pales-trina with the inscription Esmunjaur-ben Asto. In the same tomb were found a number of other objects, vases, diadems, jewelry, all decorated in the same style. Here, then, as M. Perrot notes, we have a whole "find" of monuments which bear, so to speak, the stamp or label of Phœnicia, or rather,—for we know them to have been exported from Africa,—of Carthage. In judging, then, of Phœnician

* Histoire de l'Art dans l'Antiquité. Par Georges Perrot et Charles Chipiez. Tome III. Phœnicie Cypre.

* Recent archaeologists have adopted from the French the word "provenance" as signifying the identification of objects in regard to site or "whereabouts," as it might be expressed. The word is a convenient bit of shorthand for avoiding roundabout phrase.

monuments, what we must demand of them is, not that they should be found in Phœnicia proper, but that they should bear the stamp of what, from a few inscribed specimens, we know to be Phœnician style.

Having thus established and explained his method, M. Perrot turns to the subdivisions of his subject. He treats in succession of the following:—Architecture under the three heads of material and construction, forms and decoration, then certain special subdivisions, architecture of the tomb, of the temple, and of civil monuments, such as hydraulic arrangements and the fortification of seaports. To a nation so utilitarian as the Phœnicians this civil architecture was naturally a matter of paramount importance. From architecture, M. Perrot turns to sculpture, dividing it into the two main branches of the sculpture of Phœnicia proper and Cypriote sculpture. The history of Phœnician sculpture labours under the serious disadvantage that there are no works of the first rank preserved, and, indeed, probably none such ever existed,—works that might strike the imagination of the reader when presented to him and leave in his mind some clear impression of a national style. From the first the Phœnician artist himself was at a disadvantage; he had wretched material in which to work; nothing with the compact, close grain of the stone of Egypt to compel a careful, laborious, and finished style; nor yet the yielding material of Assyria, which tempted facility, still less the magnificent marbles of Paros or Pentelicus, only a coarse tufa-stone which favoured a mean and slipshod, rough and ready, manner. Further, the Phœnician sculptor suffered, in common with the Assyrian, from the absence of the nude model, without which there can be no truth in dealing with the human body, and, therefore, no dignity and simplicity, and, of course, no organic harmony of limb with limb, head with body. The Phœnicians, like the Assyrians, were a nation of clothes, of externalism, of ritual, of vestments; the human body was to them a mere peg on which to hang a certain amount of decoration. This is the curse that rests on all purely Semitic art, and from which the Egyptians and the Greeks were wholly exempt. A nation of artists who look at nature only in this disguised and distorted fashion will never advance so far as to distinguish in sculpture the individual, nor yet even the race. They are debarred for ever from a healthy naturalism. From Phœnician sculpture we cannot reconstruct the peculiarities of the Phœnician race. The type is always fluctuating, vague, confused; in fact, they were, as we shall see more clearly later, always eclectic, never original. Not caring to see nature at first hand, they took her at second-hand from the types of Egypt and Assyria, and later from Greece.

From sculpture, M. Perrot passes to the glyptic art, to painting, and to the industrial arts, including in these last pottery, glass, metal-work and jewelry, furniture and toilette apparatus, armour and woven stuffs. We have no hesitation in saying that the most fascinating part of M. Perrot's book is that in which he deals with metal-work in general, and in particular with the long famous bronze and silver bowls. These it was that first drew attention to Phœnician art, and these it is that give the key to the whole situation. Of all the works of art attributable to Phœnicia these are at once the most authentic and the most instructive. M. Perrot has engraved a goodly series of these bowls, and his remarks on the system of decoration common to all are so valuable that we must summarise them shortly. The elements of decoration observable on these bowls are drawn, as has long been known, from Egypt and Assyria, with, on the whole, a preference for Assyria. In sculpture and architecture, as well as the decorative arts, the eclectic tendency of Phœnicia is clearly seen; but it is in these bowls, and in them only, that the utterly mechanical and unintelligent nature of their borrowing appears. By far the largest element in their system of decoration are what M. Perrot calls "empty forms" (*formes vides*); that is, designs which have not only been bor-

rowed, but which have been ignorantly borrowed, and have in the process utterly lost their old meaning, and received no new one from the borrowers. These designs amuse the eye, "as the ear may be charmed by the sound of a language not understood," but they say nothing to the mind. Even the human figure becomes in such a system mere ornamental motive. Side by side with this borrowed phraseology rigidly stereotyped and constantly recurring, this repetition of mere artistic formulae, these heraldic sphinxes and griffins, these schematic Egyptian combats, these copied but unintelligent hieroglyphs, there runs also a vein of realism, an attempt to depict in the terms of actual life a lion hunt, a siege of a city, a ritual scene of offering, a choral dance, and the like. But even when this realism is attempted, it is a confused and unintelligent realism, a *pile-môle* mingling of, as in one instance, Greek hoplites, Assyrian archers, Cypriot horsemen, light-armed Africans, anything and everything that came to hand to fill the space. The instinct of the Phœnician craftsman, for we cannot call him artist, is not for expression,—he has no thought to express,—but for decoration; eclectic, unmeaning, but for all that, saleable decoration. When we have analysed Phœnician art, as M. Perrot trenchantly says, into its component parts, and separated off the borrowed elements, nothing is left at the bottom for the Phœnicians to claim as their own but the receipt for the mixture. And yet to this people, so mechanical, so uninventive, the ancient world owes a deep debt of gratitude; they were the art missionaries of the whole basin of the Mediterranean, only they brought a gospel they themselves did not understand,—they preached a dead letter. They had no desire to teach, and yet they left behind them everywhere lessons of priceless worth to a nation that was keen to learn. They stole from the Greeks, they cheated them, but they left in exchange not only the alphabet of letters, but the alphabet of art, so swiftly to develop into the full and perfect utterance of a Pheidias and a Praxiteles. Those "empty forms" which were to the Phœnicians themselves mere vacant patterns, became to the Greeks the vehicles of new and living thought. Devices charged with sacred meaning and doubly hallowed by long usage in Egypt and Assyria were, in their original meaning, as little understood in Greece as in Phœnicia, but the Greek mind did not gladly suffer the unintelligible; it was too clear, too incisive, too,—in the fullest sense,—classical. If the old meaning was lost, a new one could be found. A fascinating chapter in Greek art (and a chapter, we may say, which has yet to be written) will hereafter deal with this subject of "iconology," the form that suggests the thought. M. Clermont Ganneau has indicated the first lines of the study in his "Inauguration Phœnicienne," and we look eagerly to see what development of the matter M. Perrot may attain when he comes to treat of archaic Greek art. May he come soon, but, alas! he has first to dispose of Asia Minor and—the Hittites!

THE CATHEDRAL SITE FOR LIVERPOOL.

BY JOHN P. SEDDON.

THE proposed cathedral for Liverpool is a matter of almost universal interest, and the world may be said to be awaiting with anxiety to see whether that wealthy city, which ranks but second to the metropolis, will or will not approach the task in a spirit worthy of the occasion.

Such an opportunity occurs now but seldom in a generation, and there is a consequent absence of the emulative enthusiasm which, under like circumstances in Medieval times, led to magnificent results. The majesty of York Minster, around which that city is grouped, is followed at a very St. Mary at Edinburgh, which seems as if it could hardly claim the title of a cathedral at all, and which is stowed away, as it were, in

a suburb. It is earnestly to be hoped that the opportunity now afforded at Liverpool may be met rather in the manner of the builders of the former of these precedents than in that of this latter.

It is to be feared that in the preliminary selection of a site, this has not yet been the case. The choice already made of St. John's Churchyard for the purpose is, it must be owned, most unfortunate. Cheapness is its sole claim to consideration, and this in reality only from the most superficial point of view for the cost of another, in every way more advantageous, could be recouped by the increased value of surrounding property.

Liverpool happens to have this vacant space in its centre,—a space of inestimable value as such, both in an æsthetic and practical sense—a vital lung which it would be positive treason to obliterate, even with a cathedral. It possesses around it a series of noble municipal buildings, to which it affords means for being viewed from a sufficient distance as a whole, which would be lost were it occupied by any structure whatever. This site is so much below that on which St. George's Hall stands, that any building erected upon it would be dominated by that, and comparatively dwarfed. It is so small that, though an exaggerated parish church, a cathedral built in name, might be crowded into it, it would have none of the surroundings that are essential to such a structure. Ingenious schemes have been devised for raising its level somewhat, but these would entail the virtual destruction of the adjoining streets (which would be reduced to mere sunk lanes) and almost the extinction of the surrounding buildings. Surely, under such circumstances, cheapness (were it demonstrable, which is far from being the case, if all circumstances be considered) could not justify the persistence in such a site as this.

Mr. Robson, who was so long the town surveyor of Liverpool, and whose authority on such a subject is indisputable, has designated as "the foolish site" the one that has been chosen. In face of this judgment it is hardly conceivable that it can be longer maintained.*

It has been suggested that an appropriate site for a cathedral for Liverpool would be on the banks of the Mersey, and were it simply a matter of effect or sentiment there is much that might be alleged for such. It would be prominent at the entrance to the city from that splendid waterway, and it would be seen to advantage from the opposite side of the river.

There are, however, certain conditions for the position of a cathedral in a city which are attainable in one place and nowhere else. It should be central; in connexion with other fine municipal buildings; elevated, so that it might dominate, and not be dominated over a temple, not only for a cathedral, but for a tree-planted area around it, and other appurtenances appropriate to such ecclesiastical establishment.

Such a site exists in that known as that of Commutation-row, with the space eastward thereof. This is nearly 150 ft. higher than the river, and 50 ft. higher than St. John's Churchyard. It is in a line with the noble North-Western Hotel, and a cathedral built on it would complete, and not destroy, the splendid range of buildings formed by the Walter Art Museum, the Picton Library, &c.

It would also compose well with the surrounding structures in whatever style it were erected; for the strong predominance of horizontal lines in the Classical St. George's Hall, and its neighbours would form a good base even for an aspiring cathedral of Gothic architecture, or a dome, if preferred, would fitly crown the whole group.

Here is the best site Liverpool can find for its cathedral; the question is, will it give of its best for such a purpose? If it be not prepared to do so I do not hesitate to say it had better abandon the project for the present and leave it to posterity, who may be richer or more generously disposed; or, if more com-

* We are not, of course, responsible for the opinions expressed under the writer's own name, though we think Mr. Seddon's proposal deserves very careful consideration.
—E.

mercial views must have the first consideration, even from such this, the best site, will be found the cheapest in the end, for the following reasons:—

The property it would displace is already for the most part owned by the Corporation of Liverpool, and much of it is of a bad, and even of a disgraceful, character, needing to be pulled down and rebuilt.

The adjacent streets and buildings here, unlike those of St. John's Churchyard, would be immensely improved by the erection of a cathedral in their midst; and if advantage were taken to acquire sufficient ground in its vicinity, I have it upon good authority that the profit would more than recoup the value of the land appropriated as the site of the cathedral itself.

In order to show how a really fine cathedral would grace this splendid site, I have obtained from the skilled pencil of Mr. Brewer a drawing representing that of Notre Dame of Paris, as given by M. Viollet-le-Duc, with the spires which were intended to complete it. I have chosen this particular example, because the unusually strong horizontality of the main lines of its façade cause it to harmonise with those of St. George's Hall on the right, and the museum and libraries on the left. These, therefore, would form the base of a composition that if realised would be unequalled in the world, since the veritable Notre Dame of Paris cannot boast of a site to compare with this which is at the disposal of Liverpool for the purpose.

M. Viollet-le-Duc, writing of this western façade of Notre Dame, remarks that it is hardly possible to conceive a design more imposing as a whole, more sound in construction, or more skilfully executed in its details. Every one, he says, knows the front of this cathedral, but few, perhaps, realise the amount of knowledge, care, resolution, and experience implied by the erection of that colossal pile within the space of, at most, ten or twelve years. Still it is, as we see it in Paris, an unfinished work; the two towers were to have been terminated by spires in stone, which would have completed and rendered intelligible the admirably-designed tower masses. "Here, indeed, we have Art, and art of the noblest kind."

I have thought that it would be a useful thing to show how this restoration of the façade of Notre Dame by M. Viollet-le-Duc with the spires added to the towers would appear in perspective, and therefore have obtained the able services of Mr. Brewer for that purpose. The accompanying drawing has been carefully set up by him from the geometrical illustration given in plate xiv. of the "Lectures on Architecture," by that accomplished deceased architect, upon the site known as Commutation-row, in Liverpool, taken from the Ordnance plans and data of levels, and with those portions of the adjoining buildings which would come into view therewith. I feel that I need say no more on the subject, but trust that this ocular demonstration may press home my previous arguments.

I will conclude by summarising the criticisms of M. Viollet-le-Duc upon this magnificent façade in order to call attention to its principal features and excellences. The divisions of the front by grand horizontal lines form resting-places for the eye. Each division has its purpose; that in the massive basement provides for the three wide and rich portals, connected by the four canopies and colossal statues, which relieve what would be the hardness in the lines of the buttresses.

The gravity and strength of this basement is emphasised by the continuous belt of ornament formed by the splendid gallery of kings which surmounts it; and the parapet above it, adapted to the scale of the human figure, marks the colossal size of these statues. The great rose-window in the centre and the couplets of the towers on each side repeat and continue the character of the basement story, as also does the loftier traceried gallery above them form, as it were, an echo to that with the range of royal statues below, and its comparative lightness seems to be the preparation for the aspiring part of the composition, which commences therefrom. Up to this point the façade

has a stern and massive character, which would harmonise perfectly with the horizontality of the buildings which would form its foreground.

Now the towers disengage themselves and spring upwards with their lofty belfry openings and the shafted buttresses, but so vigorously that they call out for something adequate to support, otherwise it must be owned that they would seem superfluously strong. Every part of the composition appears designed to support and lead up gradually to spires, which should then soar heavenwards unrestrainedly.

One other point is noticeable in this western façade of Notre Dame at Paris: this, as M. Viollet-le-Duc puts it, is "variety in unity." Though at first sight the portals appear symmetrical, the left doorway differs from that on the right. The left tower is larger than the other, and the arcading of its great gallery is the more severe and solid of the two. Thence he concludes that the spires would have been varied, and in his restoration he has accordingly made them different in many points. This diversity is still more observable in the details when examined, and certainly gives an extraordinary feeling of life to the composition.

Of course, it must be understood that I am not suggesting the repetition of this particular design for the cathedral of Liverpool. No doubt it is possible,—would it were probable,—that as grand and glorious an ideal could be incorporated with the doubtless different practical requirements of a cathedral for this age. The able architects engaged to design one may be trusted to work out the problem in a manner that will sustain their high reputation. All that I contend is that they may be allowed to employ their talents in connexion with a site worthy of them and of the noble purpose which Liverpool is contemplating.

NOTES.

WHAT has been rumoured for some time is now officially announced, that Lord Rosebery has accepted, in addition to the office of Lord Privy Seal, that of First Commissioner of Works, in place of the Right Hon. G. Shaw-Lefevre, who has succeeded Mr. Fawcett as Postmaster-General. The outgoing First Commissioner has left his mark on the administration of his late office more distinctly than most First Commissioners for some time past, and we should be the last to refuse acknowledgment of his energy and determination in carrying out improvements from what he regarded as the right point of view. We felt bound, however, to oppose much of his work, regarding it as entirely mistaken from an architectural point of view, and the small minority of Englishmen who understand at all what architecture means will be the most disposed to concur in our opinion, and to regard with satisfaction the translation of the late First Commissioner to a sphere in which his remarkable administrative ability and his energy for reform will be devoted to a class of work which he probably understands much better than architecture and aesthetics. The evidence which Lord Rosebery has given, in some of his speeches on matters other than political, of the possession of wide culture and critical sense, promises well for his ability in dealing with the class of subjects which come under the decision of a First Commissioner of Works. One can hardly avoid, however, the expression of a feeling that the treatment of works and buildings is likely at the present juncture to be a very secondary consideration in the minds of most Englishmen, and that many of our readers who have more than merely professional interests at heart will consider the accession of Lord Rosebery to a seat in the Cabinet at the present moment a more important matter than his presidency over the Office of Works.

WE print, in another column, a letter from a professional correspondent of standing and experience, who shrouds himself behind the *nom-de-plume* of "Excelsior," in regard to the subject of specifications and the alleged

neglect of specification-writing, by London architects more especially, and the frequent execution of this important branch of practical literature by proxy. We publish the letter as a statement in regard to an important branch of professional work, which, if (as we hope) it is overstated, had better be openly refuted; if it is true, should receive serious consideration. In the latter case it is, perhaps, open to those who may feel themselves to be implicated, to argue that architecture is a branch of art, that specification is a piece of dry business routine best executed by the business-man who has given himself to that special branch of work; and such an argument may claim consideration for what it is worth. To our thinking an architect who commits the specifying entirely to other hands cannot possibly know as much about his building as he ought to know. We should be glad to hear the opinions of others, both as to what is the extent of the practice in London of turning over specifications to a specialist, and how far it is desirable or justifiable.

NOTWITHSTANDING Mr. Oakley's assurance that the railway companies have no sinister designs upon the British public, the opposition to their Rates Bills is increasing daily. Condemnatory resolutions are being passed, and memorials drawn up for presentation to Parliament, from one end of the land to the other. The Canterbury Chamber of Trade is co-operating with the East Kent Chamber of Agriculture to wage war against the measures; the Midland hardware trades and the Cardiff steel industries are equally hostile; while, to turn northwards, the Highland Agricultural Society of Scotland is preparing to memorialise Parliament, and is sending circulars to the Scottish members, asking them to use their best endeavours to prevent the passing of the obnoxious Bills. The agitation is not confined to manufacturers and agriculturists, for the Worshipful Company of Butchers find that the provisions of the Bills are calculated seriously to interfere with the cost of the food supply of London, and have decided to petition Parliament against them. This brings the question home to the people, and it is rapidly pushing its way to the front as an important public question. Numerous letters have appeared in the *Times* and other journals from influential and practical men commenting upon Mr. Oakley's defence of the measures,—some disputing his statements and others supporting them. All accept the points laid down by him as forming the principal grounds of the contention, and the views expressed upon them vary considerably. The question is looked at both from a legal and practical point of view, and Members of Parliament and others interested will find that there are many different points to be considered. All this, however, goes to show that the question is one of national interest, and not, as it was at first looked upon, a matter affecting the trader and agriculturist only.

SOME interesting facts bearing upon the building trades, are published *cum multis aliis* by the *Statist* in its financial *resumé* of the past year. The demand for wood was less than in either 1882 or 1883, while the decline in value of the importation was still greater, being only 14,464,743*l.* in 1884, against 16,647,606*l.* in 1883. Prices steadily went down from the commencement to the end of the year, and although no great losses were made during the year, profits were so meagre that they represented little more than bare commission. The extreme cheapness of production, combined with the lowest freights ever known, has just enabled the trade to pay its way, but without having regained any of the strength or credit lost in the preceding years. In the iron trade, values have been most dishearteningly low for the makers, and the depression is naturally felt very keenly by the engineering community, especially those members who are dependant on the great industries of agriculture, sugar manufacture, and shipbuilding. Steel for structures in large sections is as cheap as iron, while bridges, roofs, and all structural ironwork, have not been

so low-priced for many years. There has been a great absence of railway extension, though this has been in some degree compensated by the numerous widenings and enlargement of stations on the part of the companies. The price for copper, as the result of the year's trading, is not only about 12 per cent. below the lowest price ever known, but some 30 per cent. below what is usually considered moderate and safe, and nearly the same story has to be told of tin, lead, and spelter. It would seem, looking merely at the value of materials, that never could a house be built as cheaply as now; but, unfortunately, the decline has been correspondingly rapid in the demand for houses, and also, except in favoured localities, in the value of rents.

THE contrast presented by the declining dividends of some of the most important railway companies to the cheering reports of those minor associations, the omnibus and tramway companies, has extreme significance. It demands the very serious attention of men of business. Of course an explanation is forthcoming as to the former result. In one instance it is the decline in manufacturing industry, in another the falling-off in passengers going abroad, and so on. And in so far as these excuses go to show that care, skill, and other good qualities are as characteristic of the staff of each several line, as has always been the case, we heartily agree with them. But improvement of property is better than the best explanations why the reverse is going on; especially when that reverse has been long-predicted, unless certain steps were taken to avoid it. Thus the 10 per cent. dividend, with 1l. 5s. bonus, free of income-tax, of the London General Omnibus Company, shows a prosperity like that which attended the London and Birmingham Railway in 1844. The Tramways of the United Kingdom paid 5½ per cent. all round on their capital last year, and 6, 8, and 10 per cent. dividends are being announced for the last six months. And yet the tramways have to spend 80 per cent., and the omnibus companies more than 90 per cent., of their receipts for the conduct of their traffic.

THE reason for this difference is to be found in the fact that the smaller companies have concentrated their energies on one description of traffic. Of that they keep a complete debtor and creditor account. They work with their eyes open. They content their customers and they pay. The railways that act on the same way prosper also,—as in the case of the Taff Vale,—with its 16 per cent. dividend. But the railways that attempt incompatible traffic, that run slow mineral trains and fast passenger trains, necessarily interfering with one another, and actually so doing to the extent of reducing the capacity of the lines for traffic by 40 per cent., are going backwards, as they have been doing for some time. It does not seem likely that the attempt to raise the freights by the Bills now deposited will succeed. Indeed, in some cases, such as the carriage of hops, it would be cheaper to revert to wagons and horses than to pay the proposed tariff. If the managers of the English railways would take a leaf out of the book of the French Railway Companies they might expect, in a few years, to earn as good dividends. By carrying, at a fair and ascertained profit, all such freight as can afford to pay for speed; and by remitting to water carriage all such traffic as can not afford so to pay, trade and commerce would be relieved from a heavy burden, industry would be stimulated, and railway dividends would become as good as omnibus and tramway dividends in this country, and as railway dividends in France, actually are.

IN regard to the proposal mentioned in our Paris letter last week to erect a lofty iron tower of 300 metres (984 ft.) high, at the Paris Exhibition of 1889, it may be further observed that this is not dictated altogether by a desire to possess some great novelty, for it is claimed that the scheme will have certain scientific advantages. One of these will be that strategic observations can be made, having

a radius of 60 kilomètres, and thus military telegraphy may have a good deal of additional light shed upon it by experiments, such as communicating with Ronen, and other distant towns, in case of a repetition of an invasion and siege. As incidental observations, meteorology and the condition of atmospheric currents, astronomy, and experiments on electric lighting at this vast height, would all come under consideration. Comparing the Exhibition tower at 300 metres, we find that the tower of Cologne Cathedral is 159; the Flèche at Ronen, 150; the Pyramids, 146; Strasburg Cathedral, 142; St. Stephen's Dom at Vienna, 138; St. Peter's, Rome, 132; the Invalides, Paris, 105; the Pantheon, 79; and Notre Dame, 66 metres.

NEW YORK appears to be by no means free from the reproach of overcrowding, seeing that in the early part of last year it contained 101,735 separate buildings of all kinds, of which 17,615, or more than three-eighths, were exclusively of wood, or some other inflammable material. Only about 49,000 of the New York buildings are used exclusively for dwellings, 29,000 being used partly for habitation and partly for business purposes. The whole population of New York is located in 77,000 buildings, many of which are employed also for business or manufactures, and this makes an average of sixteen persons to a house. The outlook is not improved by the fact, that a large portion of the city is filled with small and inferior houses.

THE paper which was read by Captain Douglas Galton at the meeting of the Society of Arts on Wednesday evening, on the question of dealing with the sewage of the metropolis, contained a concise historical sketch of the subject, as well as a *résumé* of "The Report of the Royal Commission on Metropolitan Sewage." The question has been a "burning" one during the greater part of the last forty years, and its present condition is undoubtedly, as Captain Galton observed, due to the hap-hazard way in which the metropolitan drainage system came into existence. Captain Galton recounts the circumstances which operated to prevent the main-drainage system being rendered more perfect than it is, and concluded his paper with the following paragraph:—

"The importance of the report of the Royal Commission lies not so much in what it recommends for the metropolis, as in the valuable information which it has collected on the present state of the general question of sewage disposal,—information which is applicable to the wants of the whole country. The comprehensive manner in which the subject has been treated is of especial value at the present time, because the country is becoming too closely built over for this question to be allowed to remain any longer in the *laissez-faire* condition which it has hitherto occupied, if regard is to be had to the purity of the air, the purity of the soil, or the purity of the rivers and watercourses."

A MEETING was arranged at the Mansion House for Friday this week, at three p.m. under the presidency of the Lord Mayor, to obtain more extended support for the Parkes Museum, so that it may be firmly established on a permanent basis. We sincerely hope this substantial guarantee will be raised for the continued existence and prosperity of an institution which has been such a useful and important centre of sanitary work and study. In connexion with the subject, we may mention that the large and valuable collection of books in the Health Section of the Library of the International Health Exhibition, consisting of about 1,500 volumes, has been presented to the Library of the Parkes Museum, thus adding materially to a sanitary library which was already of considerable value.

THE recently-reported case of Mitchell v. The Darley Main Colliery Company, though in itself a decision as to the subsidence of land from mining, in principle has a very wide application. In effect it decides that if there has been some kind of underground working and a subsidence occurs in consequence so that damage is done to a person's property, the subsidence is the cause of action.

This is followed by the further development of the principle that if there ensues a second subsidence several years after the first in consequence of the old working, an action will still lie for any damage which may occur, and it is not barred by the Statute of Limitations. The second subsidence is, in fact, a new and wholly independent injury if damage result from it. It is unnecessary here to enter into a discussion of the general legal principles which underlie this important decision: the effect of it, whether damage be caused to buildings by mining or by excavations of other sort, is very visible.

WE recently commented on the noise occasioned in the Law Courts by the machinery beneath the central hall, which is used for the purpose of the electric light. To noise is now added a strong and offensive smell, which pervades the hall and the adjoining passages. It may or may not be unhealthy, being apparently produced by the oil or grease on the machinery. Be this as it may, it is not creditable to the public department which superintends this building that our metropolitan law courts should reek with offensive smells.

ON Monday, February 9th, the obsequies of the late M. dn Sommerard were celebrated at the Church of St. Severin and at the cemetery of Père-la-Chaise, with the pomp and ceremony suitable to the memory of one who held the important offices of Director of the Musée de Cluny, Vice-President of the "Commission des Monuments Historiques," President of the "Association des Artistes" (including painters, sculptors, and architects), and who was a "Grand Officier" of the Legion of Honour and a member of the Institute of France, besides being the holder of many foreign orders and honorary decorations. The pall-bearers were M. Kaempfen, Directeur des Beaux-Arts, representing the French Government; M. Bouguereau, President of the Académie des Beaux-Arts; M. Antonin Proust, Deputy-President of the Commission des Monuments Historiques; and M. Sahatier, Senior Vice-President of the Association des Artistes; all of whom, in the name of the various bodies which they represented, spoke in commemoration of the professional career of the deceased, referring also more especially to the important part which, as Commissaire-Général of France, he had taken in the International Exhibitions at London in 1872 and Vienna in 1874, to the dutiful and artistic care which he had taken in the conservation and increase of the treasures of the Musée de Cluny, and to his active collaboration in the recent formation of the Comparative Museum of Sculpture and Casts in the Palace of the Trocadéro.

ARCHITECTS who desire to turn an easy, if not an honest, penny are certainly not left without their opportunities and suggestions in that direction. A fortnight since we noticed the circular of a building firm, offering commissions on work introduced. We have now before us a circular of a more ambitious description, on larger paper, and with more pomp and circumstance; the appeal of a Land and Building Company "To Architects and Surveyors," indicating that the directors are prepared to erect private houses, schools, hotels, churches, or public buildings on the following terms:—"The Directors will erect any of the above class of properties at a profit of 10 per cent. on the moneys expended on the works in materials, labour, and hire of plant, and will allow the architects or surveyors introducing business (that is accepted by the Directors) half the Company's profit, viz., 5 per cent. The Commission is payable on receipt of all monies by the Company." The directors must surely be aware that architects and surveyors are supposed to be the impartial advisers of their clients, yet they are offering the profession the direct inducement to advise clients for their own, the architects', private interests in an indirect and underhand way. In both these cases the circulars in question were sent to us by architects, requesting our reputation, on the part of the profession, of any co-operation in such dealings. We shall

be happy to deal with any more literature of the same sort that may be going about.

THE following little story throws an interesting light on the spirit in which some of the so-called sculpture in connexion with ecclesiastical architecture is carried out by the carving firms who supply statues of the proper saints at so much a head. A dignitary of the church, looking on at the work of a carver on a restored church front, wished to inform himself of the cost of such work. "Why, that depends," was the reply; "you see they are so different; now, one like that David there runs into a heap of money,—arps and that like makes 'em ever so dear." The questioner tried again with, "Well, then, what do you suppose those angels would come to?" "Oh! we don't think nothing of angels; we turn them out by the dozen!"

PROVISION FOR HOUSING THE WORKING CLASSES IN ITALY.

THE urgency of the question of housing the workman is by no means felt only within the shores of the United Kingdom. In Italy, where the climate allows so many of the occupations of daily life to be carried on out of doors, the cubic volume of house-room required per individual is much less than is the case with us. Yet so great is the pressure as to call for the interference of the Government in the case of their most important arsenal. In Italy, it should be remembered, the problem of housing the greatest number of persons on a given area has been twice solved, and that under two distinct forms of civilisation. In Imperial times, as we know from the structural remains of Pompeii, the sleeping-apartments for working folk, as well as for domestic servants, were but little larger than would hold a bed or mattress. The *cubicula* were often without doors, shut off from court or corridor only by a curtain, and in keeping with the little open-fronted dens occupied as shops. It was before, rather than in, these apartments that the wares for sale were displayed to attract attention, and that, as in the present day in Naples, the owners were wont to carry on their handicraft *al fresco*. It is desirable to bear this question of accommodation in mind when any question arises as to the comparative cost of Italian and English buildings. Material, over the greater part of Italy, is cheaply furnished by tufa, which is as easy to quarry and to dress as our own chalk, or by other building stones, some of them of great excellence and heavy. Lime almost everywhere is excellent, and the *lapilli*, or white gritty volcanic ashes, or, rather, cinders, form an admirable ingredient for cement, for stucco, and for scagliola. The men, in many instances, are born masons; constructing, with the utmost readiness, out of a few stones, a little mortar, and perhaps a coating or cushion of mud, those temporary appliances for which we are accustomed to call in the aid of the carpenter; as, for example, the centering of an arch. On the other hand, the solidity of the buildings and the thickness of the walls throughout Italy, intended as they are to resist the force of earthquakes, are incomparably greater than with ourselves. Thus when we set the quantity of walling required for a given content of cubic space in Italy, against the cheapness of the material and of the workmanship, we still find that it is only by the reduction to the minimum size of the accommodation per head, as in the cells of the large monasteries, that cost is kept from becoming excessive.

Around the great arsenal of Spezia the working population has been housed, or has housed itself, in so small a space of house-room, that the result has been to intensify the recent ravages of cholera, which is said to have raged more fiercely there than even in Naples. The Minister of Marine has called on the Municipality of Spezia to aid in removing the source of mischief, in so far as it is attributable to overcrowding. Dwellings to accommodate 1,000 families are at once to be commenced, and to be completed within three years. The buildings will be somewhat on the ordinary plan of the monasteries, but of three floors only; a quadrangular edifice surrounding an interior court or garden of 200 metres on a side. A hospital, with 200 beds, an infant asylum, a public school, a washhouse, and an establishment of warm

baths, will also be erected; as well as a sort of *hospitium* or accommodation for the nightly lodging of 200 workmen. The charges proposed are extremely moderate. For each room the rent is fixed at 4 francs a month, which is as nearly as possible 1*l.* 18*s.* 4*d.* per year. For a kitchen the rent is 3 francs a month; for the temporary lodging, 2*d.* per night; for a warm bath, 1*d.*

It is proposed to meet the expenditure by a loan of 64 millions of francs at 5 per cent., which rate of interest is to cover a sinking fund to extinguish the debt in twenty-five years. By comparing this amount of capital and rate of interest with the charges for rent, we find that the cost of accommodation will be about 35*s.* 2*d.* per room, about 25*s.* 7*d.* per kitchen,—the kitchens will probably be in the basement,—and they are usually, in Italian houses, what we should consider disproportionately small,—and about 60*s.* for each bed of temporary accommodation. In the latter case, therefore, the use of such furniture as is indispensable must be included in the nightly charge. As the interest on the proposed capital will amount to 13,000*l.* a year, it is evident that the provision to be made is for more than the thousand families mentioned in the first instance. It will be matter of great interest to watch the mode in which this project is carried out. Working plans of the buildings may, perhaps, be obtained and communicated by some of our travelling architectural students; and the balance-sheet of the establishment, which the careful and accurate book-keeping of the Italian statisticians will, no doubt, provide in exact detail, will be full of instruction for ourselves.

The water supply, in buildings of somewhat the same kind as those described, in many parts of Italy, is usually given by wells sunk in the court; and a little crane, fixed on the topmost story, enables any occupant of a floor in a vertical line below to draw water by a rope passing over the pulley of the crane. Of course this method depends on the geological character of the site. If large quantities of water are required this hand-work comes to an appreciable cost of labour; but as it may be said to economise time that would otherwise be lost, it is likely to be generally preferred to the laying on of water through pipes, even at the lowest cost yet known in any of the great American cities.

In the calculations which have from time to time been made, by ourselves and by others, as to the feasibility of erecting in London or other great centres of population large *cenobia*, or buildings for the occupation of a considerable body of workpeople, the cost has usually come out at such a figure as to be prohibitive. It has been said that the habits and prejudices of the English people are such as to limit our cheap house-architecture to the mean and paltry aspect of such places as the outskirts of Birmingham. We suspect, however, that prejudices of this kind would disappear before the offer of cheap accommodation in a commodious barrack or *hospitium* like a great Italian monastery. The real question is, Can this be cheaply given? The subject will well repay a large amount of study. We fear that the exigencies of our climate are such as to demand a cubic volume of space, per head of the residents, which, at our prices for land, for materials, and for workmanship, render very cheap housing impracticable. Whether this be so or not, it will be doing good service to the profession and to the public to have the matter thoroughly threshed out.

It is clear that in all the inquiries and discussions that are now going on as to the housing of the working classes, such a statement of the practical cost per head, or per 100 ft. of space, as might be taken to be normal, is a primary requisite. This would, of course, involve the adoption, at all events for purposes of calculation, of a normal plan of dwelling-house, whether composite, as in the case of a large building to contain a number of families, or simple, as in the case of rows of small houses. We anticipate that the ground-rent (which should be calculated separately) would be lowest for the large house, but that the cost of building would be lowest for the row. That, however, is a matter that would soon come into daylight. Provided with a scheme of this kind, distinguishing the cost for site; for buildings; and for rates, gas and water supply; on either plan, our municipal authorities, or any persons interested in the provision of accommodation for the working classes, would have given ground from which to start. To provide a

normal plan and estimate would be beginning at the beginning; and this work of the Italian Government may well aid us in the task.

THE CAIRENE HOUSE.

ON Wednesday last Mr. R. S. Poole, LL.D., delivered a lecture to the students of the Royal Academy on "Cairene Domestic Architecture." The lecturer said that the subject he had chosen was large but yet obscure,—large in point of its far-reaching architectural scope, and obscure in the little which is known about it in the present day. This house architecture had not had its chance, it was fast dying out, and the number of those few but earnest enthusiasts who strove to save its few records was indeed small: among this number were Mr. Frank Dillon and Mr. James Wild, to the former of whom Mr. Poole expressed his great indebtedness for a series of beautiful water-colour drawings unexampled in point of completeness and fidelity,—the only series of the kind extant. The great art of the Middle Ages had two sides,—its eastern side and its western side. The names we assign to these two great sister arts are Gothic and Arab, both strangely wrong when taken in their literal sense. These two arts are in many respects so nearly akin to one another, and the one bears such remarkable and unmistakable traces of the same movements as the other, that, in order to study either in any complete manner, due consideration must be paid to its sister art. In the latest great mosque, for instance, a century old, distinct traces of the Renaissance style may be observed which are so prominent, and carry so much conviction with them that one can no longer doubt the distinct affinity between these two branches.

Where did this Arab art originate, and who were its makers? To answer those questions we must turn our steps back to the distant period of 3,000 years ago: we have an old Theban fresco representing all the particulars of what domestic architecture then was. Here we see the belvedere looking northward, and the same sloping ventilators open in the same direction, covering the terraces of the upper stories, as are now to be seen in the Cairene house of the present century. The reason, perhaps, that there have been so few radical changes is that the style of architecture which is peculiar to Egypt, and especially to Cairo, is thoroughly suited to the climate of the country.

It is somewhat astonishing to find so large a proportion of the interior of the houses built of wood, which must have been expensive in a country where very few trees are to be found; but this circumstance shows the infinite trouble which the working architect would take in order to vary the monotony of the appearance of his work, and to render it thereby as pleasing to the eye as possible. And the mention of the word architect brings us to the question as to who were the designers of these beautiful buildings. Regarding those of very ancient date, history is silent; but when we come to those which are comparatively more modern, we can say with certainty that the decorators were *Christian* Copts. When we say that they were Copts, we must not forget that though the art-workmen were undoubtedly all Copts, the architects of greater buildings were both Copts and Greeks.

So many circumstances have combined to prove the truth of this theory, that one or two instances may suffice to do away with any doubts on the subject. Remembering the essentially decorative character of Cairene art, in comparing the ornament of the Coptic church with that of the Mohammedan mosque, we find designs of a precisely similar nature, and one of the most remarkable proofs of the theory comes from the fact that the finest Coptic geometrical and florid patterns spring from a central cross, and that this cross-pattern, modified so as to conceal or obliterate the cross itself, is found in the Mohammedan mosques, where a cross could not possibly be introduced, as a symbol contrary to all the religious feelings of the Muslim. One has only to compare the Coptic type with the cross with the Coptic type used for Mohammedan without to see the far greater beauty of the Christian pattern. The cross suggests its surroundings, patterns without it are either heavy in the centre from the superposition of the saltire on the cross, so as practically to erase it,

or they present an appearance suggestive of vacancy and meaninglessness,—the want of a true centre. In any case, whichever way we look at it, the force of the Mohammedan pattern is in the surroundings, that of the Christian pattern in the centre; it is almost unnecessary to state which is the more beautiful, nay, which is the only beautiful one; and this fact does away with the sentiment of those who maintain that this Eastern art is no Christian art; and it is surely well to remove a feeling which, if true, would deserve our entire respect. It is, then, to the Copts and to their religion that we owe a debt of gratitude for the beautiful work they have left behind them, and which it is the duty of all artists to strive to maintain.

Cairo is, and, practically, for centuries has been, the capital of Egypt, and it is here that we are to look for the best specimens of our subject. The art of Cairo in the Middle Ages must stand before Spanish and Indian, or even Sicilian, but in domestic work it is an art of within rather than of without. Its beauty is, so to speak, indoors. The outside of the Cairo house is comparatively plain, with the exception, of course, of a handsome door, and sometimes a latticed window, usually belonging to the inferior apartments, the Oriental habits precluding any unnecessary views upon the street. The house architecture of Cairo is all that really survives of fine Medieval work of this kind, and is now on the eve of perishing. The examples still remaining are of the sixteenth, seventeenth, and eighteenth centuries. Even so short a time as forty years ago there were a multitude of specimens of houses which were marvels of decorative skill. A few efforts, it is true, have been made to rescue them from hopeless obliteration, notably that of Mr. Frank Dillon, who, in his splendid water-colour drawings referred to above, has given us what he actually saw before him on the spot, and not artistic efforts straining after effect. Mr. Stanley Lane-Poole also, by dint of untiring energy, has succeeded, not in transplanting a whole Cairene house to England, but in reproducing, with the original materials, an Egyptian room, which, though somewhat diminutive in point of size, is still an accurate representation, and which is to be seen now at the South Kensington Museum.

The plan of the Cairene house is intricate in details, the principles being, however, simple. One must not be led into taking one house as a general example and type of all the rest. By so doing we should narrow ourselves into forming an idea that these houses were all built alike, on hard and fast rules, a notion entirely contrary to that which the architect had in view. His great idea was variety, and his chief care to avoid monotony in appearance and construction; hence it is that all houses differ in their details. The Cairene house was built round three, or sometimes four, sides of a central court, in the which was planted a fine tree. When the house itself only took up three sides of the court, the fourth was usually occupied by a partition wall, separating it from another house. When there are more courts than one the house is made up of so many different houses, corresponding in number to that of the courts. The principal side in point of decorative beauty, that, in fact, on which the artist lavished all his skill, was the side which looked towards the north, and the reason for this was twofold, first because the belvedere or open room with arches was built to face in that direction, and secondly in order that the cool breezes thence might penetrate the latticed windows of the principal rooms of the house. This belvedere was a sort of open gallery with pillars in front,* which formed an agreeable lounge in the hot weather, and which almost always was reserved to the use of the men; in some cases, however, we find it latticed up to a sufficient height for the use of the women. The horror which the Coptic artist and architect had of monotony alike in construction and design is eminently exemplified by the arrangement of the stories and rooms, which present great irregularity. Thus the chief room or men's saloon on the ground floor often reaches to the roof, as also does the chief room on the second floor or women's saloon, and again we have an intermediate story or mezzanine built over a lower ground-floor. The ground-floor, and usually the greater portion of the north side, is generally built of stone, and painted in alternate

* See illustration in this number.

courses of red ochre and white; the higher part plastered with the fine white gypsum of the country. Throughout the building great constructive skill is shown, and, as in all architecture, wherever the construction is good it is sure to be shown prominently. So it is with our Cairene house. The beams which support the ceiling are plainly visible to the eye, and are supported at the ends by elongated corbels ending in perfect stalagmic patterns. Nothing is hidden away; everything is fair and above ground; there is no insincere work, and, unlike our modern edifices, the process of building would have stood the minutest and most critical inspection. The principal rooms in the house were the belvederes mentioned above, the men's saloon, and the women's saloon. One of the beauties of these rooms is the extensive use of wood and the rare use of stucco, which is, indeed, a testimonial to the sterling value of the architect's work, since he preferred to go out of his way to employ wood for his purpose, when he might have got a far easier but more perishable material at home. The men's saloon and the women's saloon were much the same, as far as their design was concerned, the women's being, if anything, the finer of the two; the Orientals showing that they, too, as much as other people, had the right feeling as to the magnificence of the reception apartment of the chief lady of the house. The room itself had a depressed centre, at each extremity of which was a deep bay or dais raised slightly above the central level. Round each of these bays ran divans, and in the extremities of the recesses were the latticed windows,* known as Meshraheeyehs, unequalled for their perfect harmony of designs in wood. Above the depressed centre rises a clerestory, which is usually lighted by a lantern or dome. Round the walls runs a high dado, made of light-coloured marbles, inlaid in simple geometrical patterns, or rich blue tiles of floral patterns, and in this simplicity the Copts showed their excellent taste. Our Oriental artist never forced a complicated pattern before people's faces so as to constantly bewilder them and tire their eyes. But when we bring a piece of lattice-work to England, and put it in a wrong place, we may say, because others do, that it is very charming, but in our heart of hearts we put it down as too complicated, and, therefore, trying to the eyes. But when the Egyptian sat in his room or saloon he was not obliged to be for ever staring at lattices and elaborately intricate patterns. The meshraheeyeh was behind him, and the reposeful dado on his level. The general surface, besides the dado, was usually painted in bluish grey distemper, or the white gypsum of the country was left. The only breaks in the wall were those which were absolutely necessary, such as cupboards and recesses for pottery, porcelain, &c. The only furniture, and that of the simplest kind, consisted in a small table for meals, and on the daises few coloured mats, a prayer carpet or two, and divans. What we should call the furniture in our sense in reality did not exist, the house being furnished by the architect and not by the upholsterer. Stained glass was used sometimes in the upper part of the meshraheeyeh, and constantly in the complete stained-glass windows higher up the wall. In the centre of the depressed centre, in a tessellated marble pavement, a fountain played. There was also a niche in the wall, originally for the purpose of the direction of prayer. As regards colour, and this is about the last point for our consideration, the Copts used what we should call decidedly primitive colours. The red stands for vermilion, the yellow gold, the blue lapis lazuli or ultramarine, the green emerald (sulphate of copper), the black ebony, and the white ivory; and, in their colour, the workmen had due regard for their earlier predecessors' example, and, although they might have made use of the Persian mixed tints, they preferred to employ the above primitive colours, which in no case, in the good period, grate on one's sense of harmony or offend the eye. Towards the close of the age of domestic art, which is known by examples, mixed tints came in. The possibility of adapting an art such as this to our country and climate is a question which has met with ridicule from those who are ignorant of the way to set about the work. It is not an undertaking to be finished in a day, or a work to be treated lightly. The only way to set about it is to acquire a complete knowledge

* See second illustration.

of the grammar of the art, so as to be able to speak its language, instead of, parrot-like, repeating unintelligible phrases. This truth was illustrated by meshraheeyehs, which we usually imagine as being closely latticed, but which here showed large open arches, as well as by instances of the open lattices commonly used in men's apartments. The lecturer, in conclusion, urged upon his audience the necessity of sending students to Cairo to study on the spot this noble art,—an art which, in house architecture, has no rival, and yet which is fast dying away.

FARM BUILDINGS.*

The question of satisfactorily planning and constructing buildings for agricultural purposes is likely in the immediate future to become a pressing one, and although we architects may not be called in as often as we should wish, so much work of this class falls into the hands of land agents and managers of estates, still it is worth our while to study the question as closely as we can, and to give it more attention than the subject has hitherto received, particularly keeping in view the all-important point of economy, as, with decreased rents and the uncertainty that must for many years to come overhang the agricultural interest, owners will be loth to spend the sums that even of late years have been spent upon this class of property; and although the different companies for advancing money for the improvement of lauded estates have helped many landlords to improve their holdings and replace the old and dilapidated buildings with more modern ones, and on estates under good agents and wealthy landlords much has been tried in the way of experiment, and so-called model buildings have been erected, still the great question will always be, what is the least expense that can be entered into properly to house the various farm stock and implements, and to construct the necessary dwellings for the farmer and his labourers?

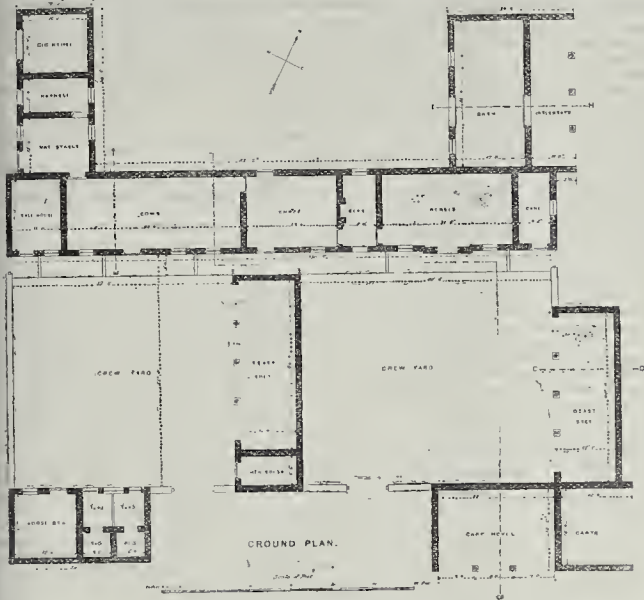
There seems little doubt also that one of the next experiments of the present rulers of our destinies will be to try and develop more largely that class of farmers known as peasant proprietors, and this will of necessity give a certain amount of impetus to agricultural building; but as the greater part of the capital required to be spent will in all probability be provided by the State in the form of mortgage loans, only carefully-planned buildings, useful for their several purposes and economical in construction, should be erected, and I purpose to give here the information bearing upon this question I have managed to gather during the last few years.

I shall not attempt to take you into the higher fields of theory, or to go into the vexed questions of silos, covered yards, or any of the elaborate details of so-called model premises, but will describe the various buildings requisite for an average-sized mixed husbandry farm; and have selected as examples three sets of buildings in the Midland counties, as being fair specimens of the ordinary requirements. I have had no experience of specially-arranged dairy farms, or of the buildings requisite in the hop-growing districts of the southern counties; nor have any of the people with whom I have come into connexion yet entered largely into the manufacture of jam,—which industry, I understand, is to rescue the impoverished British farmer from his present Slough of Despond.

The first point to consider in fixing the site of almost any building in a country district is the water supply, and for farming purposes it is most important that a plentiful supply should be obtainable close at hand. In theory, also, it is best that the buildings should be as nearly as possible in the centre of the holding; but in practice I find that the farmers as a rule prefer to have their house and home buildings as near to a village as they can be got. On any holding above 100 acres, the stock-yards, &c., then, should at any rate be on the farm itself, and a foreman's cottage should be built close at hand. The position of the main roads must be carefully studied, and the easiest access to railway stations considered, the cost of transport being one of the largest items of expenditure in outlying districts.

Having satisfactorily settled the site, the next point to consider is, whether there shall be one, two, or more stock-yards. For holdings

* A paper by Mr. Arthur Young, read before the Architectural Association on the 6th inst.



Threave's Farm Buildings.—Plan.

up to 500 acres two yards will as a rule suffice; but it is best, if the funds at the architect's disposal will allow of it, always to give two, and as far as possible to separate the yards thoroughly. The plan of Threave's Farm shows a simple way of doing this.* Having arranged the yards, the next point to take into consideration is the aspect; and it is most essential to place the buildings so in relation to the crew-yards that the stock fattening shall get the benefit of all the sun that can be obtained, and also should be sheltered from the cold winds by the buildings. The buildings should, therefore, be on the northern and eastern sides of the yards, and the sides to the south and west left open. The level of the yard should be about 2 ft. below the level of the stable pavement, and should be made as impervious as possible by well ramming and clay puddling so as to keep the straw-bedding, &c., in the yard as "good" as possible. In the yards provision should be made for drinking-water for the stock, and if this can be running water so much the better; and an overflow-pipe to keep the yard sufficiently drained is a necessity.

In disposing the various buildings round the yards, it is best to place the following within easy distance of the farmer's house or bailiff's cottage: the wag stable, gig-house, and harness-room, the calf-house, and the infirmary box. The first for convenience by day, and the latter by night, as occasion may arise when it will be important to watch a cow or mare, or to feed the calves by hand, and a dry way of access to them is a good thing. It is a fault on the right side to make both the gig-house and harness-room larger than the uses indicated by their names would imply, as the gig-house becomes generally a storage place for all sorts of odds and ends, and in the harness-room the odd boy about the place cleans the boots, oils the gun, and reads the local weekly paper on Sunday afternoon. About 18 ft. by 14 ft. is a good average size for the gig-house, and about half that width for the harness-room. A small loft is usually arranged over in which a small supply of corn is kept, along with apples.

Taking the buildings in the rotation of the plan before us, we next come to the calf-house, which, in an ordinary way, is simply a large box, about 18 ft. square, with a low manger on three sides divided up by wooden palings into pens of about 4 ft. square. In larger buildings it will sometimes form a detached building with, perhaps, a tramway running down the centre for convenience of feeding, with the pens on each side,

* See also sections and elevations on separate plate in this week's illustrations.

and a gangway all round of about 4 ft. With this arrangement the floor is sometimes sunk about 2 ft. 6 in., and I have seen a very simple and ingenious contrivance for altering the height of the manger daily as the bedding gradually becomes raised, so that the calves can get at their food without difficulty, but an ordinary iron trough answers all practical purposes.

The internal temperature of the calf-house should be kept as even as possible, and it is better to build them with hollow walls. I need not add that no loft for hay or any other fodder should be placed over any cow-shed or similar building, as the hay is not by any means improved by the exhalations of the cattle, and the risk of fire is intensified.

The most impervious floor is the best, and I advise any of the many forms of Portland cement concrete, whether called Granolithic, Imperial stone, or Wilkinson's patent concrete, is immaterial, so long as the cement is really good and the granite chips and shingle clean. I can speak in high terms of Wilkinson's work from practical experience.

The cowhouse may next be described. It is a great point here, as well as in the calf-house and stable, to ensure an equal temperature and perfect ventilation. Where the buildings are of brick, hollow walls will be of great assistance, care being taken to have a thoroughly effectual damp-course of slates in cement, and two or three courses of brickwork, also cemented under, to keep out the mice and rats, great enemies of the farmer as far as his buildings are concerned. The usual width of a cowhouse is about 18 ft.; this allows of a feeding-passage at the back of the mangers of 4 ft. The floor should slope very slightly towards the heels of the cows, and there should then be a drop of 2 in. into a surface-gutter about 1 ft. 6 in. wide, and the remainder will form the usual gangway. It is not necessary to divide the building up into stalls, but it is better to do so at the manger. This is done in the simplest way with oak paling. The mangers should be constructed of some hard and impervious material. There are very good purposely-made glazed terra-cotta bricks for this purpose. Hard blue Staffordshire bricks also do very well, but one of the simplest and best mangers is formed by using the large-sized half pipes, of glazed stoneware used for drainage works, bedded on concrete, and having an oak capping. The joints are fewer and easier made than with the other materials mentioned. I am now referring more particularly to what one may call home-made fittings, in contradistinction to the iron fittings manufactured by those firms who devote their energies to stable fittings. The cost of these would be more than

the ordinary buildings would carry; although for dairy farms, and in those establishments of a more or less show character, they are very effective.

But the strongest fittings, and those which are least likely to cost money in repairs or to need repairs, are those best suited for the farmer.

Again, the simplest methods of ventilation are the best, and the system I recommend is to carry up a large trough of wood, about 2 ft. 6 in. broad at the base, gradually decreasing to about 1 ft. 3 in. at the outlet, and having a plain cap at the top. The sides should be formed in two thicknesses, and the spaces between filled with sawdust. Sufficient air will find its way in by the door and windows to thoroughly change the air in a very short time. One ventilator in about every 15 ft. of length will suffice.

The doors of a cow-house should always open outwards, and should not be less than 4 ft. wide; 4 ft. 6 in. is a better width, and sliding doors are best. But here again the question of cost will probably intervene. I may say here that it is better, if possible, to use nothing in the way of hinges or bolts, &c., except the strongest, and those only that can be made or repaired, if necessary, by the village smith. Avoid complicated patents. The windows should be placed at such a height that if the upper portion is glazed it cannot be reached by the horns of the stock in the yards. The old-fashioned hit-and-miss window, strongly made in wood is as good as anything, and if with a small quantity of glass over will answer every purpose. Where the glass is omitted in the windows, a few glass slates or tiles in the roof will be of use. Cast-iron hit-and-miss windows can be obtained from many foundries. The cost of one, 3 ft. 6 in. by 2 ft. 6 in., will be about 25s., list price.

We next take in hand the stable. There is little to say about it that has not already been mentioned in describing the cow-house. The stall divisions, which should be about 9 ft. deep, should be about 6 ft. 3 in. apart centre to centre, and should be thoroughly strong; the mangers should be much as described for the cow-house, but one must bear in mind that the horse is rather a dainty feeder and has a very strong objection to dirt. Therefore, to avoid waste it is a good thing to have the mangers of some materials easily kept clean, and here, again, any strong glazed ware will be found the best. A cart-horse stable should be, at least, 18 ft. wide, and that dimension is quite sufficient. But it must be borne in mind that the harness, &c., is frequently kept in the stable (although this is a bad thing to do), and provision should be made for, at any rate, temporarily placing the saddles, &c., on rests until they can be put away in the gear-house.

Marking back to the dainty ways of a horse: as regards his feeding, I have been told that if one was to place a pin amongst a feed of corn in the manger, a horse would in all probability pick up every grain and leave the pin. I have not tried the experiment, but I quite believe I should do the same myself. As regards ventilation, the same as I described previously for the cow-house will answer admirably. But avoid if possible any cross draughts, and if you are obliged, as may sometimes happen, to put either windows or ventilators in the same side as the mangers, keep them as high as possible.

The horses are usually brought into the stables reeking hot from ploughing or other work in the winter, and would then be particularly susceptible to cold. I do not think, even in the best stables, it is a good thing to lay on water to the drinking-pot forming part of some iron mangers. A horse will drink with much greater zest from a freshly-drawn bucket of clear water than from a slimy trough that may have been standing for days, and it is more natural for a horse to drink from the ground-level and not from a raised trough; he can get his nose much better into the bucket. If you are compelled, from motives of economy or want of space, to place lofts for hay or corn over the stable (only do so when you are absolutely obliged) be sure and have the loft-floor of cement. The old plaster floors cannot be beaten for this purpose as they are rather warmer than a Portland cement concrete; but in ordinary farm buildings it will rarely happen that you will have to place lofts over any of the buildings, but in hunting-stables and those attached to country houses the architect is obliged to put his lofts on the upper floor, and this

arrangement has many conveniences; but, wherever possible, put lofts over coach-houses, harness-rooms, &c., and only put a passage for service over the stable. I fancy, as a rough rule in large stables, about half of the superficial area of the stable would give the requisite amount of floor-space for the lofts. Mice are troublesome amongst the corn. It is a good thing, where they are very destructive, to cover the floor and line the walls with thin zinc.

The harness and gear-house should be placed as near to the stable as possible, and should be about 8 ft. wide, and should have a fire-opening and flue, as here the farm labourers who are not boarded occasionally sit to take their "hit on the thumb," and it is frequently useful to be able to make up a fire quickly to heat a bran-mash or boil food for the pigs; and a fireplace here saves a journey to, and gossip in, the farm-kitchen. Harness fittings should be of the strongest and rudest description; there is nothing better than strong oak pegs, built well into the wall. The gear-house should have a good-sized window.

A small space should also be provided for storing, under lock and key, artificial manures and oil-cake. The floor of this department should be of wood, with about half an inch between each board, and plenty of ventilation under, as oilcake very quickly gets mouldy, and requires to be kept in a dry and well-ventilated place. Between the stable and the cow-house is the best situation for the root and chaff-cutting place; in small farms an area about 12 ft. by 18 ft. will do, but in larger ones these dimensions should be increased. As the roots will probably be stacked and bedded on the opposite side of the stable range to the crew-yard, it is necessary to have a door at both ends of the building. In the ordinary way, of course, the machines will be worked by hand, but on large farms, and in other cases where steam power is used for other purposes, the chaff-cutting, mulling, &c., will be done by steam power. In the large set of buildings the same engine, one of about 10-horse power, drives, works the sawing-machine, and also does the chaff and root cutting, &c., the gearing being interchangeable.

The barn, partly I suppose by the greater facility with which farmers now dispose of their produce, and partly also from the fact that much that was formerly placed in the barn is now kept in separate places, is generally built very much smaller than used to be the case. Many of us have no doubt wondered at the tremendous stocks that must have been accumulated in the tithe-barns of bygone days. Unfortunately in recent years the farmer has been only too anxious to get his corn thrashed and sold, and there has been little use made of the barn for long storing,—35 ft. to 50 ft. by 20 ft. will nowadays be considered a good barn. It is usual to put the doors of such size that a wagon can be driven through it, and about a third of the barn has a sort of loft over. Cement makes the best floor, and it is a good thing to render the walls in cement for about 5 ft. in height all round. Sufficient ventilation is gained by putting a few air-slits, which should be covered with bird-netting to keep out intrusive sparrows.

I have now taken you round most of the buildings, and there remain only to describe the open sheds for various purposes, and the piggeries. Open sheds are required firstly in the crew-yards, for the protection of the fattening stock, and next for the covering of the various implements, wagons, and carts. The construction of them all is similar on three sides, enclosed by walls, and open on the fourth. On the open sides the roof should be supported by story-posts of wood or iron, and these should be placed on stone bases. The top of the stone base should be about 1 ft. above the level of the paving of the yard, to keep the wood or iron post away from the damp bedding laid down for the beasts. Great care should be taken with the principal trusses of the sheds, as, indeed, throughout farm buildings, and I think that on the whole the queen-post truss is the best one to adopt; and it is a good point to make the tie-beam deeper and stronger than usual, as the principals will most likely be called upon to carry the ladders, sheep-trays, and all sorts of poles, &c., that are wanted out of the way.

I think I have previously mentioned that the sheds should get all the sun possible, so the south-east is the best aspect for them; but

with the cart and implement shed the reverse is the case, as they should be sheltered as much as possible from the sun, and also from the rainy quarter, which in most English districts is the south-west; so that the best position for the cart-shed is facing north-east. It should also be on the main farm road if possible. About 15 ft. is a good depth for these sheds. In many cases an additional useful room could be obtained for standing implements by bringing down the eaves of the barn to take anything not finding sufficient length of room in the cart-shed. This would be cheaper than increasing the width of the shed throughout.

An important point is to get a good isolated infirmary box. This should be about 14 ft. square, and be as much apart from the other stables, &c., as the yard will allow, but should be within easy reach of the farm-house.

Ordinarily in England we do not give very much thought to the housing of the pigs; but upon the plan of the Swiss buildings upon the wall you will see that very great attention is given to "interesting little animals."

Over the infirmary-box in the buildings shown on the wall I have arranged the pigeon-cot, or dove-house, as it is called in Northamptonshire. The great point in arranging a dove-house or columbarium is to provide plenty of nests, and in building with brick this is easily done. A table in the centre, a looking-glass, and a good lump of salt, complete the furniture of the most improved pigeon-cot. It is a good thing to put an external door, as pigeons are easily stolen by putting a net over the pigeon-hole and then rattling the doors which startles the birds, driving them into the nets. Of course, this applies more particularly to those detached buildings at some little distance from the house.

I am afraid that I have already exhausted your patience, or I should have wished to have gone into the question of labourers' cottages and the working portions of farm-houses. But the time at our disposal will not allow this. The question of cost is the great one that requires attention, and the points for us, as architects, to consider how best we can build the most durable buildings, leaving to the farmer and land agent to give us in each case the particular requirements, and having obtained from them the number of horses likely to be required on the farm, and the number of cattle kept, then to give them the necessary accommodation, and to do this always with the materials ready to our hand.

I am having continually impressed upon me that the cost of buildings erected recently is really greater than the land can bear, and that we ought to turn our attention to devising, if it be possible, cheaper modes of construction. And I shall be glad to hear if any of the gentlemen present can give us any information as to the cost of concrete buildings. I am of opinion that farm premises might be erected more cheaply in this material in many districts.

Then the question of roofing material is also a most important one. Galvanised iron is recommended by many as the coming material. I cannot say that I have yet seen it introduced in an architectural manner; and it seems to me lacking in the first essential for roofing material,—durability. It will do admirably for open barns and in similar positions, but how long will it last, watertight, without painting? Not quite long enough to repay the first cost, I am afraid. We have a difficult problem to work out. Let us do it well,—with beauty, if possible,—but always with truth.

For a few notes of the discussion which followed, see next column.

Endless Wire Saw.—A French engineer, M. Viallette, has invented a new saw for stone-cutting, consisting of an endless metallic cord, composed of one or more soft steel wires twisted together, and subjected to a continuous movement in a uniform direction. It is fed with silicious sand or grit, mixed with water, as in ordinary stone-sawing, in order to facilitate its penetration to the bottom of the crevice, and to prevent heating. The apparatus can be easily set up, taken down, or transported from place to place, one of its great advantages being the readiness with which it can be used in quarries, so as to avoid superfluous transportation. M. Tisaandrier, the editor of *La Nature*, speaks of it as "the butter-cutting wire used for sawing stones."

ARCHITECTURAL ASSOCIATION.

At the ordinary meeting, held on Friday, 14th inst., Mr. Colo A. Adams, President, in the chair, it was intimated that the second Saturday afternoon visit will be made this Saturday, 14th, to 16, Carlton House-terrace, Waterloo place.

Mr. Arthur Young then read a paper on "Farm Buildings," which will be found in another column.

The Chairman, in opening the discussion, said that any special subject brought before the Association by a man who had devoted his attention to mastering its details must be professionally interesting. Mr. Young had evidently gone into the subject *con amore* as was seen from a professional point of view, and had given them a most useful lecture for reference hereafter. An important question for the architect and engineer was the necessity of seeing how the greatest amount of accommodation could be brought into the smallest space how the health of the stock could best be preserved; and instead of rule-of-thumb, there should be a *raison d'être* for everything. Considering the rise in the cost of building, and the great depression in agriculture, the necessity for arriving at the lowest cost, in the most scientific manner, became at once apparent. With reference to damp-courses, it was necessary in wet climates to have these to the chimneys.

Mr. H. W. Pratt said he should be sorry if the cutting up of the land into small holdings resulted in farm buildings being too much of one pattern. Architects, if consulted in reference to such buildings, should study what was most suitable, in conjunction with the landscape, as a model farm set down amongst beautiful scenery would mar it to a great extent. He had much pleasure in proposing a vote of thanks to Mr. Young.

Mr. C. H. Brodie remarked that in the matter of plaster floors he knew of an instance in which a manure-tank was tried in the yard, but was finally filled up. It was found that liquid manure did not get to the tank, but that only water from a neighbouring stream got there. The reason so much trouble was taken in Switzerland in regard to manure was its utilisation in the vineyards. He seconded the vote of thanks.

Mr. H. G. Turner had always found that the great difficulty lay in the question of cost. The general idea was to have good buildings, but the expense must be kept down, and, as Mr. Young had remarked, this question would become more difficult in future. If large farms and a considerable amount of capital could not afford good buildings, what could be done by peasant proprietors? He could hardly imagine that the system of ventilation mentioned by Mr. Young would answer well; but he found that Kite's or Boyle's ventilators answered in stables. His experience was that concrete was the best flooring for stables, giving a good foothold for the horses, and being the cheapest floor that could be laid down. He had always heard the plaster floors called "Nott's floors," but he could not understand their being warm. He was born in a house with such floors, and it was no joke to get out of bed and step on them in cold weather. As to the cost of concrete farm buildings, they might be economical where several farms of one shape and in one district had to be built, but not otherwise. He was afraid that picturesqueness in farm buildings would have to be given up, especially where it interfered with economy, and that the picturesqueness would have to be resorted to.

Mr. Ellison questioned whether corrugated iron roofs would come into use in farm buildings. They stood very well about three years, after which the only thing to be done was to tar or paint them every year. The question of paving was often a matter of choice, one man preferring blue Staffordshire bricks, and another Dntch clinkers.

The Chairman then put the vote of thanks, which was carried by acclamation. He also referred to the picturesqueness and simplicity with which Mr. Young had treated some of these buildings. He (the Chairman) had used a good deal of concrete pavement; he believed it was the best; and if channelled out there was not the slightest fear of the horses slipping. The drainage should be in straight lines, with an eyelet at every junction.

Mr. Young, in replying, advised the members to get the Swiss book on agricultural construction to which he had referred. With

regard to simplicity, nothing in that way was so picturesque as a group of Sussex farm buildings, while there could be no greater blot on a landscape than a set of new farm buildings built of new bricks and slated.

THE PUGIN TRAVELLING STUDENT-SHIP.

DURING a part of last week there were exhibited, in the "Arbitration" room of the Royal Institute of British Architects in Conduit-street, the drawings and sketches submitted in competition for this fine ribbon of the architectural sketched, which this year has attracted no less than twelve knights of the pencil; in strong contrast with the Godwin Bursary, for which we are sorry to see there were but two competitors,—a very regrettable fact, and one which is a little surprising when we recollect the complaint in some quarters that our young men are becoming too practical, to the neglect of the artistic side of the profession. Some of the sketches exhibited are certainly very excellent, and in at least one instance of quite exceptional quality. We say this in all sincerity, and recalling, as well as we may, former competitions for the same prize, we think that the general level of execution is up to the average of other years.

It seems to be understood by the judges and most of the competitors that the claims of applicants who submit specimens of both measured drawings in ink and of freehand, pencil or water-colour sketches, will be considered before those of students who produce the one or the other alone. This is only right and reasonable, since both are necessary to the proper study of architecture; and it is to be regretted that some very beautiful work in either section was unaccompanied by any effort in the other, and was, probably, more or less put out of court on that account.

The choice of the judges has this year fallen upon Mr. W. H. Bidlake, who has already distinguished himself by winning the Institute Silver Medal for his measured drawings of St. Mary's Church, Leicester, and by obtaining honourable mention in the last competition for the Architectural Association Travelling Studentship. We think that few will question the wisdom or justice of the decision. The drawings of St. Mary's Church, just mentioned, are themselves marvels of conscientious draughtsmanship, but are surpassed by those of Prior Crauden's Chapel, now shown for the first time, and of which it is hardly too much to say that they leave nothing to be desired in the way of beautiful execution.

Mr. Bidlake's pencil sketches* show a wonderful delicacy of touch and a painstaking determination to be true as well as effective, which is most delightful and refreshing after some of the dashing scribbles that seem fashionable just now. We would offer one criticism, and that is, that the author seems to have, either consciously or unconsciously, a little too great love for the effect of pretty pencil work for its own sake, and apart from consideration of the objects represented; such a feeling, though creditable in itself, is likely to hamper its possessor unless fully recognised and kept in its place.

Mr. H. O. Cresswell, to whom has been awarded a medal of merit and the second place, showed careful measured drawings of the tomb and shrine of Henry VII. in his chapel in Westminster Abbey. Of these it is no disparagement to say that they are only a little less beautiful than the drawings of the same shrine made by Mr. Pither in 1874, and which obtained for him the Silver Medal of the Royal Academy. Mr. Cresswell submitted also a large number of pencil sketches, some strong water-colours, and two drawings of a design for a theological college, which were awarded a medal of merit in the competition for the Soane Medal last year.

Mr. T. MacLaren, who, at the instance of Professor Kerr, was recommended to the prize committee as deserving a second medal, exhibited some fine measured drawings of the cloisters of Westminster Abbey, and some careful ones of the south transept, which are also good, but being executed some time back show by comparison the very decided progress of their author in draughtsmanship. The pencil sketches of this competitor are numerous, and

particularly interesting as representing rather unfamiliar objects with great force and feeling. We heartily applaud the wish to recognise the merit of Mr. MacLaren's work. Such sketches as those of St. George's Chapel at Windsor, the east window of Malrose Abbey, and that grand old fellow the Florentine Boar, should not go unnoticed.

Mr. Reginald Barratt sent some truly delightful sketches of Italian buildings and church furniture,—and other less architectural objects,—sketches which are certainly above the common level of architectural students' work. It was obviously no lack of merit that failed to gain them recognition, but probably the absence of studies of English work, and, indeed, of any important ones of a purely architectural character. We noticed with particular pleasure the sketches of the market-place at Verona, of the font in the Frari Church at Venice, some lamp-pendants, and some Byzantine capitals, as well as one of a shrine in St. Mark's.*

Mr. E. Guy Dawher had a number of good sketches in portfolios on the table, but, owing to the absence of larger drawings, they may have attracted less notice than their merit entitled them to. Mr. Littlewood had a goodly show of measured work. Mr. J. R. Sutton exhibited the drawings of Terrington St. Clements Church, which gained him a medal of merit in another competition last year. Among the other competitors there was, we believe, one from the United States, but his work was not up to the level of what we have lately seen of American students' sketches,—for instance, in the Sketch Book of the Boston Architectural Association,—and failed to gain recognition. We hope and believe that this will not in any way tend to deter others of our consins from the opposite side of "the puddle" from competing for architectural honours in the old country; it is obvious, from remarks made in the course of the discussion at the Institute last Monday week, that if any notice at all were taken by the judges of the nationality of competitors—and we do not for a moment believe such a thing possible—it would rather tend to take the form of considering the disadvantages under which these students labour who have none of the fostering care of our London societies, the inspiring influence of our London buildings, and the other advantages of a residence in the English metropolis.

MR. C. ROACH SMITH, F.S.A., ON THE ROMAN WALL OF LONDON.

LONDON AND MIDDLESEX ARCHAEOLOGICAL SOCIETY.

THE usual monthly meeting of the members of this society was held on Tuesday evening last, at King's College, Somerset House, Mr. J. G. Waller in the chair, when a paper written by Mr. Charles Roach Smith, F.S.A., vice-president of the society, was read, in the unavoidable absence of that gentleman, by Mr. E. W. Brabrook, F.S.A. The paper was entitled, "On the late discoveries in the Roman Wall at Bevis Marks, and at other parts of the northern mural boundary of London," and in it the author said:—

The London and Middlesex Archaeological Society has recently contributed materials of the most important kind for the history of Roman London, thanks to the energy and perseverance of a few of its more active members. Written records are but scanty; they are but little beyond a blank for centuries. They do not amount to as much as the newspapers of our time tell us in a day. Yet the metropolis of Roman Britain, the central focus of the province to which converged the great highways, crowded with military bodies, with travellers, merchants, and merchandise, through the very heart of Britain, must have had a history of its own which, had there been chronicles of it, would have stirred our souls far beyond what is effected by the disjointed and loose annals of the ages immediately subsequent. Deprived of written narratives which would have revealed the mental life of the great city, we are supplied only with a few disintegrated fragments of tangible memorials to help the formation of some idea of the architectural constructiveness, of the artistic skill, and of the social condition of the inhabitants. In these, however, there is something, and

it is the duty and province of the antiquary to make the most of them. When bronze heads, arms, and legs are dug up in different places, in imagination we restore the bodies. We justly conclude that they were public monuments, and that no city but one of importance could have afforded such costly adornments. The same with the remains of villas, of sculptures, and the examples of the elegant and industrial arts preserved in our public museums, or engraved in publications. It is not difficult to point out here and there the sites of public buildings, of a temple, and of villas, but nothing more; who erected them, or at what precise time, there is nothing to show. The genius of destruction is swift and relentless; almost before the lapidary record which indicated the site of a temple to the personified province could be copied, it was snatched from us, and the resurrection of thousands of historical monuments has been more perpetually fatal to them than the grave in which they had so long been buried.

I need not here describe the sculptures which of late years have been recovered from the foundations of the Roman wall on the north of the city of London. The Society has rendered it unnecessary by its engravings and descriptions. Added to these must be the statue from Bevis Marks, engraved as the frontispiece to the catalogue of my London Collections,* and also the fragments of sculptures engraved or described in the same volume. I see that I remarked, "They prove a violent destruction of at least considerable portions of Roman London, at a comparatively early time," &c.

Especially connected with the discoveries now before the Society are those made at Tower-hill, in 1852, described in my "Illustrations of Roman London," taken, I make no doubt, from the foundations of a Roman bastion; but I had no opportunity of witnessing this disinterment. With them were mill-stones in Andernach lava so large that they must have been worked with horses or mules. These remains were all from the foundations of bastions; but the equally-important sculptured stones, which I have repeatedly referred to in former years, excavated in Thames-street, were in the foundations of the curtain wall, at the depth of some 14 or 15 feet. They were mostly of very large size, sculptured, with Lewis holes; and must have originally belonged to edifices of great public importance. They had been found, I was told, by hundreds, and were carted away forthwith to be used again for building materials. There were some dozens on the ground when I saw and sketched a few. It must be remembered that the existence of a wall on the river-side had been denied,—denied because no trace of it could be seen!

Now come the questions, when and for what cause or causes were these sculptures placed in the foundations of the wall? It is probable I may at the outset be at variance in my opinion with some of my friends and colleagues in saying "the wall." They may consider that the bastions do not properly constitute a part of the wall, and that they may have been built later. I look upon them as co-eval, and I have shown that, so far as regards the river mural boundary, at least, sculptured stones were used in the foundations of the curtain wall.

Many years ago, I laid before the Society of Antiquaries of London reasons for believing that the great Roman circumvallation known as "London Wall" was built at some time posterior to the time of Severus, and that the limits of the earlier wall did not extend northwards so far as the site of the Royal Exchange.

Unfortunately, none of the inscriptions found in the wall afford the means of fixing a date. But, made and rough as some of the sculptures are, taken altogether they suggest a comparatively early and not a late date; they are quite unmixt with any characteristics of the style of art or of the sentiment of the times after the Constantines; and, I need scarcely add, they show no trace of Christian influence. Among the inscriptions found in the walls of Bordeaux, to which I am about to refer, was one of the time of Posthumus, A.D. 258, proving the wall to have been built subsequently to that epoch. Had opportunities been afforded in past years, no doubt some decided evidence of date might have been gathered from other parts of the London Wall, for I believe that in its construction throughout these monuments were

* A drawing of the pulpit in S. Lorenzo, at Rome, which Mr. Barratt also submitted, was reproduced in the *Builder* for July 12, 1884.

* Also in "Illustrations of Roman London," Pl. V. *Ibid.*, Pl. VI.

* We propose to reproduce two of these next week.

used. Why were they employed in such abundance? They indicate violence in each case, whether they are from public buildings or from cemeteries.

When the city was enlarged, large portions of the latter must have been included within the walls, where, it is probable, they would no longer be tolerated; and, moreover, generations had passed away and the memorials of tributary affection had become disregarded. Human nature is the same in all ages. What has become of the thousands upon thousands of the sepulchral monuments of our ancestors? Search the graveyards, and it is rare to find any anterior to the sixteenth century. Search the churches, and perhaps not one in a hundred is to be found. From the absence of historical evidence it is difficult, if not impossible, to point to any national calamity to which the destruction of public buildings in Londinium can be inferred, yet such there may have been, and extensions of the city may have immediately followed it. We shall gain something by comparison. It will be seen that numerous other Roman towns and cities exhibit in their walls precisely similar revelations as those of London. Most of the extremely interesting monuments which (chiefly by aid of the artistic skill of Mr. Waller) I have published* from Bordeaux, Sens, Dijon, &c., are from the foundations of the walls of those towns. At Sens, upwards of 300 sculptures, all more or less important,† have been collected from the destroyed walls; at Bordeaux and many other places, probably as many more. At Bordeaux the wall was found to be built to a height of about 12 ft., and to the thickness of about 15 ft., with large worked stones from the violent destruction of ancient monuments, such as temples, palaces, triumphal arches, fountains, tombs, &c.; these stones were carefully laid without mortar, one upon another. Above this thick substructure, mortar was used for the usual materials, the facing being of small squared stones regularly laid, with hands of tiles at intervals. It is remarkable that the Roman masons, in using these ancient monumental stones, had, almost always, taken care to avoid useless mutilation, and had evidently laid them in a spirit of religious conservatism. But, whatever may have been the degree of veneration for these remains, it was obvious that the monuments had been destroyed by violence. The walls had been built, especially on the south side, upon the ruins of burnt houses, and the vicinity was entirely composed of the debris of ancient edifices destroyed by fire; many of the largest stones were calcined, and almost all bore traces of intentional and brutal mutilation. In 1826 another excavation at Bordeaux,‡ brought to light similar sculptures, with a like respect for their preservation; for they had been carefully arranged without mortar, in the interior of the wall, and guarded on the exterior by layers of enormous stones, placed without cement. I noticed the same construction of the wall of Tours. Such is the indestructible tenacity of the mortar, that while in the lower part fragments of large monuments and inscriptions are to be seen in place, the corps of the wall is yet well preserved. The extensive lapidary museum at Narbonne has been supplied almost wholly from the destroyed walls of the town. I only refer to a few out of numerous instances, and I have not referred to the castra, in some of which ancient monuments have been used for the foundations of the walls, as, for instance, at Larzac, near Tours, where large columns, sawn horizontally, are disposed exactly as those were which I saw in a bastion at Bevis Marks. M. H. Schnermaus, of Liège, in an almost exhaustive article on the Ramparts of Arlon and Tongres,§ has discussed this subject in all its bearings with great judgment and success. Arlon, *Orolanium*, has furnished from its walls, which showed a construction similar to those of Bordeaux and other towns, a large number of sculptures and inscriptions. M. Schuermaus has reviewed comprehensively the remains I have referred to and those of other places, and he concludes, with M. de Camont, that the building of these walls with ancient monumental remains must be assigned to the end of the third century. He denies the possibility of any such erections (as has been in one

instance suggested) in the interval between the fourth and ninth century.

To return to our own country, I can see that these discoveries in London will tend to promote inquiry as to what similar facts have occurred in towns and castra in England. Some can certainly be shown.

A discussion ensued, in which Messrs. Alfred White, F.S.A.; J. E. Price, Hon. Sec.; and the Chairman took part, and a vote of thanks was accorded unanimously to Mr. Roach Smith for his paper.

ARCHITECTURAL SOCIETIES.

York Architectural Association.—On the 5th inst., in the saloon of the Victoria Hall, Mr. K. A. Parkin completed a course of three lectures on graphic strains, principally referring to buildings. A good attendance at each meeting has been the rule. Mr. Wm. Hepper, vice-president, proposed a hearty vote of thanks to the lecturer, which was ably seconded by Mr. Norman R. Yeomans. Mr. Parkin, in responding, offered a few encouraging words as to the value in the future of the subjects he had attempted to demonstrate.

Edinburgh Architectural Association.—The usual fortnightly meeting of this Association was held on Monday evening last in the Professional Hall, George-street. The President, Mr. G. Washington Brown, occupied the chair. After some preliminary business, the Chairman called on Professor Baldwin Brown, B.A., to read his paper entitled "Gottfried Semper and his Theory of Architecture." The lecturer described Semper as one of the most distinguished of modern German architects, and as a writer famous for his contributions to the history and theory of the art he practised. His career was especially interesting to natives of this country, as part of it was passed in London, where he worked for some years in connexion with the Science and Art Department. The leading events of Semper's life were briefly summarised. His last practical work as an architect was in connexion with the colossal buildings erected on the "Ring" at Vienna, where he finished designs for the Opera House and the new Museums. He died in Italy in 1879. Referring to Semper's contributions to the literature of his art, Professor Baldwin Brown gave a short account of Semper's book on "Style," which contained, he said, in the first place, a full and admirable discussion on the industrial arts, the materials employed in them, and the style of treatment which the artist should adopt in dealing with different purposes. In the second place, there might be found in the work the materials for a history of the constructive and ornamental arts of antiquity, which should do for ancient times what Jules Lahorte has done for Byzantine and Medieval in his "Histoire des Arts Industriels," while there were dispersed through the volumes profound and suggestive remarks, which might form bases for a philosophy of art. As a specimen of Semper's treatment of the industrial arts, a *resumé* was given of the first few chapters of his book, which deal with the materials of the textile art, and the principles to be followed in the decoration of walls and floors. Semper's general theory of architecture was next referred to. Architecture as a fine art did not, in his view, begin with the shelter or fortress of primitive man, but in structures raised for purposes of religious or patriotic commemoration. Early monuments of architecture were in many cases, like the Temple of Solomon, merely copies in permanent materials of festal structures formed of wooden framing, and covered with rich hangings and garlands. A few words on the bearing of this theory on the history of architecture up to the time of the Romans concluded the paper.

The Improved Wood Pavement Company (Limited).—The report and balance-sheet presented to the shareholders at the thirteenth ordinary general meeting held on Monday last show a net profit of 11,700*l.* 19*s.* 1*d.*, from which, on the recommendation of the Directors, it was resolved to pay a dividend of ten per cent., which will absorb 8,221*l.*, and to credit the account of the "vendors" with the sum of 1,622*l.* 16*s.*, as shown year by year in the balance-sheet, carrying the balance 1,851*l.* 8*s.* 1*d.* to "Reserve Fund," which will then stand at 11,991*l.* 1*s.* 3*d.* The Directors state that in face of the very severe competition, the company has still held its own successfully.

Illustrations.

CARVED WOODEN PANEL (RENAISSANCE).

THIS panel, the original of which in the Louvre, may be described as a conglomerate of details very executed, though having so much Renaissance ornament with no logical connexion or character of detail. The foliage of the lower portion is naturalistic, as well as that in the cornucopia; the foliage which the arms of the torso ramify, is conventional and of very fine type. It cannot be recommended, therefore, as a study of ornamental art in the abstract ought to be, there is a holdness and freedom about it which one must admire while condemning its esthetic principle, or want of principle. Work of this kind often furnishes admirable hints for designs which could be worked out in a more homogeneous style of detail.

REREDOS, ST. ANDREW'S CHURCH, ABERDEEN.

THE reredos has been erected as a memorial to the late Bishop Suther. It is in Caen stone with the shafts of the columns of polished Devonshire marble, and was executed by Harry Hems, Exeter. The inscription above the base runs, "In memoria viri reverendissimi Thomæ Georgii Suther, D.C.L., qui xxv annos (1857-1883) Dioceseos Aberdoniæ Episcopatum, simulque per xxv annos (1855-1879) hujus etiam Ecclesiæ curam pastoralem gessit. Hoc sacrosanctum monumentum pietatis, desiderii, testimonium Natus 1814. Obiit 1883."

PROPOSED CATHEDRAL SITE FOR LIVERPOOL.

FOR description of Mr. H. W. Brewer's design of the Cathedral of Notre Dame, Paris, restored with its spires by M. Viollet-le-Duc and arranged upon the site for a cathedral at Liverpool, see Mr. J. P. Scaddon's article, p. 224.

HOUSES IN CAIRO.

THE two photolithographs entitled "Front House on Court, showing Mak'ad" (after Prisse), and "Barber's Shop" (after Coste) formed part of the illustrations used by Mr. Stuart Poole in his lecture at the Royal Academy on "The Cairene House," for report of which see p. 227.

TOYNBEE HALL.

THE University Settlement, Commercial-street, Whitechapel, has just been completed from designs by Mr. E. Hoole, F.R.I.B.A., 104, Great Russell-street, W.C. Accommodation is provided for twenty resident University men, for whom bedrooms, private sitting-room, and common room are provided. On the ground-floor are lecture-hall, dining-hall, drawing-room, and offices. The buildings have been executed by Messrs. Lathey Bros., in brick and Box stone.

The object of the institution, it may be mentioned, is to provide for and encourage the residence of educated men in the midst of the East End population, and it is one of the machines which have been promoted by the Rev. S. A. Barnett, of Whitechapel,—whose name will be known to all in London who are interested in the good of the people,—for enabling various classes of society to meet more, and know each other better, and for giving increased facilities to the poor for gaining culture and raising the standard of life. A large number of classes and lectures are already in progress in the hall to which all are admitted at merely nominal fees.

FARM BUILDINGS.

FOR details of these see Mr. Arthur Young's paper on p. 228.

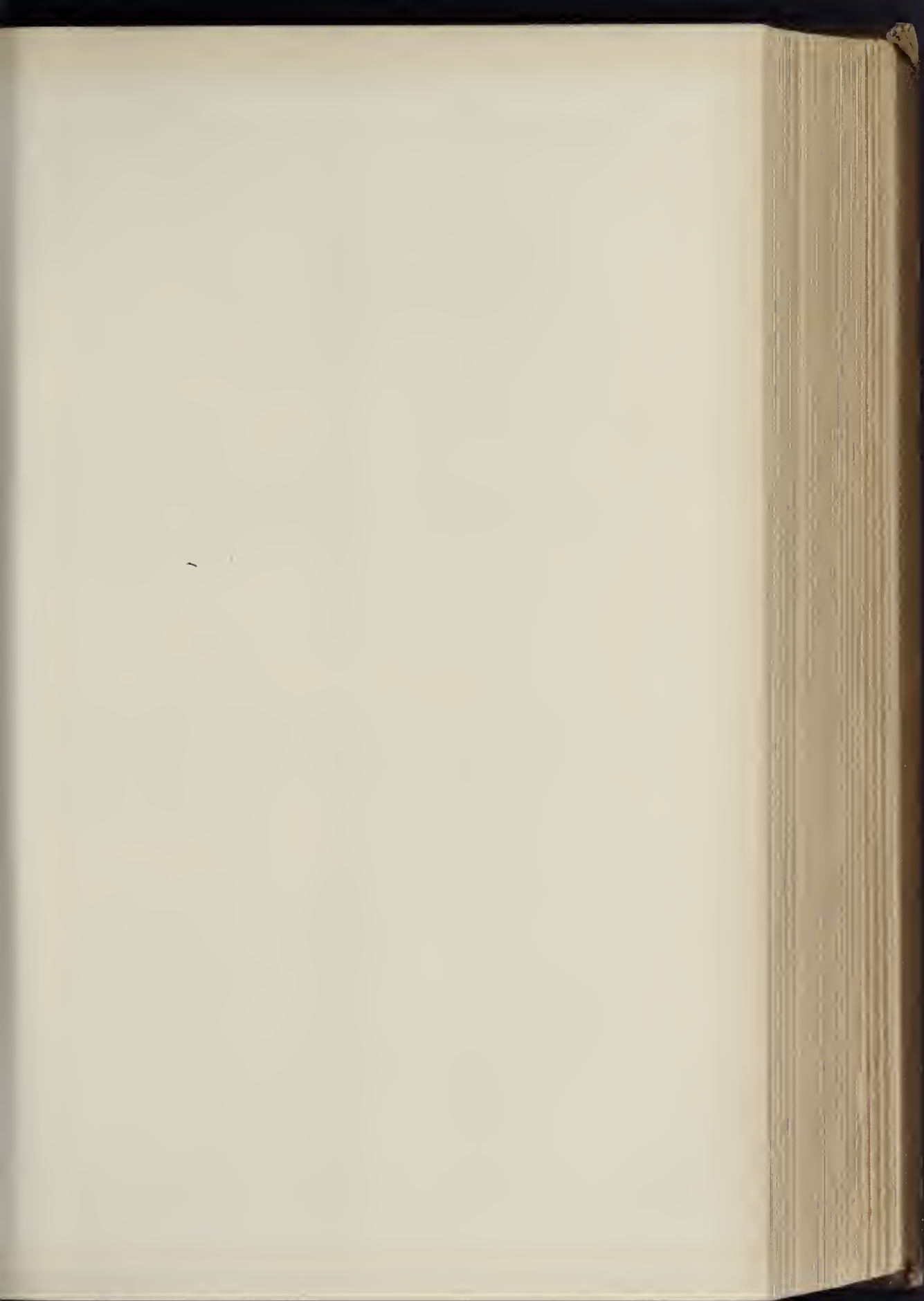
The Hospitals Association.—The first annual meeting of this Association is to be held on the 11th of March, when Sir Andrew Clark, Bart., M.D., will preside.

* "Collectanea Antiqua," vols. ii. to vii.

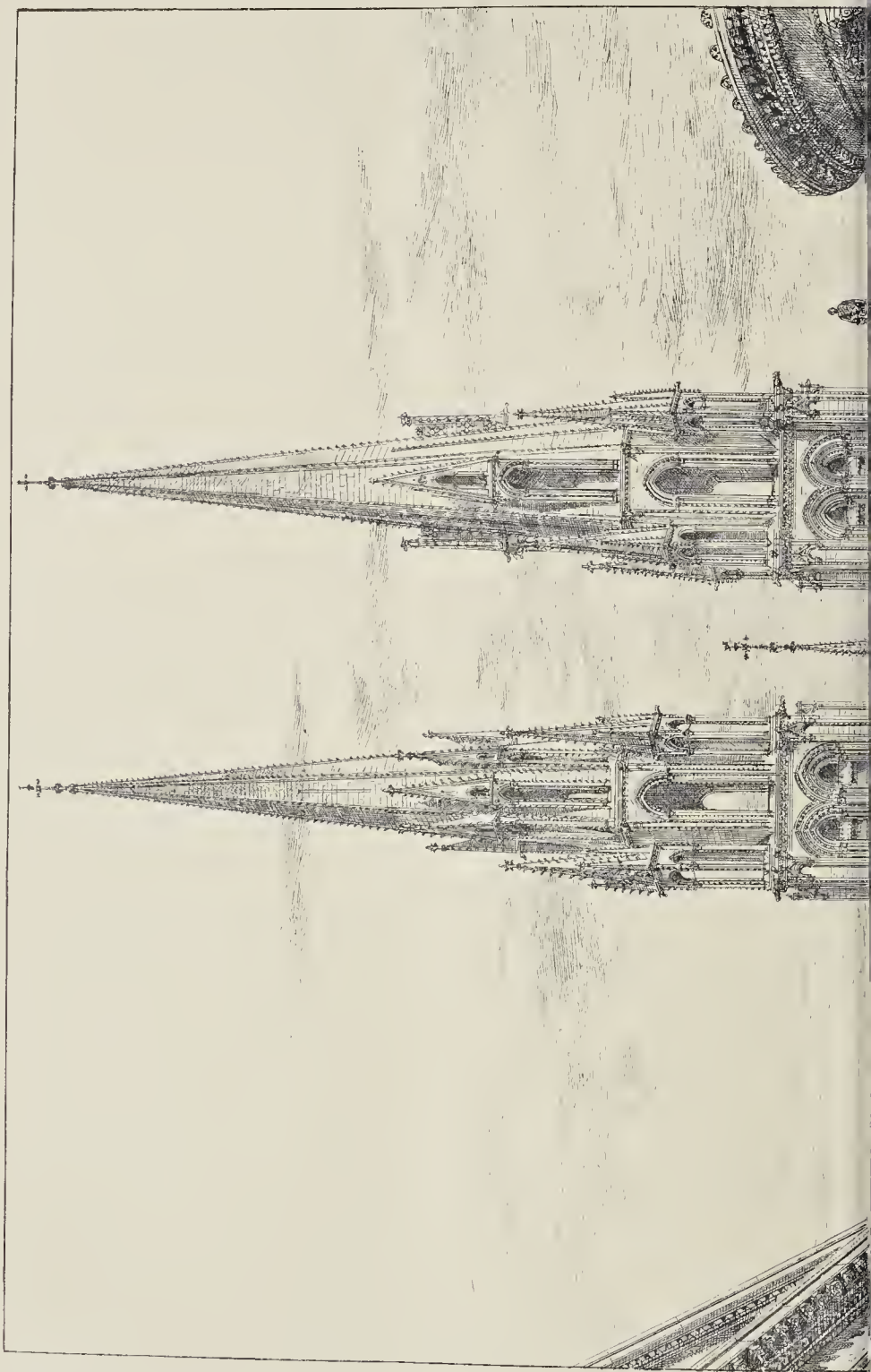
† "Catalogue des Inscriptions de Musée Gallo-Romain de Sens," par M. G. Julliot, Sens.

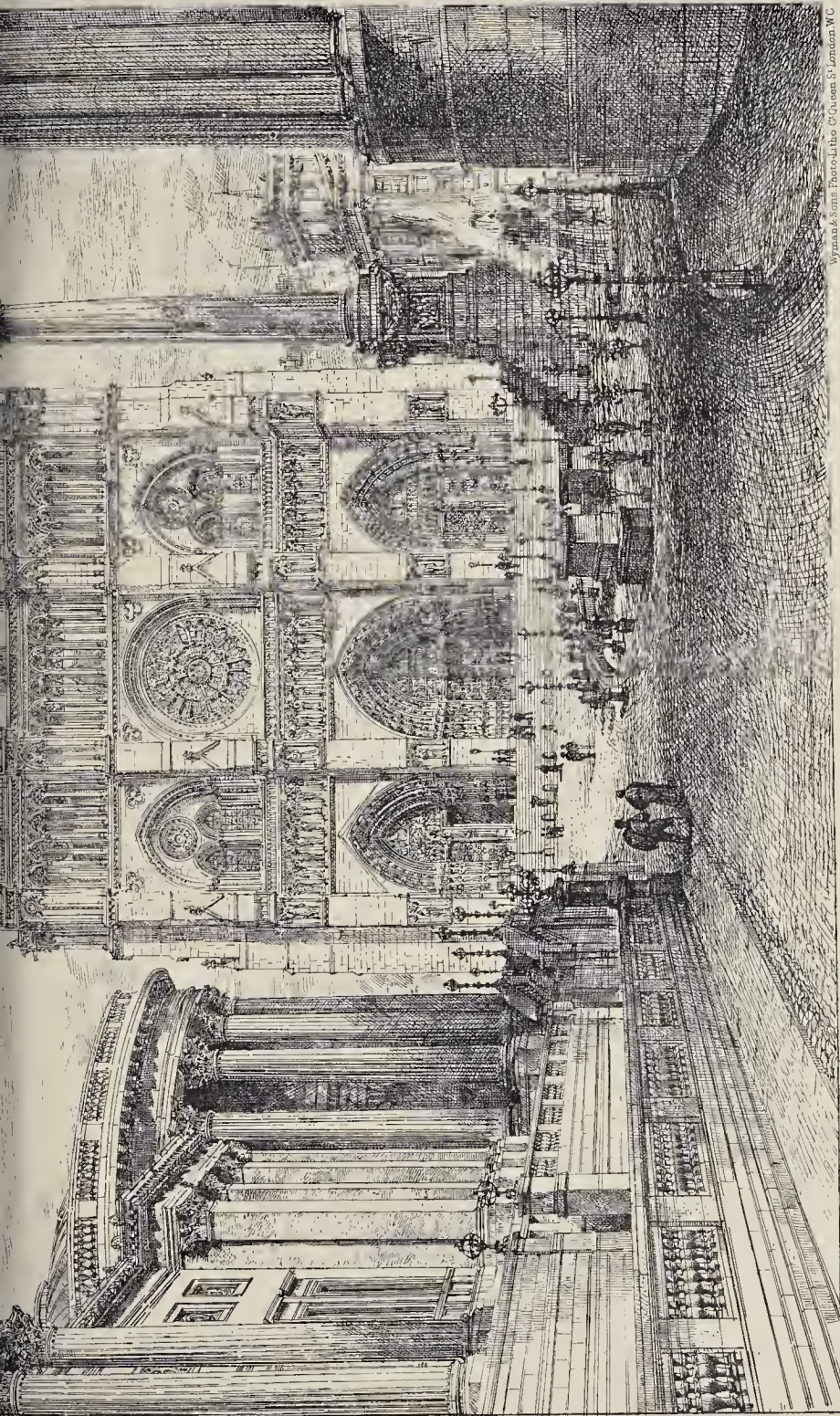
‡ Proceedings of the Société Archéologique de Bordeaux, II.

§ Bulletin des Commissions Royales d'Art et d'Archéologie, Bruxelles.



THE BUILDER, FEBRUARY 14, 1885.





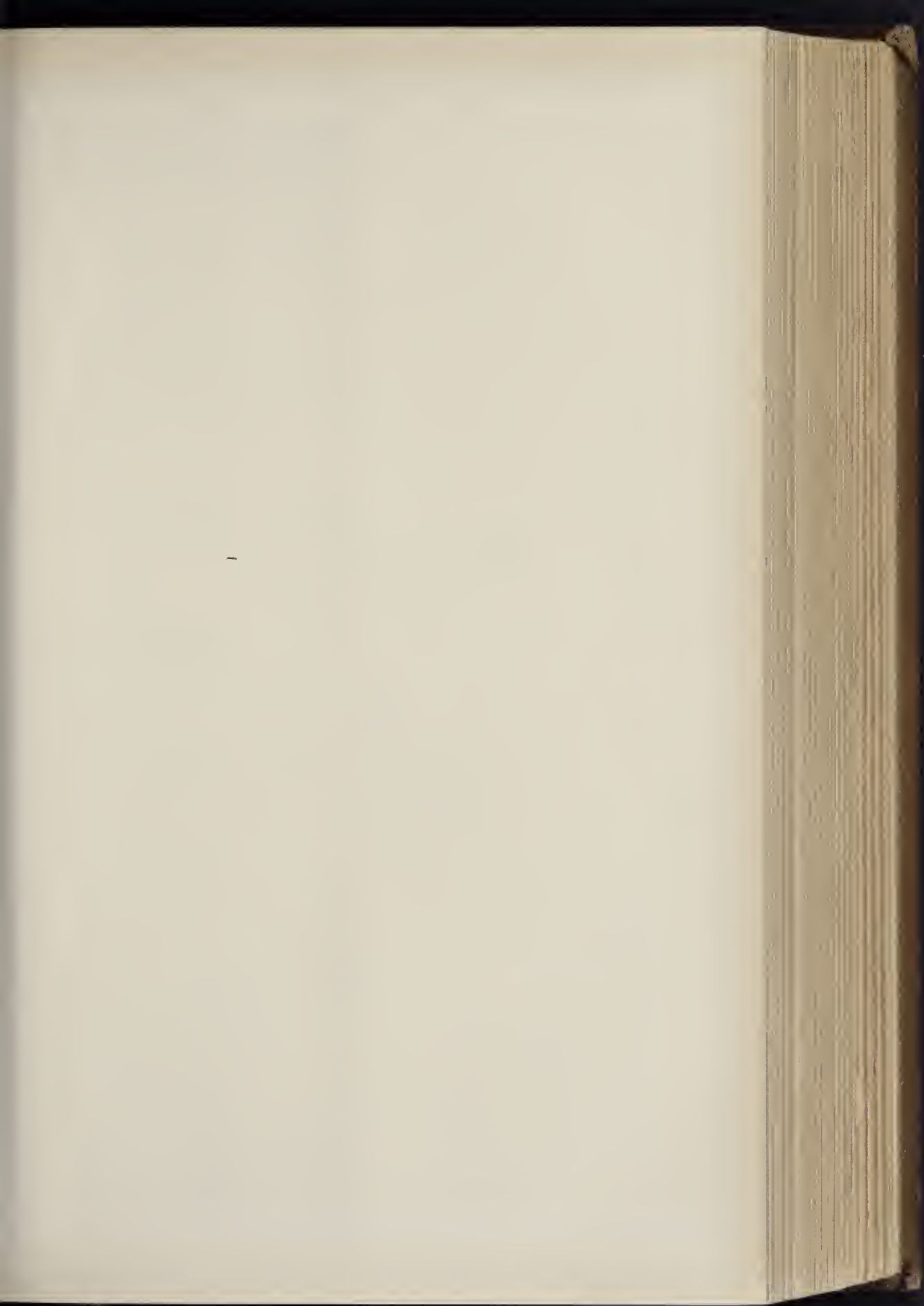
Drawn by H. W. Brewer.

Wyman & Sons Photo-Litho 57 Queen St. London W.C.

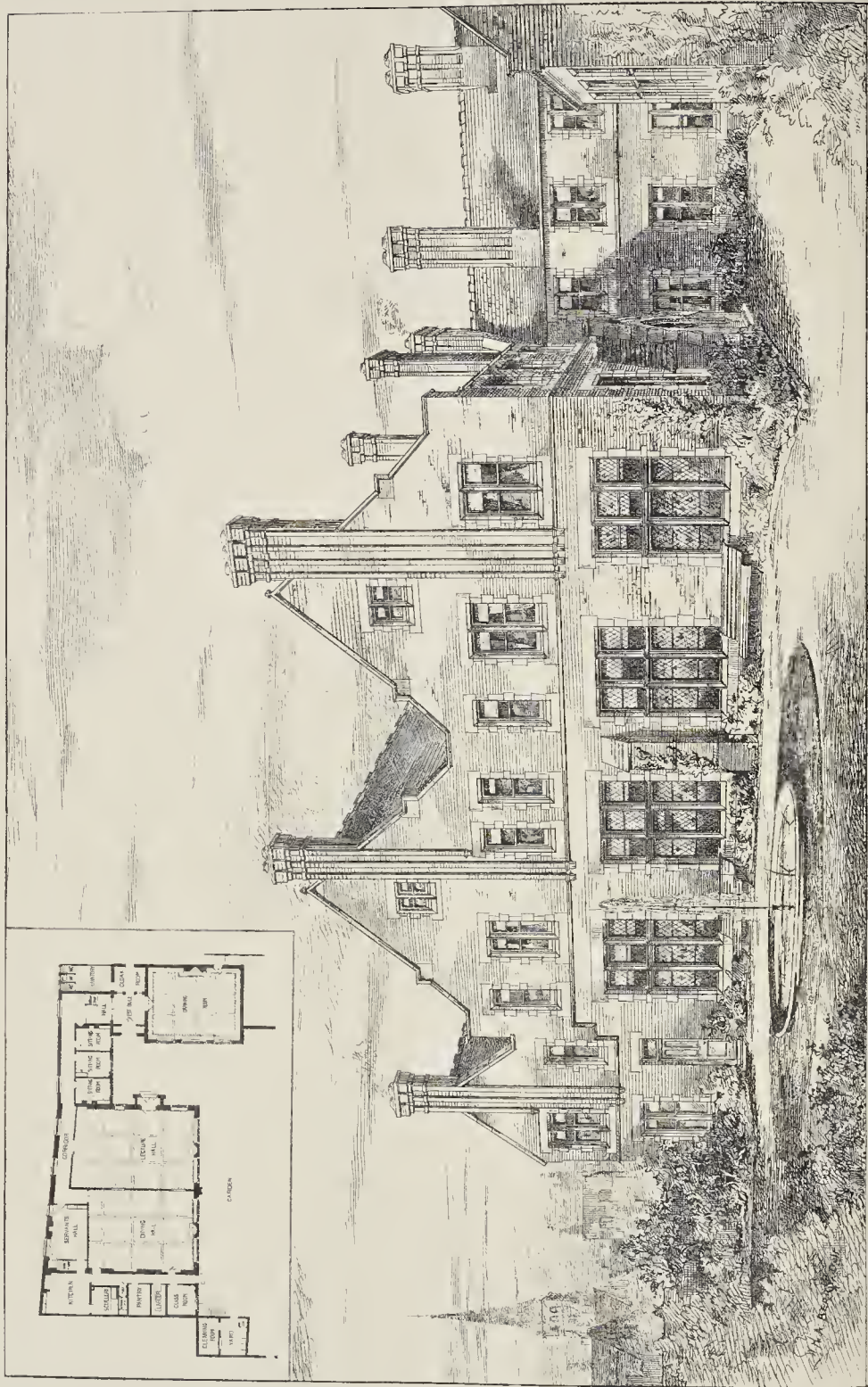
THE CATHEDRAL OF NOTRE DAME, PARIS,

As Restored with its Spires by M. Viollet-le-Duc, arranged upon the Site for a Cathedral at Liverpool, as suggested by

Mr. JOHN P. SEDDON, F.R.I.B.A.

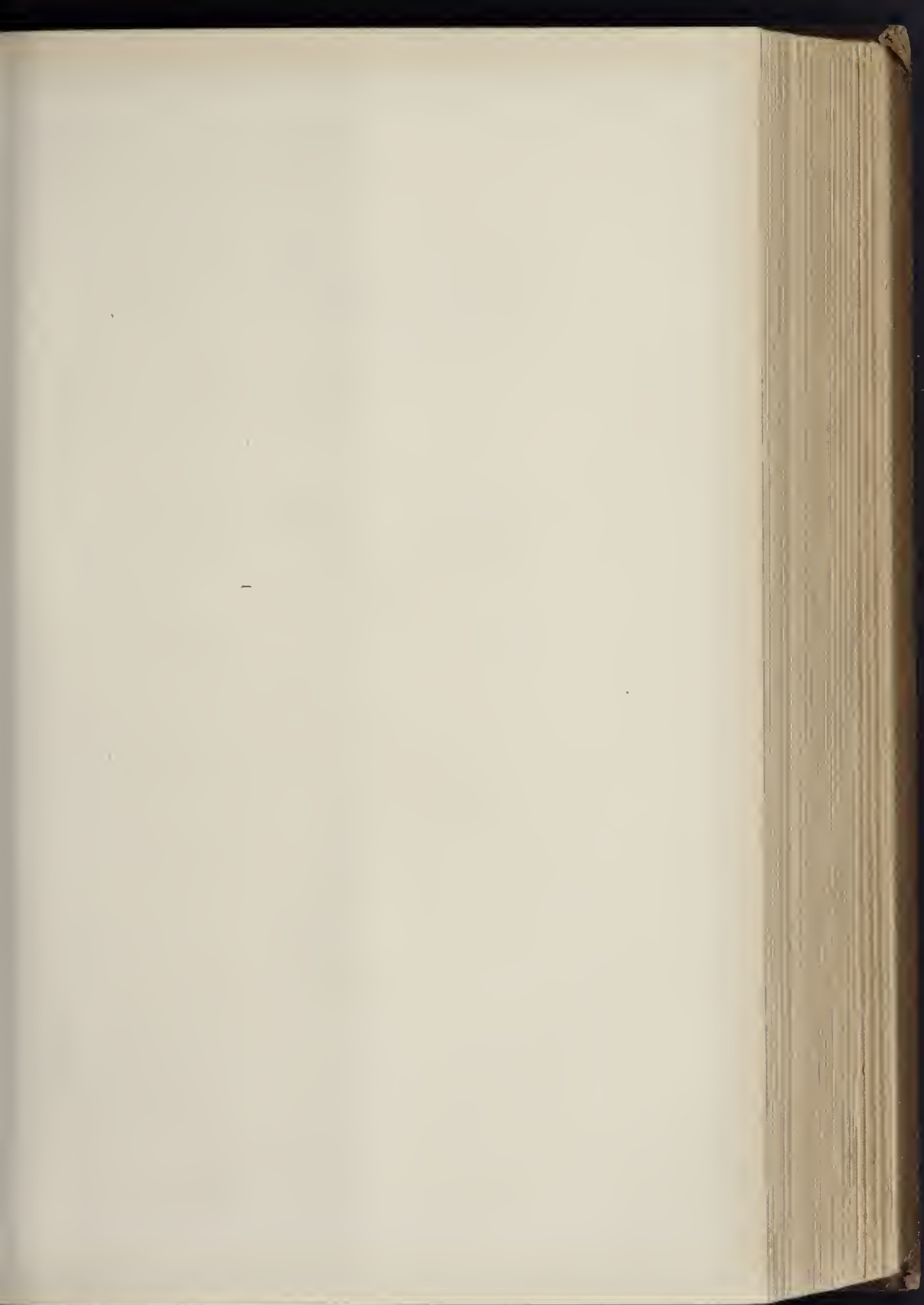


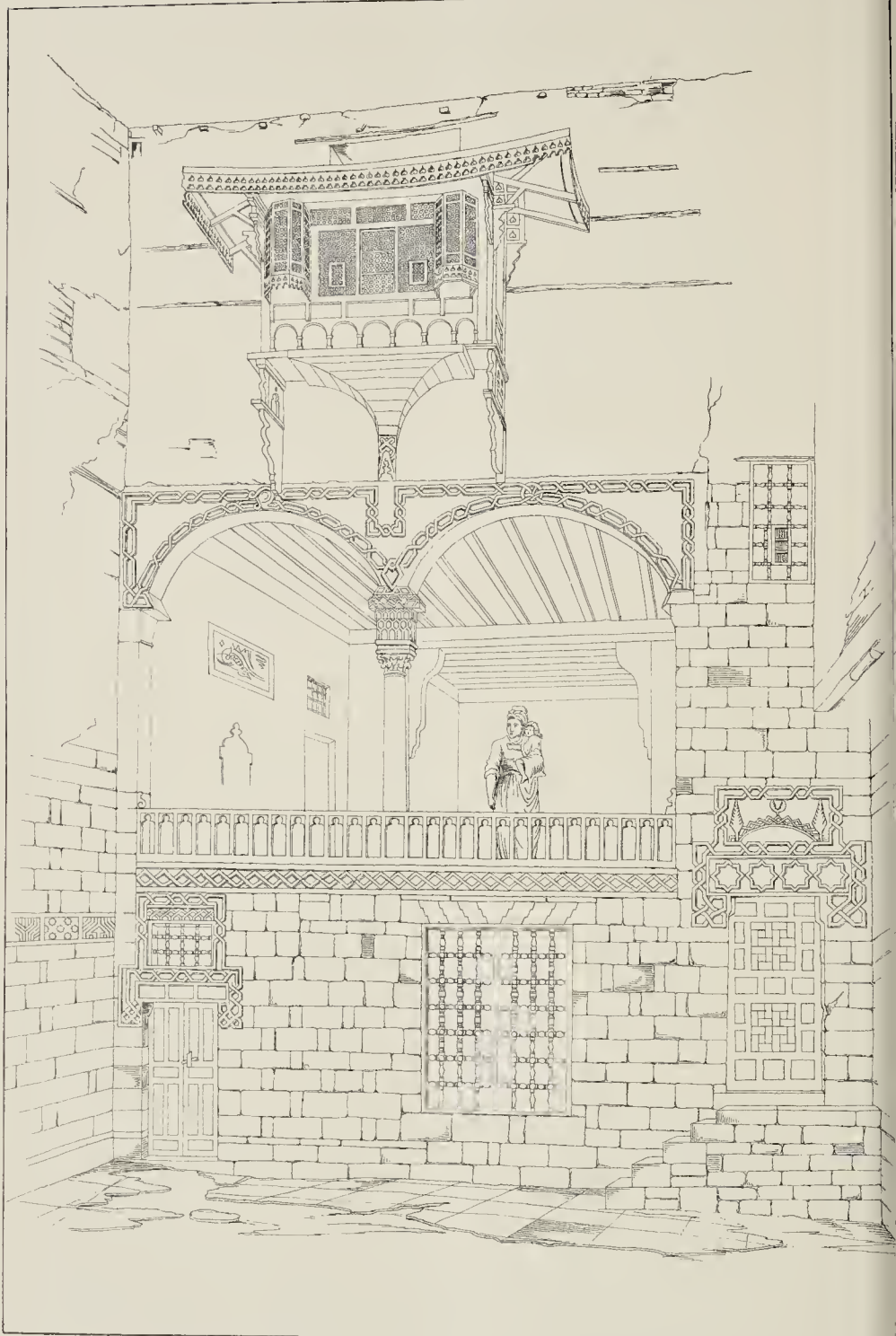
THE BUILDER, FEBRUARY 14, 1885



TOYNBEE HALL, Commercial Street, Whitechapel, London, E.

M. E. HOOLE, ARCHT.



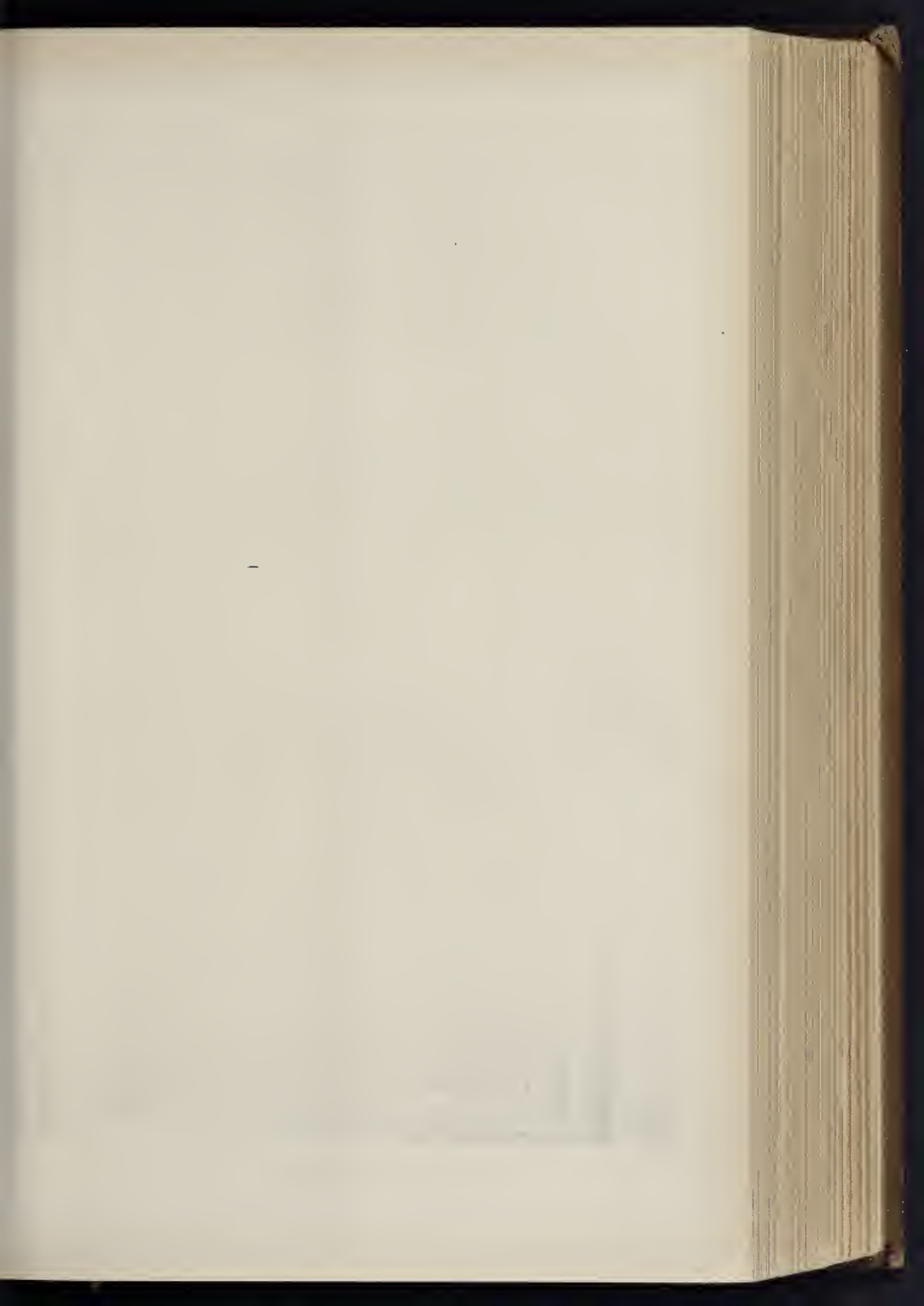


Wright & Sons Photo-Litho

C'Queen St London, W.C

FRONT OF HOUSE ON COURT, SHOWING MAKAD, AFTER PRISSE.

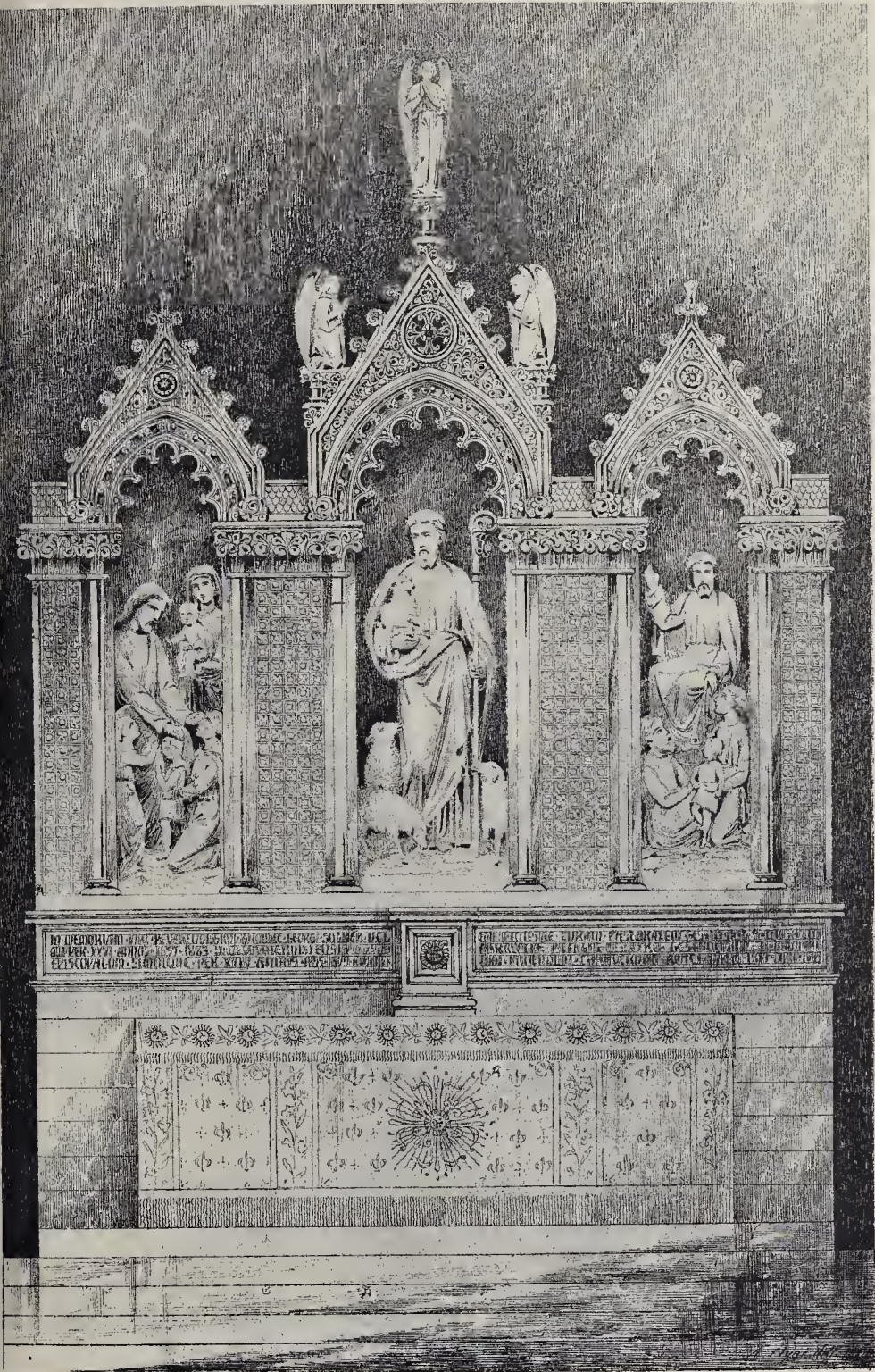
In Illustration of Mr. Stuart Poole's Lecture.





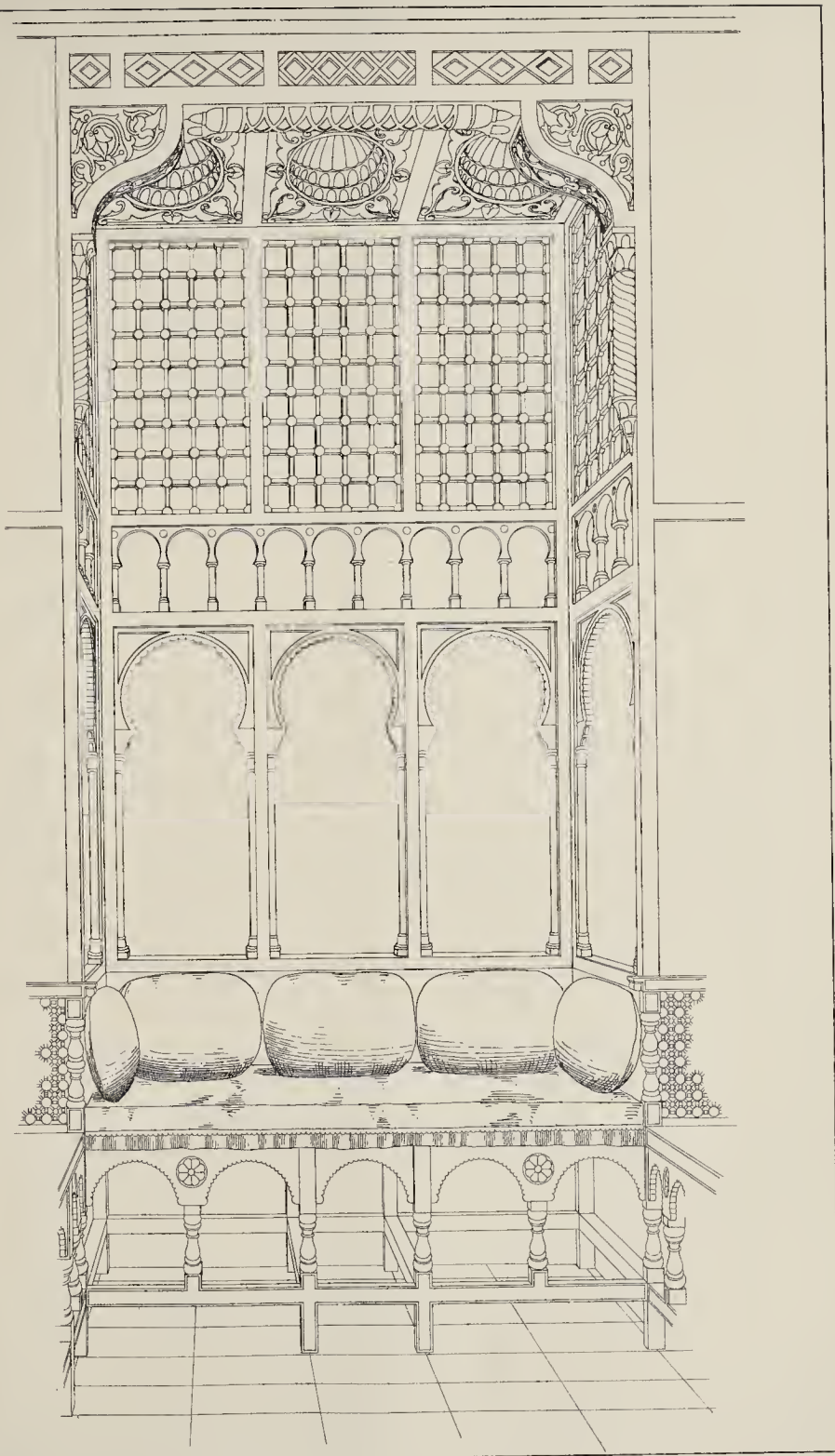
INK PHOTO. SPRAGUE & CO LONDON

WOOD PANEL (RENAISSANCE).
IN THE MUSEUM OF THE LOUVRE.



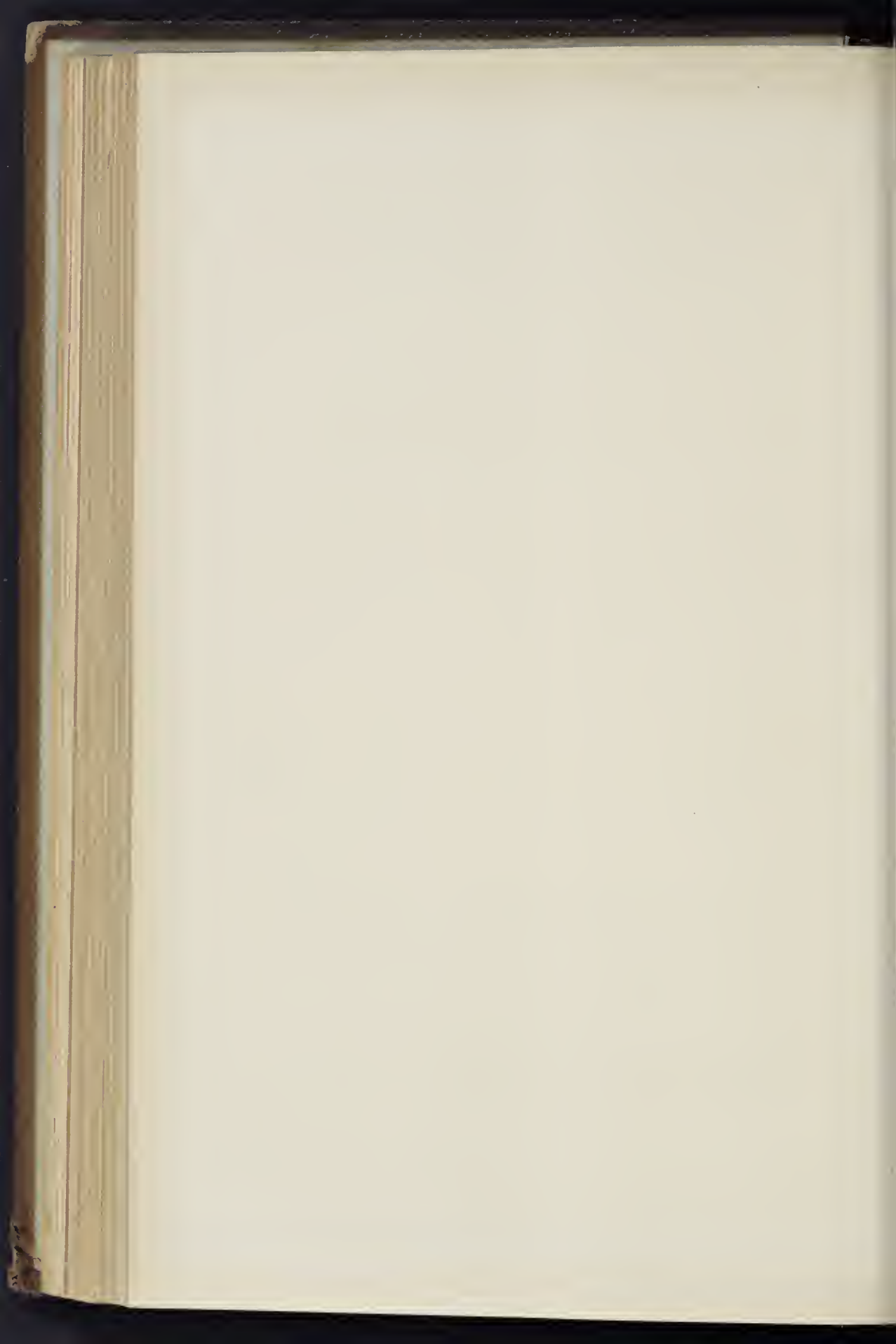
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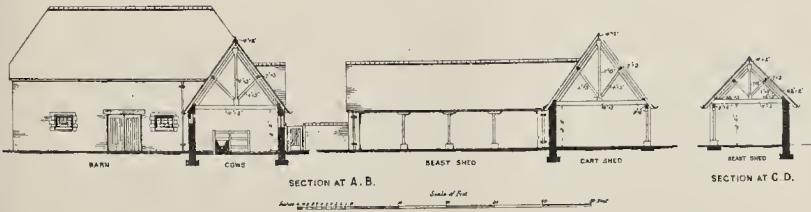
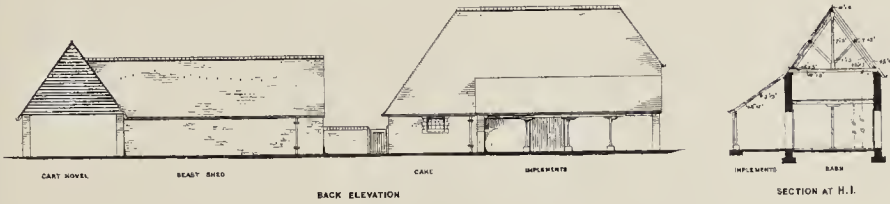
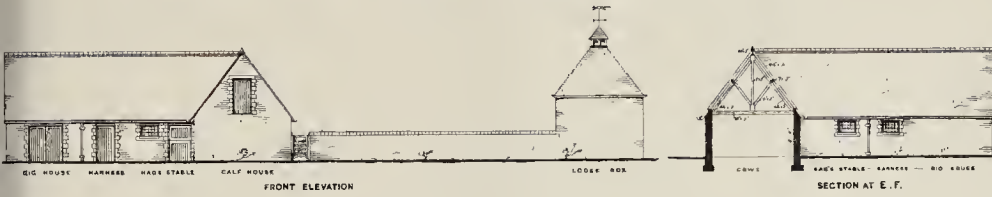
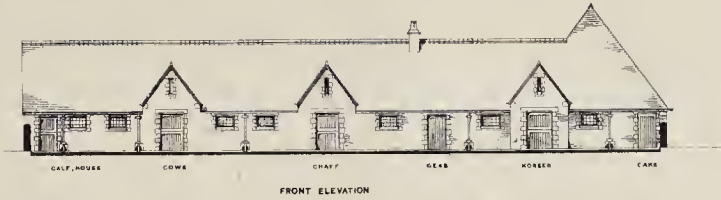
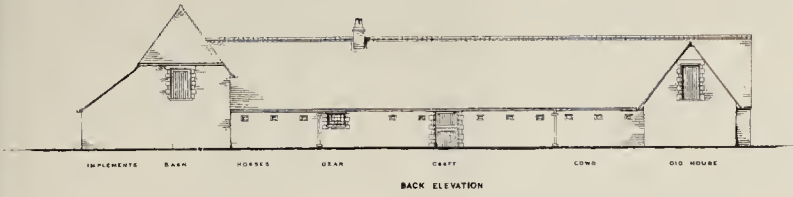
REREDOS, ST. ANDREW'S CHURCH, ABERDEEN.
MESSRS. PIRIE AND CLYNE, ARCHITECTS.



BARBER'S SHOP, AFTER COSTE, CORRECTED.

In Illustration of Mr. Stuart Poole's Lecture.







WILLEY CHURCH, WARWICKSHIRE.

WILLEY CHURCH, WARWICKSHIRE.

This small but interesting church, which lies in the neighbourhood of Lutterworth, where Wycliffe ministered, is at present undergoing thorough restoration, together with several important additions.

The building previously to restoration consisted of a plain but effective Late Decorated tower and nave, with a semi-Classic chancel and porch of red brick and stone dressings, added in the early part of this century.

The tower not being square on plan has a curious oblong appearance, and is heavily buttressed at the angles. It has good gargoyles and parapets, and is connected with the nave inside by a boldly-moulded arch.

The nave has been overhauled in Perpendicular times, when a flat roof of the period was substituted for the old high-pitched Decorated roof, the rake of which is shown by the stone string on the tower; at the same period two large three-light windows were inserted. The present existing roof is a later one still, and is very curious and interesting, having been added at an age not particularly famous for church restoration. At the first glance the principals appear to be Perpendicular, but the date 1678, carved upon them, and the character of the initials I O and E R, and carving generally, show its undoubted age. A curious "end" was made when the architect was examining the building: over the chancel arch (which only remains to the spring) there was discovered, partly covered up with plaster and timber work, a well-carved principal of Perpendicular work; no doubt one of the beams of the earlier roof which appears to have been destroyed by fire, and which served as a model for the principals put up in the repairs of 1678.

In these explorations a very good square-headed doorway, with an internal arch, was found on the north side of the nave leading into the octagonal stair-turret, which shows on the north side of the nave outside; above this was found another door, narrower and arch-headed, at the level of the roof-loft, all traces of which are gone.

There were also found the remains of a very beautiful thirteenth-century tomb, built as a lintel over the south door, probably in the repairs of 1678. It represents the recumbent and nearly-

perfect figure of a woman with her hands clasped in prayer, resting behind three well-moulded quatrefoil panels cut in stone of a very red colour, apparently so by the action of fire.

On removing the plaster from the north wall of the nave the whole wall was found to be covered with paintings in distemper arranged in panels, and a dado with a stencilled running pattern on the top representing I.H.S. monograms interchanged with scroll-work and birds; the doorways to the rood-screen stair and chancel arch were also stencilled with very good ornament. The paintings were all too much defaced to make a restoration possible.

The outside of the nave roof was roughly covered with lead, lapping over the walls at the eaves, all traces of the parapet being gone. It is intended to relay the roof, and to place a crenellated parapet, with mask gargoyles and lead spouts, on both sides of the nave.

The new additions to the church in course of erection are a Decorated chancel and porch, a new chancel arch, and a vestry opening into the chancel by a stone arch filled up to the spring with a wooden screen.

The old gallery at the west end of the nave and the old seating will be removed, and new seating substituted upon wood flooring.

Every care is being taken in these restorations to preserve the ancient character of the old work, and nothing will be removed or touched which is not absolutely necessary.

The work is being done by the rector, the Rev. F. Morgan Payler, from designs by Mr. Walter F. Lyon, of 50, Lincoln's Inn-fields; the builders being Messrs. Law & King, of Lutterworth, who carried out the restoration of Bitteswell Church in the same neighbourhood in a very satisfactory manner for the same architect a year or two ago.

The Cheshire Lines Extension Contract.

Owing to the failure of Mr. Walter Smith, the contract for the Cheshire Lines Extension to Southport fell through, but was subsequently tendered for by Messrs. R. Neill & Sons, of Manchester. That firm will complete the work, with several additions. The contract on the whole will amount to upwards of 20,000.—*Liverpool Journal of Commerce.*

THE PURITY OF AIR IN TOWNS.

CAPTAIN DOUGLAS GALTON, C.B., read a paper on this subject on the 7th inst., at a meeting of the Association of Public Sanitary Inspectors, held in the rooms of the Social Science Association, Adam-street, Adelphi, Mr. Jerram being in the chair.

Captain Galton said he had selected a subject which had a most important bearing on the profession of his auditors. All air, and especially town air, was full of floating matter or dust. The experiments of Mr. Aitken, of Edinburgh, showed that it was owing to the presence of foreign matter, such as dust or smoke, that aqueous vapour became visible as fog. If there was no dust in the air there would be no fog, no cloud, no mist, and probably no rain. Dust was not, therefore, necessarily an evil except when present in excess, which was generally the case in large towns. In manufacturing districts and in towns which approached the size of London, the evils arising from smoke and dust became greatly intensified. The experiments of Dr. Russell on London air, of Angus Smith on the air of the Scottish hills, and of M. Marie Davy of Paris, had proved that air in the centre of large towns was more laden with bacteria and similar organisms, which are forms of dust, than air in more open and elevated places. These organisms were of immense use in the economy of nature, but they were also causes of certain forms of disease: and the question of how to diminish the impurity of air in large towns, therefore, became one of the utmost importance. The smoke of factories, the dust from street sweepings, organic matter from stable-yards, and defective sanitary arrangements in the home, were the principal causes of the pollution of town air. Dr. Morgan's statistics showed that the mortality of persons under fifteen was 40.7 per 1,000 in certain enumerated towns as compared with 22 per 1,000 in the country districts.

The removal of the children of the London Orphan Asylum from Clapton to Watford had resulted in a large diminution in the death-rate. The deaths in the ten years previous to removal from Clapton amounted to forty, and in the subsequent ten years at Watford to only fourteen. It was an undoubted fact that the populations of large towns deteriorated, and that the stamina of these populations was mainly

kept up by immigration from the country. The importance of the removal, and as far as possible of the prevention, of smoke would be evident in comparing the population of London at different periods. At the beginning of the present century it was 960,000, at the present time 4,000,000, and it was estimated that, at its present rate of increase, in 1920 it would be 8,000,000. Simple machinery for the uniform distribution of fuel over the bars of grates would prevent black smoke; bakers' ovens could be worked by gas, though not profitably at the present price of gas; steam, hot-water, hot-air, and gas might be much more largely introduced into the household for heating purposes, and in other ways the evil of smoke might be almost entirely got rid of. An increasingly-important question in London in respect to purity of air was that of the disposal of the dead. The universal use of the inhumation should be insisted upon.

An interesting discussion followed, in which Mr. E. C. Robins, F.R.I.B.A., and Messrs. Middleverick (South Kensington), Mr. Rains (St. George's-in-the-East), Mr. Stace (Limehouse), Mr. Fisher (Camberwell), Mr. Alexander (Shoreditch), and other inspectors took part.

TEMPORARY OR MOVABLE WOODEN STRUCTURES.

By Section 13 of 45 Vic., c. 14, it is provided that it shall not be lawful for any person to erect or set up any wooden structure or erection of the above character, unless the same be exempt from the first part of the Metropolitan Building Act, 1855, which exemption, so far as is necessary for the consideration of this section, is as follows:—

"All buildings not exceeding in height 30 ft., as measured from the footings of the walls, and not exceeding in extent 125,000 cubic feet, and not being public buildings wholly in one occupation, and distant at least 8 ft. from the nearest street or alley, whether public or private, and at the least 30 ft. from the nearest buildings and from the ground of any adjoining owner."

And further,—

"All buildings not exceeding in extent 210,000 cubic feet and not being public buildings, and distant at least 30 ft. from the nearest street or alley, whether public or private, and at least 60 ft. from the nearest buildings and from the ground of any adjoining owner."

And in case any person erects or sets up any such structure or erection without the licence first had and obtained from the Metropolitan Board of Works, a penalty not exceeding 5l. and a further penalty of 40s. for each day during the continuance of the same, may be proceeded for. Wooden structures erected by builders for use during the construction, alteration, or repair of any building, are exempted.

This is a very important section to keep in mind, as a great number of temporary erections, such as mission-halls, temporary chapels, meeting-houses, &c., are being erected in the metropolis, and as it has been held in a recent case that the penalties are continuous, and may be sued for at any time, a builder or other person may find himself, after some time has elapsed, mulcted in a very heavy amount; and in all cases it would be well before erecting structures of the above character to first obtain the licence of the Board.

The Powers of Water Companies.—In a special report which has been submitted to the Kensington Vestry, Dr. Dudfield draws attention to a case in which twenty separate business premises in a mews in his district were suddenly deprived of their water-supply by the action of the Grand Junction Waterworks Company, who severed the service-pipes to the several premises because the landlord had failed to pay the water-rates. In this case the landlord's default to make the proper payment seems to have been inexcusable; but Dr. Dudfield refers to the case mainly with a view of showing how needlessly extensive and arbitrary are the powers with which water companies are vested in this matter. Not only can groups of houses be thus suddenly deprived of one of the necessities of health and life, but if any neighbours or friends were to give those persons whose water has been cut off a supply from their own service-pipes, or were to allow them to take enough for their needs, they would render themselves liable to penalties of 10l. and 5l. respectively; whereas the company could, without resorting to so extreme a measure, recover the rent for water by an ordinary legal process.—*Lancet.*

HOUSE DECORATORS' CLUB AND INSTITUTE.

The fourth annual general meeting of the shareholders of the House Decorators' Club and Institute Company, Limited, was held in the large room of the Club, 19, Howland-street, on Thursday, the 5th inst., Mr. J. H. Donaldson in the chair. After the minutes of the last meeting had been read and adopted,

The report and balance-sheet were carefully discussed. It appeared from these that the number of shares had been increased by 104, making the subscribed capital upwards of 1,000l. Owing to the delay caused by the completion of the necessary legal arrangements with adjoining owners and others, only a portion of the alterations and improvements referred to in a previous report had been commenced, but it was hoped the remainder would be proceeded with shortly. The decreased income derived from the Club was considered to be sufficiently accounted for by the very depressed state of trade during the past year.

After the passing of the balance-sheet and report, and the re-election of the secretary and treasurer, six directors were elected to complete the board. A suggestion from the chairman to secure the services of a public accountant as auditor was unanimously adopted, the usual remuneration being voted to the retiring auditors.

Replying to the cordial vote of thanks which closed the business of the meeting, Mr. Donaldson said that in the face of the state of trade in the past year their report must not be looked on as discouraging. Business is often sick, but never dies, and he hoped that a revival of trade during the ensuing year would bring greater prosperity to the company. He would venture to suggest that the greater attention should be paid to the library of the Club, the book-shelves of which he regretted to see so sparsely filled. Mr. J. F. Pascock, their solicitor, had just authorised him to promise them a parcel of books at once. In addition, he (the chairman) recommended that each one should give a small sum specially for this object; and if he succeeded in collecting by their next meeting the sum of 100l., he would himself give a similar amount. The 20l. to be entrusted to a specially appointed book committee to expend on the books most suitable for a library principally used by house decorators.

LIGHT AND AIR CASE.

BULLER v. DICKINSON.

This was a case (High Court of Justice, Chancery Division) in which it was contended that there had been a loss or abandonment of an ancient right

under the following circumstances:—The light in question was originally derived from a window in a room on the ground-floor of an old wooden toll-house three stories high, the line of frontage of which projected forward into a street, 4 ft. at one end and 7 ft. at the other. Nine years before the action the old house was pulled down by the then owners, who sold the projecting part of the site to the Vestry of the parish for the purpose of widening and straightening the street, and further without any interval erected a brick building of one story on the rest of the site. In so doing, he carried back the frontage to the line of the rest of the street, and he placed in the front wall a window which, according to the evidence, occupied a portion of the corresponding space of the ancient light in the old house, but was situated in a wall not built in the same plane as or parallel to the old wall, but set further back 4 ft. at one end and 7 ft. on the other. The ground-floor room which this window lighted was an extremely small room, and was used for the storage of iron.

Mr. Justice Kay, in giving judgment, held that the ancient light had neither been lost nor abandoned.

WIDTH OF STREETS.

FELIX BELL, of 5, Lansdowne-road, Old Charlton, appeared to a summons taken out by the Metropolitan Board of Works, at the Woolwich Police Court, for unlawfully (after committing a breach of the Metropolis Management Act, 1856 and 1862, and 41 & 42 Vic., c. 32, and By-laws), continuing a certain house or building in such a manner that the external wall or fence was at a less distance than 20 ft. from the centre of West-street, Charlton; and for allowing the same to remain after conviction for a period of 172 days.

Mr. Thomas Burton appeared for the Board, and the defendant appeared in person.

Mr. Burton, in opening the case, stated that this was the third application against the defendant, who was first convicted on the 27th of November last, and fined 20s. and 2s. costs. As defendant had done nothing to remedy the offence, a second summons was taken out, which, after several adjournments, was heard on February 6th, 1885, when defendant was fined 10l. and costs. He now applied for the balance of the penalties at 20s. a day for the breach of the by-law.

The defendant said it was impossible to remedy the defect, and that he had the consent of the Vestry to the erection as it now stood.

Mr. Marsham said he should again convict the defendant, and fined him 20l. and costs.

WHO WRITES THE SPECIFICATIONS?

Sir,—The Institute is fortunate in its present President, for many reasons. Amongst others because he believes in specifications as an important part of a true architect's work and duties. Witness his address a few years ago to the Architectural Association.

In the rules of the Institute, the specification (for estimate and contract) is described as one of the items of an architect's work to be covered by the 5 per cent.

I should like to know how many of the "leading" architects practising in London write their own specifications, or have them, a rule, written in their own offices, under their own immediate direction, by their own clerks? The specification is, or should be, an important part of the design. It sets forth, for the information of the client and of the builder, the architect's mind and purpose as to innumerable matters, or it should so set it forth.

When I entered a London office, many years ago, I found it the practice to let the quantity surveyor write even the more important specifications. Now, again, in 1885, I am told by an architect's assistant (working for me), and who was articulated in one of the leading London offices, that after seven years' experience in London, the greater part of the time under architects of eminence, he never had a chance at specification writing. He does "not think it was done in the office." "The quantity surveyor used to do it" (just as they used in experience, over a quarter of a century ago). I should like to ask also if those architects who do not write (or pay for the composition of "their" specifications, make a corresponding deduction from the 5 per cent. commission.

Nothing has done, nothing is doing, our profession more harm than the action of those architects,—many of them deservedly eminent—who undertake a great deal more work than they can possibly duly design or see to in detail; which they cannot (for want of time) duly describe in a proper artistic specification and which they cannot, for the same reason, properly supervise as the buildings go on. Trouble comes surely enough,—on the builder or on the client, or on the architect, or on a three. Cases crowd on my memory as I write of defective foundations, undrained basements, costly apartments unusable, pillars of arcade giving way, stone shafts chipping and flying with unskillful construction, decay of timber (and within a few years) too-flat tiled roofs letting water in like a sieve, bad flanking omitted, masonry and brickwork with little or no mortar, dangerous steps, scamped builder's work undetected, drains letting sewage soak into foundations, or acting as conduits of sewage to dwellings.

These are the things that defile our profession. There is one sort of architect who, when he gets work, spares neither time, nor trouble, nor money in order that everything may be the best that he can make it under the instructions received,—a man who shows his "genius in an infinite capacity for taking pains." There is another sort, whose chief anxiety and effort is to get work, and when once the client is committed to him, his next point is to carry on the work at the least pecuniary cost to himself, and at the least trouble.

Nowadays any number of people can draw and draw well. A very large number can design well too, and of these a large proportion can make good details. I fear that comparatively few can see a building well through to the end, and deliver it up to its proprietor in all respects what it should be and is understood to be; and of these last I fear there are still fewer who do it. EXCELSIOR.

ÆSTHETIC PROPORTION.

Sir,—If I rightly interpret your leader in the *Builder* of the 7th, headed, "Proportion in Theory, and Proportion in Practice," it is an invitation to discuss the subject. I cannot just at present, say all that I would wish because I have to give a lecture in April,—not on the 1st,—on the Foundations of my new Science of Æsthetics, in which I propose to show why the subject of proportion is so important a study in the fine arts. With moderns it would appear to be a foregone conclusion that the Greeks possessed a science of æsthetic proportion. I myself believe that this was the case, but we have to recollect that belief is not certainty, and that not until we

shall have worked out and formulated a science of proportion by a rigorously scientific method, and are able to test Grecian work by his science, shall we be able confidently to assert that the Greeks had also worked out this self-same science. It would appear to be thought that the Greeks were in possession of some occult science of proportion never to be revealed to meaner mortals. That such a notion should obtain in this scientific age is somewhat anomalous. It is clearly absurd to suppose that the Greeks could, by any possibility, have been acquainted with the correct principles of proportion, had they not obtained them by careful investigation, by a scientific method. It is true that the instinct of a perfectly constituted optic sense may have been their monitor, and kept them near the truth, or it is on the evidence of the perfectly constituted optic sense that the principles of correct proportion are founded, or, at all events, verified. Instinct, however, is not knowledge. We should not forget that although the Greeks had not traversed the whole circle of the sciences as we moderns, they, nevertheless, had their one pre-eminently exact science, the mathematics, and we may reasonably suppose that possessing but this one, they may have made much of it, and have even applied it to express the principles of art. This art, about which persons without the slightest understanding of it are so fond of chattering, is a product of the human nature; it is in the constitution of this that its principles are to be sought. Art is not an entity of the outer world to be observed and measured like the planets and their orbits. Art is, as we have said, a human product, resulting from the adaptation, of whatever may for the nonce be its theme, — either to human taste, or to the human understanding. Strange to say, however, that when we push our investigations on this subject to their ultimate issues, we find that the principles of proportion, oppositely to the human nature, coincide with those which obtain in the Cosmos. That is to say, there is but one science of proportion.

W. CAVE THOMAS.

THAMES SEWAGE NUISANCE.

SIR,—With respect to the Thames River nuisance frequently discussed in your journal, may mention that I had occasion to pass up and down the river four times, in the course of travelling, last autumn; I venture, therefore, to add my testimony to confirm the statements therein as to the noxious emanations both from the banks and waters of the river. If one considers the hydraulic action of river estuaries, it will be seen that they may be unsuitable pools for the discharge into them of outfalls of sewage. Any one may observe the phenomena of discharge and entrance of the waters of a river at a seaport provided with a river flowing out between two jetties into the sea, as at Ostend. The sea-water on the flood tide will be found creeping along the bottom of the channel, and flung up the fresh water flowing down on its back. When the tide of salt water recedes it will be seen that it creeps down again the same way it came up, leaving the fresh water on top. This physical condition is effected by virtue of the heavier specific gravity of the sea-water (1025.30) over the fresh water, compelling it always to tend to lie underneath it, and not to mix with the other above, unless by violence.

The sewage and drainage matters and fluids will consequently tend to remain generally on the surface of the water of the river estuary, except the mineral ingredients, whose specific gravities will be greater than that of the sea-water. Further, when the tide is running up on the flood, the level of the water will be an inclined plane sloping downwards from the mouth of the river to the town above. This will tend to prevent the river water flowing out to sea, and drive it back again to the town.

When the sea-tide is running out, the inclined plane will be reversed, and the fresh water will tend to run down to the mouth of the river. This reversal, however, will take place, not at the point of the backed fresh water at the town, but will commence first at the river's mouth, and gradually ascend to the relief of the imprisoned water above.

It may, however, in long rivers arrive too late to be of much service in letting out the

whole of the impounded fresh water down stream for an exit to the sea. Consequently before this can be done, owing to want of time and great distance, back comes the fresh water on the back of the rising flood, with all its impurities, to discharge afresh decomposing vapours over the riverine areas.

Viewing the sewage fluid as an organic infusion, like tanning or dyeing solutions, the ultimate destination of it on arrival at and discharge into the sea will, no doubt, be to float on the surface and spread out as a film, owing to its superior lightness and lower specific gravity than that of pure salt water. It will then be probably carried off by the prevailing winds in different directions, assisted by the tidal currents.

Its final dissipation will likely be due more to their natural action than to that of the sea-water underneath, which already has dissolved in it nearly as much as it can carry, viz., from three to four per cent. by weight of solid matter.

In the summer weather the evils of the floating sewage will necessarily be intensified, as its light specific gravity will be made lighter still by the sun's heat, and decomposing interstitial gases will be easier liberated by virtue of increased elasticity imparted to them.

In the winter the only mitigation must come from the aerial coldness diminishing evaporation and gaseous elimination, as the condensation of bulk owing to this cause in the sewage fluid can scarcely attain the superior original density of the sea-water. It would become of much interest in this view of the matter that experiments might be made in the river to find the temperature and density at different depths, and at different places along its course a chemical investigation at the same spots might also lead to determining the different ratios that subsist between the organic and saline matters present in each sample taken.

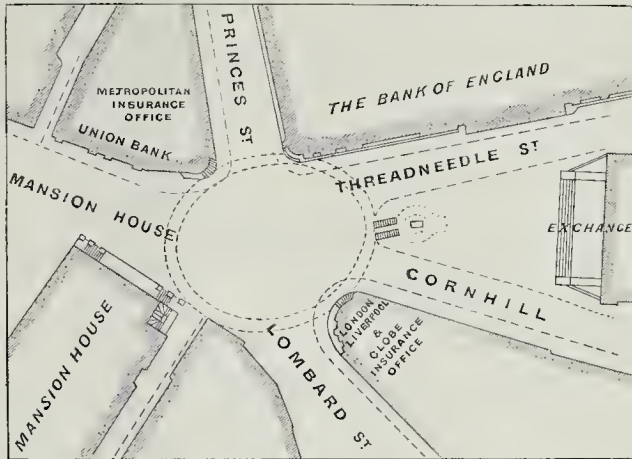
If sewage were found to float off on the surface of the river and not become mixed or dissolved in it, then this would explain why the banks get fouled with blackened deposits.

If the fluid really did mix with the sea-water, then it would be borne down by the ebb tide in the centre of the chief current in the middle of the river, out to the open month.

The phenomenal appearance there of fish in the river would be explained by their swimming in their real native element below the film of sewage fluid above, which no sooner they by chance would enter than they would get poisoned.

TRAVELLER.

Hydraulic Power.—Mr. J. Stannah, of Southwark Bridge-road, has just completed new hydraulic cylinders for working a very powerful crane, and a passenger-lift, at Messrs. Page, Draper, & Co.'s warehouse, Weston-street, Bermondsey. They are working by the high-pressure water supplied from the General Hydraulic Power Company's mains.



Mr. E. Gregg's Plan for a Subway at the Mansion House.

MANSION-HOUSE SUBWAY.

SIR,—I beg leave to point out a defect in the proposed scheme [*Builder*, p. 163, ante], and to offer the suggestion of an alternative route. It is well known that a large number of persons cross the space from the corner of the Bank of England, and by the scheme this corner is excluded from the proposed benefit; the alternative route is shown on the enclosed sketch, and consists of an irregular oval subway touching the six points, Bank of England, Union Bank, Mansion House, Smith Payne's Bank, Liverpool London and Globe Office, and, finally, the Wellington Statue. This particular form could easily be ventilated by means of the six approaches, and would obviate the necessity of the central circular obstruction 20 ft. in diameter, which must seriously interfere with the vehicular traffic. The space could be left entirely free, or the present refuges could be retained for such persons as would not avail themselves of the subway. I make this suggestion solely on the assumption that a subway is a necessity. I am not by any means sure that it is.

E. GREGG.

VENTILATION AND VENTILATORS.

SIR,—The paper upon this subject, read before the Architectural Association by Mr. F. R. Farrow, as reported in your issue of the 24th of January [p. 123], is one of the best I remember reading.

I was particularly struck with the sensible remarks of the author upon the diffusion of gases. Many people believe because carbonic acid gas, in comparison with the atmosphere generally, is much heavier, that therefore it inclines to collect at the bottom of the room. Mr. Farrow very ably corrects that mistake; and if further proof be wanted, it will be got in the interesting experiment made by Count Berthollet (as explained in Part I., p. 151, of Deschamps's "Natural Philosophy"), who filled two globes respectively with hydrogen and carbonic acid, and placed them above each other at some distance apart and communicating by a very small pipe. Notwithstanding the carbonic acid being in the lowest globe, it would not stay there, but went up and mixed with the hydrogen, which latter came down and mixed with the carbonic acid, all while the two globes were at rest.

I agree with Mr. Farrow that a good fixed ventilator is better than a moving one.

W. P. BUCHAN.

Glasgow.

KINNAIRD CASTLE.

SIR,—In the Dictionary of the "Architectural Publication Society," it is stated that W. H. Playfair, of Edinburgh, was the architect of Kinnaird Castle, Forfarshire (the mansion preceding the present one by Bryce); and the authority for this appears to be a work entitled "Forsyth's Beauties of Scotland," 1805-8, but this statement is clearly inaccurate, as Playfair was at the date not more than seventeen or eighteen years of age.

A recent writer on the mansions of Scotland also associates W. H. Playfair with the erection of the castle, but states that it was completed by the year 1790.

This seems rather to point to James Playfair, the father of W. H., as the author of the design. He was living in London till 1792, and was esteemed an architect of eminence in his day. Can Mr. Papworth or any of your readers kindly throw any light upon this?

G. S. AITKEN.

Dundee.

GOVERNMENT TENDERS.

SIR,—I observe that your paper contains almost every week numerous advertisements of the Commissioners of her Majesty's Works and Public Buildings soliciting tenders for various works in London and other towns, but my experience is that in no case will the Department give the slightest information concerning the result, except as to the acceptance or non-acceptance of a tender.

As your readers are aware, this is totally opposed to the usual practice of architects, who generally open tenders in the presence of the competitors, or at least furnish them with a detailed list.

Even the London School Board is considerate enough to post up such lists in their lobby for general inspection, and the Poor Law Department tenders are usually made known, while the Office of Works will not even give the name and amount of the accepted tender.

It therefore seems quite time, in this age of competition and publicity, that this secret practice of her Majesty's Office of Works should be given up, as no one knows whether the lowest tender is usually accepted, or the grossest favoritism shown.

It is hard, too, on the firms who tender, as, if the lists were shown to them, they would see their relative position, and be saved the annoyance and loss of repeatedly tendering when it is all to no purpose, either through their prices being too high or their tender being passed over in favour of some one else's.

I do not suggest that there is actual unfairness in the selections that are made; but if none exists there can be no good reason for such impenetrable secrecy.

Could not the Builders' Society or the National Association of Master Builders induce the architects of the Department to conform to the general practice? Or, must we try and get some Members of Parliament, before another election, to obtain a relaxation of the present rules?

Even if publication were prohibited, I think those who expend time and trouble in the preparation of *bona fide* tenders should be allowed to know how they stand.

H. S.

"NON-ACCEPTANCE OF LOWEST TENDER."

SIR,—I can fully endorse the opinion expressed by Mr. Wm. White in last week's *Builder* [p. 217], that if "Fairplay" has been asked to tender for work, and his tender, being the lowest, is not accepted, he can charge the person inviting him to tender with the cost of preparing his estimate. If he has simply applied, in answer to an advertisement, for the quantities, &c., he has no ground for action.

To prevent the possibility of any misunderstanding on this point, I always print on the endorsement of my quantities the following words:—"The lowest or any tender not necessarily accepted, and no allowance made for tenders."

W. HOFFMAN WOOD, F.G.S.

Leeds, February 9.

DAMP DWELLINGS.

SIR,—Could any of your readers kindly give me some information or advice on the following case? About two years ago I built a large dwelling-house in a somewhat exposed situation, the outer walls of which are 1 ft. 6 in. thick, built of mountain limestone, with "diamond rock-work" facing in close joints and Beer stone dressings, and lined inside with bricks (no air-space). After occupation, one angle of the building (north-west aspect) showed signs of excessive damp, which has continued to the present time, the plaster crumbling and the wall-papers rotting and dropping off. This is in the drawing-room, and, curious to say, in no other part of the building is there the least sign of damp. For some time it was thought to be the natural effect of the new walls, and would dry out; but it has now been occupied twenty-one months, and is no hotter than at first. Nothing has been done externally; but a year ago the walls inside were coated with silicate, and tar-paper put under the wall-paper, but with no good result. Can any one suggest a remedy?

JOSEPH BIRD.

CAUTION TO ARCHITECTS, SURVEYORS, AND OTHERS.

SIR,—Let me warn you and other members of our profession against a circular recently issued by "The Orphans," five in number, of a highly respectable practitioner (P.S.A. and F.R.I.B.A.), who died in September last, and who before his death received a considerable sum of money subscribed for him by friends and several professional colleagues.

It has come to my knowledge that money has been and is being obtained, ostensibly for the family of this deceased architect, by a person who has signed their names without, I am told, their authority. One pretence under which small amounts have been thus obtained from two well-known London architects is that one of the orphans (the second in age) required a certain sum to enable him to defray the cost of a passage to Australia; another is, that the Architects' Benevolent Society, having made a grant to these orphans, is unable to pay it for a

week, a fortnight, or so on,—a statement made with profit some weeks after the whole amount of the said grant had been paid to the eldest of them.

This letter may, perhaps, be in time to save many from being victimised, and if the few who have already suffered will communicate with me, or send me any of the numerous letters written by, or in the name of, these orphans, some good may yet result from the too-indiscriminate almsgiving which has taken place in this instance.

WILLIAM H. WHITE,
Hon. Sec. Architects' Benevolent Society.

IMPERMEABLE SURFACE.

SIR,—Would any of your readers be so good as to inform me, through your paper, of an inexpensive way of rendering the surface of a few rods of ground nearly, or quite, impermeable to water, in order to collect rainfall to fill a tank?

T. T.

The Student's Column.

DESCRIPTIVE GEOMETRY.—II.

HERE are cases when it is exceedingly easy to draw the projections of an object, and work out any problem relating thereto; for instance, a wall parallel to the plane of the picture allows one to measure its dimensions on the elevation, both widths and heights, but the elevation of the roof will not allow you to measure direct the distance from the ridge to the eaves. If there be a wall on the skew relatively to the elevation, such as the sides of a bow-window, you cannot get at its width from the elevation only, you must then use the plan.

The whole science of descriptive geometry consists in various methods of bringing back the objects represented to such positions relatively to the planes of elevation and plan, that the problems relating thereto should be easily solved.

This is achieved by two different methods. 1. Rotations.—You can turn about an object and bring it to any position you like by two rotations, which are very easy to draw. In the first, the object rotates round a vertical axle; in the second, round a horizontal axle. In the rotation round a vertical axle, Δ , the elevation of the point m^* travels along a horizontal line from m^* to m^v , whereas the plan of the point m travels along an arc of a circle from m^h to m^h . See fig. 3.

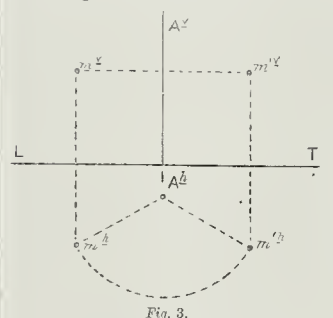


Fig. 3.

In the rotation round a horizontal axle, A^h , it is the elevation of the point m which travels along an arc of a circle from m^* to m^v ; whereas

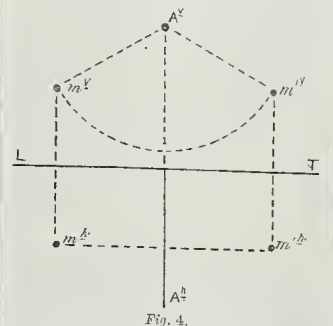


Fig. 4.

* The point is sp. ken of as m simply, when no immediate reference is made to its relative positions on the diagram; it is m^h or m^v when the special positions thus designated are referred to.

now the plan of the point m travels from m^h along a line parallel to $L T$. See fig. 4.

It is often convenient to be able to rotate plane, P , round one of its traces, P^h , and lay flat against one of the picture planes, say on $plan$. In this case the plan m^h of a point m move on a line perpendicular to the trace P^h of the plane, which serves as axle or hinge to rotation. See fig. 5.

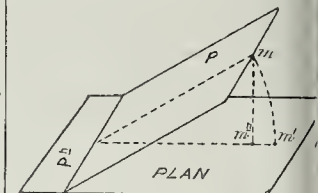


Fig. 5.

Practical Application of Rotations.

We want the real length and the real inclination of the hip of a roof given in plan and elevation.

We can make it rotate until it be parallel to the elevation plane. In fig. 6 the vertical

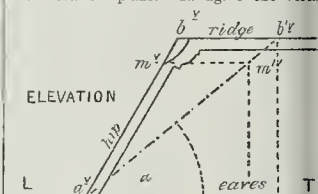


Fig. 6.

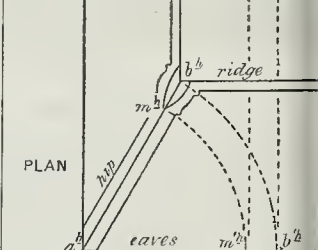


Fig. 7.

rotation axle is taken at the lower end of the hip; $a^v b^v$ is the real length of the hip, $a^h b^h$ angle a of $a^v b^v$ with the horizon, is its inclination.

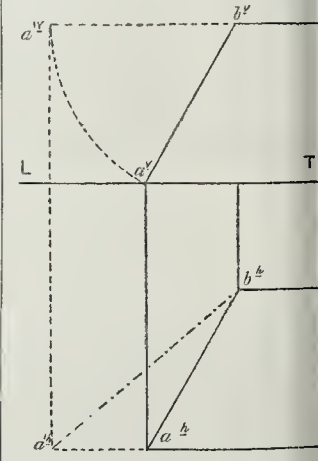


Fig. 8.

If you want to mark out a certain length of the hip,—to draw, for instance, a given zinc lead ornament thereon,—all you have to do is first bring the hip parallel to the elevation

mark thereon the dimension $b^1 m^1 r^1$ red, and rotate back the point m to $m^1 m^1$. There are many ways of carrying out this item which the student may try simply as a way of exercising himself in geometrical drawing. It can be brought by rotation the hip parallel to the horizontal plane. See fig. 7. It can be rotated the hip round its horizontal projection, and lay it down flat upon the plane having marked the length, $b^1 m^1$, he wishes to draw, he rotates the hip line back in its former position. See fig. 8.

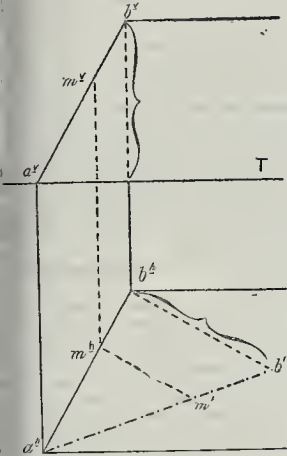


Fig. 8.

It can rotate the hip round its vertical projection and lay it down flat upon the elevation. See fig. 9.

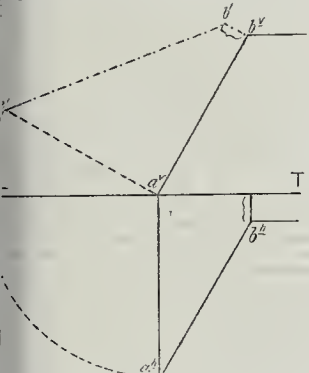


Fig. 9.

But all these processes are, in practice, not carried out to the following figure. You make a right-

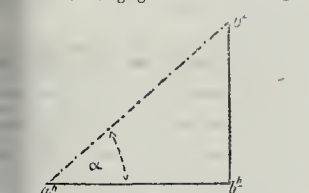


Fig. 10.

angle triangle, of which the horizontal projection $a^1 b^1$ is the base; the height, $b^1 m^1$, of the triangle over the eaves forms the other side; the perpendicular, $a^1 m^1$, on the third side is the real height of the hip; and the angle, a , is its inclination.

VARIORUM.

MR. EDWARD STANFORD, of Charing-cross, has sent us his annual map showing the proposed new metropolitan railways, tramways, and miscellaneous improvements for which plans were deposited at the Private Bill Office in November last with a view to legislative sanction in the coming Session of Parliament. It is very clearly arranged, and provided with adequate "references." Mr. Stanford has also issued another map of much interest at the present time, viz., "A Map of the New London Boroughs as proposed in 'The Redistribution of Seats Act, 1885.'" The map shows at a glance the extent of the several new boroughs, their population, and the number of members to be allotted to each. The proposed divisions of the new boroughs are not shown, no doubt because the Boundary Commissioners have only just held their inquiries in the metropolis. An examination of the boundaries of the boroughs as proposed to be constituted shows several anomalies, — or, at any rate, the lack of a "scientific frontier" in more than one place. For instance, the new borough of Chelsea (the major part of which consists of Chelsea proper), has a minor part far to the north, between Kensington and Willesden; thus the proposed new borough of Kensington will intervene (in the direction of its greatest length) between the two parts of the new borough of Chelsea. Two or three similar cases are to be noted south of the Thames, where a small portion of the new borough of Wandsworth is completely detached and wedged in between the new borough of Lambeth and Camberwell, this minor portion of Wandsworth being to the east of Lambeth, while the major portion is to the westward. Another instance south of the Thames is in Southwark, where the districts known as St. Saviour's, St. Olave's, and Horselydown are, as at present proposed, not to form any part of the suggested new borough of Southwark, but are to be thrown together and form a completely detached portion of the new borough of Rotherhithe, with the new borough of Bermondsey between them! No wonder that the inhabitants of St. Saviour's and the other districts are protesting against this arrangement. The inconvenience and confusion caused by calling the district of which St. Saviour's Church (St. Mary Overy's) is the centre by the name of a district some distance further down the river, and not even adjoining it, will be great. The proposed new borough of Southwark is to be formed of the districts of Christ Church and St. George-the-Martyr, and will be one of the oddest and most awkwardly-shaped of any of the boroughs. Bounded on the north by the Thames in the vicinity of Blackfriars Bridge, and on the west and south by Lambeth, the new borough of Southwark will be bounded on the east by the detached part (St. Saviour's) of the proposed borough of Rotherhithe and by the proposed borough of Newington, but will have an awkward tongue or isthmus running out in a south-easterly direction for about a mile between the boroughs of Bermondsey and Newington. This strip mainly follows the line of the Old Kent-road, and is for a great part only an eighth of a mile wide, and in no part apparently more than a quarter of a mile wide. Such anomalies are due, of course, to adherence to the parochial boundaries, which in London are sometimes "fearfully and wonderfully made." How this comes about we will not stop to inquire, nor shall we venture to suggest any re-arrangement of the districts on lines which should partially ignore existing boundaries. With the political aspect of the subject we have nothing to do; we have merely pointed out certain anomalous boundaries because we think that the constitution of the proposed new Parliamentary boroughs cannot but have some bearing on the municipal government of the metropolis, its efficacy or its inefficiency in the promotion of the public health. We should add that the map showing the proposed new borough boundaries forms a supplement to Mr. Stanford's series of London Government maps, which we noticed in the *Builder* for June 21 last, p. 912. — Messrs. Cassell & Company (Limited) send us a parcel of their magazines for February. In the *Quiver* there is an article on church steeples and towers, illustrated by views of the Norman tower at Bury St. Edmunds and the tower of St. Mary's, Hull. Knight's "Practical Dictionary of Me-

chanics," part 98, contains a great deal of information, concisely put, as to Electricity and Electric Lighting. Part 12 of the new and revised edition of Cassell's "Technical Educator," contains, among others, papers on mining and quarrying, the art of glass-painting, perspective, drawing for stonemasons, and principles of design. — The *Leisure Hour* for February (56, Paternoster-row) contains an article entitled "Hints for the Improvement of the Dwellings of Artisans and Labourers," addressed "not to speculating builders, but to the wealthy, and especially to proprietors of land and extensive manufactories and mines." — Part 3 of Ward & Lock's "Technical Journal and Industrial Self-Instructor" (Ward, Lock, & Co.) contains papers on draughtsmanship for the building and engineering trades, wood-working and cabinet-making, "The Stonemason as a Technical Worker," and other subjects. With this work is being issued a "cyclopaedic dictionary of terms in technical science and industrial art," with French and German equivalents. The section now being issued deals with "architectural design and building construction."

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.	
FEBRUARY 2.	
By G. A. WILKINSON.	
City—15, Fish-street-hill, freehold, area 954 ft.	£4,500
Walworth—Ground-rent of 40l. a year, reversion in 38 years	1,000
Victoria Docks—25, Custom House-terrace, freehold	2,630
21, Custom House-terrace, freehold	800
Shoreditch—10, Church-street, freehold	855
By H. C. NEWSON.	
Lavender-hill—20, Ficke-road, 85 years, ground-rent 6l. 5s.	330
Upper Holloway—84, Elthorne-road, freehold	465
Hoxton—11, Bristow-street, 22 years, ground-rent 6l. 4s.	215
14, Wimbourne-street, 19 years, ground-rent 4l.	230
81 and 82, Shaftesbury-road, 17 years, ground-rent 7l.	430
By W. B. HALLETT.	
Hampstead Heath—The Lease of Windmill Hill House, term 10 years	40
FEBRUARY 3.	
By FURBER, PRICE, & FURBER.	
Marylebone, 25, St. Mary's-terrace, 53 years, ground-rent 12l. 12s.	680
Knightbridge—33, Trevor-square, 32 years, ground-rent 3l.	560
FEBRUARY 4.	
By MARK LIEBL.	
Poplar—9, Dull-street, freehold	270
Milwall—183, Westferry-road, and a Plot of Land, 27 years, ground-rent 3l. 16s.	405
By S. WALKER & RUNTZ.	
Wood Green, Neas-road—Four Residences, 93 years, ground-rent 25l. 4s.	639
Southgate-road—Two Villas, 24 years, ground-rent 16l.	620
Station-road—Three plots of freehold land	220
Southgate—1 to 4, Cyprus Cottages, 92 years, ground-rent 12l. 12s.	410
Glebeon Cottage, and a plot of land, freehold	160
FEBRUARY 5.	
By TOWERS, WILLIAMSON, & ELLIS.	
Paddington—30 and 32, Prad-street, 36 years, ground-rent 24l.	1,610
By MARSH, MILNER, & LANGTON.	
Lewisham—130 and 132, Lewisham-road, 31 years, ground-rent 10l. 15s.	855
FEBRUARY 6.	
By MITCHELL & SCODDLE.	
Clapham-road—14 and 20, Lingham-street, freehold	730

MEETINGS.

SATURDAY, FEB. 14.	
Architectural Association.—Visit to 18, Carlton House-terrace. 3 p.m.	
MONDAY, FEB. 16.	
Royal Institute of British Architects.—Mr. Ralph Nevill, F.S.A., on "Roof Coverings." 8 p.m.	
Royal Academy.—Professor C. F. Newton on Sculpture: "The School of Praxiteles." 1. 8 p.m.	
Royal Architectural Museum and School of Art.—Distribution of Prizes by Mr. F. H. Morris, A.R.A. 8 p.m.	
Statistical Society of Glasgow (Architectural Section).—(1) Mr. R. A. McIlvray on "Plaster Work." (2) Mr. H. Morrison on "Slates."—Professor George Forbes on "The Distribution of Electricity." III, 8 p.m.	
Victoria Institute.—8 p.m.	
TUESDAY, FEB. 17.	
Institution of Civil Engineers.—(1) Mr. B. Baker on "The Metropolitan and Metropolitan District Railways." (2) Mr. J. Wolfe Barry on "The City Lines and Extensions (Inner Circle Completion) of the Metropolitan and District Railways." 8 p.m.	
Royal Institution.—Prof. Sidney Colvin on "Museums and National Education." I. 3 p.m.	
Birmingham Architectural Association.—Address by the Vice-President, Mr. W. H. Kendrick, 7.30 p.m.	
Statistical Society.—Sir Richard Tempe on "Population Statistics of China." 7.45 p.m.	
WEDNESDAY, FEB. 18.	
Royal Academy.—Lectures on Sculpture: Mr. R. Stuart Cook, LL.D., on "Medals." 8 p.m.	
Carpenters' Hall, London Wall (Free Lectures to Artisans).—Professor Corfield on "House Sanitation." 8 p.m.	
British Archaeological Association.—(1) Mr. Thomas Morgan on "The Roman Baths of Bath." (2) The Rev. G. F. Browne on "The Ancient Cross in Leeds Church." 8 p.m.	

Erratum.—In the list of "Complete Specifications Accepted," on p. 219 of our last, No. 15,139, Piggott, should have been described as relating private or domestic fire-escapes, not fireplaces.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting, 8.30 p.m.
Douglas Institute of Architecture.—Professor Carnelley on "Some Chemical Facts connected with Plumbers' Work." *Royal Meteorological Society.*—7 p.m.

THURSDAY, FEB. 13.

Royal Academy.—Lectures on Sculpture: Mr. Hamo Thornycroft, A.R.A., on "Imitation the Means, not the End of Art." 8 p.m.
Institution of Civil Engineers.—(Special Meeting).—Mr. W. Pole, F.R.S., on "The Theory and Practice of Hydro-Mechanics." II. Water Supply. 8 p.m.
Society of Antiquaries.—8.30 p.m.
York Architectural Association.—Mr. W. H. Thorpe on "Colour Decoration." 7.30 p.m.

FRIDAY, FEB. 20.

Royal Academy.—Mr. G. F. Bodley, A.R.A., on "Some Principles of Ancient Architecture, and their Application to the Modern Practice of the Art." 8 p.m.
Architectural Association.—Mr. H. A. Gribble on "The Human Renaissance." 7.30 p.m.
Society of Arts (Indian Section).—Mr. P. L. Simmonds on "The Teak Forests of India and the East, and our British Imports of Teak." 8 p.m.
British Museum.—Professor J. F. Hodgkiss on "Medieval English Remains." I.—The Normans. 2 p.m.
University College.—Professor C. T. Newton on "Greek Inscriptions." IV. 4 p.m.

SATURDAY, FEB. 21.

Edinburgh Architectural Association.—Visit to Calton Jail.

Miscellaneous.

Hygienic Comparisons between Gas and Electric Light.—Some interesting experiments have been recently made at the Royal Theatre, Munich, in order to determine the elevation of temperature and amount of carbonic acid generated under illumination by gas and the electric light respectively. Before the performance commenced, the curtain was raised, and all the lamps allowed to burn for an hour, at the end of which time the temperature was observed at intervals of five minutes simultaneously in the parquet, balcony, and third gallery. During the performance, when from 500 to 600 persons were in the theatre, the thermometer was observed every two minutes. The experiments showed that the electric light greatly diminishes the increase of temperature. It does not render ventilation superfluous, but it requires a less active ventilation than gas, since it does not, like gas, contribute to the increase of heat and carbonic acid.

Durrans's Patent Disconnecting Valve for Soil-pipes.—Mr. Thos. Durrans, A.R.I.B.A., has recently patented a new arrangement for disconnecting water-closets, and bath, lavatory, and other "wastes," from direct communication with the main soil-pipe. The water-closet outlet or bath or lavatory waste-pipe discharges into a globular receptacle which is supported on, and forms an enlargement of, an arm or branch soil-pipe connected with the main soil-pipe. In this arm or branch soil-pipe is an air-tight valve below the globular chamber, so arranged as to shut without any mechanism, and not needing any packing. It is claimed for this valve that "it opens with the slightest flush of water, at the same time allowing every drop to drain away." On the top of the globular chamber before mentioned is fitted an air-tight access door for inspection. The arrangement (one merit of which is that one down-pipe only is needed for all requirements) may be seen in action on the premises of the manufacturer, Mr. F. Botting, 6, Baker-street, Portman-square.

A mural Tablet is to be erected in the church of Overstone, near Northampton, as a memorial of the late Baron Overstone. It is of Dove marble, nearly 5 ft. long, 4 ft. high, and 3 in. thick, with a hollow moulding round the outside edges. The corners are square, and project $\frac{1}{4}$ in. beyond the general line of the design, with a semicircular centre at the top. There are eleven inlaid panels of pure black marble, the four corner ones being cross-shaped, the centre top one circular, with long narrow ones extending from corner to corner and surrounding the large centre panel, which is 3 ft. 3 in. long and 2 ft. 3 in. high, and upon which the inscription is engraved in gilt letters. All the marble-work is highly polished. The whole of the mouldings are of bronze, and surround each panel, that round the centre one being surmounted by the baron's coronet, while within and upon the black marble is his monogram. The tablet has been executed by Messrs. J. W. Bird & Co., Marble Masons, of 147, Easton-road, where it is on view up to Monday evening next.

The Sanitary Assurance Association.

The fourth annual meeting of the members of the Sanitary Assurance Association was held at the Offices, 5, Argyl-place, Regent-street, W., on Monday last. Professor F. de Chaumont, M.D., F.R.S., in the chair. The secretary, Mr. Joseph Hadley, F.S.S., read the annual report and financial statement for the year 1884, from which it appeared that the work of sanitary inspection and issue of sanitary certificates had been continued on the plan initiated by the Association in 1881. The properties inspected during the year had been of the most varied character, including residences of every class in London and the country, also mercantile offices, dairies, and other trading premises, and institutions of a public character. In every case, save one, the sanitary arrangements had been found to be more or less defective. In order to encourage good workmanship, certificates had been given to builders and plumbers who had satisfactorily executed sanitary works under the supervision of the Association. A reduced and inclusive scale of fees had been issued, with the result that the demand for the services of the Association had so much increased that, in spite of the reduced charges, the financial statement for the year showed a greater income than in 1883. The Chairman, in proposing the adoption of the report and balance-sheet, expressed his satisfaction at the steady progress which had been made during the fourth year, and he looked forward to this progress being continued so long as the Association maintained its present high standard of sanitary work. Lieut.-General Burne seconded the adoption of the report, which, after some discussion, was carried unanimously. Mr. Barrington Kennet and Dr. Danford Thomas were re-elected members of the executive council. Sir Joseph Fayer, K.C.S.I., F.R.S., was re-elected President, and Professor Roger Smith, F.R.I.B.A., was elected Vice-president.

British Archaeological Association.—At the meeting of this society on Wednesday, the 3rd inst., Mr. S. Tucker, Somerset Herald, in the chair, the Rev. Prohemary Scarth reported the discovery of the base of a pedestal at Park Farm, Tockington, Gloucester, with some fragments of tessellated pavements of Roman date. It was ornamental, with a star pattern, and an adaptation of an egg-and-tongue moulding. Mr. Earle Way described a large find of Roman pottery and glass at St. Saviour's, Southwark, among which was the head of a remarkably large Amphora. Mr. C. Lynam described two plaster casts of portions of the Runic cross, at St. Michael's, Isle of Man, worked in slate. Mr. Loftus Brock, F.S.A., drew attention to the mode of execution of the figures represented, which had evidently been cut by a chisel, although some authorities believe that all old work was executed by a pick or axe. The date is that of the ninth or tenth century. The first paper was by Mr. J. W. Grover, F.S.A., on the registers of the Old Clapham parish. These are fairly complete from 1551, except that those from 1691 to 1701 are missing. In course of an animated discussion, in which Mr. Walford, Mr. Wright, F.S.A., Mr. Brock, and the Chairman took part, the lecturer stated that the recent excavation of Mount Nod, Clapham, has only revealed that the mound was artificial, but nothing was met with to determine its date, although, contrary to expectation, it was probably no older than the large mansion which formerly stood on the site of the Cedars-terrace. A portion of a paper was then read by the Rev. G. F. Browne on the remarkable cross now preserved in Leeds Church, found during the rebuilding. The remainder of the paper was deferred until the next meeting.

Henley-on-Thames.—By the liberality of Col. Mains, M.P., the Town-hall at this well-known riverside resort has been presented with an illuminated clock, visible at night from a long distance, manufactured by Messrs. Benson, Ladzate-hill, and fitted with all recent improvements. All the pinions are of steel and the wheels of gun metal, and made by machinery. The pendulum is compensated to counteract the variations of temperature, and to cause the clock to keep a uniform rate of time in all weathers, the lighting and extinguishing are performed by the clock itself by means of an automatic machine, specially designed for that purpose.

"Thomas Park and his 'History of Hampstead.'"—At the meeting of the London and Middlesex Archaeological Society on Tuesday evening last, Mr. E. Walford, M.A., reporter entitled "Thomas Park and his 'History of Hampstead.'" This work, Mr. Walford said, had been regarded as a valuable contribution to topographical literature. It was out of print soon after its publication in 1814, and he (the lecturer) was now commencing its reissue. Its author was a native of Hampstead, and died commencing to study law though not until he had been elected to the chair of English Law and Jurisprudence in King's College. Mr. Park's father, Thos. Park, F.S.A., the editor of Horace Walpole's catalogue of Royal and Noble Authors of the Harleian Miscellany, and of a long series of reprints of old English poetry, had long been resident in Church-row. As a child he was searched over and over again through the parish records, and had pored over the registers and charters in the keeping of the Dean of the Chapter of Westminster, to whom nearly all of Hampstead had once belonged, and this he had done with such good effect that when he was only twenty years old he produced a work equal in merit to Robinson's History of Tottenham and Hackney, and superior to Prichard's History of Highgate. A discussion followed, and a cordial vote of thanks was accorded Mr. Walford.

Lectures at Carpenters' Hall.—The first of a series of free lectures to artisans, inaugurated by the Carpenters' Company, was delivered on Wednesday evening to a large and attentive audience at Carpenters' Hall, London wall. Professor Kerr was the lecturer, and chose as his subject the "Comparative Anatomy of Beams, Trusses, and Arches." Mr. Alfred Preston, a Past-Master of the Company, presided, and was supported by Professor T. R. Smith, Mr. T. Blashill, F.R.I.B.A., Mr. J. Kennard, Mr. Simpson, and others. The Chairman, in introducing the lecturer, referred to the desire of the Carpenters' Company to do use to the craft, as was shown by the exhibition they held last year, and by the course of lectures now inaugurated. What they wish to impress upon the workman is a desire to do their work conscientiously and honourably, whether it was visible or hidden from the eye of experts and professional men. We desire a report of the lecture until next week.

The National Freehold Land Society.—The thirty-fifth annual report, submitted to the members at the annual meeting, held on the 5th inst., states that the subscriptions during the year were 503,914*l.*, the withdrawal, 537,416*l.*, and the members' capital at the end of the year was 1,830,933*l.* The freehold leasehold securities and properties have been increased to 1,677,033*l.*, and the convertible securities reduced to 236,384*l.* The rate of profit on uncompleted shares was 3 per cent. throughout the year. The interest on completed shares was 4 per cent., from the 1st November, 1883, to the 31st of July, 1884, in which date it was reduced to 3½ per cent. The directors, with much reluctance, felt it necessary to adopt this course in consequence of the difficulty of obtaining suitable investments sufficiently remunerative rates of interest to enable them with safety to maintain the rate of 4 per cent. The gross profit of the year was 87,009*l.*

Messrs. William Brass & Son, the well-known firm of builders, carrying on business 47, Old-street, St. Luke's, and 18, Silver-street, Wood-street, write to say (as all who know them will be aware) that they have no connection with the firm who issued the circular condemned by us in a "Note" a fortnight ago (see p. 161, ante). They point out that the disclaimer is the more necessary in consequence of the recent alteration (referred to by us on p. 215) in the style under which their established business is being carried on.

Ilkeston.—The new Church of Holy Trinity, Ilkeston, which was opened some four weeks since, has been supplied with a pulpit and font by Messrs. Jones & Willis, of Birmingham. The font is of Caen stone, octagonal in form, supported by a marble shaft, the panels of the bowl being carved with emblems of the Trinity &c. The body of the pulpit is of oak, upon a stone base, and consists of carved figure panels representing respectively the Sermon on the Mount, St. Paul, and St. Peter.

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Table with columns: Nature of Work, By whom required, Premium, Designs to be delivered, Page. Includes entries for Asylum at Hartwood, Colchester Hotel, etc.

CONTRACTS.

Table with columns: Nature of Work, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page. Includes entries for Scavenging, Widening a Bridge, New Engine House, etc.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page. Includes entries for Storekeeper, Surveyor, etc.

TENDERS.

Table listing tenders for construction of Queen's road, Dalston Sewer, Maidenstone, etc., with names and amounts.

For alterations and additions to Girls' and Infant Schools, Red Lion Yard, Watford, for the Watford School Board. Mr. W. H. Syms, architect, Watford. Turner 1,829 8 0; Longman 1,474 0 0; Waterman 1,299 5 0; Chadwick 1,314 0 0; Judge & Fames (accepted) 1,237 10 0; Neal (withdrawn) 1,137 0 0.

Table listing tenders for new business premises, warehouses, &c., South Eastern-road, Canterbury, for Messrs. Cox & Elliott. Mr. J. Cowell, architect: Schofield 27,980 0 0; Newby Brok 5,726 0 0; Mills 5,317 0 0; Slade 5,240 0 0; Woolgar & Son 5,168 0 0; Hayward & Farmer 5,145 0 0; Richardson 5,065 0 0; Snow 5,040 0 0; Knock 5,000 0 0; Brooks 4,958 0 0; Cozens 4,957 0 0; Lovell 4,928 0 0; White 4,741 0 0; Bingham 4,543 0 0; Whiting 4,318 0 0; Cornelius 4,267 0 0; Adcock 4,288 0 0; Wallis & Clements 4,784 0 0; Stiff 4,734 0 0; Shrubsole 4,724 0 0; Amos & Ead. 4,724 0 0; Guskie 4,719 0 0; W. & T. Denue 4,685 0 0; Martin 4,684 0 0; Wins 4,674 0 0; Howell 4,670 0 0; De uo & Son 4,688 0 0; Greenwood 4,560 0 0; Terry 4,983 0 0.

For the erection of a residence, boarding-house, and school preparatory to the King's school, Sherborne, Dorset, for Mr. W. Hoildland Blake. Messrs. Thomas Farrall & Edmunds, architects, Sherborne. Quantities supplied by the architects: Phillips, Exeter 21,450 0 0; Jeakins & Son, Bournemouth 4,746 0 0; George, Bournemouth 4,225 0 0; sievel & Son, Bristol 3,993 0 0; Young Bros., Salisbury (accepted) 3,800 0 0.

For six four roomed cottages at Winkfield, for Mr. W. J. McCloskie. Messrs. Byrne & Wilnot, architects, Loudon and Windsor. Quantities by the architects: Hicks, Egham 11,020 0 0; Norris, Ascot 955 0 0; Akery, Windsor 895 0 0; Watson, Ascot 876 0 0; Wiliam, Windsor 815 0 0; Snell, Maidenhead 810 0 0; Charman, Ascot 796 0 0; Baker, Slough 732 0 0; Bishop, Windsor 735 0 0; Hann & Co., Windsor (accepted) 735 0 0.

For proposed boat-houses at the King's Arms, Thames side, Windsor, for Messrs. Burgess & Co., Victoria Brewery, W.C.: J. L. Hollis, Windsor 4,934 0 0; H. Foreman, Windsor 340 0 0; W. P. Reevell, Windsor 298 0 0; Hann & Co., Windsor 288 0 0.

For Croydon Union New Infirmary, roads and paths, and tar asphaltting. Messrs. Berney & Monday, architects: W. Carter, Anerley 23,915 0 0; Adam Bull, Croydon 3,128 0 0; H. Lake, Croydon 3,068 0 0; B. Cooke & Co., Battersea 2,908 0 0; Wm. Williams, Wimbledon 2,653 0 0; H. Streeter, Croydon 2,635 0 0; Fathing, Lorrimer, & Co., Wandsworth 2,432 13 9.

For the erection of stabling at Hurlingham-lane, Fulham, for the London General Omnibus Company, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. A. J. Bolton: Collier 21,655 0 0; Howell & Son 1,372 0 0; Dearing & Son 1,460 0 0; Parker 1,410 0 0; Knight 1,429 14 0; Bolding 1,437 0 0; Jackson & Field 1,414 0 0; Haynes 1,375 0 0; Aldridge & Jenvey 1,368 0 0; G-rud 1,394 15 0; Huut 1,341 0 0; Evans 1,335 0 0; Richens & Mount 1,274 0 0; Scherren & Williams 1,312 0 0.

For alterations and repairs to the Pied Bull, St. Margara's, Herts, for Mr. B. Young, Brewer, Hertford. Mr. C. Legg, architect. Quantities by W. Hawker: Chudney 2,825 2 6; Huggins 706 7 6; Fisher 585 0 0; Nichol 794 0 0; Vint 759 0 0; Saunders 709 0 0; Norris 4,561 14 0; S. W. Hawkings 689 0 0.

For section I of the Working Lads' Institute, White-chapel, Mr. George Baines, architect, Great Winchester-street, E.C.: Wm. Bangs & Co. 25,453 0 0; G. & J. Green 5,491 0 0; Atherton & Latta 5,154 0 0; James Morter 5,119 0 0; Wm. Brass & Son 5,148 0 0; G. H. & A. Bywaters 4,699 0 0; Ashby Broe 4,282 0 0; Patman & Fotheringham 4,973 0 0; Laurence & So 4,968 0 0; B. E. Nightingale 4,839 0 0; J. H. Johnson 4,733 0 0; Kilby & Grayford 4,734 0 0; Staines & Son 4,543 0 0; Thos. Boyce 4,451 0 0; Shurmer 4,419 0 0; Jackson & Todd 4,375 0 0; Wm. Gregar, Stratford (accepted) 4,128 0 0; A. Reed, stratford 3,500 0 0.

For engineering works at the Baths and Wash-houses, Bermondsey. Messrs. George Elkington & Son, architects.—

Table with columns for contractor name, amount, and status. Includes Bradford & Co., Cockburn & Co., Thomas & Taylor, George Pratt & Co., Badham & Co., J. Season, T. & J. Hosking, J. Knight, E. Richmond & Co., E. Thompson, J. & E. May (accepted).

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ILLUSTRATIONS.

A Bit of Old French Renaissance; Dormer and Chimney, Château de Blois.....	268
The "Magasin du Printemps," Paris.—M. Paul Scéllin, Architect	269
Sculpture, "Magasin du Printemps," Paris.—"Le Printemps"; "L'Été"; "L'Automne"; "L'Hiver."—M. Chapu, Sculptor	272-277
Hôtel Bonrthéroulde, Rouen: Portion of Façade on South Side of Courtyard.—Measured and Drawn by Mr. G. G. Woodward	280-281

CONTENTS.

The Craft of the Carpenter	257	The "Magasin du Printemps," Paris (with Plan)	268	Closet and Dust-Bin	284
The Roman Bridge over the Trent at South Collingham. By E. P. Loftus Brock, F.S.A.	258	A Bit of Old French Renaissance	269	"Non-Acceptance of Lowest Tender"	284
Recent Discoveries in Lycia.....	261	The Drainage of Greater London	266	Grey Friars Church, Aberdeen	284
Roof Coverings: Royal Institute of British Architects.....	262	New Buildings at Westminster Workhouse	266	Stockholm Tar	284
Lectures to Artisans at Carpenters' Hall: The Comparative Anatomy of Beams, Trusses, and Arches.—House Sanitation	263	Michal's Patent Automatic Cement-Testing Machine (Illustrated)	265	Provincial News	285
No. 16, Carlton House-terrace: Visit of the Architectural Association	264	Royal Architectural Museum and School of Art: Prizes	268	The Student's Column: Descriptive Geometry.—III.	285
The South Window, Westminster Hall	265	Distribution	268	Books: Benham's Diocesan Histories: Winchester Society for Promoting Christian Knowledge; Har's Sketches in Holland and Scandinavia (Smith, Elder, & Co.)	286
Architectural Societies	265	"Who Writes the Specifications?"	268	Recent Sales of Property	287
		Paris Buildings.....	268	Meetings	287
		The Royal Arms	268	Miscellaneous	288

The Craft of the Carpenter.



CARPENTRY may be briefly defined as the art of framing timbers for various purposes of support; but much more is implied in this definition than is apparent on the face of it, for just as the strength of a chain is only that of its weakest link, so however carefully an assemblage of pieces of timber may be framed together, if they are so arranged that the weakest point of the framing is where the strain on it is greatest, no mere skill in adjusting the parts will prevent failure. Hence it is necessary, as Professor Robison remarked, that a skilled carpenter should know the mathematical and mechanical laws according to which strains are propagated on the one hand, and the material fibres of timber are exerted in resistance to them on the other. For the designer who is, or ought to be, the architect, something more is required, and that is a knowledge of the geometrical rules according to which graphic delineations of various forms are drawn,—in other words, of stereotomy. We are afraid that these very essential branches of an architect's education have been too much neglected, and, in fact, almost ignored in this country. In France and Germany much greater importance is attached to these subjects, and various papers have been read recently at the architectural societies' meetings, which we hope will have the effect of drawing attention to the methods of education adopted in those countries. Old Nicholson, who is always interesting and instructive, though not always accurate, says that "no man may pretend to be an architect who is not well acquainted with the principles and practice of carpentry"; and Tredgold, writing in 1820, laments the fact that "in consequence of the neglect by architects of the principles of construction, works requiring any considerable skill are given to the members of a new profession,—civil engineers."

Although carpentry must necessarily have been one of the first arts practised by man in an early state of civilisation, it would advance but slowly in consequence of the slender resources of the early builders, and the probability is that timbers would at first be joined by ligatures and not by mortises and tenons; but the use of iron for cutting-tools was very early, and we know, from Wilkinson's researches, that the Egyptians were very expert carpenters and used a most complicated system of dove-tailing. The buildings of the Romans show them to have been great car-

penters, and their mantle, probably, descended on such men as Serlio and Palladio, whose works are the earliest treating of the subject at all fully. We get an occasional glimpse from old travellers' records of skill in carpentry in most unexpected places; for example, Pyrrard de la Val, a Frenchman who was wrecked on the Maldivic Islands in 1601 and wrote an account of his voyage, states that the carpentry and joinery there was of the finest and most beautiful kind, no iron being used. Mediaeval carpentry depended upon large and heavy scantlings, but was always good, simple, and well proportioned. It attained its highest development in the sixteenth century, and depended almost entirely on skilful framing without iron straps. Viollet-le-Duc says of it: "Le fer ne vient pas, comme dans les charpentes modernes, suppléer à l'insuffisance ou à la faiblesse des assemblages." There can be no doubt that the extended use of iron has led to the decadence of carpentry proper, and, if we want to find the technical skill of the old carpenters, we shall have to look for it in some of the more secluded English villages.

We have still no work in English equal in completeness to Colonel Emy's "Traité de l'Art de la Charpenterie," published in Paris in 1841, and in fact there have been very few English works on carpentry of any importance, the earliest that we are acquainted with being Richards's translation of the first book of Palladio, published in 1676, the phraseology of which is very quaint and instructive, because all the old terms of carpentry such as *summer*, *interbrace*, *wind-beam*, and others, show the original purpose of many parts of a building which have quite lost their former meaning. The ablest treatises on carpentry up to a recent date are buried away in obscure places; for instance, Nicholson's article on "Carpentry" is in Rees's "Cyclopaedia," and Professor Robison's article, which really forms the basis of all that has since been written, is in the "Encyc. Brit.," edit. 4. The first edition of Tredgold was published in 1820, and it has been the standard work ever since, and the sixth edition is now before us.*

The earlier editions of this work are so well known that we do not propose to allude particularly to the original matter, but we are chiefly interested in the additions. In the earlier editions of the work no attempt was made to give the mathematical investigation of the various formulae for strength, stiffness, &c.; but reference was made to other works where this information could be obtained. We think, however, it is a great gain to the

* Elementary Principles of Carpentry. By Thomas Tredgold, C.E. Sixth edition, thoroughly revised and considerably enlarged by E. Wynham Tarn, M.A., architect. London: Crosby Lockwood & Co.

student to have these investigations, where the higher mathematics are not involved, ready to his hand, with an explanation of the method of practically applying them; and we hold, therefore, that the present editor has acted wisely in embodying these in the new edition. The mathematical investigations of the formulae for calculating the strains upon timber in different positions, and framed in various ways, do not, with few exceptions, involve the higher mathematics, and a splendid opportunity was open to the editor, by a careful revision of the old work and the addition of new matter, to make the new edition the standard work on carpentry in the English language. In a work of this kind special care is requisite to avoid errors, and the closest possible scrutiny of the proofs is needful in order to detect mistakes, which may prove most perplexing and misleading to the student, and we are very sorry to have to notice many signs of haste or carelessness in this respect. We are not disposed to criticise too severely such slips as *verticle* line, and the statement that "timber is wrought into various forms according to the *principal* of geometry," though we think with a little care they might have been avoided.

We notice in the discussion of the question of the best form for lock-gates that the radius of the curve of equilibrium is given as $\frac{x^2 \times y^2}{2x}$, where x represents the sally of the gate, and y the half breadth of the lock: this ought to be $\frac{x^2 + y^2}{2x}$, and we cannot help thinking that a diagram showing the curve of equilibrium should have been added, as in the diagram given the above expression will not hold good.

The strain upon beams when laid in a horizontal position, and loaded, is one of the most important subjects of investigation in practical carpentry, and a considerable amount of attention is paid to it in the new edition, but as the principle of the lever is so intimately connected with the subject, we should have been glad if Mr. Tarn had devoted a few paragraphs to a clearer explanation of its action, as this would have rendered many of the subsequent paragraphs easier to the student. We also think it would have been desirable to give a diagram, with a few words of explanation, showing how to calculate the moment of rupture at any point in a beam loaded by a weight placed at any other point. This is of considerable practical importance when considering the strains on girders supporting binding joists.

The strains upon beams are, on the whole, well treated, but here, again, we are quite sure,—judging from what Mr. Tarn has done in previous works,—that a little more care would

have rendered the investigations more lucid. For instance, on p. 39 the diagram is carelessly drawn, and a very slight alteration would have rendered the steps of the reasoning much clearer. Again, throughout these investigations L is supposed to represent the length in feet, l the length in inches, so that $12 L = l$, yet on p. 47 in ascertaining the deflection of a beam uniformly loaded L and l are used indiscriminately to represent the same thing. This may seem a very small point, but we are strongly of opinion that these errors ought not to occur in a work of this importance.

Several examples involving the use of the integral calculus are given. Now, we think Mr. Tarn might have drawn the line at the calculus, as very few would be able to follow him; but if he does use it, at least he should be correct. But there is an equation worked out on p. 50, of which the first integration is correct, but the second is wrong, as it is based on an assumption inconsistent with one made in the first integration; and it is the more curious that this error should not have been noticed, as the result as printed is a fraction in terms of l and x , which can only equal zero when $l = x$, whereas the proper solution is something quite different. Now, it is scarcely kind of the editor thus to befog the student who attempts to follow him. It may be said that if the results are given correctly these errors are not of very material consequence, but we assume the editor would not have given the steps of the calculations unless he thought they would be useful to some one. It is, however, when we come to the tables of scantlings that we find ourselves most hopelessly perplexed. In the earlier editions of this work it was stated that the table of scantlings for girders in a framed floor was calculated from experimental data, and there is no doubt that the scantlings there given were inadequate for the longer bearings. There is a considerable amount of new matter in this section, and the strains are estimated upon girders in accordance with the number of points at which the weight rests on the girder: 120 lb. per foot super. is taken as the load of the floor, the girders being supposed to be 10 ft. apart. Now, let W represent the entire weight of that portion of the floor extending 5 ft. on each side of the centre of the girder; then, if the latter be about 12 ft. long, it will have but one hindering-joint resting on it, and the load on the girder will be $\frac{W}{2}$ at the centre. The longer the

girder the greater will be the number of binders resting on it, and the more nearly will the load on the girder approach to W, but also the more nearly will it be a distributed load, which would be equivalent to $\frac{W}{2}$ at the centre, so that the strain on the girder varies very slightly whatever the number of the binders may be. The mathematical investigation is, however, interesting from the fact that it shows clearly that how many soever the binders may be the strains is always a maximum when one of them rests on the centre of the girder, and this shows the great desirability of leaving the centre of any timber beam free from load whenever possible. When the weight is taken at 120 lb. per foot super., the familiar formula $B D^2 = a W L^2$ becomes $B D^2 = 6 L^2$, or very near it, and from this formula the scantlings in the new table are professedly calculated. This table interested us considerably, as it differs from Tredgold's *total* *rule*; but we are very sorry to say it is not reliable for the longer bearings when tested by Mr. Tarn's own formulae. For instance, a girder 30 ft. long and 18 in. deep is given 21 in. wide; in reality, according to the formula, it should be 27 in. wide, and it is actually stated that the dimensions of a timber girder 36 ft. long may be 17 in. deep and 37 in. wide. A girder of this depth and bearing ought to be, according to the formula, 57 in. wide. We do not wonder that Mr. Tarn recoiled from this dimension. But even the scantling given in the tables is rather startling, and such a girder would be somewhat of a curiosity. We have calculated the deflection of such a girder when

loaded, and we find it would be 1½ in. instead of ¾ in. as it ought to be. Now what is the practical use of giving tables of this kind? No one nowadays would think of using timber for such bearings as this, and if Mr. Tarn had said that iron was always used now for long bearings, but that if on an emergency timber had to be used for a 36 ft. bearing, it should be a built-up beam, 26 in. deep and 15½ in. broad, this would have been a piece of useful information, and would also have had the merit of being correct, and the same plan might have been adopted with all girders over 24 ft. bearing. The method of building up beams by holding and keying two pieces together is described on pp. 90 and 91; but here, again, we must complain of the carelessness of the revision of the work, as we find in the letter-press references to figs. 42, 43, 44, and 45 on Plate IV., but when we turn to Plate IV. we find no figures at all thus numbered, the illustrations referred to being numbered 5, 6, 7, and 8; and this is by no means the only instance where illustrations are wrongly indicated,—the reader has to hunt them out on the plates for himself. The tables for binding joists and for single joists also differ from Tredgold's, and here, again, we find they are not accurately calculated according to Mr. Tarn's own formula; for instance, a single joist 20 ft. long and 3 in. wide is given as 1½ in. deep, whereas the rule makes it 1½ in. deep; and, in the same way, a joist of similar bearing of 2 in. breadth is given as 13 in. deep, when it should be over 14 in.; and we are disposed to ask whether 19 in. by 1½ in. is a practical dimension for a joist of 25 ft. bearing. Moreover, according to this table, a joist 8 in. by ¾ in. is of the same stiffness as one 8 in. by ¾ in., and several similar cases could be pointed out. We find it to be the same with the table for binding-joists; for instance, a binder 20 ft. long and 12 in. deep is given as 17 in. wide; if tested by the rule it ought to be 20½ in. wide. The table gives the breadth of a binder 14 in. deep for a 17 ft. bearing as 7 in., the rule makes it over 8 in.

Now, for one person who will read the work throughout probably a hundred will consult the tables, and the least the editor could have done, after deciding to alter tables which have been accepted for so many years, would have been to take care that the calculations are accurate and the dimensions practical. We are not saying that timbers of the scantlings given would break when loaded in the ordinary way, but these tables are professedly calculated for *stiffness* and not for *strength*, and the necessity of distinguishing between these two properties is frequently alluded to, as the comparative stiffness of timbers is of much more importance than the comparative strength; a girder, for instance, carrying both floor joists and ceiling joists would defect enough to utterly ruin a ceiling, while there would be no danger of its breaking.

When we come to the section on roofs, we find that the useful remarks of Tredgold on roofs, domes, &c., are reproduced, together with new matter, which, in some cases, is very valuable; but we are continually being pulled up by annoying errors which a little care would have avoided. Here, again, the tables of scantlings are altered, new rules for calculating them are given, but in many instances the figures given are not those obtained by the rule.

We will take two instances: first, that of a tie-beam. Tredgold's old rule is, "Take the length of the longest unsupported part in feet and divide it by the cube root of the breadth in inches, multiply the quotient by 1.47, and the result will be the depth," and on this calculation his tables are based, and we have always found them reliable. Mr. Tarn gives the rule as above, with the omission of the words in italics, but he does not act upon his rule. Take the case of a roof 50 ft. span of the design shown on Plate IX, the longest unsupported part of this tie-beam would certainly not exceed 15 ft. Taking L to represent this length, and B and D the breadth and depth of the beam, the rule says $D = \frac{L}{\sqrt[3]{B}}$, which when $B = 6 = \frac{15}{\sqrt[3]{6}}$, or just

over 8 in. for the depth; but the table gives 10 in. as the depth of this tie-beam, and we should be glad if this discrepancy had been accounted for. The old table give 12 in. as the depth, and we must say we should prefer to use this. Secondly, the principal rafters. The new rule is very simple, and says:—"Find a queen-post roof, multiply the cube of the span by .0125, and the square root of the product will give the area of the principal i inches. If this be worked out for a span of 46 ft., the area of the principal would be 34.8 sq ft. The area as given in the tables is 41.25 sq ft. We have dwelt upon this matter of the table at some length, because we do think it a most important matter that these should be accurate. Mr. Tarn appears to us to be in this dilemma: he has altered the old tables and gives new rules for calculating them; either these rules are reliable or they are not; if not, why are they given? if they are reliable, why does he not act upon them? No one can retain in his memory a number of tables, whereas simple rules can be learned by heart and applied wherever wanted; but it scarcely inspires confidence in these rules to find their author departing from them so frequently without a word of explanation.

The latter part of the work comprises a great deal of very useful and interesting information on the nature and properties of timber, in which advantage has been taken of the investigations made on this branch of the subject subsequently to Tredgold's time by Rhind, Lasset, and Fitcham; but we must most strongly protest against the manner in which the references to the works consulted are given. In this section of the work there are not less than between seventy and eighty references to other works, and in no single instance is the page of the work referred to given. The utility of giving such a reference, for instance, as Beckman's "History of Inventions," vol. ii., is practically nil, as no one can spare the time to hunt through the volume to find out the exact passage. And these omissions are the less excusable as in the earlier editions the pages of the references are all given, and any new ones introduced could have been verified by a couple of hours' work.

It is in no captious spirit of fault-finding that we have noticed this work. We took it up with great expectations, and we finished its perusal with feelings of deep disappointment. We hold that the editor of such a standard work as this takes upon himself great responsibilities, and ought to exercise special care to send the work out as free from errors as the closest scrutiny can render it, and we can only hope that the present edition is not a large one, and that care will be taken to revise the revision before another edition is issued.

THE ROMAN BRIDGE OVER THE TRENT AT SOUTH COLLINGHAM.

BY E. P. LOFTUS BROCK, F.S.A.

THE discovery of ancient Roman remains is always a matter of interest, even when the objects found are only sufficient to gratify ordinary curiosity, or when they are but similar to those ordinarily met with. When the discovery reveals some object out of the common we feel that a fresh page, so to speak, of the history of bygone times is being turned over for our inspection; and feelings of curiosity give place to the more real work of practical study.

Such an event has recently occurred at South Collingham, Nottinghamshire, where sufficient of the fabric of a large Roman bridge has been found to enable us to reconstruct the structure theoretically, so completely has the design been recovered.

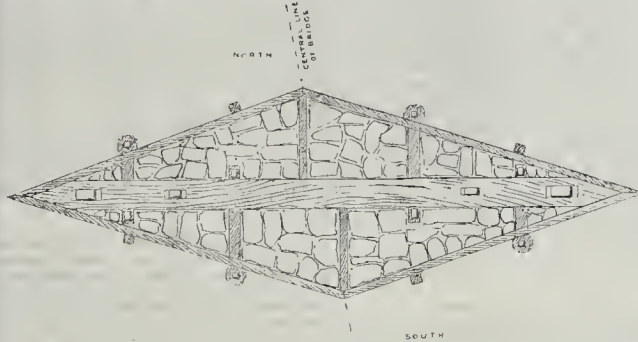
During recent months works have been undertaken along the course of the river Trent to improve its navigable powers, the importance of which will be rightly estimated when it is remembered that the navigation along this river connects Hull, Grimsby, and Goole with the whole Midland canal system, including Birmingham and all its district. These works are in progress by the Trent Navigation Company, under the direction of

Mr. H. Rope, C.E., engineer-in-chief of the company, and consist of, among others, of a large amount of dredging to deepen the bed of the river.

When the works had reached to a point between the villages of Cromwell on the north bank of the river and South Collingham on its southern, the workmen found a mass of timber framing and stonework in the bed of the river, resting on the undisturbed gravel formation. On examination, it was found that this unexpected obstruction was, in fact, the massive pier of a bridge. About 20 ft. nearer to the northern bank a second pier was found, precisely similar. Subsequent observation enabled the system of construction to be entirely recovered, and the details are so curious as to merit exact description. The piers were constructed of masonry, tied together by a framework of solid oak timbering, resting upon a carefully-framed base acutely diamond-shaped on plan. This latter was naturally set

still carried four piles to support the superstructure, which were driven about 3 ft. into the gravel through the sill, by means of neatly worked rectangular holes cut through it for the purpose. These piles were set slightly diagonally, being inclined at an angle from each end respectively to afford a wider base, and thus giving a lesser width for the roadway above. The angle of the supports was clearly shown by the marks in the sills, and a portion of one of them was in position. The oak was still solid and hard, and the whole bore evidence of having been skillfully framed and put together in a very workmanlike way.

Masses of masonry found in the stream during the dredging operations, as well as by the weather-worn surfaces on some of them, indicated that the piles were encased in piers of stonework, the mortar-heds and jointings still remaining on some of the stones, while rebates, as if to fit over the timbers, were also visible, some of the stones being 2 ft. high.



with its pointed ends to the stream. The extreme length from west to east was 30 ft. 9 in., the width being 10 ft., while the roadway was 20 ft. in the clear from pier to pier. The diamond shape was not an exact figure, for the bridge having crossed the river diagonally, the shape of the piers was set out to afford the proper course to the superstructure. A solid central sleeper, about 18 in. by 18 in., formed the backbone, so to speak, of the framing, the diamond forms being made up by waling pieces about 18 in. by 4 in., carried to the extreme points and neatly mitred. These were secured into the sill by stout ties mortised through both waling and sill in each case, ending outside the latter in large octagonal headings worked out of the solid. Square holes were sunk through these heads, and also through the opposite ends of the ties after having passed through the sills, for the insertion of stout wedges, whereby the whole of the framed structure was kept in place and rigid. Extra solidity was given to the varying position of the lateral angles marking the outline of the diamond form by struts, also laid horizontally to the main sill, and four tapering piles, two on each side, driven into the solid river bed, kept the whole in position.

This system of framing was found to be the same, or nearly so, in both of the piers met with, and it was solid and firm after the lapse of so many centuries. Indeed, when it was found necessary to remove the piers as obstructions to the deepened river bed, it was deemed advisable to use dynamite for the purpose. Eight charges of dynamite were requisite before the solid mass could be removed, and the fragments of framing recovered were still so well tied together that it was not a difficult task on shore to place them again in position, when a very interesting photograph was taken. It was evident, on observation, that the framework had been put together on the land, and simply lowered down into position afterwards, and then the spaces of the framing filled in with rubble masonry, solidly hedged in the well-known hard setting mortar, which the Romans so well knew how to make. The main

The stone is similar to Ancaster, and the mass of it still remaining, built up into the walls of the oldest of the cottages and barns in the locality, on both sides of the river, is sufficient to show to how great an extent the material of the old piers was utilised at a period, it may be, long subsequently to the destruction of the bridge. No arch stones having been found, it is reasonable to conclude that the roadway was carried on a horizontal framing of oak resting on the masonry and oak piers. The width of the roadway, as determined by the rake of the piles, must have been about 20 ft. or 22 ft. It is not likely to have exceeded the latter width. The width of the Trent at the point of crossing is about 240 ft., and, making allowance for the two abutments at the river banks, seven piers would have been necessary to form the bridge. Only two have been met with and destroyed; a third one was not found, and it is probable that it was removed on some former occasion, and, since the river has receded from the southern bank (to encroach upon the old line of the northern) it is a matter almost of certainty that the traces of the remaining piers are still safe, to be revealed, it may be, to some future generation. No traces of the abutments are visible, and indeed, nothing is very apparent of the course of the road itself, which crossed the river by this bridge. The diagonal position of the piers gives us exactly the direction of the roadway, and it may be here remarked, as evidence of the direct course taken in Roman constructions, that an obstacle such as the River Trent was not considered sufficient to cause the direct line to be diverted even to the small extent necessary to cross the river at right angles to its course.

Considerable interest has been taken in this remarkable discovery, not only by Mr. Rope, but by others, and a very careful set of plans indicating the construction has been prepared by Mr. J. H. Whieldon, Surveyor to the Company, while both these gentlemen have obligingly rendered me particulars on every point, and shown me copies of the drawings which were exhibited publicly at a recent

meeting of the British Archaeological Association. But for the painstaking care and attention of the engineers named, the discovery would, perhaps, have passed unnoticed, and certainly it would not have been possible for the system of construction of this important work to have been recovered.

The capabilities of oak for preservation under water during so lengthened a period, demonstrated by this discovery, as well as some others, help us to estimate the age of some similar discoveries which were passed by at the time, somewhat unnoticed. Thus the removal of old Rochester Bridge, and the construction of the present one, revealed the existence of a mass of wooden piling which we may very reasonably conclude to have been of Roman date, and a part of an ancient wooden bridge to carry the Watling-street across the Medway. In like manner, the removal of old London Bridge revealed similar evidences, while much of the Thames River bank along Billingsgate was piled at some remote period, doubtless to render the waterway secure. Close to Lanercost Priory, in Cumberland, the oak-framed base of a small Roman bridge can still be seen partly lying in the bed of the little river, the Irthing, partly raised above the water-line, it having been disturbed by some flood. It is framed in a very similar manner to what has now been described, and one work will serve to illustrate the other. The mode of construction of the upper part of the bridge spoken of, namely, a series of piers supporting horizontal bearers to carry the superstructure, had its counterpart in the fine Roman work, the North Tyne Bridge, erected on the line of the Picts' wall, to carry it across that river, where it seems to be a matter of certainty that the massive abutments, one of which is now entirely excavated for observation, were not to receive the thrust of masonry arches, but only to take, it may be, massive lintels of oak, upon which the wall across the river was built.

It is just possible that at Collingham the timber framing was erected first and the masonry filling in subsequently. Be this as may, we may reasonably conclude that some system was adopted by which air could have circulated around the timbers to prevent their decay, for such good constructors as the Romans would hardly have carried them up solidly in the mass of masonry. Examples have been met with elsewhere showing the care taken by these old builders to prevent the decay of their timber constructions, when they were even less exposed than here to the danger of being covered up. Notably, the process of charring has been met with, although not observable here. Mediaeval builders were not so careful in this respect, and it not infrequently happens that when an old wall has been examined, where bond timbering or anything of an analogous nature has been used and the air excluded, nothing has been found except the void space occupied by the wood. A noteworthy instance of this occurs at Plympton Earls. The Norman walls of the shell keep were constructed with a chain bond of timber of fairly large scantling. It has completely decayed, leaving only a curious passage in the mass of masonry, to which many and various uses have been assigned. The modern west front of St. David's Cathedral, erected by Nash at the close of the last century, had two flying buttresses springing from detached piers. These have recently been removed for the rebuilding of the front in better taste. They were found to contain wooden shores evidently erected as a support to the original front prior to its rebuilding, and retained within the mass of the masonry. Although so few years, comparatively, had elapsed, the woodwork was found to be badly decayed. Many other examples derived from old buildings might be cited, but these may suffice to show the bad results of excluding the air from any timber work. Our modern works, however, themselves teach the same lesson.

The framing at Collingham was wedged together, and neither pinned with oak nor bolted with iron,—at least, so far as the foundations were concerned; there was not sufficient evidence remaining to indicate the construc-

tion of the upper portions. The expansion of the timbers under the action of the water had made the framing very rigid and solid.

The peculiarity of the roadway not having crossed the river at right angles has already been referred to. It can scarcely be doubted but that this was arranged for to preserve exactly the straight course of the roadway, however unnecessary for practical purposes the arrangement may have been. Taking the line formed by the axis of the bridge, which is an angle of 79 degrees to the river's south bank, we find that if prolonged to the south-east it falls in with the straight course of a modern road for two miles or so, indicating most probably that this latter is on the site of the old one. If prolonged further, it would join the main Roman road, the foss-way, at a distance of about six miles and a quarter from the bridge. The foss-way was undoubtedly the principal road in this part of Nottinghamshire, and it is but reasonable to conclude that the adjacent roads must have had some relation to it. Following its course, the distance from Lincoln to the bridge would be fifteen modern miles. Taking up the line of the roadway on the other side of the river, we find that, if extended to the north-west, still going perfectly straight, it would fall in with the Roman road, Spring-lane going westward across Sherwood Forest, on the high ground, into Derlyshire, while the point of junction would be very close to the ancient encampment marked on the maps as existing just to the north-west of Kirklington. This line is but a theoretical one, based on the angle given by the bridge itself; but whatever its direction may have been, it is evident that the object of the bridge was to afford a way from Lincoln along Spring-lane. The fact that a portion of this was along the foss-way indicates that the latter road was the older of the two.

This course avoids Southwell entirely, where it is more than probable that a Roman station existed. This station would probably be reached by a road branching out of the foss-way over a bridge crossing the Trent near Winthrop, where some foundations were discovered about ninety years ago. It would then most probably be continued to the north-west to join the course of the road already referred to at Kirklington. It is also very probable that a third road started from the foss-way at East Bridgeford, going northwards up to Spring-lane.

This most remarkable discovery has naturally caused a great deal of local comment and attention, especially with respect to any evidence it may afford as to the undecided positions of the stations named in the Itineraries. These are Margidunum, Ad Pontem, and Croccalana, the latter being twelve Roman miles from Lindum (Lincoln), the others being stated as being seven miles apart from each other. The finding of the bridge not unreasonably points to Ad Pontem being somewhere in its locality, although it would apply equally well to the position of the bridge near Winthrop or to East Bridgeford. It must, however, be borne in mind that the name of this missing station does not occur in the Itinerary of Antoninus, but in the forged history, said to be the work of Richard of Cirencester, who, tracing the well-known course of the foss-way, probably found in the name East Bridgeford, where there was a Roman station, a plausible opportunity for its interpolation. The bridge at Winthrop had not been found in the days of the arch-impostor referred to. The two other stations named were doubtless along the course of the foss-way, and therefore, wherever their true positions may have been, the discovery at Collingham does not afford additional evidence of their position, except, perhaps, to call attention to the point where the axis of the bridge would cut the foss-way.

It is a matter of congratulation that this discovery has been in such good hands, and that such careful attention should have been bestowed upon the details of the discovery. Still more will thank be due to Mr. Rope, since he has the intention of having the exact position of the bridge marked for all time by a stone set in the bank of the river.

NOTES.



THE meeting at the Mansion House last week in furtherance of the better support of the Parkes Museum was at least a success in regard to the reception of the speakers who moved and supported the principal resolutions. The Duke of Cambridge moved that the Parkes Museum is meeting a great educational want, and is worthy of increased public support. Mr. Erichsen seconded the resolution, and Mr. G. Godwin, speaking in support of it, rightly urged that the premises in which the Museum was now situated were too small for the work which the institution might accomplish, and that more room was wanted for extending the instruction which could then be given to those qualifying themselves for sanitary inspectors, and for builders, plumbers, and others connected with the building trades. Lord Temple moved that it is essential to the permanent efficiency of the Parkes Museum that the number of annual subscribers be increased. Mr. Ernest Hart, in support of this resolution, observed that the Parkes Museum had served as the model for similar institutions at Washington, Paris, Turin, and Yokohama, but these museums had been subsidised by the Governments of their respective countries, while no such recognition had been bestowed on the Parkes Museum. It is surely time that this example of other Governments should be followed by our own. Some considerable donations were announced at the close of the meeting,—sufficient to meet pressing requirements, but far from what is needed to put the museum on the footing which its importance and value demand. The resolutions were passed unanimously.

THE Swedish Government are making an effort to provide a museum building at Stockholm, to be called the "Nordiska" Museum (Museum of the North), for a collection of which the nucleus will be formed by the valuable assortment of Scandinavian antiquities brought together by the energy, and at the cost, of Dr. Arthur Hazelius, and at present distributed in various rooms in Stockholm. In 1880, Dr. Hazelius, who had already designed to hand over his museum to the country as a permanent national possession, formed a committee of trustees, consisting of five persons, to co-operate with himself in carrying out his scheme, and to share with him the heavy burden of management. King Oscar, who is president of the committee, having given a suitable site in the Djurgården, a noble park in the eastern suburbs of the city, an open competition of designs for a great museum was invited in 1883, and was mentioned in our columns. Plans were sent in last year by fifteen architects of different nationalities, to seven of which prizes were awarded, but a final decision has not yet been made. It is determined, however, that the building must be of ample dimensions to meet the requirements of the present, and to provide for the growth of the collections. It is to be of brick on a deep substructure of granite, and the estimated cost of construction and fitting up is about 165,000*l.* Towards this about 7,000*l.* has been contributed, and decorative materials (originally designed for a palace) to the value of upwards of 3,000*l.* have been given by members of the Royal Family. The Committee will not commence building till 30,000*l.* is in hand, and towards raising this sum they intend to hold a lottery at the close of the present year, to consist of three million tickets at one krona (1*s.* 2*d.*) each, and they appeal for help in the way of articles for the lottery, or of money, "to art-loving English men and women." We fear the method adopted will not much commend itself to the English mind. Those, however, who think the end sanctifies the means, or who are superior to insular prejudices, have thus the opportunity of assisting. Contributions of any kind will be received by the Swedish Minister, 47, Charles-street, Berkeley-square; or by Sir Philip Cunliffe-Owen, at the South Kensington Museum.

THE offer of the Ecclesiastical Commissioners, made through Lord Stanhope to the last meeting of the Court of Common Council, "to appropriate for the perpetual use and enjoyment of the inhabitants of the metropolis sixty-nine acres of wood at Highgate and thirty acres of land at Kilburn," was unanimously referred to the Coal, Corn, and Finance Committee for consideration, but with every symptom of approval. The growing need of the vast population of London for open spaces, secured in perpetuity for recreation and fresh air, and saved from the inroads of the speculative builder, cannot be too strongly insisted upon, and the gift is a wise and well-timed one. It is available subject to the sanction of Parliament to the proceeding, and the undertaking of the Corporation to maintain these two spaces as parks in perpetuity. The latter condition we have no doubt the Corporation will be willing to fulfil. About the former there may be a contest, possibly. Clerical writers in the daily papers appear to think that the scheme involves an alienation of their rights. "This would be scanned," of course; but the consideration of the greatest happiness of the greatest number points in the other direction, and those who may be eventually in full enjoyment of the Highgate woods and their health-giving influence will, perhaps, be apt to dismiss the clerical claims as shortly as the man in one of Leech's old hunting scenes: "Who's that come to grief in the ditch?" "The Parson." "Never mind, we shan't want him till Sunday."

THE returns relating to all authorised gas undertakings in the United Kingdom, which have been recently printed, enable us to take a bird's-eye view of an industry which, for its magnitude, is unquestionably the most prosperous of any carried on within our shores. Nor is the magnitude contemptible. Of that sixty-nine millions sterling authorised, fifty-two millions have been actually raised in shares and loans, of which 18 millions come under the control of local authorities, and thirty-four millions under that of companies. The sums paid as interest or dividend are not included in the returns; but the receipts of the local authorities amount to 4,252,296*l.*, and their expenditure to 2,877,732. As to the companies, ten per cent. is in most cases fixed as the maximum rate of dividend, but eleven and twelve per cent. have been not unfrequently divided. The total tonnage of coal carbonised is 7,631,304 tons; a quantity almost exactly equal one-third of the total quantity exported in 1883. Ten thousand cubic feet of gas have been produced from each ton of coal, on the average. The consumers of gas are returned at 2,019,846, which we may take to represent rather more than 10,000,000 individuals, as the number approaches very closely to that of the houses in Parliamentary boroughs, which were 2,096,497 in 1881. At this rate gas capital is rather more than 5*l.* per head for our urban population, each member of which will have been furnished with the gaseous product of 15 cwt. of coal, at an average cost, probably, of from seven to eight shillings a year, including public as well as private lights. The annual value of the property assessed to income tax, in gas works, in 1882, was 4,640,363*l.*, but it is not apparent whether the returns of the local authorities are included in that amount.

THE Revenue Report of the Irrigation Branch of the Public Works Department in the Government of Bengal has just been issued. From it we take the following figures. The total area irrigated during the years 1883-84 was 497,293 acres, of which 350,614 acres are situated in the province of Behar, within the limits of the system comprising the Sone Delta scheme; 48,760 acres in Orissa proper, and 97,919 acres in the Midnapore series. The irrigated area in the Sone system was double that in the previous year, while Orissa shows only one-half, and Midnapore about 4,000 acres less than in 1882-83. The diminution in Orissa is ascribed to the fact of the greater portion of the five-year leases having fallen in, and an expectation on the

art of the cultivators that by holding aloof they would be able to obtain lower rates from the Government. The receipts aggregated early 117,000*l.*, of which about 72,700*l.* were paid for water, and 37,820*l.* were navigation bills. The working expenses were 107,000*l.* The Lieut.-Governor considers the results of the year, in a financial point of view, unsatisfactory. A commission has lately been appointed to inquire into the administration of the Orissa canals, and to report on the actual profits derived from the works, independent of the share received by Government, and their inquiries will afford grounds for coming to a conclusion as to the propriety of endeavouring to secure for the State a larger share of the benefits reaped.

SEVEN of our principal railways there has been a decline in both gross and net revenue for the year 1884. On three there has been a fractional increase; and on two, namely, the London, Brighton, and South Coast and the Great Eastern, there has been an increase of respectively 14,500*l.* and 37,000*l.* in net revenue. The diminution in the aggregate receipts of the twelve lines has been $\frac{1}{2}$ per cent. The working expenses have been reduced by rather less than $\frac{1}{2}$ per cent.; and the result is a decrease of $\frac{1}{3}$ per cent. in the net profit for the year. To that has to be added the charge for additional capital, which as yet to be shown. With a declining revenue the proportion between increase and expenditure has been very fairly maintained, the proportion of working expenses to gross revenue having been 51.44 per cent. in 1884, against 51.29 per cent. in 1883. The result is the more discouraging, as the increase in gross revenue has hitherto been steady since 1879, the amount for 1883 being 9 $\frac{1}{2}$ millions sterling more than that for 1879. The net receipts were not advanced *pari passu*, having been 9,000*l.* less in 1882 than 1881; but they were more by 5 $\frac{1}{2}$ millions in 1883 than in 1879. The proportion (over the whole of the railways of the United Kingdom) of net revenue to capital in the last five years has been:—1879, 15 per cent.; 1880, 4.33 per cent.; 1881, 2.6 per cent.; 1882, 4.32 per cent.; 1883, 2.9 per cent.

AN interesting letter from Athens in last week's *Athenæum*, by Mr. S. P. Lambros, deals with the question of the demolition of some of the Turkish buildings on the Acropolis, in order to bring to light portions of ancient Athenian structure which have been hidden by these late additions. Mr. Lambros specially refers to the demolition of the Byzantine bastions which abutted on the eastern side of the Propylæa. The removal of these has brought to light various fragments containing reliefs and inscriptions, one of the latter being of great interest. Mr. Freeman has, it appears, written strongly against this and other demolitions of Turkish work on the Acropolis as interfering with and obliterating historical records. This is, of course, in itself to be deplored, but we must consider the matter with due regard to the relative value of the remains. We cannot think that Turkish utilitarian structures of the seventeenth century are in any way comparable in value to ancient Athenian remains, and their demolition, if it gives place for a fuller study of the latter, is gain both to history and archaeology. Mr. Lambros, who argues in this sense, has, we think, quite made out his case.

SOME interesting discoveries have just been made at that remarkable building, the Great Yarmouth Tolhouse, now in process of repair under the supervision of the architects, Mr. E. P. Loftus Brock, F.S.A., of London, and Messrs. Bottle & Olley, of Yarmouth. The whole of the rough-cast which has for many years covered the old walls, giving to the building a very modern appearance, is being removed, thus opening out to view the ancient walling. A series of pretty arches of early fourteenth-century work, supported upon neatly-cut corbels, has been found, hidden hitherto by the plastering, just below the open

porch from which proclamations and addresses used to be made. Below this, again, has been found and opened up the arched opening which once let light and air into the "Hold," a dreary prison, partly underground, into which offenders of all sorts and ages were thrust in former times, and chained to a central beam. The opening had been enlarged roughly at the expense of the arcading, much of which had been cut away for the purpose and walled up at a much later period. This very interesting feature of the fabric will be carefully repaired. Indeed, the effect generally of the works in progress will be to make this curious building appear more ancient than it did at their commencement. The old roof has been opened out, and it is intended to fill the side windows with amorphous glass of the old local families.

FROM the *Gazette des Architectes* we learn that the following gentlemen have been appointed as officers and council of the "Société des Amis des Monuments Parisiens":—President, M. Albert Lenoir, Member of the Institute of France; Vice-Presidents, M. Cernisson, architect, former President of the Municipal Council; M. Franklin, Chief Administrator of the Bibliothèque Mazarine; and M. de Montaignon, President of the "Société de l'Histoire de l'Art Français"; General Secretary, M. Chas. Normand, architect; Assistant Secretaries, M. Alfred Lenoir, sculptor; M. Maignan, painter; and M. Mareuse, Secretary of the "Commission des Inscriptions Parisiennes"; "Archiviste," M. Muntz, Keeper of the Museum and Library of the "Ecole des Beaux Arts." The Society has its quarters at 215, Boulevard St. Germain.

THE current number of the *Antiquary* contains the second instalment of an interesting series of articles by Mr. W. Carew Hazlitt on "Venice before the Stones." The author has collected much interesting information as to the original condition and the artificial formation of the ground from which the city of the sea was to rise. "The true foundations of Venice," he observes, "were laid by men who ate and slept like the beasts of the field, and whose wages were their daily bread and the grace of life.* The free work we see, but the other lies beneath us, wherever we move: a gigantic task of preparation by such as knew not for what they were making ready, nor cared." Repeated entries on the proceedings of the General Council, particularly in 1303 and 1305, show that the directing authorities, however, spared no trouble in securing a firm bottom everywhere, and that "a considerable part of the capital and the adjacent islands rests on made ground of a date much posterior to the natural uprise of the lagoons; and this may be taken to be the true interpretation of the term *fundamentum* or *fondamento*, which we find so frequently applied in documents to established routes as well as to prepared sites for building, and which survives in the modern nomenclature."

ACCORDING to the *Courier de l'Art*, M. Amboise Tardieu has discovered, over a confessional in the little church of Herment, a small town about thirty miles from Clermont, a painting, which he believes to be a hitherto unknown work by Guido Reni.

WE do not know to whom we are indebted for the trees with which the southern end of Gray's Inn-road is planted, whether it be to the Metropolitan Board or the Holborn District Board, but we would like to call the attention of the authority responsible for their planting to the extremely ugly supports which have been placed around these trees. The supports are of wood and are unnecessarily thick and clumsy, and are certain to be destroyed in a short time. A light iron guard of a simple character should be substituted, and the galvanised iron netting which at present protects the trees should be replaced by something of a more permanent character.

* Hardly so much "grace," in Falstaff's phrase, "as would be prologue to an egg and butter," one may suppose.

OUR readers may remember that a short time back we made note of a case of building with bad mortar, which took place at Hackney. In August, 1882, proceedings were taken by Mr. A. Payne, the District Surveyor of East Hackney (South) and North Bow, against Simeon Muncey, the builder of two houses, who was fined 3*l.* and costs for not using proper mortar. As he made no alteration to the structures, the Metropolitan Board of Works proceeded still further against him, and the Magistrate made an order that the houses should be taken down. The defendant then appealed to the High Court of Justice, having in the meantime mortgaged the property. The Magistrate's ruling, however, was confirmed, and judgment was given for the Board, and, after great delay, by an arrangement with the mortgagees, all the parts built with bad mortar have been taken down. In the interest of the public, there is no doubt that houses built with bad mortar should be levelled to the ground. It is to be regretted, however, that under the present system of building the mortgagees may, in such cases, chiefly suffer, while the builder, who certainly deserves punishment, escapes practically free. But it is also true that there are other cases in which the builder is a mere dummy to shield some real owner, who carefully keeps his name and ownership out of sight so as to escape the penalties of the Building Acts.

IN view of the proposed change in reckoning the hours of the day, from 1 to 24, instead of by two twelves (which we are inclined to believe will be tacitly adopted before very long), Mr. T. R. Weston has taken out a provisional patent for affixing to any watch or clock face, divided on the present system, a ring of thin enamelled card, bearing in red numerals the hours from 13 to 24; the ring falling within the outer circle of hours as at present marked. This will render the renumbering a matter of easy application to any watch or clock face of ordinary size.

THE respective Mayors of Birkenhead and Liverpool formally shook hands, on Friday, the 13th, in the middle of the Mersey Tunnel, signalling by this ceremony the completion of this valuable and successful piece of engineering. We gave a detailed account some time ago of the method and progress of the operations, and will shortly illustrate the new stations which are being erected over the two ends of the tunnel, from the designs of Mr. Grayson. The tunnel will not be actually open for railway traffic for some little time yet.

RECENT DISCOVERIES IN LYCIA.

A FULL account of the splendid and costly work, in which is embodied the official report of the first Austrian expedition to Lycia, has already appeared in the pages of the *Builder*.* We are glad to be able to point out that a small popular volume† has appeared almost simultaneously, which deals with such aspects of the expedition as struck the non-professional mind. This small octavo, with its abundant excellent illustrations, may be obtained for as many shillings as the official folio costs pounds, and it should be in the hands of all who care to study both sculpture and architecture in their relation to topography. Baron Warsberg is already known by his "Odysseeische Landschaften" (including Cofu, Epirus, Ithaka, Cephalonia, Zante), and he promises us forthcoming books of a similar description, with views of Thracian, Mysian, and Bithynian landscapes. He feels very rightly that all students are too apt to take the *musæum* view of the remains of ancient art, to think habitually of fragments of sculpture and architecture as they now lie in dark museums, rather than to picture them in their original tectonic and topographical surroundings. A little effort is needed to think back the old circumstances, and the effort is gladly shirked. We have ourselves met with students of Greek art who were well versed in the many and conflicting theories as to the

* See p. 127, *ante*.

† "Homerische Landschaften." Von Alexander Freiherr von Warsberg. Erster Band. I. Das Reich des Sarpedon. II. Rhodos. III. Im Ägäer Meer. Wien: Carl Graeser, 1884.

interpretation of the sculptures (to take a Lycian example) of the so-called Harry tomb in the British Museum, who yet had formed no image, however shadowy, of the beautiful Xanthos valley where they once stood, nor even of the height and shape of the pillar-like tomb from which they were rent. The Berlin Cast Museum has found it possible to surround the walls of each different "Saal" with paintings of the surroundings of the sculptures arranged below, the landscape of valley or mountain, and sometimes when possible the reconstruction of the monument. Till something of this sort is possible in England we must welcome the more eagerly illustrated books of topography. It is not the least our purpose even to summarise the contents of Baron Warsberg's book; he writes in a pleasant chatty style, telling always as much of the history of the place as is necessary for the understanding of its monuments; he was one of the few eager enthusiasts (would there were more of the same sort) who met in Dr. Bendorff's drawing-room on that memorable evening of the 24th of March, just before the expedition started, and he tells in German fashion how eager was the enthusiasm then kindled in his heart, and how indomitable the vitality of the good "seed then sown." Wherever Dr. Bendorff went, he went with Homeric associations ever present in his mind; and in the twenty-one plates interspersed in the book he has left us the landscape background to many a Homeric action. Some of these plates we recognise as the same as those in the large work of Dr. Bendorff, and we are glad they should thereby obtain a wider circulation. Three relate to the Djölascher Heroon, as yet left untouched by the official account. They give the entrance to the Heroon, the frizes on the inside of one wall, and the magnificent view seen from the hill on which the monument stands.

Naturally Baron Warsberg is strong on the method by which the expedition was set on foot; it was, as we have already had occasion to note, a private enterprise, not a Government undertaking; the Austrians are, as opposed to the Prussians, strong on the subject of self-government. Like the English, they are apt to reduce the functions of State government to the lowest practical minimum. For archaeological, and, indeed, all scientific enterprise, Baron Warsberg thinks the private system is preferable, but, then, he is an Austrian. For ourselves, with the Prussian excavations of Olympia and Pergamos before our minds, and the inertia of England as a contrast, we are not so sure. Anyhow, there is room for all.

ROOF COVERINGS.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

At the ordinary meeting of the Institute, held on Monday evening last, Mr. Alfred Waterhouse, A.R.A., presiding, the death of Mr. John Middleton, Cheltenham, Fellow, was announced.

Mr. Ralph Nevill, F.S.A., read a paper on "Roof Coverings." After stating that it was very difficult to obtain from the older members of the profession, who were in full working, long and exhaustive papers on any subject, Mr. Nevill expressed his conviction that considerable benefit would result from the discussion of subjects of practical interest, introduced in short papers requiring little preparation. He could not attempt to deal exhaustively with so large a subject, and would confine himself to what he could speak of from practical experience. Nearly all roofs in rural districts were constructed either of tiles or slates, the former being superior from the point of view of pictorialness and non-conduction of heat; the latter from that of cheapness and closeness of fit. In the great snowstorm of 1882 there was scarcely a single tile roof which kept out the snow, and this had caused him to endeavour to find some easy method of meeting the difficulty.

After alluding to the general plan of securing tiles to laths, and showing how liable the laths were to split, reference was made to the old plan of bedding tiles on hay, and its objections were pointed out, as also the serious drawbacks to bedding in mortar. The various ways of laying felt under tiles were next described, and the objections to its use noted, viz., its liability to stretch, the likelihood of its causing the rafters to rot, and its short durability. Mr. Nevill then described the plan

adopted by himself. He advocated covering the backs of the rafters with 1 in. of concrete or plaster, in which the pins for the tiles could be fixed, the plaster being laid on the laths in the ordinary way, 3-in. rose-nails being first driven into the backs of the rafters, standing out 1 in., care being taken to keep these nails out of the line of the tile-pins. The plaster or concrete should be made of seolemic lime, mixed with coke breeze and sand, and it was essential it should set quickly, and it should be trowelled to a smooth and hard face. Before the plaster had quite set, the tiles should be laid, the pins being pressed into the plaster, and it was important that the pins should not be more than 1½ in. long. Should the plaster have become too hard, the pins must be driven in with the hammer. The eaves-lath should be 1½ in. thicker than usual, in order to stop the plaster; the valleys should be carefully trowelled, and the hips would require a raised rail. No practical difficulty occurred in the case of chimney-stacks. It would be apparent from this description that there would be a coat of concrete all over the roof, which would throw off any damp that might penetrate through the tiles, and would make the rooms underneath much more equal in temperature. Specimens of concrete plaster that had been used were exhibited, and the advantage of such a roof in preventing the spread of fire was pointed out. Objections might be raised on the score of increased weight, but Mr. Nevill had not found it necessary to increase the scantling of roof timbers. It might also be thought that the timbers would decay for lack of ventilation, but hitherto no signs of such decay had appeared in roofs thus treated. The cost, as a rule, would not be more than 14s. per square above ordinary tiling, and several tables of comparison had been prepared. Mr. Nevill concluded by referring to the advantages of this system of laying tiles in the case of the larger tiles, such as pastiles, Phillips's, &c.

Mr. W. G. Coldwell next read a paper on the same subject. He said that after an inspection of the districts in Essex affected by the earthquake in April last, he was profoundly impressed with the want of security of the plain tile roofing. The tile roofs had come down almost en masse, and it was evidently most desirable to adopt some system of laying tiles different from that now in vogue. With reference to lead, no more important subject for discussion could he suggested than the deterioration in the quality of lead as now supplied. In the case of the lead-covered roofs over an important building, which was examined some few years ago, it was found that on the underside of the lead, which was laid on boarding, a film of white powder existed, in lines corresponding with the joints of the boarding, thus indicating that injurious action had taken place below. Dr. Frankland, who examined this lead, found that the white powder was white lead, and it was probable that the modern de-silvering process really rendered the lead more liable to injury from acidulative vapours, than the other process which did not remove so much silver from the ore. Various methods of covering iron roofs were alluded to by Mr. Coldwell.

Mr. McLachlan gave some extracts from a report he had made when holder of the Godwin Barony. The roofing materials used in North Germany were tiles—plain and ornamental; slates of English and German fashion; corrugated iron, galvanised zinc, copper, lead, asphalt, roofing paper, felt, and wood-cement. In the case of tiles, the effect of some of the German roofs was very good. The laths were laid from course to course, and on each lath was hung a double row of tiles, the upper being supported by the lower course. There was always a thickness of two tiles, and, in parts, even of four tiles. The heavily-weighted laths were from 1½ in. to 2½ in. wide, care being taken in the selection of the wood. The church of St. John, Altona, was roofed with plain tiles, and some of the German churches had colours laid in patterns. German tiles were 4 in. or 5 in. longer than English tiles. Slates had only been introduced as a roofing material in many of the North German towns during the last fifty years. In several cases Welsh slates were now used; the German mode of laying slates being in oblique courses, similar to what could be seen at the Law Courts. Copper appeared to have been chiefly used for public and municipal buildings of the first class, especially spires and domes. Zinc was now perhaps the material most extensively used for

covering buildings, where it was a matter of great moment that there should be an equal temperature beneath. Forty years ago it was unknown in Berlin for roofing purposes, but it was now used there to a very great extent. Galvanised corrugated iron was extensively used for the roof coverings of the new prison buildings in Hamburg. He had not seen a single instance of the use of lead for roofing in Germany, and he was told that it had been superseded by zinc and copper. Roofing paper was largely used for buildings where great economy was desired; it was necessary, however, to re-tar it every two or three years. Wood-cement was one of the most important roofing materials in North Germany, and appeared to be in a fair way of superseding other materials.

Mr. John Slater said he had had some experience of the roofing-paper and the wood cement. He had superintended the erection of a brewery built by a German contractor, who had used it in great quantities. He was afraid it would not last, but it had lasted well and produced an equal temperature underneath. They had worked out the idea of sowing seeds on the *hals-cement*; but the gravel was washed away and the gutters and pipes became clogged. He could have wished that Mr. Nevill had had a larger experience of the roofs described by him. That they were very impervious went without saying, but they must be extremely heavy. Through differences of temperature and the variations of the wind, roofs had a certain amount of spring, and it would be curious to ascertain whether this affected Mr. Nevill's roofs. If it did, it probably was that the cement would crack in a great many places. It was interesting to notice how closely alike in form and character some of the new patent tiles were to the Roman and Medieval tiles. Tiles were doubtless used for roof-covering at an early period, and the probability was that the early Roman tiles were made with a ridge on one side and a notch on the other, so that the ridge fitted in the notch vertically. They also ran up a series of hollow tiles which overlapped and covered the vertical joints. He believed an improvement of the principle was made by having tiles of a trapezoidal shape, fitting closely to the underneath. With regard to Medieval tiles, a better had been made than those used in Champagne for buildings of the thirteenth and fourteenth centuries. Some which could be seen in the neighbourhood of Troyes were very carefully made, and the exposed parts were sometimes slightly vitrified. One thing in connection with the Medieval tiles might be adopted in modern ones, viz., the chaufuring off of the end of the tile, which largely diminished the risk of the roof being stripped off by wind-pressure. The question of wind-pressure on roofs was an interesting one and deserved an evening of itself. He proposed a vote of thanks to Mr. Nevill for introducing the subject.

Mr. W. H. White (Secretary) said that reference had been made to the French system of using books for slates instead of nails. It was usual in English specifications to stipulate for copper nails, but, during the last twenty-five years, in all French buildings of any importance slates had been hooked and not nailed. A copper hook was used, so that when the wind played against the side of the roof it simply blew under the slates, and rattled, without destroying them. M. Viollet-le-Duc was, he believed, the first to introduce these books. Even twenty years ago he (Mr. White) had the advantage of seeing them at Cherbourg, a town which was very much exposed. There he had seen part of the roof of a chateau destroyed by the wind when the slates were simply nailed, but, when books were substituted, the wind had no injurious effect whatever. With regard to Mr. Coldwell's remark as to the effect of the lead on timber, he could recall a visit which Mr. Roger Smith and he had made to the dome of the Invalides when it was being repaired, seventeen years ago. The lead was then being taken off and they found half an inch of the greyish powder referred to between the lead and the oak battening of the dome. Mr. Nevill had suggested that our roof should be concreted, but he might say that the French had adopted this plan for a considerable time.

Mr. E. G. Paley referred to the danger of using felt under the slates. On one occasion he found the common inodorous felt had been fired by sparks from a chimney. Mr. Nevill's suggestion of using concrete was a most important one, and unless the weight and expense were serious

certainly seemed to be the right thing. Mr. Nevill appeared to be wrong in one respect, in regard to slating. If well fastened with copper nails on good battens, and afterwards pointed, slatted slates were perfectly impervious to the finest drizzle or snow. A slate well put on and pointed would really last for ever, and in that respect was perhaps the best possible roofing.

Mr. Brodie asked Mr. Nevill what was the best of repairing his roofs?
 Mr. Alexander Payne had prepared the following paper on the subject:—I was only asked on Saturday last by the Secretary to write a short paper on the "Employment of Concrete for Roofs and Roof Coverings" as a corollary to Mr. R. Nevill's paper. I may be allowed briefly to recapitulate what I have already said in this room on this subject. In the volume of the Transactions for session 1874-75, p. 183, is an appendix to Mr. C. H. Driver's paper on Iron as a Constructive Material, which will be found some remarks accompanied by an illustration on concrete combined with iron as applied to the construction of vaults and domes, and I believe I am correct in saying that the most important fireproof domes of large span which have been constructed in this country since that date have been constructed on the system therein indicated, viz., of concrete with an ties embedded to resist the tendency to spread. Perhaps the largest is the dome over the Oratory at Brompton, by Mr. Herbert Turnbull. I believe the dome over the Greek church, in Bayswater, is constructed of concrete in the same way, but I am obliged to refer to memory here, as I cannot find my notes on its construction. In 1876 I had the honour of reading a paper before the Institute on concrete as a building material, which dealt chiefly with walls and ornamentation, but roofs and vaults were also alluded to, and illustrated by some examples. In treating of concrete as a material for roofs and roof-coverings, it may be well to limit the subject at once to those instances in which the employment of such a material would be of practical advantage. For an ordinary pitched roof of the general run of buildings we are not likely to see concrete much employed, except in the form of concrete slabs or slates, on account of its great weight, and the consequent expense of both the roof itself and its supports. We may also, I think, lay it down as a rule that concrete, if employed, should be not only used as a covering, but would itself form part of the construction of the roof. The following appear to me to be cases in which concrete may be advantageously employed in roofs:—1. For flat roofs. 2. For all kinds of fireproof roofs. 3. For all kinds of domes and vaults. 4. For the roofs of all buildings of a monumental character in which great strength or durability is required. As an example of the first kind, viz., flat roofs, may mention one which has come under my notice as District Surveyor in my district at Hackney, where Mr. H. M. Millar, builder, is erecting some small houses in which several ingenious applications of concrete are adopted. The top story is covered by joists 8 in. by 3 in. at one end and 3 in. by 3 in. at the other, made by putting through a 11 in. by 3 in. joist diagonally so as to get fall without waste, placed about 21 in. apart; these are covered by boarding 2 1/2 in. widths and 3/4 in. thick, each board being 1/4 in. distant from the next one (a very important point, as if laid close they swell with wet, spring up and break the roof). On this, as centering, is added 2 in. of Portland cement concrete as a roof-covering; the concrete is made of brick rubbish, ground to powder in a mill; one quarter in bulk of Portland cement is added, thoroughly mixed dry, and then wetted and brought to the consistency of a thick paste; it is laid on the boarding, smoothed over with a trowel, and the roof is complete,—a coat of tar is sometimes added, but is not absolutely necessary. Mr. Millar says he has had about eight years' experience with roofs of this kind, has made about fifty, and has never had a failure, except in the case of some which were done during a frost. More frequently the centering boards are put under the joists, embedding them in, and thus making the roof practically fireproof. I believe this is a method frequently adopted in the roofs of artisans' dwellings in the East End and elsewhere. It is quite obvious that in buildings of greater importance the same system might be adopted with iron joists instead of wood; or

any of the numerous methods in use for the construction of fireproof floors in concrete would come in also with slight variation as useful flat roofs, and no doubt many of the members present could give examples of such application. 2. The same reasons that make concrete available for fireproof floors make it also available for fireproof roofs of all kinds. Suppose a fireproof roof be required, and it is determined to cover the building with a roof on the Mansard principle. Let all the principals be formed of iron trusses, the front and back walls of the attic story being framed of suitable iron uprights, instead of the usual wooden quarterings, and let the common rafters be of iron; put boarding on each side of these rafters and quarterings to form a mould, and fill in with fireproof concrete, so arranged as to cover and protect the iron, and you then have a complete fireproof roof without thrust on the walls, which is neutralised by the trusses. I have noticed in houses in the course of construction in Paris that all the roof framing and common rafters are frequently of iron, and it would be interesting if our secretary, or some other gentleman equally well acquainted with French construction, could tell us in the discussion if this iron framework ever has a concrete filling-in like the fireproof floors which are so general in Paris; [The Secretary: Always.] and also some member may possibly be able to inform us if this mode of construction has been adopted in America. 3. On the subject of domes and vaults, I think I have little to add to what I have already said in the former papers above alluded to, so that I will not take up the time of the meeting by going into it, except to allude to the immense importance of the subject and its bearing upon the whole question of style and construction in architecture. To realise this, one has only to turn to a work like M. Viollet-le-Duc's Dictionary, and glance at the chapter on vaults in the article on "Construction," where he shows, in that lucid, analytical style which is peculiarly his own, how the whole fabric of the Gothic cathedral rose up step by step from the repeated attempts after many failures to cover in those large buildings in a fireproof manner with stone vaulting. We know how the Gothic architects ultimately succeeded by an ingenious collection of the various thrusts of the vaults in given points, and opposing these by buttresses. Wonderfully ingenious and skillful as this method is, I think it must be admitted that it carries with it the elements of unrest and of comparatively early dissolution; in most instances, if one pier or one buttress gives way, the rest will follow at no distant date, like houses built of cards; it is to be doubted if buildings on this system, unless constantly watched and repaired, will ever attain the ages of those of Egypt and Greece, constructed on the principle of the upright support and horizontal lintel; and, is it not quite possible that if the ingenious and practical designers of the Middle Ages had had at their disposal iron in large bulk, worked with the ease and facility that it is in modern times, and a strong and plastic material like Portland cement concrete to use in conjunction with it, that the problem of roofing in large buildings in a fireproof manner might have taken a totally different direction to the buttress system of equilibrium between thrusts and dead weight which so characterises Gothic vaulted buildings? I am now trenching on my fourth heading, viz., the suitability of the employment of concrete for roofs of buildings of a monumental character where durability and fire-proof construction are required, and in proof of this, I think I need only refer to the examples of splendid buildings erected in India, both in ancient and modern times, some of which have been described and illustrated in the Transactions of the Institute, and in which concrete figures certainly as the chief material in the construction both of roofs, vaults, and domes.

Mr. Blagrove mentioned that there were no iron ribs in the dome of the Oratory at Brompton, concrete only being used throughout.

Mr. T. Blashill remarked that he much preferred good large fillets to flashings, where the roof came against the wall or chimney, for with the most carefully put-on flashings the water would come into the house. It was not so easy to put soakers under the edge of the tiles as it was to put them on the slates; but if a good fillet were put upon the edge of the plain tile roofing, it generally held well.

Mr. J. Macvicar Anderson (Hon. Secretary) considered that, instead of using ordinary tile fillets, the better course was to cut a small chase in the brick-work, to let the tiles into the chase, and to make any slight settlement afterwards good with cement. Lead flashings on a tile roof were an abomination.

The Chairman, having seconded the vote of thanks to Mr. Nevill, was carried.

Mr. Nevill, in replying, said that he had tested a great number of buildings with these roofs, but in no case had he found the least sign of any sagging. As to repairs he had found no difficulty, because, if a tile snapped in the middle, it could be taken out and replaced in cement. He had not meant to say that slates were pervious to snow; on the contrary, he gave them the advantage over tiles in that respect.

MEDALS.

ON Wednesday evening last, Mr. R. S. Poole, LL.D., delivered a lecture to the students of the Royal Academy on the "Art of Medals." The lecturer said that medals were commemorative, and should therefore hold a great place in art. They commemorated the deeds and faces of great men, and were much more generally diffused than statues or pictures. Medals may either be produced by the process of striking or that of casting. We may at once reject the struck medal from its mechanical character, and select the cast as the one to be described. We give this preference to the cast medal from the possibility and scope it affords the artist for skillful and true work, owing to the process it undergoes in its production. It is also a far cheaper method than the other, costing one-third or one-half as much. In a struck medal the expense is owing to the mechanical part of the work, and in a cast the honorarium for the artist's labour is the main outlay. This art is not taught at any of our great artistic schools except the Slade, and Professor Legros and Miss Hallé are perhaps the only teachers of the art of medal-working. The production of a medal can be performed in either of the two following ways:—First, you may model your medal in wax; from this wax you may get a succession of plaster moulds and proofs, and from the last plaster essay the final mould itself; otherwise you may make the wax model your final work, and the mould may be produced from it, or it may be converted into a medal by the process *à la pertuis*. The tools generally used in making a medal vary in their material as the substance worked upon. For work in plaster steel tools are used; for wax, wood; but, as often as not, in the finishing work of the wax medal, steel should also be used. The shape of the tool used is really a matter of taste, and provided that the worker used something with which to work the right curves, a blunt needle or penknife answered the purpose as well as anything else. The method adopted by the Greeks is remarkable, as they made dies of hard steel, and worked them, like gems, with the wheel. And now, leaving the mechanical side, and turning our attention to the artistic, we find that relief is necessarily adopted, and it is this feature that enables us to place the medal as a sort of connecting link between the picture and the statue. Thus we find that in ages when painting was the leading art, relief, and in consequence the medal in all its principal features, showed its relationship to the picture, and when sculpture predominated medals followed the lines of sculpture. For the three kinds of relief, bas-relief, high, and mezzo, we cannot do better than accept Sir Charles Eastlake's definition. He says that bas or low relief is used where there is a bad light. It therefore requires strongly-marked and clearly-defined drawing for its principal outlines. High or alto relief is generally to be seen in the open air, and has its own shadows as well as those cast upon it; it must, accordingly, be treated largely and very simply. Mezzo-relief was used by the Greeks for objects near the eye and in a good light, an instance in point being the choroi frieze of the Mausoleum. The metals used by the Greeks for the purpose of making medals were four in number; gold, silver, electrum, and bronze. Of course, it is not possible to command an unlimited supply of gold for purposes of working now, but it should be remembered that when bronze is used for this purpose, as it almost invariably is, due regard should be paid to the character and substance of the metal in the nature of the

production. As regards the shape of a medal, it should, above all things, be natural, and not mechanical: it should bear evidence in all its details of the presence of the human hand. In Italian medals, we can almost see the gradual formation of the rim, which was not clearly defined in the first instance by a pair of compasses. The surface should not be a dead surface; in Greek work we find the obverse convex and the reverse slightly concave. The importance of this relief in the surface is due to the fact that from the shades of light cast we practically get air, and even colour. The two sides of the medal should be harmonious; and this was a fact recognised largely by the Roman and Greek artists: thus we find the head of a divinity on one side and something relating to his myth on the reverse. In order to understand as nearly as possible this harmony of the two sides, it is better to note the obverse and reverse side by side. There are two positions in which the head is depicted on a medal, either three-quarter face or in profile; the former belonging to the purest age of Greek art, namely, from B.C. 420-330, or, roughly, from the age of Pheidias to that of Lysippus. The finest period of Italian medal work is also characterised by the three-quarter face. The profile is easier than the three-quarter face, and presents less difficulty. The great point of difference between the Greek medal and the Italian is that, while the Greek sought to represent heauty in as perfect a form as possible, the Italian's aim was to give us man as he was and could be: he could depict all the stages of existence. Thus the Greek sought to represent measure and the elimination of all that was disagreeable to him; the Italian was absolutely true and natural. The lecturer then briefly criticised the Greek and Italian diagrams, drawing particular attention to the simplicity of the head-dresses and the accessories, which, he said, should not be thrown in vaguely and without discrimination, but should be typical. The border might be either of the fillet type or a wreath. With respect to the inscription, the letters should carry dignity, be bold, and slightly rounded, as though the limbs were of cylindrical shape. In conclusion, the lecturer drew attention to the importance of combining work from the model with a due observation of the antique, and of producing work from memory rather than by trusting to a mere system of copying.

LECTURES TO ARTISANS AT CARPENTERS' HALL.

THE COMPARATIVE ANATOMY OF BEAMS, TRUSSES, AND ARCHES.

As we briefly announced last week (p. 254, ante), Professor Kerr on the 11th inst. gave the first of a series of free lectures to artisans, in the great hall of the Carpenters' Company, taking the above-named subject as the theme of his discourse.

The lecturer commenced by asking his audience to suppose that the carpenter's rule he held in his hand was a beam loaded so heavily on the middle as to be overstrained. They all knew what happened: it began to deflect more and more until it opened at the soffit and became fractured. At the same time it became buckled at the upper surface. If he took a bar of iron instead of a carpenter's rule, and supposed it to be overloaded, it would deflect very considerably, the material being highly elastic, and while the under side became extended, the upper side became perceptibly crumpled. This showed that the lower part of the beam was in tension, and the upper part in compression. The strength of a beam was in direct proportion to its breadth, because two beams put together would carry twice the weight. But it was as the square of the depth, so that the depth was of the principal value. In considering these facts they would find all kinds of materials tabulated in respect of strength, and they would get into the system of adjusting sectional areas at the top and bottom of a beam so that it should be equally strained in the two capacities of compression and tension. The resistances of timber against compression and tension did not vary sufficiently to induce them to interfere with the simplicity of the square or rectangular section. But cast iron resisted tension with only one-sixth of the force with which it resisted compression. Thus they required a very different section from the rectangular one, and they had the utmost

strength that the material could offer in a complicated section, based on the relative strengths of this particular material as against compression and tension. If, on the other hand, they were dealing with a wrought-iron joist, the top and bottom flanges were equal, because the strengths were as nearly as possible the same. The web had only one function; it had nothing to do but to maintain the element of depth. With regard to stone, as long ago as the time of the Romans, when large stones were used as lintels, they made use of discharging arches. Concrete was a better material, and here he would mention a proposition he was accustomed to lay before his students at King's College. It was this: Nature did not undertake to find us in building materials. Building is a highly artificial performance, and nature expects us to improve on the raw materials in order to make them suit our artificial purposes. Thus concrete ought not to be looked upon as an inferior makeshift for stone, but as a superior artificial material. The cementing medium was stronger, while the bonding of the particles was also better, giving a sort of fibrous character to concrete which stone could not possess. The Professor then referred to tubular iron bridges as exhibiting the perfection of scientific design, returning to the primitive form of a plain rectangular beam, with its upper surface all in compression, its lower surface all in tension, and the walls serving only to maintain the d -square against cross-strain. He then showed how the plain timber beam in side elevation became converted into the form of a truss, by cutting out superfluous material, leaving the equivalent of a pair of rafters in compression, and of a tie in tension, with the same d as before, maintained no matter how, but the former cross-strain being now abolished, that is, converted into the more favourable strains of tension and compression. Out of this the regulation king-post and queen-post roof-trusses of timber, and the same in iron, were easily developed, the d being always the chief element of strength. The unscientific roof-trusses of the Medieval period were also illustrated, and the origin of true trussing in the sixteenth century shown by drawings. Braced and latticed girders, and the simple Warren girder, were here again returned to the primitive form of a solid timber beam, with the d in simplicity. Thus it was manifest that the truss, of whatever kind, was only a beam after all, with the top portion in compression, the bottom portion in tension, and the depth made the most of for the sake of the strength being as the square of it. The lecturer proceeded next to show how a scientifically perfect truss is made by two pieces of cane spreading asunder at the foot, and restrained by a piece of string; and then converted this at once into an arch, by substituting a single piece of cane, brought up to a curve by the same piece of string. In the first case the depth was measured from the string to the apex of the truss; in the second, from the same string to the crown of the arch. The next step was to get rid of the tie in the arch by applying at each end an immovable abutment, and then we had in effect just the same beam as at first, with an upper portion, the voussoirs, in compression; an imaginary lower portion, the tie, in tension; and the d preserved by the resistance of the abutments: that is to say, a beam with the superfluous cut out, and the cross strain all converted as in the truss. The history of the arch was then referred to. Although the old Egyptians and Assyrians were said to be ignorant of the arch, they even better than the Romans. What the Romans did was to introduce the use of the arch extensively, by making a characteristic feature of it, and thus it was that the semicircular arch became a matter of every-day construction throughout the world. In the twelfth century a new arch was introduced from the East, viz., the pointed arch, which was stronger than the semicircular arch. The reason for the introduction of this arch might be that the European builders had got into the habit of building less substantially than their predecessors, so that a great many of their buildings gave way. There could be little doubt that the pointed arch was introduced, not for show, but for a sufficient reason, which must have been a question of strength. The lecturer next touched on bridge equilibration, referring to Southwark Bridge as a special example, and finally dealt with flying buttresses. What he

had wished to impress upon his hearers throughout the whole was the development of a beam, in the first place, into the truss; and the second place, into the arch; and being identified from the beginning to the end with the d , the most important element in the formula of calculation. Whatever might be form of any construction which had to carry a load from one support to another, it was always looked at in that light. There was something equivalent to the upper surface or flange of a beam which was in compression, and something equivalent to the lower flange or tie-rod which was in tension, and between these two was the element of depth. This he termed a comparative anatomy of beams, trusses, and arches, their comparison resulting in a certain identification of philosophical or constructive principle, most important to understand a most interesting to study. The only consideration to be borne in mind was, that whatever forms of construction or contrivance whatever new, strange, or apparently hazardous forms, were developed or designed, the section areas must be adjusted,—that which was compression being adjusted to that which was in tension, thus giving the full force of the d -square to carry the load. He had desired to lay before them, in the first place, an intellectual exercise of a strictly practical and common-sense character, and, in the second place, a proposition full, at all events, of suggestiveness to practical men, and of considerations which might be developed in a discussion offered into sound, substantial, and serviceable knowledge.

The lecturer, after complimenting his numerous hearers upon the close attention which they had followed his discourse, resumed his seat amidst loud applause, and a vote of thanks was passed to him, on the motion of Mr. Kennard, seconded by one of the artists in the body of the hall.

HOUSE SANITATION.

The second lecture of the course was delivered on Wednesday evening, to a large audience at the artisan class. The lecturer was Professor Corfield, M.A., who treated of "House Sanitation."

Professor Corfield dealt first with permeable and impervious soils and the diseases attaching to them. To plaster the outside walls of a house was to render it permanently unwholesome, and the way to cure damp was to put a damp-proof course in the walls when the house was built. This course would be of tar, asphalt or tiles set with cement, or better still of stone ware. This was a matter of the greatest importance, and was the only way of preventing decay in timbers. The sub-soil or ground-water varied very much in different localities, and at different times. The nearer this water was to the basement the more unhealthy would the house be, and it had been generally shown that wherever means had been taken to lower the level of the ground water, the death-rate from consumption had been lessened. Ground air, again, which made its way into the house, contained foul organic matter, and its entrance should be prevented by having an impervious basement floor made of cement concrete, or of York paving set in cement or asphalt. In houses where this precaution had not been taken the inmates were usually unhealthy. The air of over-crowded places contained foul organic matter, with little less oxygen and a little more carbonic acid than the ordinary air. It was, therefore, of the utmost importance that it should be changed, each individual requiring about 3,000 cubic feet of air per hour. The wind by perflation and aspiration was an important agent in changing the air in houses. If a hole were made in the wall of a room in which a fire was burning, the outside air would flow in like water; but the incoming air should be given an upward direction in the form of an air fountain, and be thus distributed over the room. A piece of wood placed in front of an inlet ventilator would prevent the air falling down, the opening should be such as to give the air an upward direction, but should not be too near the ceiling. In the case of a door one of the top panels might be cut out and a kind of hopper fastened to it. The well-known Sheringham valve worked on this principle, although it was movable. Louvres formed good inlets, and Venetian blinds in front of a window made excellent inlet ventilators. There was also the system

known as Tobin's tubes. One objection to all inlet ventilators in towns was that soot and blacks came in with the air, but there were a variety of devices to prevent this. Passing on to the water supply, the Professor pointed out the danger arising from shallow wells in the soil, dealing also with the questions of constant and intermittent services, and the necessity for a thorough periodical cleansing out of cisterns. The waste-pipe of the cistern should always discharge into the open air, and the cistern supplying the drinking water should not connect directly with the water-closet. In regard to the disposal of waste matter, dust-bins built against the walls of houses were very unwholesome. The proper way to collect dust was in movable receptacles, like galvanised iron boxes, which could be lifted by one or two men, and emptied into a cart. In the matter of drainage, the old brick house-drains were very bad, being pervious, and allowing rats to work their way through them. One rat in a house would do an immense amount of mischief. The Professor here exhibited part of the waste-pipe of a sink with a hole about 3 in. long made by a rat. House-drains should be impervious, and made of glazed stoneware or iron pipes, the former being better suited for the purpose. After being laid and properly joined the drains should be tested to see that they were watertight. House-drains should be self-cleansing, and the size generally used should be 6 in., the pipes being laid at a fall of 3 in. or 4 in. in 10 ft. A water-trap of some sort ought to be put on the house-drain before it joined the main sewer. The dip-trap commonly used in brick drains was bad, as it was not self-cleansing. The water passing through it could not prevent an accumulation of filth, and it was, in fact, a small cesspool. A much better form of trap was that commonly called a syphon, but which might be termed a U-trap. This was self-cleansing, and no deposit would take place if a sufficient amount of water passed through it. In spite of the traps in the drains, a certain amount of foul air would pass through them, and they therefore required to be ventilated. The ventilating pipe carried above the roof was not sufficient; there should be an inlet for fresh air, the trap having a pipe leading up to the level of the ground, with a grating over it. The air would then come in at the inlet, and leave at the outlet, and if it did not do this it was the fault of the arrangement, not of the system. The water-closet should be of as simple a form as possible, one of the best forms being the short hopper or "Artisan's" water-closet, provided with a flushing rim. A basin of this kind with a small bend underneath it, might be perfectly self-cleansing if supplied with sufficient water by means of a 1½-inch lead pipe. The syphon action water-waste preventer held about two gallons, and might be filled from the drinking-water cistern. In houses where the water-closet was upstairs the descent-pipe should be outside. It should be made of 7 lb. lead or galvanised cast-iron; if not ventilated the foul air would sometimes eat holes in these pipes. The D-trap was generally used upstairs in houses; it was not a self-cleansing trap, but in course of time became foul. The waste-pipe of the sink should not be connected directly with the drain, and underneath the sink a syphon trap should be fixed to prevent the entry of air fouled by matter adhering to the sides of the pipe. Rain-water pipes also should not connect with the drains, but should discharge into the yard over gullies. The bell-trap was one of the worst possible contrivances; it was not self-cleansing, and when the trap was off the foul air could make its way into the house. The trap which should be used in the yard was the syphon gully. The Professor concluded by remarking that he had said enough to show that the principles of sanitation as applied to houses were exceedingly simple.

The following are the remaining lectures of the series:—On the 25th inst., Professor Church, M.A., will lecture on "Black, White, and Red Lead"; on March 4th, Mr. Blashill, F.R.I.B.A., on "The Shoring of Buildings"; on March 11th, Professor A. B. W. Kennedy, M.Inst.C.E., on "A Piece of Steel"; on March 18th, Professor Bonney, F.R.S., on "Flint"; on March 25th, Mr. J. Slater, B.A., on "Roof Coverings"; and on April 1st, Professor T. R. Smith, F.R.I.B.A., on "Some Celebrated Timber Roofs."

NO. 16, CARLTON HOUSE TERRACE. VISIT OF THE ARCHITECTURAL ASSOCIATION.

CARLTON House-terrace occupies a part of the site of Carlton House, the exact position of which is the opening between the York Column and the foot of Regent-street. The original Carlton House was built by Henry Boyle, Baron Carlton, on a piece of ground leased to him by Queen Anne in 1709. He died without issue in 1725, and his house and grounds descended to his nephew, Robert Boyle, Lord Burlington, the well-known architectural amateur. When in 1783 the Prince of Wales, afterwards George IV., was allowed a separate establishment, Carlton House was assigned for his residence, and Henry Holland, the architect, was appointed to execute the necessary alterations; he added the chief features of the House,—the Ionic screen and the Corinthian portico. Carlton House was taken down in 1826, and the columns of the portico transferred to the National Gallery. No. 16, Carlton House-terrace is the town residence of Mr. Alfred Morrison, and, by permission of that gentleman, was the place selected for the second afternoon visit this session by the members of the Architectural Association, which took place last Saturday. The members assembled at the house at three p.m., and were headed by Mr. Cole A. Adams, the president, and Mr. H. D. Appleton, hon. secretary, who conducted them through the various rooms and apartments.

This visit was one of much interest to the members of the Association, the object being to study and examine the decorations of the house by the late Mr. Owen Jones; this design being, we believe, one of his latest works, executed and completed just prior to his decease, April 19th, 1874. The designs and drawings for the decorations and furniture of this house had been previously exhibited in the Vienna Exhibition. They have been more than once described and commented on in the pages of the *Builder*, and at the time of the lamented death of Mr. Jones we published a long memoir of him in this journal, and alluded especially to these decorations as among his best works.*

The cabinet inlays, tables, couches, chimney-pieces, chairs, &c., are generally in that semi-Saracenic style which Owen Jones had made his own. They were carried out very ably by Messrs. Jackson & Graham.

The members dispersed soon after four o'clock, having had a most agreeable hour's study of Owen Jones's decorative work.

THE SOUTH WINDOW, WESTMINSTER HALL.

THE large south window of Westminster Hall, which was executed by Messrs. John Hardman & Co. between the years 1847 and 1851, and erected in the year of the Great Exhibition, is now placed in the hands of the same firm, under the First Commissioner of Works, for restoration, since the destructive effects of the explosion of the 24th ult. The window represents the arms of all the kings and queens, and founders of reigning houses of England from some time before the Conquest downwards. Fortunately it has been found that all the authorities and drawings prepared by Messrs. Hardman with much labour and care some thirty-seven years ago, from which the work was executed, are safely preserved in their possession, and will be of course invaluable in the work of restoration.

The window in its present damaged state exhibits a remarkable and interesting evidence of the power of suction peculiar to dynamite in explosion. The panels of leaded glass, nearly 100 in number, much torn and distorted by the force of the explosion, are nearly, without exception, bulged *inwards*; the plain diamond-shaped glazing which formed an outer guard or protection to the stained glass, is bulged outwards at every point, but the inner window hears unmistakable evidence of a sudden and violent contraction of air immediately subsequent to the first expansion recorded by the state of the outer glass. It would seem that the same force would account for the fact of the two constables and Mr. Green being found drawn into the hole which the explosion itself had made.

Messrs. John Hardman & Co., who designed and executed all the stained glass in the new

Palace of Westminster, under the late Sir Chas. Barry, are commissioned to restore all that is destroyed or damaged, comprising a number of windows in the House of Commons, Division Lobbies, and St. Stephen's Hall. Except to the great south window in Westminster Hall, the greatest damage is to the series of windows in St. Stephen's crypt. The total cost of Messrs. Hardman's restorations will amount to some 2,000l.

ARCHITECTURAL SOCIETIES.

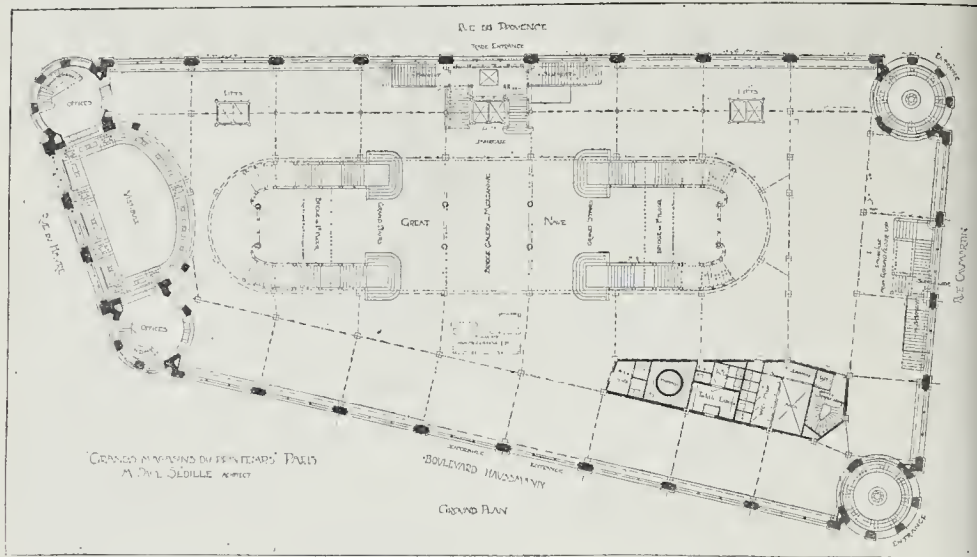
Birmingham Architectural Association.—The fifth ordinary meeting was held at Queen's College, on Tuesday evening last, when the Vice-President (Mr. W. H. Kendrick) delivered an address. He first of all dealt with the affairs of the Association, and inferred that, judging from the present and increasing success of its classes, &c., prosperity in the future was assured. The connexion now existing between them and the London Architectural Association was commended, as serving to mutually strengthen each other for the promotion of the interests of the profession. The lecturer then gave his views upon the education of architects, and recommended the pupilage system, supplemented by technical study, as by this method the vigorous individuality of British design would be sustained. He desired also a greater appreciation of art workmen, and as a means for their improvement he desired the establishment of a technical museum in Birmingham. This should contain a completely arranged collection of specimens of every period of architecture and sculpture. He believed that if this were accomplished the art work of the town would be raised in tone, and the workman, by the study of good examples, would be dissatisfied with his present meaningless productions. On the proposition of Mr. H. H. McConnell, supported by Messrs. R. B. Morgan and Victor Scruton (hon. sec.), a hearty vote of thanks was accorded to the lecturer.

Architectural Section of the Glasgow Philosophical Society.—On Monday evening last a meeting of the members of the Architectural Section of the Glasgow Philosophical Society was held in their Hall, 207, Bath-street. Mr. Landless, architect, presided. Mr. E. A. McGilvray read a paper on "Plaster Work." He confined himself to the plain branches, and said he hoped at some future time to say something of the ornamental branches. Mr. Henry Morrison subsequently read a paper on "Slates." He traced the growth of slate rock, and pointed out the localities of the principal slate ranges in this country. He also referred to some of the more important slate quarries, to slates as a covering for roofs and as articles of commerce.

British Museum Lectures.—On Wednesday next Mr. W. St. Chad Boscawen will commence a second series of six afternoon lectures on the "History and Antiquities of the Assyrian and Babylonian Empires." The unexpected success which attended the former course has enabled the authorities of the British Museum to arrange a new and commodious lecture-room in the new east wing of the Museum, where the lectures will be given each Wednesday at 2.30. The subjects selected for the present course are, February 25th: "The Chaldean Temple: its Construction, Symbolism, and Services"; March 4th, "The Creation Legends"; March 11th, "The Palace: its Architecture and Ornament"; March 18th, "The Deluge Legend"; March 25th, "Chaldean and Assyrian Libraries"; April 1st, "The Legends of the War in Heaven." The lectures will be fully illustrated by maps, plans, and diagrams, and casts of antiquities from other museums. In order that students attending the course may become familiar with the monuments in the British Museum, Mr. Boscawen has arranged a series of morning tours of demonstration, to which the lecture-tickets will admit. Tickets and full syllabus of the lectures may be obtained from Mr. W. B. Cutler, 35, Great Russell-street, Bloomsbury, W.C.; or on application by letter to Mr. W. Boscawen, at the British Museum.

International Inventions Exhibition.—We understand that the Wilkes' Metallic Flooring Company, of 17, Devonshire-square, Bishopsgate, have received instructions to pave the Old London Street at the International Inventions Exhibition.

* *Builder* (May 9, 1874), p. 395.



Illustrations.

THE "MAGASINS DU PRINTEMPS," PARIS.

THE vast "Magasins du Printemps," of which two-thirds only are reconstruction, occupy, including the new building and the rebuilt portions, the large trapezium-shaped site bounded by the Rue du Havre, the Boulevard Haussmann, the Rue Neuve des Mathurins, and the Rue de Provence, between the new Opera and St. Lazare Railway Station. These buildings are noteworthy as much for their internal arrangements as for their external architecture; and their architect, M. Paul Sédille, has distinguished himself in the threefold capacity of engineer, architect, and decorative artist. It may be added that the company, of which M. Jaluzot is the director, has placed immense sums at his disposal, both to insure the solidity of the foundations (which are partly laid across or in a subterranean pool of water), to give full scope for costly decoration, architectural and sculptural, and to bring the latest mechanical improvements to bear on the full ventilation, warming, and lighting of this vast hall of stone, iron, and glass.

Our illustration of the building, which is engraved by Mr. Cooper from a photograph, shows only the principal and most ornate front; the long flank of the building, of which a small portion only is seen in the view, is a good deal shut in by trees, and is more utilitarian in character.

SCULPTURE.

We give separate illustrations, to a large scale, of the principal sculptures, representing the Four Seasons, by M. Chapu, which are in themselves fine works of art. In England we see decorative architectural sculpture of this class, even on a large scale, so frequently given over to mere carvers, and marked by nothing better than respectable mediocrity, that it is desirable to emphasise the fact that, in some cases at all events, they "manage these matters better in France." Why are not our sculptors given similar opportunities?

HÔTEL BOURGTHÉROULDE, ROUEN.

THIS extremely interesting building may be easily overlooked. It is reached through a low archway leading from the Place de la Pucelle. The façade, of which our illustration shows one bay, forms one side of a courtyard. An adjoining side is of late Gothic work, and is well illustrated in Pugin's work on Normandy. The remaining sides are mostly modern, and of little interest.

G. G. WOODWARD.

A BIT OF OLD FRENCH RENAISSANCE.

THE sketch of a portion of the Francis I. part of the Chateau of Blois reproduced, from a sepia sketch by Mr. A. B. Pite, by Messrs. Boussoad & Valadon. It was originally made to afford a sample of this method of reproduction through the agency of photography, of which another example was given in the first number of the *Builder* of this year (Callender House).

The process, which results in what is practically an engraving on metal in very low relief, is satisfactory as a reproduction of monochrome brush drawing, and can be used in any other cases where contributors prefer it to other processes. In the case of coloured drawings it is open only to the objection which affects all photographic reproductions from colour,—the balance of light and dark is not preserved in the case of certain colours.

The bit of architecture represented exhibits well the admirable qualities of that school of French Renaissance, forcible yet refined, which Viollet-le-Duc characterises as the best modern application of Classical materials in architecture. A great deal of Medieval feeling still pervades this type of French Renaissance.

OBITUARY.

Mr. John Middleton, F.R.I.B.A., of Cheltenham, died on the 13th inst., at Adpar House, Newcastle Emlyn. He was elected a Fellow of the Institute in 1876. At the meeting of the Institute on Monday evening last, Mr. Alexander Payne said that Mr. Middleton had been in business as an architect for at least thirty years. He practised successfully at Darlington, then spent some years in travelling, especially in Italy, and finally settled in Cheltenham, there. A year or two afterwards, however, he gratuitously made the design for All Saints Church, Cheltenham, which was so much admired that he was induced to commence practice again, and carried out the Ladies' College, Cheltenham, and a great many other works in the neighbourhood, having especially a large connexion amongst the clergy in Wales. Whilst on a business round, through Wales, a week ago, Mr. Middleton was struck down by paralysis. He was devoted to his profession, and several well-known men were brought forward by him, amongst others Mr. Boniton, the architectural sculptor.

Mr. Colin Minton Campbell, of Stoke-on-Trent, died on the 8th inst. He was the grandson of the founder of the extensive china works at Stoke, which were commenced in 1788. He was born in 1827, and at the early age of fifteen years he was inducted into the pottery business by his uncle, Mr. Herbert Minton, who, having no children of his own, seems to have taken a

special interest in his nephews. Under his watchful supervision, Mr. Campbell became a good practical potter, and was also made acquainted with the commercial department of the business. Upon attaining his majority Mr. Campbell was taken into partnership with his uncle.

THE DRAINAGE OF GREATER LONDON.

AN important report was to be presented to the Metropolitan Board of Works at its meeting yesterday (Friday), by the Works and General Purposes Committee, who recommend,—

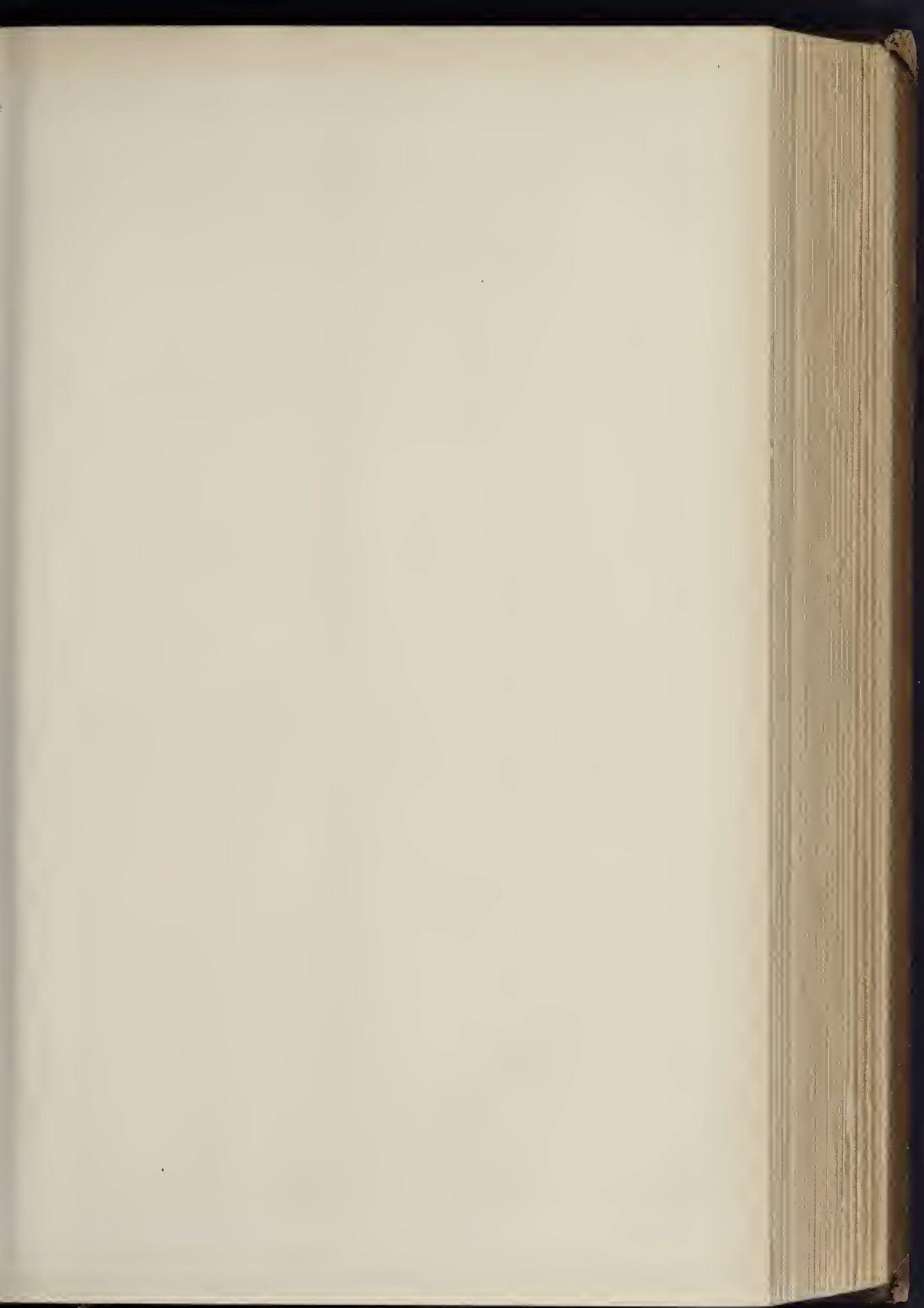
"That, in reply to their communications, the Home Secretary and the Local Government Board be informed that this Board has had under consideration the suggestion that the parish of Tottenham should be annexed to the metropolis pursuant to section 249 of the 18 & 19 Vict., c. 120, especially with reference to the main-drainage system, but that the Board is advised that financial and other arrangements would be involved in such a proceeding to which legal effect could only be given by special legislation, and that, in considering the question of the drainage of Tottenham, it would further be necessary to have regard to the possible expediency of taking the sewage from other localities in the Valley of the Lee, which could not, as the Board is advised, be dealt with under the 249th section.

That, even if it could be so dealt with, there would still remain the question whether it would be expedient to deal with that portion of the outlying districts of the metropolis otherwise than as part of a measure for the general extension of the drainage to the whole of the districts round London.

That, at the same time, should her Majesty's Government decide to promote legislation with a view to bringing outlying districts within the metropolitan area,—which measure would, however, as above mentioned, necessitate the consideration of very important financial and other matters,—the Board would not be unwilling to have the duty cast upon it of dealing with the sewage of the lower valley of the Lee, as well as that of other outlying districts."

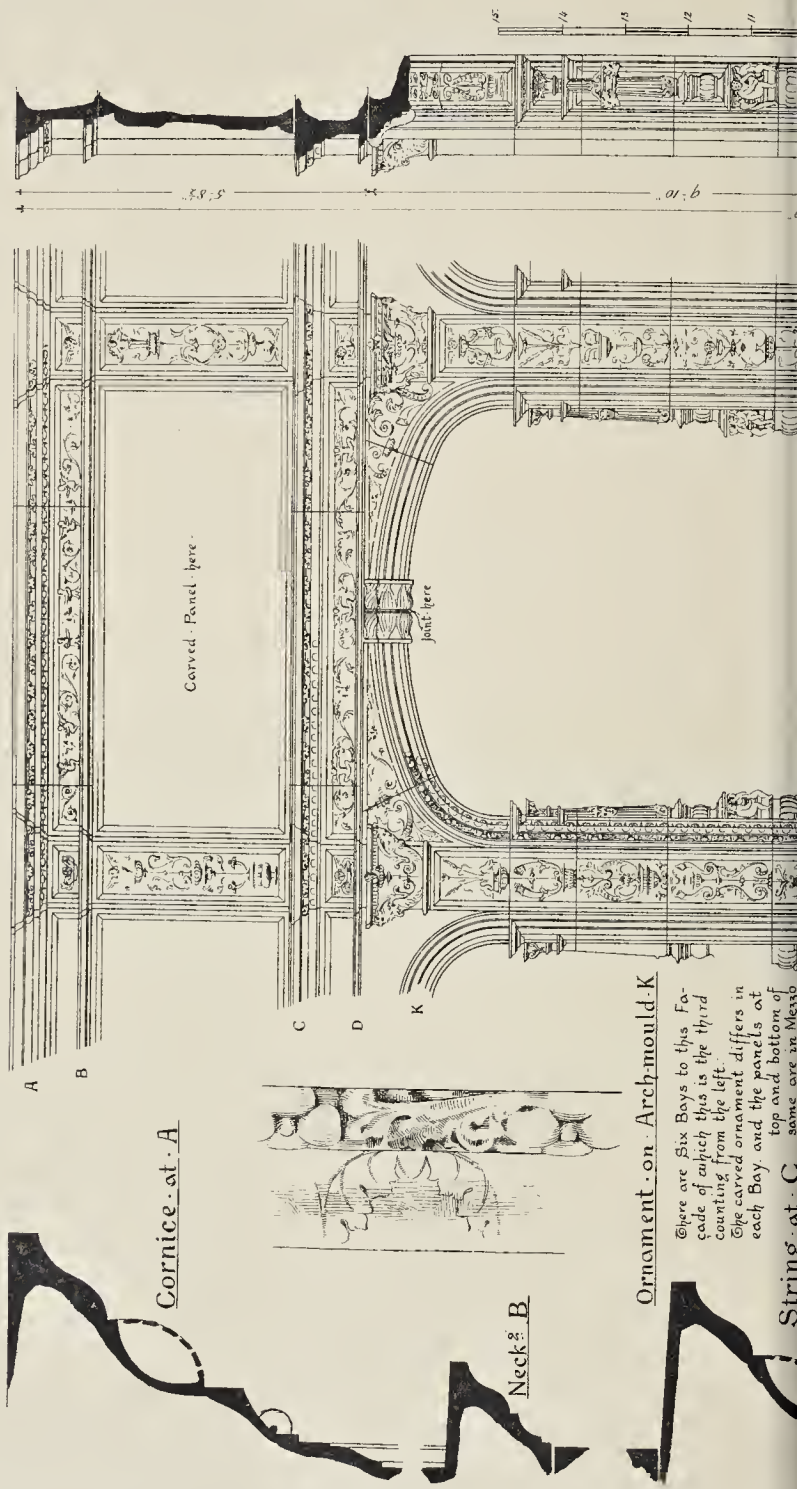
New Buildings at Westminster Workhouse.

—For some time past the Guardians of the Westminster Union have been alive to the fact that the accommodation for pauper lunatics of the male sex has been very inadequate, and the result was an application to the Local Government Board for permission to erect a building affording the requisite accommodation. That permission having been obtained, the plan of Messrs. Saxon Snell & Son, of Southampton-buildings, was decided upon, and the contract for the execution of the works has just been entrusted to Messrs. Mowlem, Barr, & Freeman. The building will be erected within the precincts of the workhouse in Poland-street, and will occupy part of the space which is at present an open quadrangle bounded by the workhouse buildings. The structure, which is intended for the accommodation of about a dozen patients, will be one story high.



THE BUILDER, FEBRUARY 21, 1885

HOTEL · BOURGTHEROULDE · AT · ROUEN · PORTION · OF · FACADE · ON · SOUTH · SIDE · OF · COURT · YARD ·



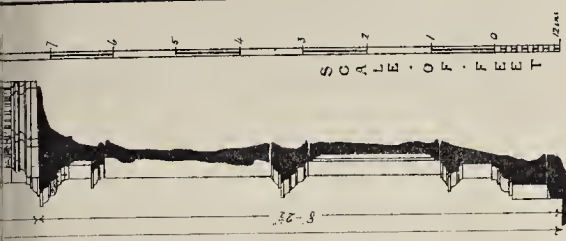
Cornice at A

Neck B

Ornament on Arch-mould K

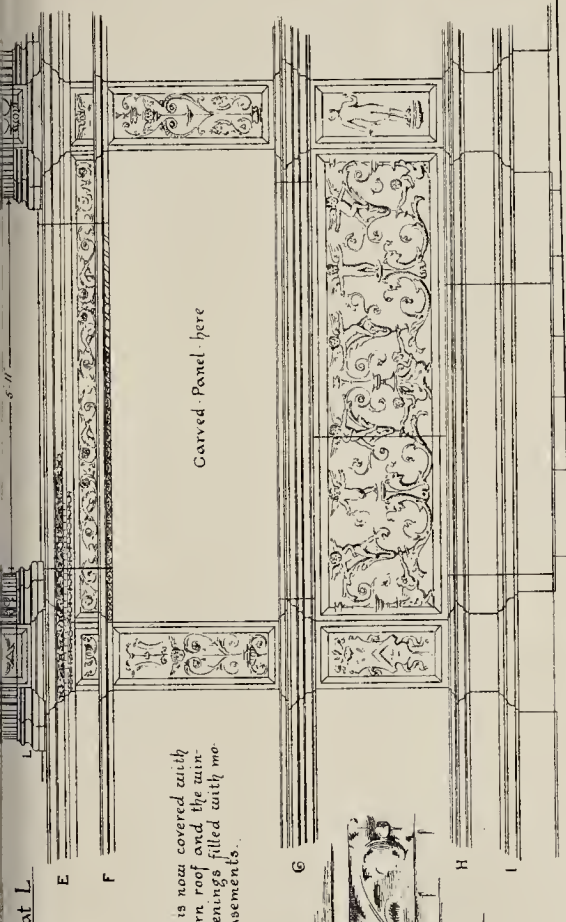
String at C

There are six Bays to this Fa-
cade of which this is the third
counting from the left.
The carved ornament differs in
each Bay and the panels at
top and bottom of
some are in Mosaic



SECTION

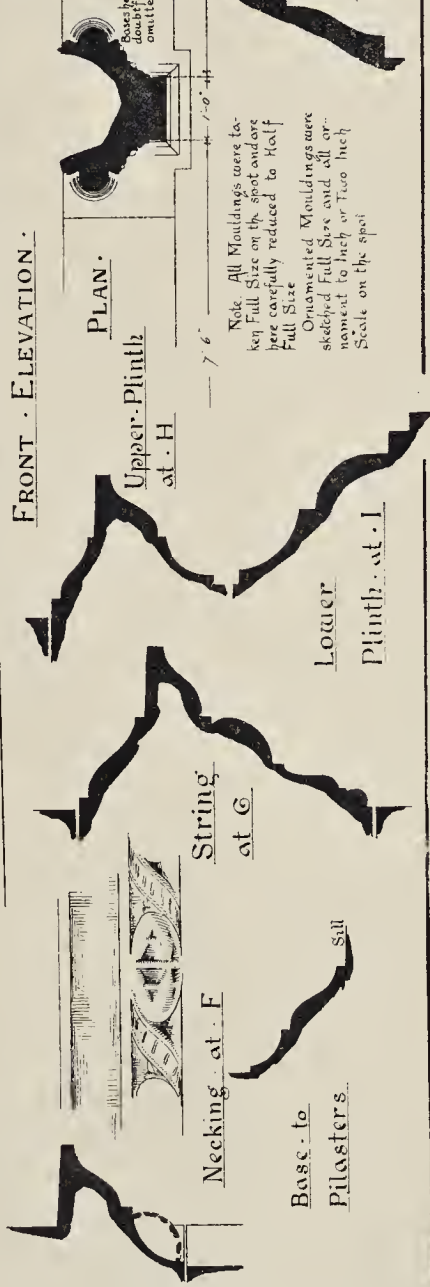
This Moulding was not taken Full Size but carefully measured.
George Gilbert Scott
 Measured July September 1852.
 Drawn



FRONT · ELEVATION ·

The top is now covered with a modern roof and the window openings filled with modern casements.

Carved Panel here



PLAN ·

Note All Mouldings were taken Full Size on the spot and are here carefully reduced to Half Full Size
 Ornamented Mouldings were sketched Full Size and all ornament to Inch or Two high Scale on the spot

Necks · D

Sill · at · E

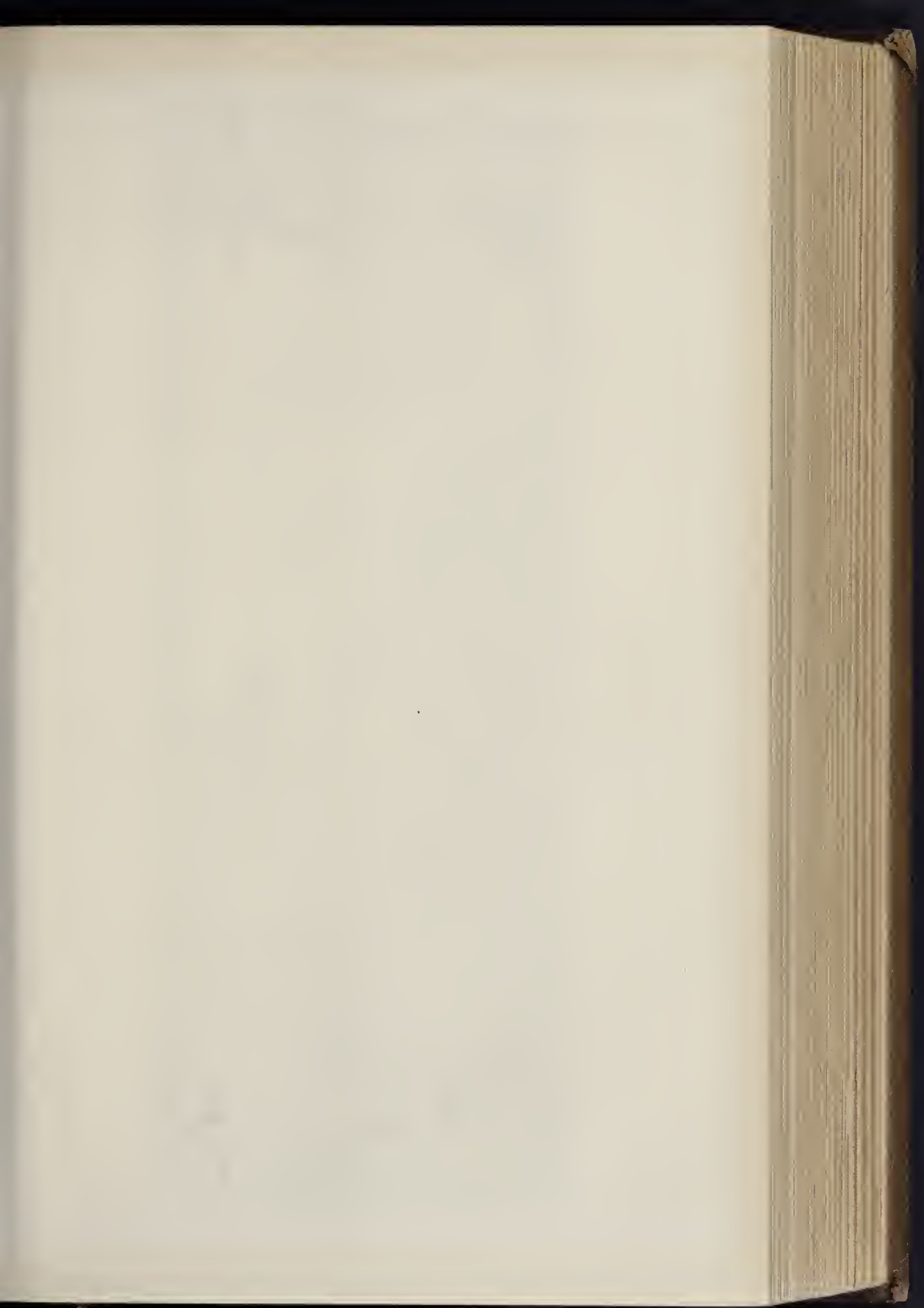
Necking · at · F

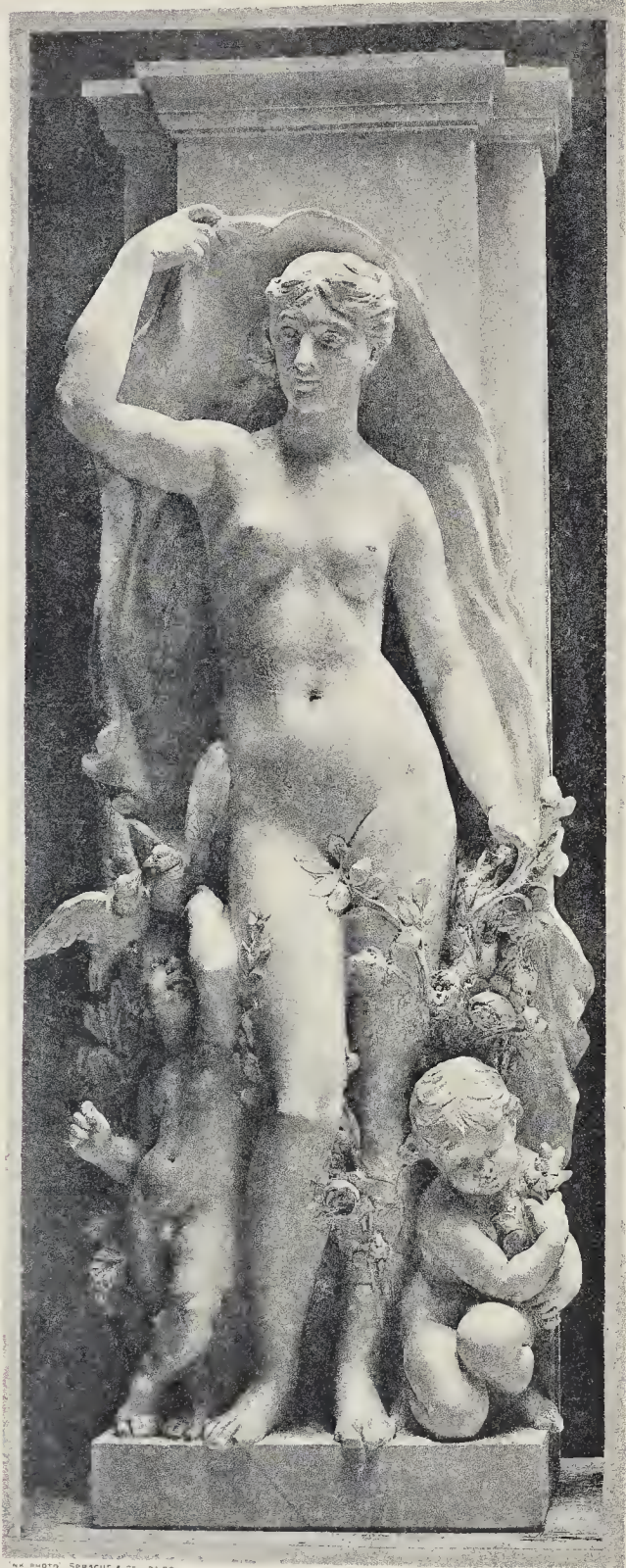
Base · to · Pilasters · at · I

String · at · G

Upper · Plinth · at · H

Lower · Plinth · at · I





SCULPTURE, MAGASINS DU PRINTEMPS.
"LE PRINTEMPS."
M. CHAPU, SCULPTOR.

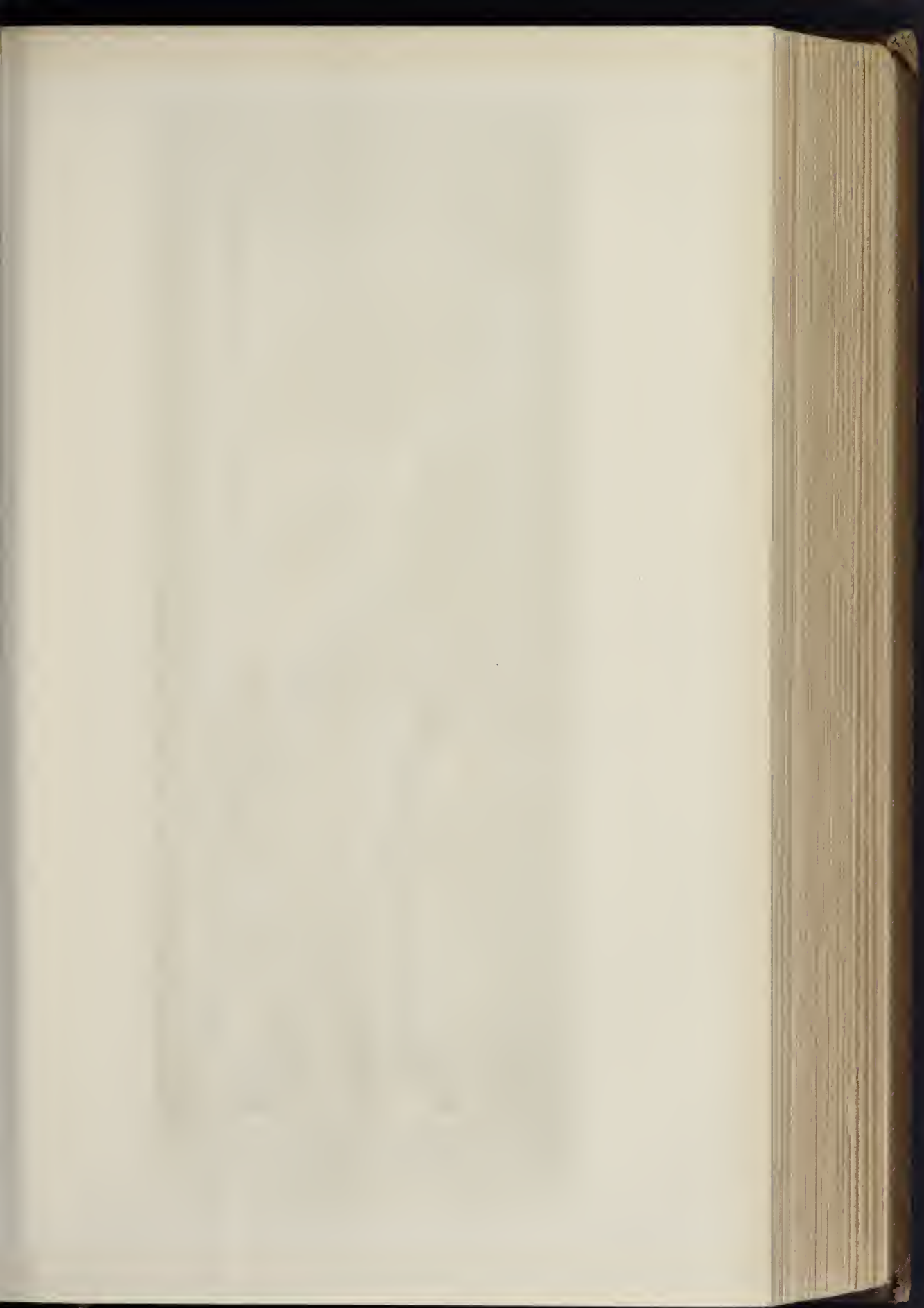
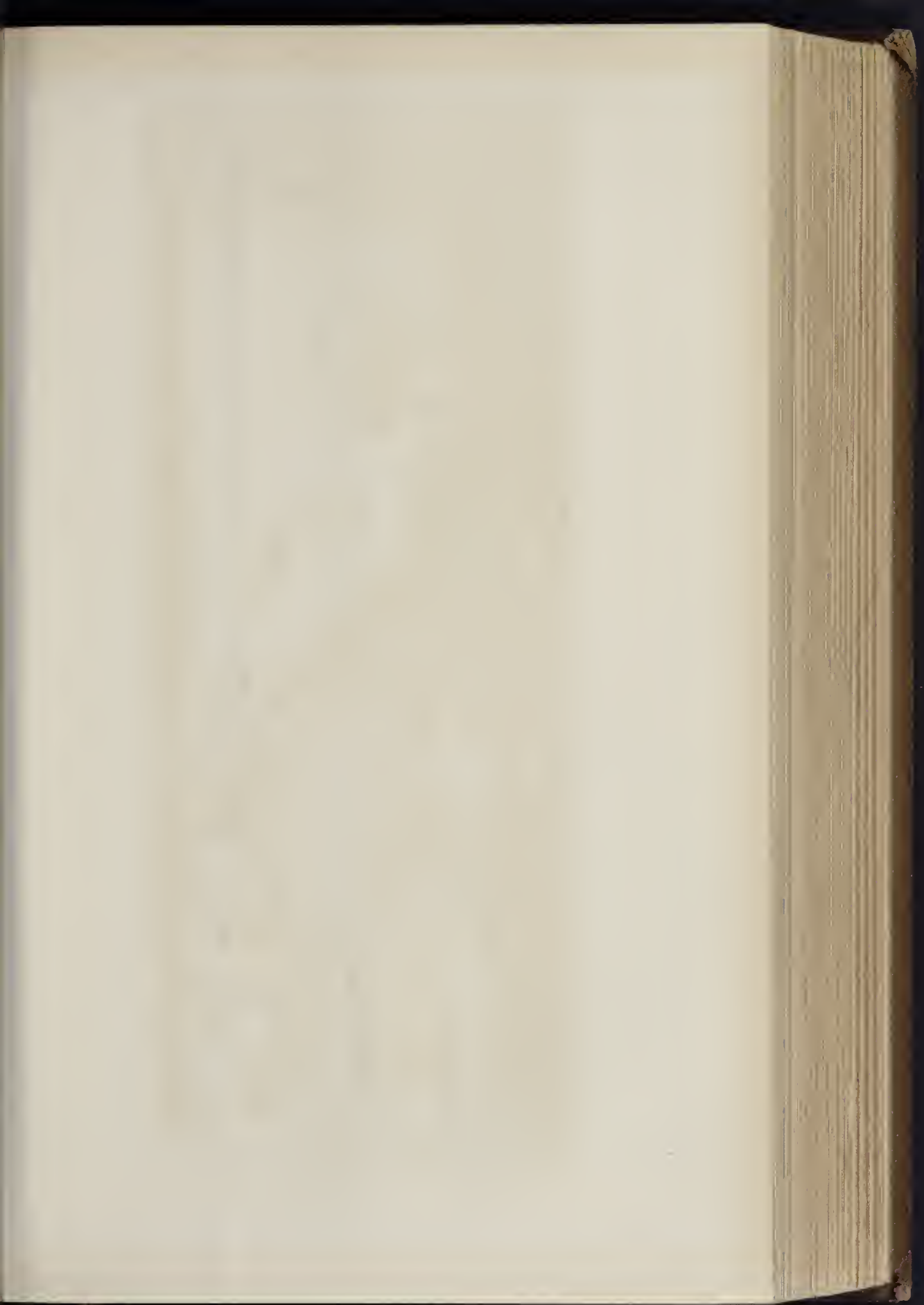
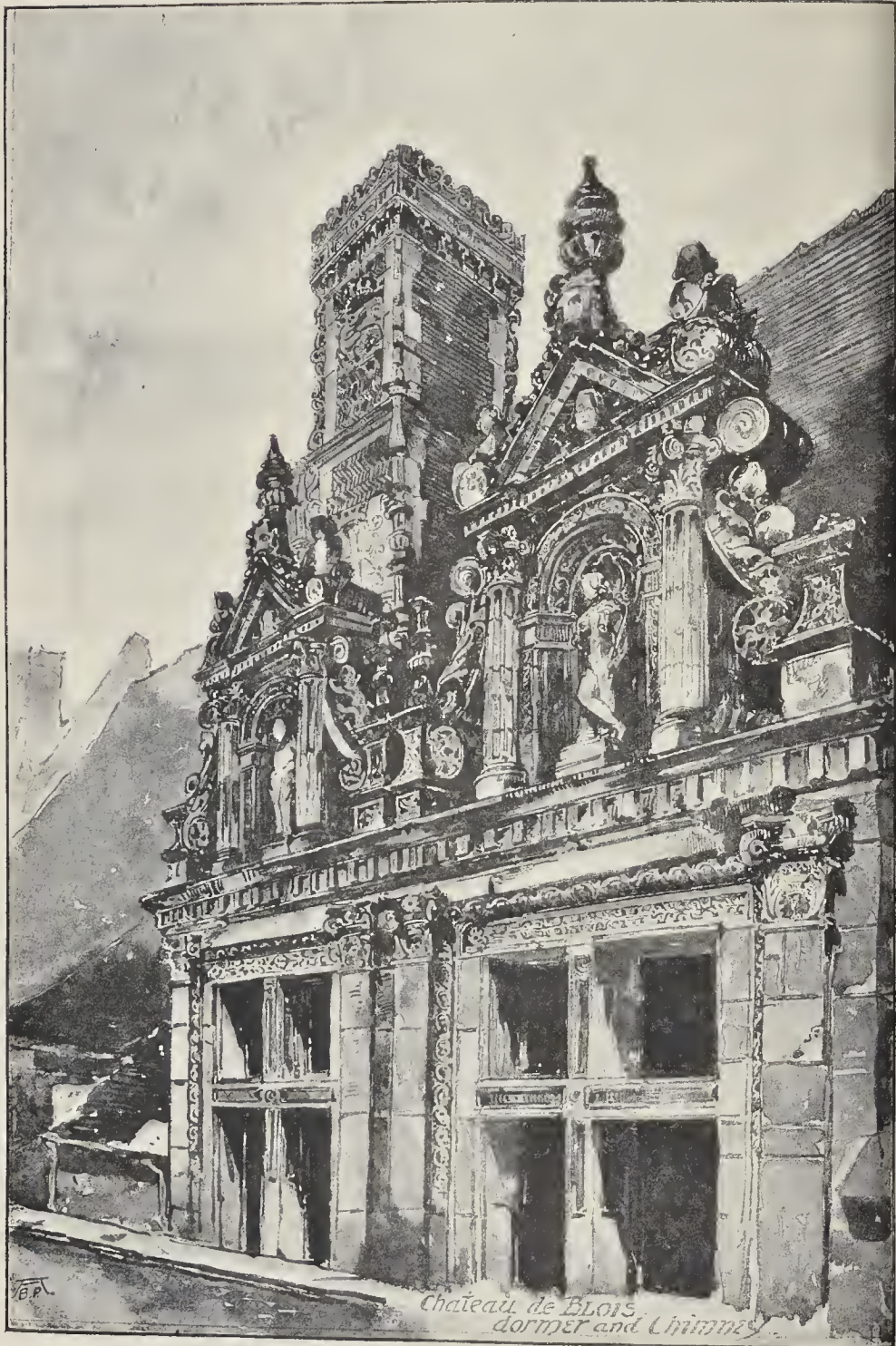




PHOTO SPRAGUE & CO LONDON

SCULPTURE, MAGASINS DU PRINTEMPS
"L'AUTOMNE"
M. CHAPU, SCULPTOR





A BIT OF OLD FRENCH RENAISSANCE.



THE "MAGASINS DU PRINTEMPS," PARIS,—M. PAUL SÉDILLE, ARCHITECT.



INK PHOTO SPRAGUE & CO LONDON

SCULPTURE, MAGASINS DU PRINTEMPS
"L'HIVER."
M. CHAPE, SCULPTOR

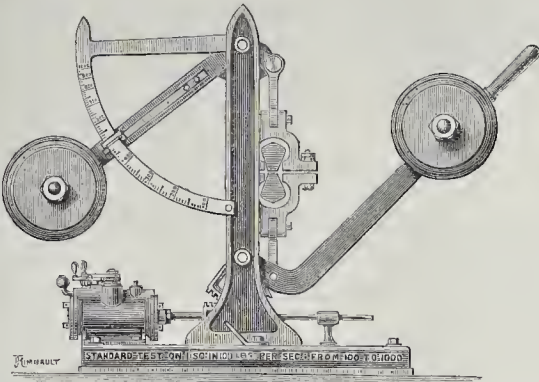


"INK PHOTO," SPRAGUE & CO., LO-ANDON

SCULPTURE, MAGASINS DU PRINTEMPS.

"L'ÉTÉ."

M. CHAPU, SCULPTOR.



Michele's Automatic Cement-Testing Machine.

MICHELE'S PATENT AUTOMATIC CEMENT-TESTING MACHINE.

We illustrate above a new and improved machine for testing cement, lately patented and brought out by Mr. V. De Michele, of 14, Delahay-street, Westminster. As will be seen, differs considerably from the machine which has been hitherto associated with his name, and which has been so extensively adopted by the principal cement manufacturers and users for many years past.

The old machine is so well known as hardly need description here, but we may remind our readers that the cement briquette was broken by exerting a pull through the briquette at the short end of a weighted lever, by means of a handle and worm, and wheel.

In the new machine, as will be seen by our illustration, the strain is applied by the slightest lever on the right-hand side of the machine falling, and as it does so, raising through the medium of the briquette, the other eighted lever, the motion being governed by a handle regulating the resistance of oil to the piston of a cataraet. In this way the motion of the machine is most completely under control, and is, moreover, very uniform and steady. It can be handled can be set so as to break a briquette slowly or as quickly as may be desired, but the standard test is that the strain should be applied at the rate of 100 lb. per second on the pure inch. At any period of the stroke the machine can be stopped for any desired interval, and when re-started, applies the strain at the same rate as it did before the stop. The machine is also made in a non-automatic form. In this case the weighted levers are in equilibrium at all portions of the stroke, and the briquette is broken by lowering the right-hand lever by hand pressure.

The Strains on the Forth Bridge.—At a meeting of the Royal Scottish Society of Arts, held last week, Dr. Edward Sang read the second part of his paper giving "An Elementary view of the Strains on the Forth Bridge due to the Shifting Load." This part of the paper was devoted to the geometry of the cantilever truss, and in the course of his remarks Dr. Sang used the laws of trussed structures and the method of lessening strains, and referred to the fitness of the structure in question, and the determination of the distance between the piers. Regarding the structure of the truss, he said he was at variance with the designers of the bridge, who crossed bracings introduced new points, each of which must have its three determinants; that as the bracings were in pairs, and as no collection of even numbers could ever make an odd number, there must always be either deficiency or redundancy. Solely from a geometric point of view, the construction was inadmissible. Mr. Westland said no one could say anything against what Dr. Sang had said, and that the theory was perfectly correct, and he said that the double bracing of the pier was just one fault he could see with design of the bridge. Mr. Reid said that, after the experience of the Tay Bridge, he would be inclined to doubt the accuracy of the calculations of some of the people who had to do with the Forth Bridge.

ROYAL ARCHITECTURAL MUSEUM AND SCHOOL OF ART.

PRIZE DISTRIBUTION.

On Monday evening last, Mr. P. R. Morris, A.R.A., presided at the annual distribution of prizes to the students of the Art School at this Museum, situate in Tufton-street, Westminster.

The curator, Mr. Randall Bruce, presented a report which stated that the school had earned last year a Government grant of nearly 100*l.*, the highest yet gained. The Saturday "Life Class" numbered 38 students, with frequently 20 in attendance; while the evening class for drawing from the life, though only started last March, had outgrown the accommodation provided for it. The class for Modelling in Clay numbered about 12, and that for Drawing from the Antique 42 students. The Elementary Class had 60 members. Lectures on Architecture, and on Design and Building Construction, had also been given during the year, the exceedingly valuable collections stored in the Museum being thus well utilised. Among the principal prize-winners was Mr. G. Wilson, who gained the silver medal and first prize offered by the Plasterers' Company for a design in mastic for a panel. For Building Construction first-class certificates were gained by Messrs. T. Morgan, J. Jackson, W. King, and E. Bird; and in the Class for Architecture prizes were gained by Mr. Ernest Poole for a design for a cathedral, and by Mr. W. Ferguson. The attendance prize given by the President, Mr. A. J. B. Beresford-Hops, M.P., was won by Mr. W. Kirk.

Mr. Morris having distributed the prizes, delivered an address, in which he observed that the training of the artist must be thorough, and not a training in one branch or speciality of art only, but a training on a very much broader basis. The professor of the pictorial art should know something of architecture, the architect should know something of modelling, and the sculptor should be able to paint. Without such a varied training, it was useless for the artist to think of achieving success in life. Pretentious was the besetting sin of modern art. The sculptor's whole endeavour was too often not to produce a good work, but to make it pretty; but he was, perhaps, not altogether to be blamed,—he only produced what was demanded. Though England was a century later than Continental countries in beginning to recognise the national importance of artistic knowledge, it had a great future before it. We had been too long the Cheap Jacks of the world, but there were signs that the artistic education being given to so many hundreds of thousands of students in our art-schools throughout the country would yet acquire for us a foremost reputation for artistic superiority. Already he had been informed we had obtained a leading position in the export of wall-papers through the superiority of our designs. He looked forward to the time when every man, woman, and child in the Kingdom would feel something of that great art-movement and benefit by the influence of such schools as that. We should raise up a race of architects who would rescue our towns and villages from the squalor which seemed to be inevitable at the present day. To drive through London from St. Pancras to Charing-cross and to see the black houses weeping with soot was most depressing. The taste of the rich required to be educated quite as much as that of the poor. In proof of this he had had only to call attention to the mania for chocolate colour. Chocolate as a colour did not exist, except in chocolate; and even if it were a colour it was worse than all others for this London of ours. It was a horrible invention. The inventor of chocolate and the inventor of stone colour should have niches all to themselves in the Aquarium.

The Charity and Endowed Schools Commissioners of England and Wales have appointed Mr. Joseph Clarke, F.S.A., their architect.

"WHO WRITES THE SPECIFICATIONS?"

STR,—If you will permit me to offer a word of comment on your editorial note [p. 225] on my letter [p. 250] in your issue of the 14th inst., I would say that I have always considered a proper specification to be a work that gives ample exercise both to the inventive and to the imaginative faculties. One describes much of one's design that one cannot well draw. One describes ways of doing things, not necessarily routine ways, helping out one's words by abundant marginal sketches. I contend that a specification that can be at all correctly described as "a piece of dry business routine" is signally fails in its scope and purpose. It would be possible to make such numerous drawings, so covered with descriptive notes and memoranda, as would to a great extent supersede such a specification as I speak of. But then this is merely putting part of one's specification on drawing-paper instead of on specification paper. It does not affect my argument. You do not want invention and imagination in quantity-taking. You want a man to measure off accurately, and with knowledge of trade technicalities, what an architect shows on his drawings and describes in his specification. The qualities that would make a man a good quantity-taker are very different from those required in writing a good specification. There are dry technicalities and routine in a set of artistic drawings, as there are in a specification; but a good specification is an interesting document on the whole, and will be read with real interest by the intelligent client. I know accomplished quantity-takers, but I do not happen to know one who is also a good specification writer. A quantity-taker has to deal with facts presented to, and prepared for, him. An architect (one after my heart) delights as much in his specification as in his drawings, all being a portion of his one design. An architect who does not write, or have written under his own direction, his specifications, is apt to be the kind of man (whom I have known in the flesh too often) who "leaves all that sort of thing to the builder," or, it may be, to the clerk of works. A quantity-taker may write the specification to oblige the architect who finds him work; but he does not, and cannot, write it as the author of the design should do it. It is one thing to depute work to the man who can do it better than one's self, but quite another to shirk one's own proper work that one ought to be able to do better than any one else. EXCELSIOR.

FARM BUILDINGS.

STR,—Will you permit one who has had some experience in farm buildings, and who looks at the question of designing them from a different standpoint to that generally adopted by architects, to make a few observations re Mr. Young's paper and plans as given in the *Builder* of the 14th inst.? Principally, I find fault with him for evidently looking at the question as though, while it is important that they serve their purpose as farm buildings, it is more important that, in their elevation, they shall show that an "architect" had a hand in it. Now, although in the designing of most buildings, whether public or private, questions of style, precedent, taste, &c., are of some importance, they need scarcely at all be considered when planning farm buildings,—not, in fact, to any greater extent than would be required say in designing a set of ironworks. And, if in designing the furnace box were to be influenced in his ideas of proportion (say) by his previous studies of public buildings or private dwellings, instead of by the question of how to make or smelt the iron at the least expense, it would be rather unfortunate for the owner of the works, particularly if he had to meet with much competition. Now this is something like what happens when an architect is asked to design a set of farm buildings. He does not look upon it as a question of how to manufacture meat, or milk, or corn at the most profit,—or perhaps I might say at the least loss,—but how to make a set of buildings that, while they shall in some measure answer the purpose for which they were intended, they at the same time *must* exhibit in the elevations something that, for want of a better name, I will call style, but which in substance is something no more connected with, or necessary for, the manufacture of meat, &c.,

* We did not call it so; we only said that some other people might.—Ed.

than it would be for any other business quite foreign to that in hand. And as in the supposed case of building an iron furnace, any other consideration than that of how to make iron in the cheapest and best manner would, if indulged in, be at the cost of the iron made, so similar indulgences in the designing of farm buildings will be at the cost of the articles manufactured in them, and the early probability of "the works being shut up," &c., the farm being unutilized.

A detail in Mr. Young's plans which I think is open to improvement, is the unnecessary high pitch and consequent expense of the roofing. I presume they are of tiles, and, if so, I should only have had the roofing of a square pitch, which is ample. Not only is money wasted in this, but the factory is less suited for the manufacture of its goods. Cattle-sheds should be warm, and, for this purpose, should be kept as low as possible. High roofs do not favour warmth. If a desire or study for appearance has prompted these high roofs, a satisfactory result might have been better attained by overhanging the eaves and gables, which would also have protected the walls very much from the rain.

I should have liked to have made a remark or two on some other details, but my main object has been to enter a strong protest against the designing of these buildings being entered upon in any other spirit than that which should actuate a man when designing, say, a furnace for smelting iron or a steam saw for sawing wood.

It is probably news to most members of the profession that it is in consequence largely of this adherence to details suitable only for very different buildings, combined with a want of knowledge of the requirements of farm-buildings, they are so little employed in this branch. To those who do make it a study it is an unworked and profitable mine. H. G.

THE ROYAL ARMS.

SIR,—“J. R.,” in your issue of the 31st of January [p. 182], referring to my letter of the preceding week [p. 152], as to the place of honour as supporter being held on the Scottish shield by the unicorn instead of the lion, asks if I can tell whether the quarterings on the shield are also reversed in Scotland.

This point I could not answer of my own knowledge, so I wrote to a friend in Edinburgh who was likely to be able to give the information, which he supplies quite to the point in the following words:—“You are quite right in your heraldry of the royal arms of Scotland. If you consult Chambers's ‘Encyclopædia,’ under the head of ‘Scotland, Royal Arms,’ you will find a short account of the matter. The arms of the two countries came to be quartered at the time of the union of the crowns in 1603, and since then in Scotland precedence has always been given, not only to the unicorn, &c., as supporter, but to the Scottish lion on the quarterings occupying the first and fourth quarters, while England and Ireland hold the second and third quarters respectively; on all judicial seals and public buildings in Scotland the rule prevails. The Act and Treaty of Union, sec. 24, sanctions the ancient Scottish seals. The question of the proper marshalling of the Royal arms within Scotland was raised in 1853 by a petition to the Queen from the magistrates of Brechin; a reference was made by the Home Office to Garter King of Arms, and to the Lord Lyon, who considered Scotland entitled to precedence on the judicial seals of the country, and his views have since continued to be acted on.”

EDWD. COCKBURN.

CLOSET AND DUST-BIN.

SIR,—Allow me to call the attention of architects and others interested in sanitary matters to the description of a recent patent, which appeared in your issue of the 24th ult. [p. 153], the one numbered 13,841, entitled a “Closet and Dust-bin” combined, by J. Ennals. I maintain there is nothing new in his arrangement, substantially the same thing having been in use for years. Attached to my house is one where a modification (I might say a great improvement) of the same idea is in use. Instead of the moisture being encouraged to draw to the front, and become mixed with the soil and dust, and so become a great nuisance (it is generally admitted that the nuisance of ordinary privies lies in the collection and retention of moisture), it is drawn to the back of the receptacle and drained off, and connected with a sewer, leaving the rest of the “contents innocuous.” I am afraid under Mr. Ennals's arrangement it would hardly be so, owing to its being so sloppy, and more readily giving off an offensive odour.

I think under these circumstances, Mr. Ennals

will have some difficulty in proving his right to the patent if it should be disputed.

It seems to me a pity the Patent Office authorities should grant a patent for any such arrangements. Why not patent the planning of rooms? W. J. S.

* * We give the patents, of course, simply as information; not as endorsing or recommending them in any way.

“NON-ACCEPTANCE OF LOWEST TENDER.”

SIR,—I shall be obliged if “Mr. W. Hoffman Wood, F.G.S.,” Leeds, will kindly give me his authority for the statement he so confidently makes in his letter on the above subject in your issue of Feb. 14th, p. 252, viz.:

“That if he [the contractor] has simply applied, in answer to an advertisement, for the quantities, &c., (and his tender being the lowest is not accepted), he has no ground for action.”

Is Mr. Wood aware that there is an important action pending, on this particular point, against a wealthy Corporation in the West? The result of this action is looked forward to with great interest, and will seriously affect every responsible contractor in the kingdom who devotes his energies, experience, and valuable time to the preparation of *bona-fide* tenders for the execution of works or the supply of goods.

I should like Mr. Wood to say what is the object of advertising for tenders, unless it is to obtain the lowest possible estimate from a substantial contractor. BONA FIDES.

GREY FRIARS CHURCH, ABERDEEN.

SIR.—The authorities of Marischal College, Aberdeen, contemplate an extension of their buildings, and it is rumoured that in the event of the scheme being carried out they seriously propose removing the old Grey Friars Church which stands on the site; but as this fine old building can easily be converted into a College Hall there is no justification whatever for such an act of Vandalism. It will be a source of lasting regret if anything of the sort takes place. G. S. A.

STOCKHOLM TAR.

SIR.—Last summer I had the weather-boarding of some new farm buildings tarred with two coats of Stockholm tar, which, after about a month or so, became the colour of mud. Could any reader tell me the cause of this? Soon after the tar had been put on we had some very wet weather, and I also find now that the men used paraffin with the tar to make it work on easy. Would this cause it? E. B.

PROVINCIAL NEWS.

Chester.—The foundation-stone of the new Museum and School of Art for Chester was laid a few days ago. The style of the building is an adaptation of the Anglicised Renaissance which was in vogue during the seventeenth century. The accommodation for the various purposes is comprised on three floors, besides a basement, which would be available for stores, &c. The ground-floor is about 4 ft. above the level of Grosvenor-street, the main entrance being through a corridor leading to a large open staircase-hall, whence access is gained to each department. On entering the building there is a joint library and reading-room, 21 ft. by 19 ft., on the left, and an apartment on the right, 36 ft. by 25 ft., intended as a natural history museum; beyond this is the lecture-theatre, 44 ft. 6 in. by 30 ft., having two distinct entrances from the staircase-halls, beside platform-entrance and preparation-room at the other end; this room is specially arranged so that all present may have an uninterrupted view of the platform and the lecturer's table, and, in connexion with the preparation-room, a lift is provided to the chemical laboratory on the first floor. The room to be devoted to the archaeological specimens, and also to an art-gallery, is 60 ft. by 25 ft., with top light suitable for pictures, &c. The first floor comprises joint committee-rooms 20 ft. by 19 ft., two science-class rooms having an area of 1,170 square feet, and a chemical laboratory 30 ft. wide, having an area of 520 square feet, and there is a room devoted to the school of art on this floor 320 ft. in area. The second floor is devoted entirely to the school of art, being upwards of 66 ft. in length and 25 ft. 6 in. in width, amply lighted from the northwards; besides this there is a master's room 14 ft. 6 in. by 12 ft., so situated as to overlook the whole of the teaching space. The whole of the floors of the main building will be fireproof, with

wrought-iron beams and light Dennett arcing which would also prevent the transmission of sand between the various floors. The materials for the decorative facing of the exterior consist of red Ruabon bricks, with dressings of Grinshill stone. The architect for the building is Mr. Thomas M. Lockwood, of Chester, and the work will be carried out by Mr. Edmund Gabbatt, of Liverpool, whose tender of 8,150 has been accepted by the committee; the clerk of works is Mr. E. Muspratt.

Liverpool.—Some eight years ago the Liverpool Union Bank opened a branch in Bold-street, and they have now removed the business to new and spacious premises in the same street, which were opened on the 9th inst. The building is of the Italian style of architecture. The lower portion is of polished Scotch granite, and the entrance to the bank is of stone ornamented by a carved representation of the arms of the bank. There is an outer and an inner vestibule, and the bank proper is situated in the centre of the building. It is one story high, apical, and is lighted by a cupola and other lights high up next to the ceiling, all of which are filled in with coloured glass. The walls of the vestibules are lined with marble and falcene glazed tiles and the floors are covered with mosaic. The fittings throughout, door casings, &c., are also of American walnut, and the counters are made of the same wood. There is a keeper's residence at the back, and the front portion over the shops adjoining the bank is to be used as showrooms and workrooms. The cost of the new building is about 9,000l. The granite has been supplied by Messrs. Newall, of Dalbeattie; the decorative and tile work by Messrs. Simpson & Son, of London; Messrs. Jones & Sons, of Pleasant-street, Liverpool, were the contractors and the architect is Mr. G. E. Grayson, of James-street.

Rotherham.—At a Council meeting of the Rotherham Corporation, held last week, Mr. H. L. Tacon, of Rotherham, was appointed architect for the proposed new baths and free library, which are to be erected at a cost of 6,000l.

Richmond (Yorkshire).—At the meeting of the Richmond (Yorkshire) Town Council held on the 4th inst., it was decided to proceed with the new Cemetery, and Messrs. Clark & Moscrop, architects, of Darlington, have been instructed to prepare plans for laying out the ground and for the erection of chapel and lodge.

Darlington.—On the 6th inst. the new Hospital and Dispensary at Darlington was formally opened by Mr. J. B. Hodgkin, the Mayor, of which occasion his worship was presented with a silver key by the architect, Mr. G. G. Hosking, F.R.I.B.A. The key, which has been specially designed by the architect, and manufactured at his expense by Messrs. Harrison & Son, silver smiths, Darlington, is of solid sterling silver weighing 4 ounces. The several contractors have been:—For excavating, brickwork, and mason's work, Messrs. J. W. & M. McKenzie; Darlington; carpenter and joiner's work, Mr. R. T. Smith, Darlington; plasterer's work, Mr. R. M. Ormerod, Carlisle; slating, Messrs. G. Pattison & Son, Darlington; plumber and glazier's work, Mr. Emmerson Smith, Darlington and painting, Mr. John Law, Darlington. The heating arrangements are by Messrs. Haden & Son, of Manchester. Mr. Joseph Hindmarsh was the clerk of the works.

Colchester.—The Board of Guardians have decided to appoint Mr. J. W. Start, architect (of Colchester), to inspect the traps' war and make suggestions as to structural alterations for the better accommodation of vagrants.

Torquay.—The construction of a new reservoir, filter beds, &c., in connexion with the above works has been carried out to meet increasing requirements. They are situated a Kennick, near Christow, Devon, in close proximity to the company's existing reservoir at Tottilford. The first sod was cut some two years since, but on account of the fissures in rock, &c., that have been met with, the work has been carried out under very great engineering difficulties. They are now complete and Torquay will have a plentiful supply of water for the future. The two reservoirs have a superficial area of a hundred acres, and are capable of containing 300,000,000 gallons of water when full, or a supply for 300 days for the whole of the district supplied. The engineer is Mr. H. M. Brunel, of Dolabey-street Westminster, and the works have been carried out by Mr. A. Krauss, of Bristol.

The Student's Column.

DESCRIPTIVE GEOMETRY. — III.

THE second method of solving problems is by changes of projection planes. This means, an object being drawn on given planes of elevation and plan, and redrawn on other planes of elevation and plan which suit your purpose better. For instance, a bow-window being drawn in your general elevation, if you want to show exactly the sides of the bow-window, you must make a special elevation of the side on an elevation plane parallel to that side. This is quite elementary, but there are numerous cases where the process is not so obvious, such as, for instance, as to find the exact shape of the sides of an octagonal roof over a bow-window.

PROBLEMS ON PLANES.

If a plane P be given by its traces P^h and P^v , as in accompanying figs. 11 and 12, any line, A, belonging to the plane P will, if prolonged, intersect the picture planes in points m and n on the traces P^h and P^v of the plane P.

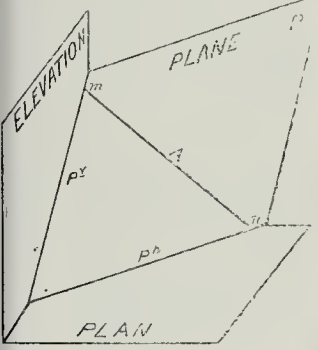


Fig. 11.—View of Plane P, and its Traces, P^h and P^v .

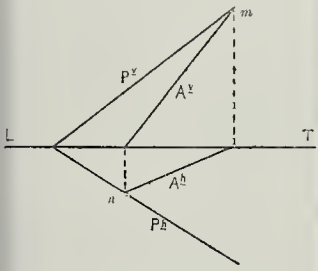


Fig. 12.—Geometrical Representation of the above.

The slope of the plane P is given by a straight line, A, thereof, perpendicular to the horizontal trace P^h of that plane, as in fig. 13.

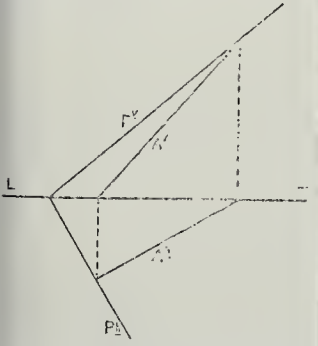


Fig. 13.

The inclination of line A is to be found by rotation as shown before. The slope of a roof will be given by a line perpendicular to the eaves.

Any horizontal line A belonging to a plane P will be parallel to its horizontal trace P^h (in a roof to its eaves). If a point belongs to a

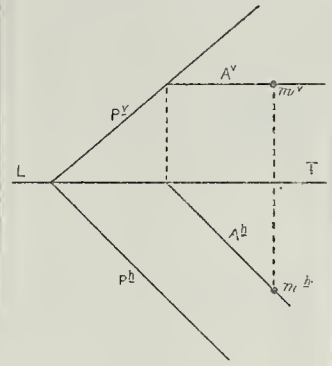


Fig. 14.

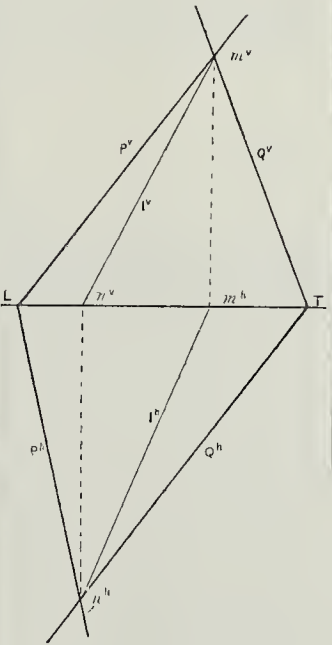


Fig. 15.

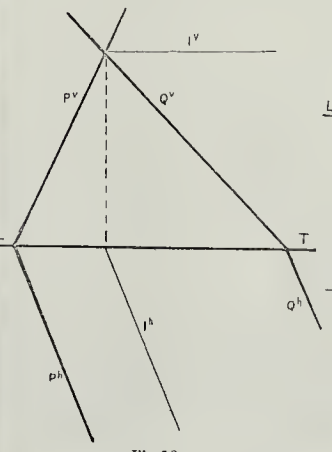


Fig. 16.

plane it will be on a line belonging to the same plane; as the point m in fig. 14.

Intersection of two planes, P and Q, given by their traces.

We know that the points m and n , where the traces of the planes meet, are points of the intersection I; by connecting the plans and the elevations of m and n we have I^h and I^v as in fig. 15.

If the planes have parallel traces, such as P^h and Q^h in fig. 16, or P^v and Q^v in fig. 17, then the projection of the intersection, I, will be parallel to the traces.

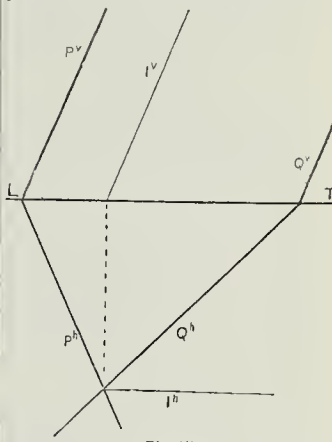


Fig. 17.

Intersection of two planes, P and Q, given by their traces, when their traces do not intersect within the limits of the drawing-paper.

This is accomplished by the use of auxiliary planes. You cut the two planes P and Q by a horizontal auxiliary plane R; the intersections of plane R with planes P and Q are the lines A and B, of which A^h and B^h are the plans, the point m where A and B cut one another is a point in the line formed by the intersection of the planes P and Q. By operating in the same way by the means of an auxiliary plane, S, parallel to the elevation, we find another point n , which also belongs to the intersection of the planes P and Q; the line m and n is therefore the intersection required. (See fig. 18.)

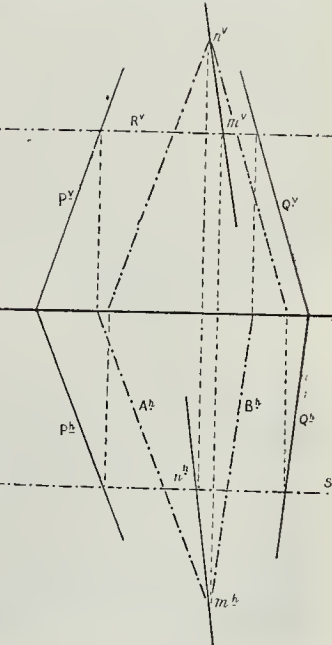


Fig. 18.

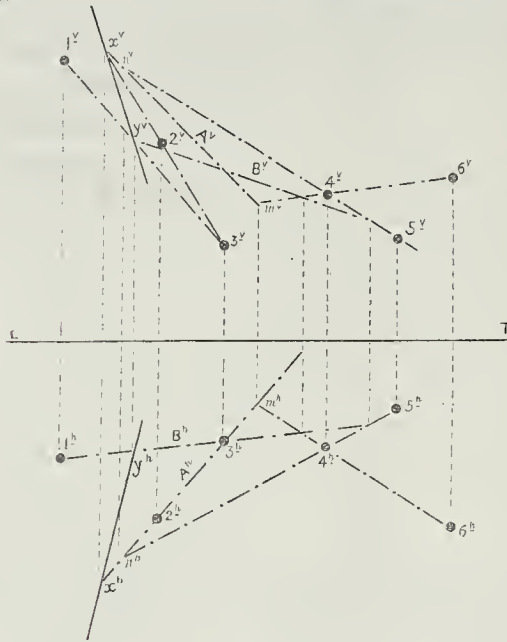


Fig. 19.

Intersection of two planes given each by three points belonging to their respective surfaces.

This is the case most likely to occur in practice, as, in architectural drawings, we have not to do with unlimited planes given by their traces, but with planes defined by lines or points belonging to them. Let the points 1, 2, 3 given in plan and elevation belong to the first plane, the points 4, 5, 6 belong to the second plane.

We use, in this case, the very same method as in the preceding one; that is, we select auxiliary planes, the intersection of which with the planes given can be readily determined, and we get thereby two points which we have only to join to get the intersection required.

In fig. 19 the auxiliary planes selected are vertical, and their horizontal traces are on the lines 1^a, 2^a, 3^a and 4^a, 5^a, 6^a is the line A, which is found by joining the intersections m and n of the auxiliary plane with the lines 4, 5 and 4, 6. A^a is of course on the line 2, 3. The intersection of the same auxiliary plane (2, 3) with the given plane (1, 2, 3) is the line 2, 3 itself; the point of intersection x of the lines A and 2, 3, belongs to the intersection of the two planes given. By means of the auxiliary plane 1, 3, we find the line B and the point y, and by joining x and y we have the intersection of the two planes as required. (Students are particularly advised to re-draw this diagram on a large scale, many times varying the disposition of the planes.)

Books.

Diocesan Histories: Winchester. By WILLIAM BENHAM, B.D., F.S.A. Society for Promoting Christian Knowledge.

THIS is the latest volume in the useful series of Diocesan Handbooks issued by the venerable Society above named, which now conducts a great publishing business. Mr. Benham deals chiefly with historical matters, but, of course, he finds it impossible to give biographies of such prelates as Henry de Blois, Godfrey de Lucy, and William of Wykeham, without saying a good deal about their architectural works. St. Cross Hospital, founded by the first of these bishops, though it naturally falls short of the noble cathedral of Winchester in grandeur and dignity, possesses some features of unique interest. Nowhere else does the atmosphere of antiquity cling more closely about the relics of the past,—nowhere else can

one realise so well the character of a Mediaeval religious house. Its restoration within the last few years has been singularly happy, having extended from the material fabric to its sometimes notorious administration. Bishop Godfrey's work, in which is included all the east end of the cathedral from the hack of the apse (excepting the Lady-chapel), is specially interesting, not merely on account of its architectural beauty, but from the fact that its date, 1202-1207, is accurately known. Wykeham is best known in connexion with the two colleges which he built and endowed, but he also left his mark upon the cathedral. Bishop Edjngdon, his predecessor, had begun the restoration of the nave; Wykeham pursued it, but in a very different way. Edjngdon pulled down the old Norman work to make room for his own improvements; Wykeham, on the other hand, retained Walkeyn's structure, but transformed it from Norman to Perpendicular by altering the mouldings of the undisturbed stones, or else by entirely encasing the Norman piers with new work. This singular treatment is shown with great care by Professor Willis, and is worthy of close examination.

Of the ecclesiastical buildings within the diocese of Winchester we must not speak at length. Romsey Abbey is an excellent example of Norman work, and Christchurch Abbey, though marred by later additions and mutilations, almost rivals it. Gilbert White says that, "Norfolk excepted, Hampshire and Sussex are as meanly furnished with churches as any counties in the kingdom"; but few persons will be found nowadays to accept this dictum. Mr. Benham, indeed, goes so far as to assert that "the most exquisite modern church in the diocese, if not in England," is that of the little parish of Privett. It was built only seven years ago, and has not yet attracted general attention. Mr. Benham has written a book of some little value, but has been too often content with second-hand authorities for many of his statements.

Sketches in Holland and Scandinavia. By AUGUSTUS J. C. HARE. London: Smith, Elder, & Co.; 1885.

We might call this pretty little book "Holland and Scandinavia in Vignette," for the sketches, whether in pen or pencil, are upon a very small scale. Norway has less than thirty pages allotted to it, and Denmark and Sweden are treated with even greater brevity. But Mr. Hare knows how to use his tools efficiently, and is able to convey to his readers, by means of a few graphic touches, very distinct impressions

of the places he has visited. His book will be of service to those who follow the author's steps, and of interest to those who are obliged to stay at home. Only we would recommend tourists to select the spring and not the autumn for their visit to Holland. If Mr. Hare had chosen the former season, he would have had far less occasion for groaning over the dulness and drabness of the country and the mildewed stagnation of the towns. That the latter are not without features attractive to the artist and suggestive to the architect, Mr. Hare's sketches abundantly prove. The town gateways at Kampon and Zwolle are noble examples of Mediaeval brickwork. The great church at Haarlem is, at any rate, externally, a striking edifice. At Utrecht there are quaint gabled houses, picturesque in their decay; and the same may be said of Breda, Dordrecht, and Alkmaar. Picture-lovers may spend pleasant hours at the Hague, Amsterdam, and Rotterdam, while at Delft and Leyden the antiquary may live in the past without an effort. We are glad to find that Mr. Hare, in his notice of Denmark, draws attention to Lübeck, which has been strangely neglected by tourists, though almost rivalling Nuremberg in interest. With Copenhagen he was charmed, and of the great Castle of Frederikshorg he says,—"Each view is more picturesque than the last. It is a dream of architectural beauty." Sweden he describes as pretty, but never rising to absolute beauty. A good sketch is given of the Church of Old Upsala, with its detached wooden helvy and apse, "built out of the Pagan sanctuary." Of course, in Norway he visited and sketched "the date-forgotten old wooden church" of Hitterdal, which resembles a Chinese pagoda more than anything in occidental architecture, and he is warm in his admiration of St. Olaf's Cathedral at Throndhjem, or, as we prefer to call it, Drontheim. But it is the natural scenery which attracts people to Norway, and there takes them captive. For such as desire to taste the sweets of that captivity, Mr. Hare's little volume will be found very useful.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,034, Cold-water Tap. R. Hallimond.

The valve of the tap is an indiarubber ball mounted on a spindle, which, in the upper part of the casing, is provided with indiarubber rings. The pressure of the water from the main keeps the valve closed, and it is opened by screwing down a small milled head-screw which is the top part of the spindle. When the tap is open and water has access to the upper part of the tap, the indiarubber packing rings are compressed, and thereby prevent any leakage through the top.

4,143, Pressure Regulator. J. Roff and others, of Melhornrc.

This is a pressure regulator and economiser for gas, steam, water, and other pipes. A short conical tube is inserted in the piping so that the fluid current impinges on the small end and external surface. By properly proportioning the area of this orifice to the area of the pipe it is stated that uniformity of discharge and a consequent economy is insured. In applying the conical tube to piping it may either be made separate and fastened by screwing or otherwise, or it may be cast in one piece with the main pipe.

6,037, Roofing Tiles. J. and H. Grimbleby.

The tiles are formed with wings on one side and fillets or hars on the other, and interlock, forming waterproof joints.

1,322, Improvements in Sliding Sashes, &c. F. Oldfield.

Instead of sash-cords, pulleys, &c., a stationary screw is placed in a groove formed on one side of the sash, and upon this screw is fastened a revolving nut, the outside of which is formed as a toothed pinion gearing into a bevel-wheel. A corresponding bevel wheel geared into this is keyed upon a spindle mounted in suitable bearings, which may be actuated by a winch-handle. By revolving this handle the sashes may be opened or shut as they slide in the frames with an easy movement.

8,172, Improvements in Weather Bars. W. Greenwood and Others.

This invention automatically moves the weather bars or strips attached to the bottom of doors as weather bars or strips. A system of rods and levers is attached to the door-post or lintel and the door, by which, as the door is opened, a rod is moved to the door's outer edge; and, in closing, the reverse motion is imparted to the weather bar until it is finally pressed down when the door is shut.

7,838, Cast-iron Skylight-Frames. H. Steven and J. Walker.

The skylight-frame has two pivots or trunnions

atched to it which fit into and turn in recesses ormed in two lugs. One of these lugs is permanently fixed to a plate on the roof; the other is movable and is kept in place by means of a screw, which engages with a nut inside it. The screw can be inserted or removed from the inside of the house. When the skylight is put on, one pivot is fitted to the fixed lug and the other lug is then put on over the other pivot and screwed down. By this means unaltered entrance is rendered more difficult.

4,607, Improved Sash Frame Pulley. S. Hinery.

The front of this pulley represents three circles, one under the other in a direct line, and slightly intersecting each other. In the centre there is the usual opening for the pulley wheel and cord, and near the bottom there is a frame cast on the back of the front face to receive the wheel. This frame is closed at the bottom, but open at the back and top. The sides form the bearings on which the axle of the wheel revolves; the back portion of these sides is higher than the front, and inclines sharply down towards the front, terminating at the point where the axle works. By this arrangement the wheel put in at the back slides down the incline to its bearings, requiring no fitting, and when fixed on the window-frame, it cannot come out. To fix the pulley on the window-frame, it is slightly larger in front than at the back, it is only necessary to bore three holes of a corresponding size with a centre-bit and drive it tightly in with a mallet; but in order to prevent the possibility of its getting loose, holes for screws are provided just inside the front, and as the wheel will readily recede from the front up the inclined sides, they may be easily inserted.

4,856, Improvements in Ornamented Bricks, &c. W. R. Cornell.

The surface of the brick, block, or such like article is given a thin coat of cement. In this layer is fixed pieces of glass, earthenware, paper, or metal, according to the design or pattern to be formed on either the top or the sides, and the whole is allowed to stand out in relief. The bricks are afterwards baked and the cement hardened.

5,845, Chimney Pots. E. S. Romilly.

A pipe, whose upper part is made conical, is fitted with the smaller end uppermost to the upper end of the chimney. Surrounding this, and extending above it, is a second pipe, slightly conical. The lower end of this pipe either forms part of or is fastened to the first pipe, or it may rest and be fixed upon a ledge or flange round the pipe at or below where the conical part begins. Apertures are made where the annular space between the two pipes commences, such that any air entering through these apertures will be deflected upwards, and induce an upward current through the inner pot.

6,306, Griddle or Gully Trap for Sinks. E. Page.

The trap consists of a glazed stoneware box, rectangular in shape, with a cast-iron cover, which is set in cement. The box is divided by a partition, which does not reach the bottom, but dips below the surface of the water, forming the trap. One compartment is connected with the waste-pipe from the sink, and the other with the drain, and the object is to prevent the grease from the sink passing down the drain. This is effected by a plug, which is placed in the opening of the compartment connected with the sink, and which may be removed for cleaning through a hinged grating in the cast-iron cover.

APPLICATIONS FOR LETTERS PATENT.

Jan. 23.—960, A. Graham, Self-Acting Bolt Fasteners for Cupboard Doors, &c.—988, H. Fletcher, Improvements in Teaspoons.—993, T. Palmer, Clamps or Clamping Presses.—996, J. Stanley, Manufacture of Pigments or Colours.—1,003, S. Meacock, Apparatus for Indicating the Occupation of Rooms, Closets, &c.—1,014, J. Callow, Stencil Plates for Graining, &c.

Jan. 24.—1,033, B. Hill, Hanging and Supporting Window-shades.—1,057, H. Thompson, Arrangement of Bolters in connexion with Closed Kitchen Ranges and other Grates and Stoves.

Jan. 26.—1,090, D. Ward and G. Hayward, Socket Chisels and Gouges.—1,091, B. Sutcliffe, Machinery for Planing, Moulding, Grooving, Tonguing, and Thickening Wood.—1,102, R. Harwick, Constructing and Permanently Decorating Materials for Plastering Work.—1,104, A. Brookes, Door and other Locks and Latches.

Jan. 27.—1,132, J. Watts, Endless Band-saw Machines.—1,165, G. Garrod, Automatic Shutters, Gates, or Doors for Closing the Openings of Lifts, &c.—1,166, H. Walker and G. Clark, Improvements in Kitchen Ranges.—1,170, W. Bull & J. Lennox, Machinery for Constructing and Permanently Decorating Material into Bricks, Blocks, &c.—1,172, W. Haring, Improvements in Levels.—1,173, W. F. Gillett and H. Moreton, Ventilating Apparatus.

Jan. 28.—1,205, E. Heathcote, Improvements in Kitchen Ranges.—1,214, P. Gray, Apparatus for Facilitating the Ascent of Factory or other Chimneys.—1,225, J. Osborn, Improvements applicable to Stoves and Ranges.—1,240, G. Turnbull, Improvements in Kitchen Ranges.

Jan. 29.—1,257, J. Lee, Wrought Metal Trowels.—1,259, E. Glatzel, Utilisation of Zinc Refuse.—

1,269, E. Beal, Improvements in Window Fastenings.—1,284, J. Horne, Appliance for Braking up Solid Refuse in Sewers or Drains.—1,291, H. Walker and R. Carey, Hydraulic Lifts.

Jan. 30.—1,326, R. Ockel, Construction of Chairs.—1,340, W. Gedde, Machinery for Cutting, Planing, and Shaping Wood.—1,354, J. Dinning, Composition for Removing Old Paint, Varnish, &c.—1,355, G. Campbell, Improvements in Fire Grates.

Jan. 31.—1,366, W. Thiebener, Sanitary Ventilator.—1,372, F. Nannestad, Smoke Preventer.—1,375, J. A. Ewan's Swivel and Plug Joints for Gas Conductions, &c.—1,379, G. Outton, Soldering Irons.—1,382, H. De Berenger, Plaster Ceilings and Walls.—1,385, W. Bain, Standards or Posts for Fencing.—1,385, A. Reddie, Machine for Sharpening and Setting Saws.—1,408, T. Amos, Improvements in Water-closets.—1,410, H. Pearson and G. Morris, Street Gully Traps.

Feb. 2.—1,436, J. Wright, Seats and Covers of Prises, Water-closets, &c.—1,443, H. Stofford and T. Dykes, Improvements in Girders.—1,448, J. Muller, Imitating Majolica Ware.

Feb. 3.—1,460, J. Holden, Ventilating and Smoke Consuming.—1,461, A. Lineff and W. Jones, Brick-cutting Tables.—1,476, W. Watton, Ascending Tall Chimneys, Shafts, Spires, Lofly Buildings, &c.

Feb. 4.—1,522, F. Cunliffe, Improved Lavatory Apparatus.—1,539, J. Walker and H. Vorsey, Attaching Door and other Knobs to Spindles.

Feb. 5.—1,577, F. Commin, Economising Spaces occupied by Mortise Door Locks and Locks.—1,598, R. Wilson and others, Chimney Tops.—1,604, T. Pearce and M. Beardsley, Preservative Composition for Painting, &c.—1,626, R. Ercord, Flushing Cisterns.

PROVISIONAL SPECIFICATIONS ACCEPTED.
5,721, W. and G. Rookcliffe, Metal Handrail Stanchions.—13,574, C. Henderson and D. McNeil, Water-waste Preventers.—15,726, W. D. Cliff, Constructing Glazed Brick Walls.—16,480, W. J. Reynolds, Lock-action Fastener for Window Sashes.—16,486, A. J. Boulk, Alarums for Shop Doors, &c.—16,630, F. Trier, Machinery for Dressing, Shaping, and Moulding Stone.—16,672, E. Wright, Chimney Cowl and Ventilator.—17,066, W. Parr, Preventing the Passage of Air, Dust, and Water past doors.—11,983, C. Henderson, Warming and Ventilating Buildings.—16,924, P. Corcoran, Machinery or Apparatus for Dressing Stone.—117, J. Bennison, Chimney Pots for Preventing Down-draught and Curing Smoky Chimneys.—15,422, P. Walker, Portland Cement Tiles.—16,471, A. Cordingley, Ornamental Decorations.—16,593, P. Mitchell and H. Townsend, Portable Machine for Trimming the Edges of Paper-hangings.—16,781, J. Walker, Window Sash Fasteners.—16,792, S. Ross, Laying and Seaming Slates.—16,943, S. Willott, Securing the Meeting bar of Sash-Fasteners.—17,103, A. Mulford, Venetian Blind Laths.—363, A. Reddie, Improvements in Bakers' Ovens.—679, T. Fletcher, Swivel Joints for Gas, Water, and other Pipes.—10,717, W. J. Holmes, Syphon Water-waste Preventer for Flushing Pipes.—15,045, W. Mearns, Manufacture of Laminates and Sizes.—16,679, G. Collings, Improved Sash Fastener.—16,672, T. Lytchgo, Sanitary Slopstone.—16,893, J. Gillespie, Improvements in Bricks for Furnaces and in Concrete Walls.—17,924, F. Bond, Pervious Fire Bricks.—60, H. Robinson, Roofing Tiles.—101, T. Greenwood, Improved Hinges.—136, A. M. Clark, Improved Construction of Girders.—166, T. Fielder, Brick Mould Stock.—217, W. Court, Wood Block Flooring.—264, J. Walker, Cupboard and other Door Fastenings.—486, J. Hancock, Producing Ornamental Devices on Glass.—579, S. Graham, Combination Ladder.—968, H. Fletcher, Improved T-squares.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to improvement for two months.
4,699, H. Dow, Improved Chimney Cowl.—5,104, H. Hart, Manufacture of Bricks.—16,818, M. Ismay, Automatic Closing of Doors.—3,123, W. Allen, Whittaker and Chimney-pieces.—3,481, T. Fixing, Presses for Bricks, Tiles, &c.—5,657, A. Geary, Wooden Block Flooring and Scoring sashes.—5,662, W. Titchelpony, Fireproof Floors and Ceilings.—5,192, J. Martin, Manufacture of Red Pigments or Paints.—5,255, W. Tuffee, Improved Copying Tile.—5,676, H. Buchan, Regulating the Supply of Water to Water-closets.—53,888, R. Lowe, Sash Windows.—5,895, C. Harcourt, Manufacture of Hinges.—6,107, G. Greig, Ventilating Apparatus.—6,178, T. Brown, Chimney Cows and Ventilators.—6,774, P. Herbetson and R. Pollock, Downcast Ventilator.—15,665, J. Davis, Wood Pavements.—4,959, J. Garret, Construction of Earth-closets.—5,478, R. O'Connor, Spring Hinges for Doors.—5,665, J. Greathead, Tunneling Apparatus.—5,680, J. Pinchen, Improvements in Glazing.—7,466, C. Haigh, Screwdrivers.—15,929, A. Grady and L. Woodcock, Hydraulic Apparatus for Preventing the Slamming of Doors.—16,114, E. Kretzner, Brick Presses.—16,968, J. Griffin, Wrought-iron Window Frames.—5,843, W. Lake, Combined Washstand

and Step-ladder.—5,880, W. Moyes and Others, Water-closet Basins.—5,881, T. Robb, Jointing or Concocting together Tiles and Wooden Blocks or Slabs for Paving, &c.—15,334, F. Hohs, Set Cementing for Lead-light Glazing.—39, S. Hooper, Euphorbia Paints.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

FEBRUARY 4.
By HARDS, VAGHAN, & JENKINSON.
Greenwich—17 to 21, Albion-street, 22 years, ground-rent 16s. 4d. 436s
126, Greenwich-road, 58 years, ground-rent 7s. 6d. 410
38, 39, and 40, Ashburnham-grove, 60 years, ground-rent 12s. 9d. 960
27, Ashburnham-road, and a ground-rent of 12s. 12s. per annum, 62 years, ground-rent 18s. 10s. 230

FEBRUARY 9.
By CHAMPNESS.
Chadwell, near Ilford—"The Orchard," and 14½ acres, freehold 2,950

FEBRUARY 10.
By R. PERKINS.
Poplar—1 to 4 and 7 to 10, Brouley-place, freehold 1,350
Camberwell—46, 48, and 62, Denmark-road, freehold 1,383
Buckhurst Hill—1 and 4, Oakley Villas, freehold—1,660

FEBRUARY 11.
By GEORGE GOULDSMITH, SON, & CO.
South Kensington—87, Gloucester-road, 66 years, ground-rent 10s. 3s. 30
F. ELIAS MORGES.
Islington—75 and 77, Oakley-road, 66 years, ground-rent 11s. 890

FEBRUARY 12.
By FAIRBROTHERS, ELIAS, CLARK, & CO.
Regent's Park, Alpha-road—"Oakley House," and 1½ acres, 20 years, ground-rent 40s. 2,350
Russell-square—31, Bedford-place, 18½ years, ground-rent 52s. 10s. 450
Mechlanburgh-square—6, Rowland-street, 26 years, ground-rent 12s. 410

By THURGOOD & MARTIN.
Wandsworth Common—58, Bellville-road, freehold 400
By NAYLOR & HARRING.
Bermondsey—133 to 157 odd, St. James's-road, 48 years, ground-rent 22s. 7s. 2,890
Kennington Park—19, 20, 21, and 22, Lucas-road, 40 years, ground-rent 24s. 815
Nos. 8, 10, and 12, Otto-street, 49 years, ground-rent 15s. 605
Goswell-road—No. 182, term 9 years, ground-rent 10s. 16s.
South Hackney—67 to 73 odd, Cassland-road, 65 years, ground-rent 16s. 1,670

By WILKINSON & SON.
Brighton—40, Cannon-place, freehold 1,780

FEBRUARY 13.
By C. W. MILNER.
Tottenham Court-road—47, 49, 51, 61a, 63, and 63a, Huntley-street, freehold 4,230
Regent's Park—38, St. George's square, 61 years, ground-rent 12s. 700

MEETINGS.

SATURDAY, FEB. 21.
Edinburgh Architectural Association.—Visit to Calton Jail.
MONDAY, FEB. 23.
Royal Academy.—Professor C. T. Newton on Sculpture: "The School of Praxiteles." 11. 8 p.m.
Surrey Art Institute.—Discussion on Messrs. R. W. Mann's and H. Martin's papers on "Leasehold Entrenchment." 8 p.m.
Society of Arts (Cantor Lectures).—Mr. J. M. Thomson on "The Chimney of Eignants." 1. 8 p.m.
Leeds and Yorkshire Architectural Association.—Mr. Cole A. Adams on "Architectural Competitions."
Edinburgh Architectural Association.—Mr. J. C. Watt on "The Poetic Aspects of Architecture." 8:30 p.m.
Lancashire Institute. 8 p.m.
TUESDAY, FEB. 24.
Builders' Clerks' Benevolent Institution.—Eighteenth Annual General Meeting. 7 p.m.
Institution of Civil Engineers.—Discussion on Messrs. B. Baker's and Wolfe Barry's papers on the Metropolitan and District Railways. 8 p.m.
Royal Institution.—Prof. Sidney Colvin on "Museums and National Education." 11. 3 p.m.
St. Paul's Ecclesiastical Society.—Mr. Arthur Taylor on "The History of Stained Glass." 7:30 p.m.
WEDNESDAY, FEB. 25.
Royal Academy.—Lectures on Sculpture: Mr. R. Stuart Poole, LL.D., on "Bianco as a Medalist." 8 p.m.
Surrey Art Institute.—Prof. Charles Hart (Free Lectures to Artists).—Professor Church on "Black, White, and Red Lead." 8 p.m.
British Museum.—Mr. W. St. C. Dawson on "Assyrian and Babylonian Antiquities.—I. The Chaldean Temple, its Construction, Symbolism, and Services." 2:30 p.m.
Civil and Mechanical Engineers' Society.—Mr. R. Nelson Boyd on "The Petroleum Fields of Europe." 8:30 p.m.
Surrey Archaeological Society.—Annual Meeting. 5 p.m.
Society of Arts.—Mr. W. D. Scott Moncrieff on "Methods of Supplying Steam-Bolters with Water." 8 p.m.
THURSDAY, FEB. 26.
Royal Academy.—Mr. J. E. Boehm, R.A., on "Bronze Casting as applied to Sculpture." 8 p.m.
Surrey Art Institute.—Professor H. Robinson on "River Pollution." 8 p.m.
Society of Arts (Applied Chemistry and Physics Section). Dr. Frederick Siemens on "Tempered Glass." 8 p.m.
Society for the Encouragement of the Fine Arts.—Mr. C. Ponsonby on "The Folk-lore and Art of Old Japan." 8 p.m.

Society of Telegraph-Engineers and Electricians.—(1) Discussion on Mr. J. A. Timmis's paper on "The Working of Railway Signals and Points by Electro-Magnets." (2) Sir David Salomon on "Constant Electro-Motive Force in an Electric Light Circuit." 8 p.m.
Society of Antiquaries.—8.30 p.m.

FRIDAY, FEB. 27.

Royal Academy.—Mr. F. C. Penrose on "Greek Architecture." 8 p.m.
Institution of Civil Engineers.—(Students' Meeting).—Mr. H. T. Turner on "The Gauging of Flowing Water." 7.30 p.m.
British Museum.—Professor J. F. Hodgkin on "Medieval English Remains." II.—The English. 2 p.m.

SATURDAY, FEB. 28.

Architectural Association.—Visit to Houses in Collingham-gardens and St. Paul's School, Kensington. Assemble at School at 3 p.m.
Builders' Foremen and Clerks of Works' Institution.—Annual Dinner. Holborn Restaurant. 6.30 p.m.

Miscellaneous.

Society of Antiquaries of Scotland.—At the monthly meeting of this Society, held in Edinburgh last week, the first paper read was a notice of the recent excavation of St. Ninian's Cave, Glasserton, Wigtownshire, by Sir Herbert Enslace Maxwell, bart., M.P. In Sir Herbert's unavoidable absence, the paper was read by Mr. J. R. Findlay, the secretary. Local tradition has long assigned to this cave the honour of having been the retreat chosen by St. Ninian for purposes of prayer and meditation. In 1871 it was visited by the late Dean Stanley, and an incised cross was discovered on the rock near the entrance. Last year some other crosses were discovered on detached stones, one of which was presented to the National Museum by Mr. Johnston Stewart, of Glasserton. This explorations now described were undertaken in June last for the Ayr and Wigtownshire Archaeological Association, and resulted in the discovery of a number of indications of the use of the cave in by-past ages,—first as a simple shelter, and latterly as a chapel and place of pilgrimage. The second paper was a description of the Church of St. Clement at Rowdill, in Harris, by Mr. Alexander Ross, architect, Inverness, F.S.A.Scot. This church, situated at the south-east angle of the island, is cruciform in plan, with a square western tower. At some time it seems to have become ruinous, and the upper part of the walls of the nave and tower have been rebuilt from old materials without much regard to character or design, a number of fragments of old moulded cornices and sculptures having been built into the tower promiscuously, and the figures placed in most unlikely positions. The lower portions of the walls of the nave, the transept arches, and the side and end windows of the chancel end are evidently of early date. The third paper was a notice by Sir Walter Elliot of Wolfelee, F.S.A.Scot., of two very curious masks of bronze, found some time ago about 1 ft. 3 in. under the surface in a coffee plantation at Canajore, in the Province of Mysore, India, and presented to the Museum by Mr. R. C. Saderson.

Gouthorn Cathedral, New South Wales. Messrs. Heaton, Butler, & Bayne, of Garrick-street, London, have just shipped two large stained-glass windows for Gouthorn Cathedral, one for the east end of the chancel and the other for the north transept. The east window consists of seven large lights and elaborate tracery in the Decorated style, and is filled with figure work very richly coloured, illustrating "The Angel's Appearance to the Shepherds," "Christ as a Child in the Temple," "Baptism," "Sermon on the Mount," "Crucifixion" and "Ascension." In the numerous pieces of tracery above the lights are emblems and Christian symbols. The window is to be erected as a memorial of William and Emily Elizabeth Bradley, at the cost of their daughters. The north transept window, consisting of six lights and tracery, contains eighteen figure panels from the Old Testament history, which subjects are arranged in bands of colour across the window, having pattern-work between. This window is in memory of Thomas Sutcliffe Mort, and has been executed under the supervision of Mr. J. D. Grace, of Wigmore-street, on behalf of the Mort family. These windows have cost about 1,000l.

Registration of Titles.—The committees of the Building Societies' Protection Association are about to offer prizes for the best essays on this subject, more especially with reference to dealings with smaller classes of property, such as constituting the main portion of the transactions of building societies.

Combination of Employers and Workmen.—A meeting of the employers and workmen in the net and holt trade was held on Monday night at Darlaston to consider what action shall be taken with regard to underselling by certain firms in the district. Mr. A. Keen, J.P., presided, and there was a large attendance. It was pointed out that some of the employers were selling goods at a price which left little or no profit, and that the men were consequently threatened with a reduction of 10 per cent. in their wages. The meeting represented four-fifths of the trade, and representatives of men and masters spoke against the proposed reduction; after which a resolution was passed to the effect that the time had arrived when there should be complete unity between the employers and workmen engaged in the trade. Another resolution was also agreed to that, as the action of employers and workmen outside the trade association was seriously injuring the prospects of trade, the meeting was of opinion that employers should employ none but associated workmen, and that workmen should only work for associated employers.

New Buildings in Birmingham.—The annual return by Mr. Lloyd, the buildings surveyor, of new buildings for which plans were approved by the Borough Surveyor during the year 1884, has just been published. From this it appears that numerically there has been a slight improvement in number of new buildings, including alterations, upon the two previous years, as follows:—

Houses	1884. 622	1883. 876	1882. 601
Shops	62	62	65
Churches	1	2	2
Chapels	—	2	—
Schools	5	2	1
Manufactories and Warehouses	24	37	64
Miscellaneous	187	—	62
Alterations, &c.	84	158	163
Totals	1,285	1,285	963

947 notices to property-owners and others relating to dangerous structures have also been sent out during the year, as against 767 in 1883.

The Safety of Theatres in Glasgow.—At the meeting of the Glasgow Town Council last week, the special committee charged with the consideration of the matter submitted regulations to be observed in the construction of all buildings intended for theatres or music-halls, as well as drainage. After much discussion, the regulations were again resubmitted to the committee, the general opinion being that they were insufficient. Bailie Richmond, in protesting against delay, remarked that there were music-halls and other halls in Glasgow that were simply in a scandalous condition, and the Council were not doing their duty as representatives of the public if they did not call the attention of the Lord Advocate to the state of matters at once. He added that there were holders of such places who, just because they knew the authorities had not the power to force them, were not using any means to improve matters.

Society for the Encouragement of the Fine Arts.—Mr. George C. Haité, author of "Plant Studies," and member of the Council of the above-named Society, read an interesting paper to members of the Society at the rooms in Conduit-street on February 12. The subject was "Wall-papers and their Manufacture," and to illustrate his discourse the lecturer had provided copper and wooden blocks, arsenical papers, and many non-arsenical papers of the present day, including designs by E. W. Godwin, F.S.A., Walter Crane, Lewis F. Day, and the lecturer himself. Representatives of the leading town and country paper-houses were present. Mr. Cave Thomas, F.S.A., kindly took the chair in the unavoidable absence of Mr. E. W. Godwin.

Free Libraries for Glasgow.—A meeting was held in the City Hall, Glasgow, on Monday evening, under the presidency of ex-Lord Provost Ure, in favour of the adoption of the Public Libraries Acts. The attendance, which was large, included many prominent citizens. Resolutions declaring that the Acts have been of great advantage elsewhere, that further delay in their adoption in Glasgow would be unworthy of the city, that until the Acts were adopted the full benefits of the Mitchell, Stirling, and Glasgow Libraries could not be obtained, and pledging the meeting to support the committee in the matter, were unanimously agreed to.

Civil and Mechanical Engineers' Society. An ordinary meeting was held on the 11th inst. at the President, Mr. Colvile, M.Inst.C.E., in the chair, when Mr. B. Haughton, C.E., read a paper entitled "Indian Railway Network, 1854." The principal points taken up by the author were,—(1) The Physical Geography of India as it applies to the Rivers and Mountain Ranges which in every Country affect its Railway Network; (2) The General Character of the Railway Network; (3) An Indo-European Railway and its connexion with the Indian Lines; (4) The Indian Railway Gauges; (5) Financial Position of the Railways. A discussion followed, and the proceedings terminated with a vote of thanks to Mr. Haughton for his paper. The next meeting will be held on the 25th inst., when Mr. Nelson Boyd, M.Inst.C.E., will read a paper on the "Petroleum Fields of Europe," in lieu of the paper previously announced, by Mr. Barge, M.Inst.C.E.

A New Board School.—On Monday last Mr. Buxton, Chairman of the School Board for London, opened the new school in Surrey-lane, Battersea Bridge-road. The school, which is one of the most imposing buildings of the 307 of a similar character which have been opened in London, will accommodate 480 boys, the same number of girls, and 632 infants,—a total of 1,592. The site, which occupies an area of 74,054 ft. cost, including legal expenses, 3,468l., or 2l. 4s. 8d. per head, and the building 15,068l., or 9l. 12s. 11d. per head, making a total cost of 18,527l. 12s. 6d., or 11l. 17s. 2d. per head. An interesting and novel feature in connexion with the school is a workshop, in which Mr. Toombs, the headmaster, proposes to teach the boys the use of various simple tools, how to execute trivial repairs, and in other ways to make them on leaving school handy and intelligent lads.

Constructional Ironwork.—Messrs. Rowson, Drew, & Co. send us a very well illustrated catalogue of constructional ironwork, beams, trusses, sections of roofs, fire-proof floors, &c., as carried out by them. Their iron tank construction appears very satisfactory; occasional serious failures in such tanks render this an important matter. In the combination of iron beams and concrete we observe that, as in other illustrated catalogues of the same class, the influence of the concrete in resisting compression, and thus rendering possible the reduction of the area of the upper flange of the beam, is not taken into account. So much has been said, and so many experiments made in regard to this, that it is odd that it should be so constantly overlooked.

Sunday Exhibition Opening.—The Council of the Institute of Painters in Oil Colours, Fecundilly, have generously placed their present Exhibition at the disposal of the Sunday Society, and it will accordingly be open next Sunday to the members of the Society and their friends; and on Sunday, March 1st, the Exhibition will be open to the public by tickets, which may be had free by all who make written application to Mr. Mark H. Judge, the Honorary Secretary, No. 8, Park-place, Villas, W., the only condition being that each applicant must send a stamped and addressed envelope for the reply.

Masons' Strike at Cardiff.—Last week the masons employed at the new Roath Dock, now in course of construction by Messrs. Nelson & Co., at Cardiff, to the number of 150, struck work against an infringement of their local rule by which their working hours are regulated. As one result, upwards of 500 other men who were no parties to the dispute have been thrown out of work. By the latest accounts, however, a foreman who had made himself obnoxious to the masons, and whose discharge was demanded by the men, has gone away, and the men were to resume work on Thursday morning last.

Clerks of Works' Reports.—Johnston's registered "Clerk of Work" Report Sheets (published by Morrison Bros., 99, Buchanan-street, Glasgow), of which a specimen has been sent to us, are very compactly arranged, and will be found exceedingly convenient and time-saving. Although published in Scotland, they are applicable for use in all parts of the Kingdom.

Post-Office, Inverness.—According to the Scotsman, it has been definitely arranged that new and more commodious premises will be erected for the Inverness Post-office, on a site fixed upon in a street at present being constructed in a central part of the town. The building will cost not less than 10,000l.

The Proposed Park at Dulwich.—A deputation from the Vestry of St. Luke's has waited on the Charity Commissioners at Whitehall to object to the interference of the commissioners in the proposals of the governors of Dulwich to make a free gift of 72 acres of land to Metropolitan Board for the purpose of a park in South London. The arguments that the property in question was held upon for the joint benefit of four metropolitan parishes—namely, St. Botolph's, Bishopsgate; St. Andrew's, Southwark; St. Luke's, and St. Dunstons, and it should be used for the national purposes for which it was left, were supported by Mr. F. G. Tolson, the Mayor of Dulwich, in reply, said that the commissioners were appointed for a special purpose, and it would be entirely beyond their powers to express an opinion upon a matter of this nature. Mr. Tolson was before Parliament.

Michael's New Schools, Little Harwood.—Mr. Lowe, architect, Manchester, who was called in to adjudicate upon the plans sent to the committee formed for the erection of schools at Little Harwood, in connexion with St. Michael's Church, has chosen those of Mr. Robinson, Derby and Blackburn, as the

first in order of merit, and those of Mr. J. W. Shorrocks and Messrs. Stones & Gradwell as second and third respectively. The design of Mr. Robinson will be carried out. It is only proposed to erect, in the first instance, the infants' school, to be used also as a mission-room on Sundays. The building will be Gothic in style, and is estimated to cost about 1,000l.

Dundee.—At a meeting of the School Committee of the Dundee School Board on the 5th inst., plans of Rosebank and Butterburn Schools, amended in accordance with the suggestions of the architect for the Education Department, were submitted by Mr. MacLaren. The plans for Rosebank showed accommodation for one hundred additional scholars, and those for Butterburn additional accommodation for thirty-four scholars. The committee approved of the plans, and instructed that they should be forwarded to the Education Department for approval.

Swinton.—At a meeting of the Church-building Committee, Swinton, near Rotherham, Mr. H. L. Tacon, of Rotherham, was appointed architect for proposed section of a church to be built at Swinton Bridge.

For rebuilding the Jamaica Coffee House, St. Michael's Alley, Cornhill. Mr. Banister Fletcher, architect:—

	Conduct if Bath stone		
J. Dover	£9,570 0 0	283 0 0	
W. Brass & Son	9,374 0 0	459 0 0	
Lawrence & Son	8,657 0 0	500 0 0	
J. Mansbridge	8,433 15 7	506 12 0	
B. E. Nightingale	8,164 0 0	609 0 0	
Higgs & Hill	7,912 0 0	490 0 0	
Perry & Co.	7,685 0 0	625 0 0	
J. Anley	7,602 0 0	280 0 0	
W. Downs	7,388 0 0	315 0 0	
W. Oldrey	7,143 0 0	700 0 0	

[Architect's estimate if Bath stone, 6,400l.]

For a new house at Harrold, Beds (exclusive of grates, chimney-pieces, tiled hearths, and hall floor), for Mr. Charles Pettit. Mr. John Day, architect, Bedford:—

White, Bedford	£2,557 0 0
Foster, Kempston	2,470 0 0
Kimberley, Banbury	2,300 0 0
Wart n, Bedford	2,142 0 0
C. & G. Clayton, Harrold	2,095 0 0
C. Clayton, Harrold	2,057 0 0
Ireston, Northampton	1,898 0 0
Brown, Wellingborough (accepted)	1,733 0 0

For a villa residence on the Bower Estate, Goldington-road, Bedford (exclusive of electric bells, grates, and chimney-pieces), for Mr. E. W. Perry. Mr. John Day, architect, Bedford:—

Kimberley, Banbury	£1,380 0 0
White, Bedford	1,324 0 0
Foster, Kempston	1,225 0 0
Adams, Bedford	1,215 0 0
Warton & Walker, Bedford	1,210 0 0
Smith, Bedford	1,169 0 0

For additions to the Horse Shoe and Maggie Inn, Great Bath-street, Clerkenwell. Mr. W. Ansell, surveyor:—

Golden & Son	£168 0 0
W. J. Haskell (accepted)	148 10 0

Accepted for repairs to the Laurels, Tilehurst, Reading, for Mr. H. Hamy. Mr. George Wymouth, architect:—

S. Hunt	£271 0 0
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Accepted for the erection of four cottages at Hampton (Heathfield Estate), for Mr. Fey, Twickenham. Mr. Brown, architect, Richmond:—

A. Chivers	£400 0 0
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For building four shops and dwelling-houses, with alterations, additions, new stables, &c., to the White Horse Public-house, Chislehurst, for Messrs. Marsden, East-walls Brewery, Chichester. Mr. T. S. Archer, architect:—

Coombs	£2,490 0 0
Holiday & Greenwood	2,397 0 0
Wood	2,384 0 0
Otway (withdrawn)	2,272 0 0
Low (withdrawn)	2,199 0 0

Second List.

Pictou	2,675 3 6
Arnaud	2,652 0 0
Wood	2,491 0 0
Holiday & Greenwood	2,367 0 0

For the erection of a wrought-iron highway bridge on cast-iron screw piles, over the river Nar, Wisbech-road (width of river 113 ft.). Mr. R. G. Mawley, engineer:—

George Moss, 64, South Hill-road, Liverpool	£1,171 7 2
Thomas Gibson, 93, Stockwell Park-road, London	3,900 0 0
M. P. Shaw & Co., 141, Cannon street, London	3,768 15 0
Huntley & Co., Britannia Iron-works, Derby	3,717 10 0
C. Williams & Co., 23, Queen Ann's-gate, Westminster	3,698 0 0
E. C. & J. Keay, Corporation-street, Birmingham	3,121 16 4
Bridge & Roofing Co., Darlaston, South Stafford	3,362 0 0
Green & Burleigh, Suffolk-lane, London	3,284 0 0
Goddard & Massey, Nottingham	2,875 0 0

[Engineer's estimate, 2,907l.] * Accepted.

For preliminary alterations to factory (No. 2), at Vauxhall, for Messrs. Barrett & Co., Limited. Mr. Edward Rawlings, No. 3, Victoria-street, Westminster, architect. Quantities by Mr. Morris Evans, 7, John-street, Adelphi:—

C. Dickinson, Loughborough Junction	£720 0 0
G. Stephenson, Hampstead	576 0 0
Fish, Prestige, & Co., Finsbury	574 0 0
H. & E. Lea, Warwick-street, W.	570 0 0
F. Higgs, Loughborough Junction	510 0 0

* Accepted.

For the erection of a small block of artisans' dwellings in Hatfield-street, Bethnal Green, for Messrs. M. & A. Davis. Mr. C. A. Legg, architect, Mile End. Quantities by Mr. W. Hawker:—

Culman & Co.	£1,491 0 0
F. & F. J. Wood	1,410 0 0
Mark Gentry	1,410 0 0
S. Jerrard	1,393 0 0
J. Holding	1,369 8 5
Paine Bros.	1,369 0 0
T. Higgs	1,280 0 0
J. Walker	1,279 0 0
W. & F. Croaker	1,278 0 0
Sanders & Co.	1,233 0 0
England & Thompson (withdrawn)	1,011 0 0

For new residence for Mr. Demery, at Bedford, Messrs. Usher & Anthony, architects:—

S. Foster, Bedford	£531 0 0
Freshwater & Co. by Bedford	527 0 0
George Haynes, Bedford	517 0 0
Warton & Walker, Bedford	510 0 0
J. P. White, Bedford	505 0 0
G. Harrison, Bedford	497 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Asylum at Hartwood	Glasgow District Board of Lunacy	10 at 50l.	Feb. 28th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Asphalting Footpath	Tottenham Local Board	De Pape	Feb. 24th	xxi.
Asphalt	St. Giles's Bd of Wks.	G. Wallace	do.	xxi.
Asphalt	Great Western Ry. Co.	Official	do.	ii.
Asphalt	Guardians, Parish of Lambeth	do.	Feb. 25th	xx.
Asphalt	Strand Board of Works	J. Gordon	do.	xxi.
Asphalt	Leicester Corporation	J. Lovegrove	do.	xx.
Asphalt	Hackney Board of Wks	Official	Feb. 26th	xxi.
Asphalt	Vestry of the Parish of St. George-in-the-East	do.	Feb. 27th	ii.
Asphalt	Com. of H.M. Works...	do.	do.	ii.
Asphalt	Warminster Local Bd.	E. Easton & Co.	Feb. 28th	xxi.
Asphalt	Bray Township Commissioners	P. F. Comber	March 2nd	xxi.
Asphalt	Com. of H.M. Works...	Official	do.	ii.
Asphalt	Paddington Vestry	do.	do.	ii.
Asphalt	Suburban Improvement Commissioners	do.	do.	ii.
Asphalt	Trustees, We Javan Chapel, Sandwich	W. P. Beal	March 3rd	xxii.
Asphalt	Wandsworth Bd of Wks.	Official	do.	xxi.
Asphalt	Finsbury Local Board	G. W. Brumell	do.	xxi.
Asphalt	Fulham Board of Wks.	Official	March 4th	xx.
Asphalt	Met. Board of Works	do.	March 6th	ii.
Asphalt	Vestry of the Parish of Westminster	Hugh McIntosh	do.	xx.
Asphalt	Trustees, We Javan Chapel, Sandwich	do.	do.	xx.
Asphalt	P. Edinger	do.	March 6th	ii.
Asphalt	Frome U.S.A.	do.	do.	ii.
Asphalt	Lewisham Bd. of Wks.	Official	March 10th	xx.
Asphalt	Belfast Corporation	J. C. Brundland	March 11th	ii.
Asphalt	Wrexham K.S.A.	A.C. Baugh	March 18th	xxii.
Asphalt	Stockport Corporation	A. M. Fowler	March 24th	ii.
Asphalt	Farnham Local Board	J. Lemon	March 23rd	xxi.
Asphalt	G. Miller	do.	Not stated	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Boro' Engineer, Tynmth.		12l. to 14l. per month	Feb. 23rd	xviii.
Surveyors, R.E. Dept.	Civil Service Com.	Not stated	March 4th	xviii.

TENDERS.

For the renovation of St. Paul's Church, Hampton. Mr. J. R. Neill, architect:—

J. & W. Cockerill, Wolverhampton

£227 0 0

The resaiting in pitch pipe

455 0 0

stones reredos and Command.

167 0 0

Hues, &c., for cook apparatus

41 10 0

Hearing Apparatus and Boiler.

Attwood, Stourbridge

100 0 0

Interior Painting and Decorations.

low, Wolverhampton

£120 0 0

For alterations and additions to St. Boniface Church, Union-street, Whitechapel. Mr. C. A. White, Mile End:—

£703 0 0

For making a new road and laying down pipe sewer and surface-water drain on the Earl of St. Germans' Estate, Cantford, Kent. Quantities supplied by Mr. Sidney Young:—

Novell & Robson	£4,555 0 0
Dunmore	4,255 0 0
Hobbs	4,250 0 0
Blackmore	3,863 0 0
Beadle Bros.	3,715 0 0
Pizzey	3,667 0 0
Woodham & Fry	3,489 0 0

For additions to Somerset House, High-road, Tottenham, for Mr. W. H. Fowler. Messrs. D. Campbell & Son, architects. Quantities supplied:—

Hampreys	£1,175 0 0
Rider	1,070 0 0
Fairhead & Son, Enfield	983 0 0
Knight	983 0 0

Accepted for heating Queen's Head-street Schools, for the London School Board. Gardner's (J. & C. Christie), London £257 0 0

For the erection of new residence, Park street, West-rect. Quantities not supplied. F. F. White £1,083 0 0 D. Danham & Son 943 0 0 B. Ford 785 0 0 Slough Bros. (accepted) 770 0 0

For the erection of three cottages in Crowhurst-road, Colchester. Mr. J. F. Gooday, architect. J. B. Payne £520 0 0 A. Gladwell 603 0 0 A. Chambers 480 0 0 F. Dupont 474 0 0 G. Bowles 467 0 0 C. Oldridge 447 0 0 G. Dobson 433 0 0 E. Eade 419 0 0 H. Ambrose 398 16 0 A. Diss 383 0 0

For pipe-laying, supplying hydrants, cocks, sluice valves, &c., for the Local Board of Gt. Glemne, near Worcester. Chandler & Sons, London £2,109 0 0 W. Thomas, Banter 1,298 0 0 Thomas Proud, Birmingham 1,238 0 0 Thomas Williams, Swansea 993 0 0 J. Guild, Newport, Mon. 970 0 0 H. Hill, High Wycombe 969 0 0 J. Bennett, Dudley 947 0 0 Jones & Fitzmaurice, Birmingham 937 0 0 F. C. Bugbird, Enfield 913 0 0 W. Bailey, Barrow-in-Furness 895 0 0 Evans Bros., Wolverhampton 888 0 0 J. Young, Skegness 835 0 0 G. Lay, Kidderminster (accepted) 827 0 0 John Stevens, Dudley (withdrawn) 773 0 0

For rebuilding the Steamship, Naval-row, Blackwall, for Messrs. Truman, Hambury, Buxton, & Co. Mr. Edward Brown, architect, Hanbury-street, Spitalfields. J. Anley £2,445 0 0 C. Marr 2,293 0 0 W. Sturmer 2,241 0 0 S. W. Hawkins 2,215 0 0 Jackson & Todd (accepted) 2,175 0 0

For painters' work at the Ranelagh Arms, Roman-road, Old Ford, for Mr. N. Argent. Mr. Edward Brown, architect, Hanbury-street, Spitalfields. J. C. Edwards £193 9 0 W. Rogers (accepted) 189 12 0 J. Thompson 188 10 0

For repairs, painting, and decorations at Clyde House, Tottenham, for Mr. Booker. Mr. A. Richards, surveyor. Smith £155 0 0 Fairhead & Son, Enfield 153 0 0

For the erection of a villa residence at Surbiton Hill, for Mr. R. A. Morris. Messrs. Wilson & James, architects, Lansdale Chambers, 27, Chancery-lane, W.C. Quantities by Messrs. Evans & Deacon, 1, Adelaide-street, Charing-cross, W.C. J. & C. Bowyer £1,825 0 0 W. Kilkink 1,750 0 0 T. R. Ducking 1,727 13 8 Hill Bros. 1,720 0 0 G. Jervis Smith 1,624 14 6 E. W. Starkey 1,583 1 3 Turtle & Appleton 1,514 0 0

For new vicarage house at Hesse, near Hull. Messrs. Botterill, Son, & Bissou, architects. Quantities supplied. F. Blackburn £2,240 0 0 Simpson & Son 2,115 7 0 H. Grassby 2,106 0 0 M. Harper 2,061 0 0 E. Frost 1,993 17 6 B. Sargeant 1,993 0 0 J. T. Skinner (accepted) 1,830 17 0 D. Robinson (withdrawn) 1,827 0 0

For the erection of a new ward at the Merthyr Infirmary for the Poor, for the Board of Guardians. John Williams, Morgantown £455 15 0 John Williams, Castle-street 393 8 8 W. L. Lewis (accepted conditionally) 310 0 0

For alterations at the Ivy House and rebuilding a shop and repairing two cottages, St. John's-road, Hoxton, for Messrs. B. & G. Hyams. Mr. Edward Brown, architect, Hanbury-street, Spitalfields. J. Kiddle & Sons £2,225 0 0 S. Salt 2,175 0 0 J. Anley 1,869 0 0 C. Marr 1,845 0 0 W. Sturmer 1,744 0 0 S. W. Hawkins 1,697 0 0 Jackson & Todd (accepted) 1,822 0 0

For Barking sewerage works. Contract No. 2. Messrs. B. S. Bundell, Doncaster, and Mr. C. J. Dawson, Barking, joint engineers. G. Smith, Newcastle £9,371 0 0 Hill & Co., Cathays, Cardiff 9,539 0 0 H. Hill, High Wycombe 7,908 0 0 J. Whetham, Weymouth, Dorset 7,273 0 0 Bottoms Bros., Battersea 6,974 2 4 G. Bell, Tottenham 4,863 0 0 Beadle Bros., Epsom 6,128 0 0 J. Smith, Barking 6,038 0 0 Cook & Co., Battersea 5,853 0 0 Cunliff, Leigh, Lancashire (accepted) 5,512 0 0

Working Lads' Institute, Whitechapel.—We are asked by Mr. A. Reed, of Stratford, to say that his tender for this job should not have been included with the tenders for above given in our last issue (p. 255), as it was withdrawn on January 23.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

K. and Co.—W. E. M.—A. K.—E. L. B.—O. C. [we cannot answer such questions].—H. H.—G. A. W. [we cannot print your letter, which is practically an advertisement; but it has been forwarded to our correspondent].—A. H.—O. F. B.—F. W. [thanks, not required].—G. N.—W. G. S.—E. R.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

Notes.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications. 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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Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY. The Publisher cannot be responsible for DRAWINGS, TESTS, SCHEMATA, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY MORNINGS.

PERSONS Advertising in "The Builder," may have Replies addressed free of charge, to the Office, 46, Catherine-street, Covent-garden, W.C. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

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The Builder.

Vol. XLVIII. No. 2155.

SATURDAY FEBRUARY 28, 1885.

ILLUSTRATIONS.

Mersey Tunnel Railway Stations, Birkenhead and Liverpool.—Mr. G. E. Grayson, Architect.....	302, 303
Semi-detached Residences, Montreal, Canada.—Messrs. Taylor & Gordon, Architects.....	306
Section of James Street Station, Liverpool, of the Mersey Tunnel Railway.....	307
Italian Fountains, Vases, Etc.—From the "Hypereonachia".....	310
Animals, Plants, Etc., Fifteenth-Century Woodcuts.....	311
South Porch, Gloucester Cathedral; and Tower and Porch, St. Margaret's, Leicester.—Sketches by Mr. W. H. Bidlake.....	314, 315

CONTENTS.

Notes on Early Painting and Craftsmen-Painters.....	291	Sketches for the Fugia Travelling Studentship.....	300	"Non-Acceptance of Lowest Tender".....	321
Notes.....	292	Architectural Societies.....	306	Fireproof Floors.....	321
New Riverside Fish market.....	294	Roman Renaissance.....	317	Damp Dwellings.....	321
On Some Principles and Characteristics of Ancient Architecture, and their Application to the Modern Practice of the Art.....	294	Villare Plesio.....	319	The Student's Column: Descriptive Geometry—IV.....	321
Imitation the Means, not the End, of Art.....	297	Architectural Association.....	319	Books: Spau's Architects, Builders, and Contractor's Pocket-book of Prices, &c. (Spau).....	322
Mersey Tunnel Railway Stations.....	300	Competitions.....	320	Recent Patents.....	322
Two Semi-detached Residences, Drummond-street, Montreal, Canada.....	300	Builders' Clerks' Benevolent Institution.....	320	Recent Sales of Property.....	323
"Art and Work".....	300	Erection of a District Surveyor.....	320	Meetings.....	323
		The "Magasin des Friseurs".....	320	Miscellaneous.....	323
		The Royal Arms.....	320		

Notes on Early Painting and Craftsmen-Painters.



IN speaking of the craft or trade of painting, we have been long accustomed to associate its practice with house-finishings, and, therefore, we call it a building trade. If we go back, however, a

few centuries, we find this craft existing under a different set of conditions than what obtained at a later period, when the revival of art in Western Europe and Great Britain brought a distinct class of practitioners to the front, and when the artist found a special field for his talent without being obliged to combine fine art with handicraft. The brotherhood or guild of painters existed from a very early period to the time of Elizabeth, before it was incorporated. We have in the civic records a very interesting acknowledgment made by a painter in the 12th Edward I. (1284). This entry, which is in Latin, says:—"On Friday, the Eve of St. Botolph, in the twelfth year of the reign of King Edward, Nicholas Bacon, painter, acknowledged that he was bound to Hugh Motun, in the sum of twenty shillings, for cinople, vermilion, and canvas, varnish and verdigris, the same to be paid to the same Hugh or his certain attorney, ten shillings at the Feast of St. Bartholomew, and ten shillings at the Feast of St. Michael, without delay." This very distinct mention of the materials used for varnish painting upon canvas is worthy of particular note, inasmuch as it is more than a century earlier than the time of John Van Eyck, who is reputed to have been its inventor. In our "Notes" some months ago* on "Early Plastering and Plasterers," we alluded to the practice of fresco-painting in the Middle Ages, in connexion with the walls of our ecclesiastical buildings and the state chambers of our chief castles, and no doubt native painters of skill participated in the work as well as foreign artists. In the reign of Elizabeth the painters began to make sore complaint about the decay of their craft by reason of other persons that had not been apprenticed to the calling undertaking painting work, and the house-plasterers among others were accused of intermeddling "in the same science." We are told much slight work was palmed off as pictures of the queen, noblemen, and others. And as John Strype, in his edition of Stow, tells the story,—“People bought the same,

being much deceived, for that such pictures and works were not substantially wrought, a slander to the whole company of painters, and a great decay of all workmanship in the said science, and also a great discouragement to divers forward young men desirous to travel for knowledge in the same.” Complaints were also made from time to time to the Lord Mayor, but without redress: so in 1575-6 the craft of painters addressed Elizabeth, and shortly succeeded in obtaining a charter of incorporation, and became known in future as the Painter-Stainers. The craft or guild, among other exclusive privileges, obtained power to prevent persons following the trade who had not been apprenticed to that mystery for seven years. They had also authority to enter shops, warehouses, or workhouses of men exercising the craft, and to “search, examine, and survey their works, painting, colours, or other stuff.”

In Elizabeth's time we see, as at a much later period, the painters or painter-stainers of London were not merely house-painters, but essayed a little artistic work in picture and sign painting. Queen Elizabeth's Sergeant-painter was one George Gower, and it was his office and that of his deputies to superintend all the painting work required in the service of her Majesty. To enumerate, this included “all colour, oil, varnish, workmen, and labourers, as well free as foreign, and all manner of necessaries and stuff whatsoever, meet for to be employed for that service. And also to take up all manner of carriages, as barges, boats, carts, wagons, horses, with their furniture, necessary for the conveyance of the premises, as well by water as land at reasonable payments and prices to be made on that behalf.” The Sergeant-painter to the Queen had certainly a kind of public department to control, and if he was obliged to express an opinion as to the excellence of certain pictures and statues, like our modern First Commissioner of Public Works, we may suppose that his decision would not give unmixed satisfaction to the artists and artist-craftsmen of his day. In the 1st Edward III. (1327), in the civic records, there is a long agreement drawn up in Latin and Norman French, having relation to the grievances of the painters as well as their brother-crafts, the joiners, and the lorniners in copper and iron, who were assaulted and defrauded by the craft of the saddlers. There was an appearance before the mayor and sheriffs on the part of the offenders and the offended, and certain rules as to the future were agreed to. The saddlers appear to have ridden the high horse for a long time, beating and otherwise maltreating the painters and men of other trades, and repudiating their lawful debts. The painters were owed upwards of 100*l.*, and the other trades lesser sums.

Alleged infringement of the privileges of one trade by another has been an immemorial cause of trade disputes, and notwithstanding that the exclusive privileges of trade guilds have been abolished, trade jealousies still exist to a remarkable extent. The infringement of a trade mark in these days is in the eye of the law an illegal act, and, apart from the litigation ensuing from a flagrant case of fraud, we constantly see what an amount of bad blood is generated even on the suspicion of a colourable imitation. *Appropos* to the early allusion to oil painting above, as also to the crafts of painters and saddlers, there is a passage in the Liber Horn, *temp.* Edward II. (preserved in the Guildhall), of interest,—“Rules as to painting old and new saddles. It is provided that no one put any but good and pure colour upon gold and silver; that is to say, good cynople, good green, good vermilion, or other colour tempered with oil and not brasil or indigo of Baldas or any other bad colour.” The sinople was most likely the green colour mentioned in old French heraldry, the brasil was a coarse red, and the indigo should be from Bagdad instead of “Baldas.”

To skilled and artistic members of the old guilds of painters may be safely attributed sundry paintings and pictures that formerly embellished the walls, wainscots, and ceilings of their old trade-halls in several cities and towns in the three kingdoms as well as in London. The painting of sign-boards and the pictorial representations of men, animals, birds, and mystic personages over the doors of inns and hostleries was, for the most part, the work of members of the painter's craft, though there have been a few artists in modern days, who afterwards became distinguished members of their profession, who did not disdain in their early career painting a pictorial sign for an inn. Large prices have been demanded and paid for some of these signs in our own day, when their author became known. Before the passing of the Irish Municipal Reform Act, which abolished the old trade guilds of Dublin, the craft of the painters or painter-stainers did not exist as a distinct guild among the twenty-five minor corporations of that city, but the trade, nevertheless, was, in its representation, associated with another; indeed, two, three, or more crafts were often represented by a guild which bore no relation in name or affinity of pursuit with those associated with it. In Glasgow, for instance, the craft or ancient guild of Wrights, *i.e.* Carpenters, had associated with them the painters and plasterers. The wrights in Glasgow were originally mated with the masons and coopers; but the latter seeking separation, were disjoined in 1567. Later on the wrights sought disjunction, and obtained from the magistrates and town council a

* See *Builder*, May 31, 1884, p. 774.

separate letter of deaconry or seal of cause, dated the 3rd of May, 1600. It appears then, by this incorporation were included wrights, glazing-wrights, boat-wrights, painters, bowyers, and sawyers. From the minutes of the Glasgow Town Council of October 1st, 1659, we take the following curious entry as to "One painter in Glasgow," his skill, and the work the City Fathers required him to do:—"The said day, in answer to the supplicatione given in be Robert Marschell, pyntor, showing that hes skill in washing and pynting of houses, and given proof thereof in sundrie places within this burgh, and seeing there is but on [one] the lyk within the samyn burgh, and not one vthir in all the Wast of Scotland, desyring therfor license to practise and occupy the samyn peacablie heirafter within the said burgh [that occupation being rather an science nor an craft], quhilk being weighed and considered be the said provost, bailies, and counsell, they, after consideration had thereanent, doe heitry grant licence and libertie to the said Rot. Marschell to wash and pynt houses to any within this burgh or territorie thairof who pleases to employ him for that effect without any impediment to be made be him thairintill." House-painters must have been in a very backward state in Glasgow in the middle of the seventeenth century. Two years earlier than the above entry, one John Colquhoun appears to have been in request by the Glasgow Town Council for making engines for carting water, mending the town clock, painting, and doing other town work. On the 8th of August, 1657, we find the following minute:—"The same day it is concludit and agreed upon be the saide Magistrates and Counsell that James Colquhoun paint and fix the townes armes and zeir of God on everie horologe hrode, and that been done, grantis warrant to James Eornis to pay the said John Colquhoun for the paynting and colouring of the four horologe brodis of the tolbooth, and gilting the letters thairof as they now stand, the summe of four hundreth merks money, out of the money collectit for the bucknats, and quhat the said James does farder to the globis, he is to be satisfied thairfore, be sicht of John Walkinschaw." The regular profession of the architect appears to have been as much under the shade in Glasgow at the end of the seventeenth century as that of the craft of painting. In October, 1678, one Alexander Thom, "archibctor," was granted liberty and licence to reside within the burgh, "and to exercise his employment and calling in architectorie and mesourie." In 1684 we find the said Alexander Thom sending in his account and getting paid in the sum of 405*l.* Scots, in addition to other moneys previously received for work done. His work included, among other details, "cutting the king's armes upon stone, furnishing ane stone thairto,—peynting and gilding thereof, and cutting the king's armes on timber for the king's seat in the High Kirk, contriving the modelles of the frontispiece of the lofts thereof, and for cutting severall thistles and crowns for the use of the said seat, and his hall panes and attendance thairon, and the taking down and putting up the said lofts, and for eight cedar tables and the pertinents belonging thairto, furnished be him for the use of the town, &c."

Some what cognate to our subject is the early craft or art of glass-painting, or staining, in connexion with our Medieval churches, and later on in the houses of the wealthy, where the work of the glass-painter was executed in movable casements and became articles of furniture. The origin and growth of glass-painting would, however, need a paper to itself; but, apart from foreign indebtedness, England in the fifteenth and sixteenth centuries, without going back further, has good reason to feel proud of the work of her craftsmen-artists, although these men were content to be known under the appellation of "glaziers." The names of several of these highly-skilled native craftsmen have reached us, with their agreements or contracts with their patrons. Dallaway and others who have written on the subject are inclined to the opinion that, from the contracts made between the benefactors of ecclesiastical buildings in the middle centuries

after the Conquest, the glaziers furnished the stained glass cut into various shapes and inclosed in lead as the colours were required. It is believed also that the pattern or design from which the windows were composed was first given by the same artists who painted the walls in fresco. John Thornton, of Coventry, executed the great east window at York in the reign of Henry IV., and the art must have been more or less successfully practised by native craftsmen before that time. James Nicolson, a glass-stainer, was in much request in the sixteenth century; and it is recorded of Mark Willens, who died in 1561, that he supplied the glass-stainers and arras-makers of his time with designs for their several works. The city company or guild of glaziers were a long time in existence before they became a chartered body. It was not until the 13th of Charles I. that they appear by the name of "Master Wardens and Commonalty of the Art or Mystery of Glaziers and Painters on Glass of the City of London." At the Reformation glass-painting in connexion with our churches passed under a dark and bursting storm-cloud of Vandalism, but there was a revival in the seventeenth century.

Before concluding our notes, a passing allusion will not be out of place to the ancient craft of writers of text letter commonly called "Limners." This class included the illuminators, painters, and decorators of manuscripts. There is an ordinance of the writers of text-letter and others who bind and sell books dating from the 4th Henry IV. (1403). The representatives of these crafts petitioned the Mayor and Aldermen "to grant unto them that they may elect yearly two respectable men, the one a lymenour the other a text-writer to be wardens of the said trades," &c., so that the crafts might be better governed and conducted in future, and that good work should result. The Limners for the time being were granted what they solicited. Ireland, at least, may feel justly proud of her early illuminated manuscripts, particularly the almost miraculous skill in ornamentation evidenced in the Book of Kells. From the fifth to the end of the eighth century illumination, or the art of ornamenting manuscripts, was practised with great perfection in Ireland in connexion with the Church. Those who wish to know more of the subject will find, in the "Paleographia Sacra Pictoria" of Mr. J. O. Westwood, the English paleographer; in "Illuminations and Fac-Similes from Irish Manuscripts in the Libraries of Switzerland," by the Rev. Dr. Ferdinand Keller, of Zurich; and in the "Handbook to the Byzantine Court" and "Art of Illumination," by Digby Wyatt, food for reflection and just tributes. The influences of this early school of illumination, in the opinion of the last-named writer, extended much further than is generally supposed, Scotland, Wales, Cornwall, the North of England, and Scandinavia adopting its peculiar system of ornament. The matchless illuminators of old have long died out, but in the architecture of the long past their influence may be traced. The history of civilisation is the history of education and science and art combined. Stone-carving in process of time in the British Islands gave birth to sculpture proper and painting as fine arts and painting, as a skilled craft, and other building handicrafts, performed good pioneer service.

NOTES.*

MR. SELLARS'S Bill to amend the system of Private Bill legislation in the United Kingdom is a practical attempt to effect a needed reform. When so much national and public business requires the attention of members of Parliament, it is wholly unreasonable to expect them to sit as judges on the numerous private Bills which require to be investigated. In one word, the object of this Bill is the creation of a court of not more than three judges, which shall be either formed

* In order to report more fully the valuable lectures at the Royal Academy, we omit our usual signed article this week.

of the whole number, or of a single judge, and fulfil the functions of the present private Bill Committees. After taking evidence and investigating the scheme and the views of those who oppose it, the Court is to report to Parliament. It is to have the power of sitting when Parliament is not in session, and of reporting the results of its investigations during the prorogation of Parliament, when it reassembles. There is also provision made for the court to sit in other places than London. Of course, there are further details, but such are the main features of this scheme.

THE advantage of the above scheme would be that it would leave Parliament free to fulfil its larger functions, and that it would allow more time and consideration to private Bills, which would not, as now, be pushed into the few months of a session. In many instances, by taking local inquiries by one member of the Court, such as in tramway and gas Bills, a great deal of expense might be saved, and a more satisfactory result attained than is now the case. Nor would the absurdity of an appeal from a Committee of the Commons to a Committee of the Lords, or the reverse, any longer continue. The scheme, in some interested quarters, and among very Conservative members of Parliament, who are fond of traditional privileges, may meet with opposition, but its main principles can scarcely fail to be approved by the Legislature and the country at large.

THE announcement that the London and North-Western Railway Company are reducing the time in their great workshops at Wolverton by one day in the week, and one hour in each of the remaining five days, is perhaps the most serious indication of bad times that has recently been given. From 1854, when the Board of Trade Railway Returns commence, to the end of 1883, the income of the English railways has shown a steady and continuous increase, the sole exceptions having been in the years 1878 and 1879, in the former of which there was a decline of 600,000*l.* in gross revenues, followed by a further decline of equal amount in the latter. With this exception, advance has been constant. From 1854 to 1877 it amounted to a little over 3*½* percent. per annum, year after year, and it has maintained the same rate on the average from 1877 to 1883. The repairs of engines and vehicles form an accurate gauge of the activity of a line, as they rise or fall in close proportion to the locomotive cost. The indication, therefore, now given that the wear, and thus the use, of vehicles, is falling off by one-sixth on this great line, is of the most serious nature; more especially coming as it does on the heels of the decline already brought to account for the latter half of 1884. When this mark of waning traffic is compared with the decline of fifty-five ships, and 59,000*l.* in receipts, on the Suez Canal, in January, 1885, from January, 1884, it will be seen that the subject is one demanding very serious attention.

THE difficulties that attend the sanitary government of suburban London do not decrease as time goes on, nor are they likely to do so, so long as the great city continues to squeeze out its inhabitants *extra muros*, while, on the other hand, the country districts continue to furnish perpetual relays of persons whom taste or circumstances induce to become town residents. Nowhere is this more clearly illustrated than in the once rural and exclusively Richmond, which, for various reasons, has fallen upon troublous times, that do not tend to make the position of the powers that be a bed of roses. First and foremost, the celebrated deep well in the chalk, about which so much has been written and said within the last year or two, has been summarily extinguished, and the engineer and contractor desired to carry away their plant. But little has been said about it since the final abandonment of the undertaking three weeks or so ago, which is not to be wondered at, as such an ill-considered and costly fiasco is not creditable to those concerned. The well was commenced originally in 1873, and, despite the experience

and ill-success of similar ventures at Kentish Town and Tottenham Court-road, was proceeded with until the great depth of over 1,400 ft. was reached, while from first to last at least 75,000 ft. has been thrown away, with scarce a single favourable item that can be placed to the credit side. The Vestry has another, though comparatively small, difficulty on hand in the shape of the new dust-destroyer, which was erected a few months ago with many laudations all round. It undoubtedly does its work as far as consuming rubbish goes, but so vigorously that the whole neighbourhood complains of it as a nuisance, and the result is that an injunction has been applied for in Chancery. When to the water and the dust troubles is added the formidable expenditure that is looming over the town for the general drainage scheme, it must be admitted that both the authorities and the ratepayers are likely to have anything but a pleasant time before them.

AMONGST other proposals for solving the vexed question of the sewerage of the Lower Thames Valley, a scheme has been submitted to the Local Government Board, based on the Shone hydro-pneumatic system, for collecting and delivering the sewage to Bisleys Moor, where it is believed sufficient land can be acquired for purification purposes by utilization. As some doubts exist as to the possibility of acquiring the land, the alternative is suggested to adopt the tank system for purification by atmospheric oxygenation, on the method patented by Messrs. Shone, Donaldson, & Ault, which consists of clarification in the first instance by settlement, and upward filtration through coke or gravel, and then by discharge through perforated plates, which form the sewage into a fine spray, each perforated plate being separated from the succeeding one by a horizontal conduit, in which the sewage flows from one cascade to the other of sufficient length to allow of the combination of the oxygen absorbed at each cascading with the impurities in the effluent sewage. The estimated cost of collecting and delivering the sewage to Bisleys amounts to 338,054*l.*, and of the tanks and cascades sufficient to deal with a volume of 7,500,000 gallons a day, about 15,000*l.*, besides 9,000*l.* for the land; or, in all, 362,054*l.* The annual charges are estimated at 20,882*l.*, inclusive of interest on capital and redemption fund. If this is intended to be distributed amongst a population of 200,000 persons, it will amount to a rate of 2s. per head of population, in addition to the sum required to meet the charge for the collection and conveyance of the sewage within each district itself. The Shone system has proved an effective one where it has been tried, and the present proposal may be the best solution for a joint scheme, which, under any circumstances, seemingly, cannot but be very costly.

PROFESSOR HENRY ROBINSON gave an address at the Parkes Museum on Thursday evening, on the subject of "River Pollution," in the course of which he observed that the Rivers Pollution Prevention Act of 1876, the result of the various Royal Commissions on the subject, was now seen to be of too optional a character, and to have a fatal defect in leaving it to local authorities (who were often the offenders) to put in force the Act. Various abortive Bills had since that time been brought before Parliament, and there now existed such a general agreement upon main points as to enable further legislation to be shaped. The recent returns obtained by the Duke of Northumberland showed that since the passing of the Rivers Pollution Prevention Act of 1876, only fifty-three cases had arisen under it, and only twenty-four cases had resulted in orders being obtained to desist from pollution. This indicated that the Act was practically a dead letter. The remedy would probably be found in the formation of Conservancy Boards to have control over wide areas, and to have charge of watersheds.

FROM Mr. MacMahon, the Sanitary Inspector for the District of Torquay, we receive a report of "seven years' sanitary progress" in that district (1878 to 1884), printed by order of the Board. In the course of it, the use of terebene oil is mentioned as a successful means of detecting the existence and position of flaws in drainage. We may quote one case as described:—

"In August, 1879, there was some illness and complaint of bad smells at a house on Victoria Parade. At that time, carbolic acid was the test generally used. I tested the drains of the house carefully, and made an examination of the arrangements, but neither succeeded in discovering any cause for the smells, which the occupier was convinced were drain smells. He pointed out a spot in the party-wall between his and the next shop as being where he sometimes found the bad odours. I obtained the adjoining occupier's consent to test his drains, which, however, be maintained was unnecessary, as he was sure they were right, having been recently laid. The result of the test was uncertain, as the smell found in the affected house resembled gas. A late member of this Board (Dr. Campbell) suggested 'terebene' as a testing oil; this was applied, with the result that near the door of the second shop the odour was perceptible, it was unmistakable in the other, and in a cupboard in a direct line with the other places named it was also found. The drain was opened under where the smell was first found, and about 2 ft. of the collar of a pipe was broken off, from which, through earth and party-wall, sewer gas found its hateful way to the house. The unfortunate occupier had suffered illness in his family, and some deaths also occurred, which were to some extent due to the cause thus brought to light. There has been no complaint from that house since. The second case gave even more satisfactory results as an experiment."

THE case of *Ballard v. Tomlinson*, decided on Tuesday, February 17th, by the Court of Appeal, by which the decision of Mr. Justice Pearson was reversed, places the law in regard to the pollution of underground water on a satisfactory footing. The Judge decided that as a person has no right of property in underground water percolating through his soil,—that is to say, that a previous landowner may drain it away if he pleases,—he has no right to any particular quality of water if it reaches his land. The corollary of this proposition naturally is that any person through whose property the underground water percolates may do what he pleases in regard to it, may foul it, and make it as impure as he pleases. It is obvious that such a decision must be injurious in its consequences. A man may not have any reason to take away the water which flows under his land, and therefore it reaches the land of B, who pumps it up. But had Mr. Justice Pearson's decision remained the law, then, as happened in the particular case, A might pollute the underground water before B could get it, so that it may not only be useless, but may actually do injury to any one who uses it. The Court of Appeal have now set the matter, if we may say so, right. They have held that a person, though he may not have a right to underground water, yet if it reaches him, is entitled to have it in a pure condition; that A may not pollute the percolating stream by putting noxious matter into a place where it will contaminate the water which reaches the land of B. It is clear that the decision may have far-reaching consequences: for it may preclude dealing with the surface of lands in a way to prevent water flowing underground therefrom being fouled. It cannot be confined to the pollution of the underground water, as in *Ballard v. Tomlinson*, where an old well was turned into a cesspool so as to pollute the water which the plaintiff drew from his well. But wholesome water is one of the first necessities of life, and a decision which helps to keep it pure is of the highest importance. There are certainly many country villages where pollution, knowingly or unknowingly, is permitted. This recent, clear, and common-sense decision of the Court of Appeal will place the law on this point in such a state that the pollution of underground water can, we hope, now be stopped without litigation.

ANOTHER case, that of *Dawson v. Clementson*, which was tried before Baron Huddleston on Tuesday last, was of some interest in relation to the rights

of tenants to throw up their engagements in consequence of sanitary defects in a house. In a general way, the law is a great deal too favourable to landlords in regard to such questions. In this case the defendant (the landlord) was shown to have gone to some expense in relaying the drains before letting the house to the plaintiff. The latter noticed a disagreeable smell under the kitchen window, and the defendant, on attention being drawn to it, satisfied the plaintiff that it was owing to a bell trap at that spot not having been kept charged with water. The plaintiff, however, left the house abruptly before the termination of the engagement, and repudiated the contract. The defendant's case was that no accusation of breach of contract in regard to the condition of the house was valid until the plaintiff had served defendant with a notice to repair, which he had never done. The jury came to the conclusion that the house was "reasonably fit for habitation" when the plaintiff abandoned it. Judgment for defendant, with costs. We hold that in the abstract no contract should compel a tenant to remain in an unhealthy house; but it seems clear that the plaintiff put himself technically in the wrong, through omitting the proper legal action, and perhaps exaggerated the evils complained of. Part of the moral of the case is,—do not trust to traps that require artificial nursing to be kept in an efficient condition.

THE Water-Colour Exhibition at the Dudley Gallery contains some powerful drawings, and some of the best work is signed by names with which we are not very familiar. Among architectural subjects, the "Exterior of the Church of the Holy Sepulchre" (179), by Mr. N. E. Green, may be mentioned, and Mr. Harry Goodwin's "Verona," seen just as it is described in "Sordello," a dark outline against a long flare of sunset light. Mr. Herbert Marshall's "Sunrise in London, Midwinter" (79), is a very fine view of the side of Westminster Hall and the Victoria Tower behind; but the points of the compass seem to have been a little freely treated to get the light behind the Victoria Tower. Mr. Medleycot's "Westminster, from Lambeth" (66), is a mere travesty of the Houses of Parliament, and shows the painter to have little eye for architecture. Mr. Edwin Ellis's "The Shadow of the Head" (178), a rough sea under the shadow of a great rocky promontory, is the best thing of his that we have seen. Mr. C. Robertson's "Whitby" and "Newcastle" (273, 348) are worth attention, the former especially; and, in a very different style, Mr. G. Marks's "Sunshine and Shadow" (380) is a bold attempt to deal frankly with the bright tone of green verdure in strong light. Mr. Bernard Evans treats "The old Road to Mientwog" (535) in a style slightly reminiscent of David Cox. Miss Helen Thornycroft has one or two admirable flower pieces, and Mr. H. R. Steer has caught the spirit of Dickens in his small but highly-elaborated representation of a scene from "David Copperfield" (491), in the middle of the screen.

THE sale is announced at Christie's, on the 5th of March, of the works of the late Mr. Harry Johnson, the well-known water-colour artist, and formerly a member of the Institute of Painters in Water-Colours. The drawings will be on view on the two previous days, and will comprise, among other things, many interesting sketches of monuments of Classic architecture in Greece and Asia Minor.

MESSRS. DOWDESWELL exhibit, at their rooms in Bond-street, a collection of marine sketches in water colours by Mr. W. Ayerst Ingram, comprising studies of sea water under very various conditions of light and movement, not all equally successful. "Tide Ripple" (28) is one of the best, and "A Drifting Match," where a number of yachts are nearly becalmed, with every inch of canvas set, is very real. But our impression is that the artist is aiming at variety rather than thoroughness of work.

THE *Courier de l'Art* mentions that Madame de Châtillon, a talented lady artist, and Professor of Painting in the Ecole Municipale of Paris, is about to organise a gratuitous course of instruction in drawing for ladies and young girls who wish to perfect themselves in the art. Madame de Châtillon entertains the hope of thus founding a school of design applicable to industries such as are most generally carried on, or may be carried on, by feminine hands, such as the shaping and ornamentation of dresses, the design of curtains and hangings, of lace, the decoration of hooks, painting on panels and on glass, &c. The Department of Public Instruction, we are told, has recognised the value of Madame de Châtillon's endeavours, and is prepared to subsidise the school.

THE Duke of Marlborough's reply to the offer made by Mr. Gladstone to purchase certain of the pictures in the Blenheim Collection, as given in a recently-issued Parliamentary paper, reminds one irresistibly of Mr. Wegg's rejoinder to Mr. Boffin's overtures to that remarkably endowed literary man, "I never 'aggle, Mr. Boffin," said Wegg; "so, done for double the money." Mr. Gladstone informed the Duke that he would be prepared to advise the Treasury to give 100,000*l.* for the "Madonna degli Ansidei," by Raffaele, the full-length equestrian portrait of Charles I., by Vanduyck, and the "Garden of the Hesperides," by Rubens, to which the Duke replied that he would be willing to take 200,000*l.* His Grace, however, ultimately agreed to accept 70,000*l.* for the Raffaele and 17,500*l.* for the Vanduyck; but as it will be necessary for the Treasury to obtain a vote for these amounts, the bargain cannot be regarded as concluded. The memorial sent in by the Royal Academy in favour of the purchase of the pictures is a curious specimen of composition, in which Raffaele's "Madonna" is said to illustrate "that happy period in which the reverent purity and serene grace of the master's earliest work is already mellowing," and more in a similar strain. Let us obtain the pictures by all means if possible, but why "gush" about them?

THE next examination of candidates for the Associateship of the Institute of Architects will commence on the 23rd of March, and the last day for receiving applications is Saturday, the 7th of March. During the present week a provincial examination for Associateship is being held at Manchester under the direction of the Manchester Society of Architects, the oral examination being conducted by the Chairman of the London Board of Examiners, Mr. Cates. The examination renders the admission to membership of the Institute a real guarantee of adequate professional knowledge and training; it is one of the best moves the Institute has ever set on foot, both for its own interests and those of the profession at large, provided the latter accept the situation *en masse*, as they will probably be more and more inclined to do as they recognise the value to themselves of co-operating with a central body which makes examination by competent men a test of admission into its ranks.

New Riverside Fish-market.—The Duke and Duchess of Westminster visited the East-end on Wednesday in order to perform the ceremony of driving the first pile at the works which have been already begun for the erection of a fish-market at Shadwell. The site is on the shores of a deep bay of the river, about one mile and a half below London Bridge, one advantage gained by the choice of this situation being that the vessels bringing up fish to the market will avoid the delays to navigation in the Pool. The market proper, that is for the disposal of fish wholesale, will have a frontage of 224 ft. to the river and an area of nearly 22,000 ft. The semi-wholesale and retail market to be erected hereafter will have an area of over 14,000 ft. Mr. C. Dunch is the architect of the market and works. The market is being erected by a joint-stock company.

ON SOME PRINCIPLES AND CHARACTERISTICS OF ANCIENT ARCHITECTURE, AND THEIR APPLICATION TO THE MODERN PRACTICE OF THE ART.*

I AM to speak to you to-night of some principles and characteristics of architectural design which may, I think, be usefully brought before you for your consideration. My remarks will be but suggestive, and will embody ideas which you may work out for yourselves, at greater length, in your researches into the nature and the history of ancient architecture. They will be, for the most part, principles and characteristics common to all styles, rather than those peculiar to any.

It is no insignificant subject that I would bring before you. Think of the long story of the great works of architecture in the past. What a history it is. Not to look further back, let us think of that marvellous time when Greece, as it were, brought order out of the chaos of barbaric work, and, suddenly, became the land of all that was beautiful in art,—art with its sculptural portraying nature and expressing the life of nature, not only in its highest phase, the portraiture of ideal perfection of the human form, but also in the delicate beauty of carved ornament and artistic detail. Then on to the work of the Romans, massive and sturdy, lacking, indeed, the grace and tenderness of the best Greek work, but eminently impressive and manly, and superior to that of the Greeks, in construction, inasmuch as the round arch was a more noble thing than a straight beam of stone.

Then, the darkness before the dawn,—through the many gloomy centuries of barbaric work; and then, to look only at our own land, the gradually refining and enriching work of the Norman; the effect of the creation of Gothic, and the revolution that its pointed arch brought about,—the almost Greek-like work of the thirteenth century, full of religious feeling, hardly, indeed, seen at its best in England, for it was more advanced and noble in other countries,—nevertheless, replete with growing beauty and interest amongst us. Then, the great time of the fourteenth century, when, for refinement of design and beauty of detail, our English architecture was second to that of no other country.

Then the fifteenth-century work, the very flower of the Gothic manner, with its development of the kindred arts of painting, of sculpture, stained glass, embroidery, and textile fabrics,—works all partaking of an architectural character.

And then the Renaissance, with its great artistic skill and exuberant richness, with almost lawless beauty, with some lack of restraint and a certain impatience of authority.

We may well review the varied images which such a vision calls up.

I shall not weary you by reciting any long list of examples of the great works of the great past, or by pointing out their merits,—you should know them well; but rather speak of some principles of the art that may lead us to see the shortcomings of our modern works, for their possible improvement. For we are not here to recount the great works of the past in our art, but rather to try and learn some lessons to be derived from the principles such examples afford. Before doing so let us, briefly, look at the building of the present day. There is little we can call architecture.

Where in our works, I would ask, are the architectural influences that would tend to educate the people?

Look at any of our new towns where there is not the presence of old buildings to redeem the general aspect of ugliness and vulgarity. It is not that the houses are merely destitute of ornament; there is the presence of vulgar and ugly ornament, so-called, in plenty, sometimes, indeed, in heavy and tiresome profusion.

The shapes and proportions of the houses seem to have come by chance and without design. The ugliest materials have been used, bricks of the poorest colour and of ungainly size, the roofs covered with cold-looking blue slates, also of too large dimensions. The details of the exterior, throughout, without interest, delicacy, or refinement.

But I have sketched enough of the outside of the kind of house which it is a positive pain to enter, so far as one's artistic perceptions are

* A Paper by Mr. G. F. Bodley, A.R.A., F.S.A., read before the Students of the Royal Academy on the 23rd inst.

concerned. Inside we find the same poverty, or vulgarity, of design everywhere. The meanness of stained deal seems to have been delighted in, or, if it could be afforded, that ugliest of all woods "pitch-pine," with its coarse grain and hot colour. In colour, in form, all is without beauty. Nor am I thinking so much of those unhappy new towns amongst us which are devoted, I had almost said doomed, to manufactures and industrial works, where the sky is darkened, and all nature disfigured, where the enjoyment of any art is almost impossible. I am thinking rather of modern watering-places, and the like,—places devoted to leisure and to pleasure, chosen for their brightness of climate and beauty of scenery, but presently made hideous by a very nightmare of badly designed, and worse constructed buildings. In such new towns as I am speaking of, the inhabitants live surrounded by these buildings, to the great detriment of all artistic perception. Or look again at our London houses of a slightly older, and better, period. Our "long, unlovely streets" are without interest or dignity, a uniform dullness, at best, prevails, with but few exceptions. You may pass through many miles of our London streets without seeing one redeeming building, or even a part of any such building. There is a uniformity of dreary ugliness alike in Camden Town and Belgravia. Whitechapel is better, there are some old buildings there. Is not all this a satire on our civilisation and on our culture?

It is easy for you in these days to compare and contrast such modern buildings with ancient ones. If you have not travelled, nor even seen much of old places in England, drawings and photographs will have, broadly, shown you the contrast. And what a contrast it is. Now in what does this contrast principally consist? It is a difference in kind, not one merely of degree; the whole feeling, the animus, is different.

And here I am brought to speak of some of those principles and characteristics of architectural design which I would bring before you to-night.

They are: Refinement, concentration, true use of detail, symmetry, economy of material, contrast, avoidance of extravagance of manner, suitability, harmony, colour, work founded on that of the past, consonance with nature, lastly truth.

Refinement of Design.

Now if there is one principle in the practice of architecture in the present day which is chiefly wanting, it is, I think, the lack of refinement of design.

What is the history of architectural art but the history of refinement in the art? We have briefly glanced at this history in our own land. What was the one principle that led on from century to century, from style to style, but that of a true artistic feeling, the desire for refinement. Nature, our great guide, never stops in her refinement. We cannot gauge the infinite delicacy of nature, nor her redundancy of life and its variety. Now it is in refinement for architectural work, that this expression of life is chiefly shown. According to the material and means at command, there should be the careful expression of artistic power to bring out, to the utmost, the expression of life.

This expression is a great principle of all art, and one to which limits can hardly be assigned. It should animate all your work. Every detail, not only as in the carving of natural ornament, however conventionalised, but in architectural mouldings, and the like, should express this, which is the highest gift of nature,—life. You see it in all good architectural work,—in the branching vault, and the graceful clustered column from which it springs; in the steady, sturdy, but thrusting buttress; in the varied moulding of carved ornament; or even in the mouldings of a cornice or of a string-course. Whatever, in architectural work, is endowed with the expression of death is bad art. Good art, on the contrary, is ever imbued with the expression of life. Look at a bit of decorative carving, it may be of the most conventional kind, as the so-called "boneysuckle" of the Greeks, or carved leafage of one of the great periods of Gothic art, and you will find this expression of life in the nervous curves, in the strength of the sturdy stem, and the delicate, reaching or twisting spray. The whole drawing and modelling, as well as the execution, express life. You may see this even in

the common utensils of daily use. Compare a Greek cup, of the simplest kind, with its subdued, refined, but nervous and animated curves, with the similar vessels we may see amongst us now. The one is instinct with the expression of life, the other is dead, as the metal or the clay out of which it was formed. It is thus that man, into whom was breathed the breath of life, has, God-like, imbued his work with the expression of the Divine attributes.

Now, it is refinement of design that is such a great aid in giving this expression of life. It is not against this principle that much of the best architectural ornament is conventional, for conventional ornament should ever be imbued with the spirit of nature,—with its energy, its repose, its beauty of detail, and its breadth of effect.

You can work out this idea of refinement for yourselves in many interesting details, as in the refinement of curves, so remarkable a feature in our fourteenth-century Gothic; in mouldings, in all the great styles, giving refinement in the effect of delicate shadows; and in many other ways, as in the refinement of decorative colour, where gradations are gentle, and colours are delicately contrasted,—not, however, in any work in a manner indicative of weakness or incapacity; for refined work in no sense denotes weakness, nor vulgarity strength. True refinement rather denotes restrained power.

Nor is it in details only that the principle of refinement is of importance. The whole building, in its lines and mass, should have the same expression,—one rather of reserve and power controlled, than of any ostentation or display.

It is these expressions which give the charm to so many ancient works of architecture. They are the principles of nature.

I have spoken of the advance of refinement in the successive styles of the Gothic period. The same history occurred in the great Classic styles. It would seem that while an art is a living and healthy one it will advance, and, like the intellectual or moral condition of man, it will progress. Alas! that a time should come when it begins to decay, and at length becomes moribund.

The English woodwork of the fourteenth, fifteenth, and sixteenth centuries shows a school of art of a very remarkable character. It showed the utmost refinement of detail in delicacy of moulded work, and in most able carvings. It was hardly equalled by any work of the same character abroad. It is work well worth your close attention and study. Comparing these beautiful works with much modern woodwork, one cannot but miss the element of refinement. In the old work you will find the traceries were more or less elaborately moulded in different orders, while a modern,—and a very crude fashion of the day,—merely pierces certain shapes in a very elementary manner. It is but childish work at best, and is an instance of what one cannot but call the barbarism of much modern work, contrasting with the refinement of the ancient manner.

Let us glance for a moment at the reverse of this element of refinement. Look at what has been called the "Victorian style." I do not mean work designed, in an honest spirit, to meet the requirements of the times, that which tries to catch the true spirit of old work, but that shallow, conceited, and futile attempt to outdo the works of the past by coarseness and what is vulgarly called "go" in design. It is a manner that can have no lasting influence, one would hope, and we may dismiss it as out of count, except to point a moral. It is a manner the very reverse of that which I would lead you to follow,—that of a true and noble refinement in your art; that which you will find, in different degrees, expressed in all noble ancient architecture.

Concentration.

Another principle on which I would touch is that of concentration of ornament, especially for our larger buildings. It is one too much neglected in modern architectural works.

For the enjoyment of richness and beauty of ornament there should be a well-designed concentration of it. The eye wearies of, and the mind fails to be interested with, a monotony of richness.

Design your building in good proportions, that is with the proportion that has an expression, suiting the character you wish to give your work. Then enrich the chief, and most important parts, with carefully-designed orna-

ment, rather than sprinkle the whole with it. Here, of course, the scale of the building dictates the character, and it is no fault for a small one to be enriched all over: it is, as it were, a detail itself. The surrounding buildings may give the necessary effect of contrast. But for large and monumental works, you will find this concentration of ornament a sound and judicious principle. It is one of the characteristics of the best old buildings.

True Use of Detail.

Another principle of which I would speak is that of the true use of detail. Now, the use of detail is not so much in order to show variety, or beauty, of design, but that it may enhance the expression, whatever that may designedly be, that is to be given to the whole building. It is surprising how the use of detail, skilfully dealt with, may add scale to a building and enhance its general effect. It is a great, but manifest, error to suppose that by boldness of detail you make your building look large. The reverse is eminently the case. This is obvious; nevertheless, much modern Gothic work, and not work in that style alone, has been ruined in effect by largeness, if not coarseness, of detail. When your mouldings are large their curves should be especially delicate and subdued. The delicacy of the shadows prevents the effect of any coarseness.

Not that it is only detail which, carefully used, gives scale to a building. The multiplication of parts is an arrangement of much use for this purpose. You know how skilfully this was done in Mediæval and in Renaissance buildings.

The study of the best designed ancient works will make the intention very apparent. It is a point, again, that you can work out for yourselves, in studying such buildings. Compare, for example, Milan Cathedral with our Westminster Abbey, or with York Minster or other great Gothic churches. To give scale by breaking up a wall into stages, as by arcades and the like, is of frequent occurrence, and is of much effect.

Symmetry.

Another principle, on which I would touch, is that of symmetry or balance in design. It is one, for the most part, applicable and of chief use for large buildings and those of monumental character; nevertheless, a house of moderate dimensions, planned on a symmetrical arrangement, may have a repose and a dignity fitting many sites. Our large Elizabethan houses owe much of their effect, externally, to this arrangement. It is not a Gothic idea; nevertheless, even for this style, a forced irregularity is always to be avoided. There is no plan for a large house, standing by itself, more dignified and quiet in effect than one with three sides of a quadrangle,—the entrance with its high porch marking the centre, and hearing, it may be, an enriched panel with shield and other sculptured ornament. The two projecting wings may be of more or less projection, as circumstances dictate.

In these symmetrical designs occasional variation from exact balance may well be brought in, as in the somewhat varied positions or sizes of windows, and the like. The general balance may be kept, but, like an unexpected note in music, the variation in no way destroys the general effect of harmony. Symmetry of design denotes care and pains on the part of the designer. It is a courteous manner and has much to recommend it. Certainly it is a principle founded on nature. It was in constant use in old days.

Another point on which I would briefly touch is that of a nice economy in the use of material. It is again another point of refinement. The almost brutal strength and ponderous use of material of the Egyptian work, especially as in the Pyramids, has an unpleasant sentiment. Contrast this with the great Gothic buildings in which (with no economy of thought, or of skill), through delicate ribs of curved or straight stone, the weight of the hanging vault is held, as if by magic, and passed down into the ground,—all with the nicest economy and without any undue waste. Each member does its work. It is Christian liberty and carefulness, contrasted with Egyptian slavery and its waste of power.

Roman work had some of this Egyptian-like waste. But I must not enlarge on this point, which opens out a large field of observation; one word, nevertheless, I would add, and it is

this. Engineers make their nice calculations, of less and more, and tell us this or that "will stand." But good architecture is not only "built to stand," it is built to last from generation to generation. It is no waste to build in such a manner that the eye and the mind are satisfied, that centuries may see the building as we see it now,—that, if not properly tended, and not cruelly dealt with by the more ruthless hand of man, the gentle, slow, natural decay of time will leave the inheritance well nigh untouched.

Such strength, combined with a nice economy, should be our aim in designing buildings.

Contrast.

Another principle I would speak of is that of well-contrasted work. In all the best architecture you will find a noble simplicity of design, due breadth of surface, contrasted with delicate detail. Neither has it its full value without the other. How well the delicate Gothic traceries and niche work, and the lines of the richly-carved cornices, contrast with the broad surfaces of the massive buttresses and the smooth ashlar of the walls. It is thus in nature you may see the delicate foliage and the fragile flower contrasting with the huzzess-like rocks, smoothed by the hand of time.

Some of the best effects of Gothic work are obtained by the use of thick walls and small detail, as in windows where the broad splay is finished by a slender shaft, giving a fine line of light and a delicate shadow, contrasting with the uniform light on the wide breadth of surface of the splayed jamb. Here, again, you can work out this principle for yourself in many ways, both as shown in examples of the past and in designing new buildings or their details. In many churches in the South of France we see the capitals throughout, both large and small, elaborately and richly carved, while the rest of the building is of the sternest simplicity. The capitals form, as it were, rich bands, contrasting with the plain walls and piers.

Again you will find that the whole practice of mouldings is derived from the sense of contrasted light and shade. Vigorous, at times even harsh, as in some early Gothic work, the system of mouldings became gradually refined to the most gentle gradations of light and shade, the simple roll moulding eventually turning into what is termed the "wave moulding," with the most delicate effect of light and shade on its surface.

Or, again, in carved work of the great times, the delicate lines of light on the ridges and the edges of the ornament, the half-shadows, tender and slight, on which the ornament seems, as it were, to rest, then the sudden deepening and darkening of the background, to throw out, in strongest contrast, the chief points of the ornament into greater light, to rule over the rest. Well considered and ably executed, contrast is seen everywhere, full of tender grace or decided vigour.

The carver has delighted in the effect nature affords everywhere where there is light to see its subtlety. It is our loss that here, in England, our dark days are so frequent. The want of light has, no doubt, a depressing effect on art. Let us the more carefully enlighten our mind's eye with the thoughtful contemplation of the works of other and sunnier countries, and of brighter days of art.

Avoidance of Extravagance of Manner.

Another suggestion that I would make is a negative one,—the avoidance of extravagance of design and manner. For example, avoid extravagant proportions. One has seen too much of this, of late, in Gothic work. A shaft only two or three times its diameter in height is surmounted by a capital out of all proportion to that shaft. It is an ugly affectation, and in no way commendable. It is an exaggeration that becomes a caricature of good art.

There is one kind of strongly-marked proportion, however, that we need hardly fear to carry out in these days. I mean that of considerable height. The controlling exigencies of economy too often prevent our churches, for example, from rising into stately and inspiring proportions.

You know the high proportion of that, perhaps, the most beautiful of all Gothic churches in the world; Westminster Abbey,—the most beautiful as regards the architecture of the interior.

The proportion of Westminster Abbey, that

of three squares, is excellent, and without any undue exaggeration of height.

The extravagance of manner I have spoken of more often lends itself to stumpy proportion, without grace or beauty. It is, like other extravagancies, to be avoided.

Suitability.

Another principle I would bring before you is to suit your design to the place it is meant for, and to the surroundings among which you are to build.

With our old buildings in the country one often sees an instinctive harmony with the sentiment of the aspect of the natural scenery, or, it may be, a wise contrast with it.

It was not apart from this refined feeling that for an old Gothic church, built among hills, you will generally find a low broad tower, with an affinity for the masses of surrounding scenery,—while, on the other hand, on the long, low, level lands the pointing spire will have been lifted in contrast to the horizontal line of the plain,—a point of relief which the traveller's eye may rest on, as he travels through the monotonous level country. In towns you may take pains, in some way, to assimilate your building to those of neighbouring ones of former times, if there be any of sufficient interest to command such respect.

It is to our loss that so many towns, in which we may have to build, are destitute of any character with which we can harmonise our work. Nevertheless it should be done where possible, not only in the use of local material, but in designing in the local manner, and in harmony with the surrounding buildings. One sees examples of what we must call "bad manners" in this way. The surroundings have been ignored.

And here let me say that we need not go abroad to find a style in which to design buildings in England. Let us keep to the *genius loci*.

Both in Gothic and in Renaissance buildings among us there has been too much copying of a foreign manner, unwisely imported from the Continent. Our own English architecture is second to none on the Continent for beauty and poetry of design. If abroad the architect is more grandiose, yet it often lacks the refinement and the poetry of sentiment of our English work. Though "art speaks the tongue of every clime," yet, in a sense, we may have a patriotism in our art. You know how long a list of admirable English works one might enumerate; each county with its hundreds of more or less beautiful churches, and often still more beautiful remains of ruined abbeys; each city with its more or less stately cathedral; our universities of Oxford and Cambridge, places unique in the world for venerable collegiate buildings; our great historical mansions, Haddon, Burleigh, Kirby, Fontaine Hall, Hardwick, Longleat, Bramshill, Montacute, Temple Newsam, and others; lastly, the refined and simple beauty of our old homesteads, and even cottages, on many a country side. Let us be loyal to the traditions of our beautiful English architecture.

Harmony.

Another principle is an obvious one,—that of harmony, not only of style, but of character and feeling throughout a building. No Eclectic School which mingles styles incongruously will ever be long-lived or successful. The result, if not one of continuous discord, affords but occasional harmony. It is true that certain styles, as Gothic, lend themselves to strong construction, while Renaissance may be more consonant with great richness and delicacy of detail; as, for example, in plaster work and the like; but there is a risk of discordant character. It is better not to attempt any such mingling of styles in a complete work, however good the effect of different styles, combined, may be in from time to time. The mind is satisfied with such an historical building, but it is irritated by the needless conceit of combined styles in a new one.

If you look at any complete work of the great periods you will find that they have a unity of feeling, and a breadth of effect, stamped upon them. Look at our abbey of Westminster and Tintern. I mention these, for you know them well. The same character is given to the whole building, in a marvellous degree. Each holding expresses, in its own distinctive manner, the sentiment desired, and there is a true artistic

breadth of effect and of idea. You will find this so in all complete buildings of the great periods. They are interpenetrated with one idea, though there is the utmost variety of detail.

Colour.

Another, and an important part of an architect's work is connected with colour, whether in the use of marble or other constructional colour, or in painting.

A fine eye for colour is a natural gift, as much as a fine ear for music, but the love of good colour may, no doubt, be caught from the teaching of nature and the great schools of painting, chiefly those of the fourteenth century, and later on. That there was a great school of decorative painting in England in the fifteenth and sixteenth centuries is seen by the painted roofs and screens remaining. Those without sufficient knowledge are apt to speak of the colouring of the Middle Ages as crude and inharmonious, or, at best, as of little artistic value. There can be no greater mistake. The wall painting has chiefly perished, but enough remains on woodwork to show how refined and beautiful the works of decorative painting were. In all the great periods of art there was, indeed, the keenest delight in colour. Take alone, for example, the stained glass of the successive centuries of the Middle Ages. It is an important part of architectural decoration, especially of churches, college halls, and similar places. Look at the deep-toned glass of the twelfth and thirteenth centuries, the gradually refining glass of the fourteenth century,—silver setting, as it were, of jewels; the figures rich and splendid in colour. Then the still fairer glass of the fifteenth and sixteenth centuries. Figures, as of painted statuary, of rich, but subdued colour, standing in tabernacle work, of wrought silver touched with gold, the delight of all beholders. Is it for us to think lightly of the colour works of the Middle Ages when we, in these days, have filled nearly every one of our cathedrals in England, and most of our churches, with glass so crude, so harsh in colour, that to see it for a moment is a pain and a shock to all our artistic feelings?

In this beautiful art of glass-painting, however, one begins to see real improvement in the works of some, though but few, artists.

Before I pass on to other matters, I would observe that the history of glass and other painting shows the same story of progress in refinement (pardon the refrain) as we have seen took place in building. The early work was powerful but crude in colour, the latter ever becoming more and more refined; and this so much so, that presently the whole scheme and idea of the decorative treatment of the building was gradually changed. For the early building had its walls white, with but little decoration, and its windows of dark richly-coloured glass.

By the time of the fifteenth century this scheme of colour was completely changed, and a nobler manner prevailed; the walls were painted with figures and subjects in dark rich colour, of the beautiful type of full but harmonious colour that we see in many old German and Flemish pictures, and the windows were, for the most part, of silvery white, with but little and that subdued colour.

It was a complete revolution. It was one towards refinement.

Let us turn for a moment to a very different branch of this subject of colour. However poor the architectural character of our houses may be, beauty of colour may be obtained for our rooms. There is not enough intelligent interest spent on the subject of the decorative effect of our houses. I cannot but express the hope that they may be made more beautiful in colour, and that our rooms may show not only a jumbled collection of old things, however beautiful these may be in themselves, but that intentional design, and harmonious architectural colour, may be given to them. In the modern decorative treatment of rooms, even those of some dignity, one too often sees mistakes of the most evident kind. For example, it is the frequent modern practice to colour the cornice of a room as if it were part of the ceiling; so if the ceiling is white the cornice is white also, though the walls and woodwork be of colour. Now surely the cornice is the crown of the wall, and not a part of the ceiling. The architectural value of a cornice in a room is to soften off the harsh line that we get without

any projecting moulding. This effect is obviously lost if the cornice is coloured like the ceiling, and not like the wall. I would just say before quitting this part of our subject, that while we now often see "dados" introduced, the use of the frieze is too seldom adopted. Yet it is a far better effect to have a well designed frieze and no dado, rather than have a dado and no frieze. The frieze, and not the dado, was the earlier arrangement. Let me say, in passing, that we should do better, in our domestic work, to follow the style of the Renaissance rather than that which is called "Queen Anne," and which is a very inferior manner at best.

Again, there is a fashion for a papered dado. This brings out with undue prominence the poor, thin, line of the dado moulding.

Now this dado moulding or "chair rail" is as it were, the cornice of the dado, and the whole should be of the same colour. Above this dado moulding there may be a wall-paper of good pattern and colour. Such a paper is best when it is of two or three shades of the same colour, and the spotty and unarchitectural effect of a variously-coloured pattern is avoided. Wall-papers were the successors of damask silk hangings, which were usually of one colour, or different shades of the same colour. These silk hangings, it is true, were the successors of tapestry of varied colour, but the pictured scenes of tapestry take one into a higher, and altogether different, kind of decorative effect. There is nothing in common with tapestry in them, except that both are for the clothing of a wall.

Again, one sees other palpable mistakes of colour, such as the use of the "black pointing" of brick work. We need not add to the gloom and dinginess of our buildings by its use.

But what I would chiefly urge on this subject is, that you should not think decorative art in any way beneath your serious attention. Here, again, look at the works of the past, or the great schools of Europe. They will be of more use to you than the imitation of Japanese or Chinese work, the fashion of the day, however ingenious it may be.

Work founded on that of the Past.

Another principle is the founding designs or the works of the past.

Sir Joshua Reynolds said, "The more extensive your acquaintance is with the works of those who have excelled, the more extensive will be your powers of invention, and, what may appear still more like a paradox, the more original will be your conceptions."

This is, I think, eminently true of architectural design. You may well find your design on some previously executed work that has won your respect and admiration, but you make it your own, your mind's eye seeing it, thus or thus, different, wholly altered, from that which produced the idea. It is thus that art hands on, in the tradition of art, the spirit of it, which is immortal.

Consonance with Nature.

Another principle is that of harmony and consonance with nature.

We have incidentally spoken of nature as the guide in all art.

It should be eminently so with the creative art of architecture.

Though our art, like music, is not an imitative one, yet its characteristics should be those of nature, in the spirit, though not in the letter. It is the strength and the delicacy, the refinement and the richness, and the other great attributes of nature, which we should endeavour to embody in our works, rather than any exact imitation.

It is thus that art should be consonant with nature. Wordsworth wrote,—

"To the solid ground
Of nature trusts the mind that builds for eye,
Convinced that there, there only, she can lay
Secure foundations."

In our art, from the rough, rock-like foundations, to the highest and most delicate pinnacle, all should be in harmony with nature and her work. It is the law for all art, at once the law and the Gospel.

Truth.

Time suffices not to speak of other principles of our art, and yet there remains one great and leading principle of this and all art, that which should indeed be first, the principle of truth. Let it have here, as in a procession of state, the

most honoured place, and be the last named of our principles.

Of truth, as expressed in architecture, much has been written, and written well, more especially by Mr. Ruskin, to whose teaching we owe so much in the whole field of art. Truth is an essential element of good art. I need not dwell on this part of our subject; nevertheless, what are many of our new street-fronts in the City and other buildings elsewhere rising around us but examples of most untruthful architecture? Iron columns and iron girders are concealed by stone columns and thin stone friezes, and the like deceptions. It is an unpleasant, and, indeed, a wretched style of building, without truth or dignity. Should a fire try the nature of the work the writhing columns and bending girders will soon show that they are found wanting in that first necessity of good building,—stability,—and the disguise will be manifest.

To conclude, let me say that architecture and all art should be animated by some great and leading principle. Religion is the highest. The noblest buildings in the world have ever been those consecrated to her service. We see this alike in the Pagan temple and in the great churches of Christendom.

After religion, civil or national dignity should call out the expression of high artistic power. Then the domestic feeling, the house, great or small, built for a family, in successive generations, to abide in, the house that should be handed down as the shrine of domestic honour; and, lastly, honour to the departed, as in sculptured monuments and memorial buildings. For art should be delighted in, not for itself alone, but as the expression, in a lasting way, that can perpetuate the feeling expressed.

Art requires, as it were, the salt of noble sentiment to keep it elevated and pure.

How far any revival of a great school of architecture is possible is a question. That there is a strong archeological feeling for the art is certain. It is an age of travel and the great works of former days, combined with their historical associations, have impressed themselves strongly on many minds.

The want of unity of feeling, as compared with other times, is one serious impediment to the formation of any school of the art. Is any such unity possible? Is any such school of architecture possible without such unity?

But consider that it is the "animus" with which you design that is of real import; that whatever style you are led to work in, let your manner be courteous, your expression that of truth, and your aim to do the right thing for the building you are designing.

No doubt our work as architects in these days is one of difficulty. It is an age of science, not of art; architectural tradition has been cut off, or, rather, alas! we inherit a century or more of bad tradition.

We have great facilities, in these days of easy travel, for seeing old buildings. Or, to take the subject of decorative art work generally, our collections and museums are numerous and admirable. Are we to make such use of them as may lead to better designs, and a more intelligent interest in such decorative work?

Such collections ought to bring about a more healthy state of public taste and inspire us all with a desire to do good work, thorough work, both awakening interest and cultivating it.

Let us remember that what we may call the "architectural arts" may have a considerable bearing on the industries of a country. Attempts at artistic manufacture have been brought before the public. Are they to lead to better things, or are they only the fashions of a day?

But I must end with one more word of advice.

Have enthusiasm for your art in all its branches, rather than an ambition for your own success, and better work will be done. There are some signs of the dawn of better things, amidst the general gloom, and we may hope that a more intelligent interest may yet be taken in architecture, and in things that belong to architecture.

Time was when she was the queen and the mistress of all the arts. Is it not for our unfaithfulness that she has abdicated her throne?

Teak.—An interesting paper on "The Teak Forests of India and the East, and our British Imports of Teak," was read by Mr. P. L. Simmonds before the Indian Section of the Society of Arts on the 20th inst.

IMITATION THE MEANS, NOT THE END, OF ART.*

ON more than one occasion we have lately heard it stated within these walls, and on no less an authority than that of our President, that the work of the sculptor-students has shown in recent years a considerable and sustained advance. This opinion, which is confirmed on all sides by current criticism, is one which cannot fail to be extremely gratifying to those who take a real interest in the plastic art.

If we examine the causes of this advance we find it due, I think, to a closer study of nature than was recommended in the last generation and to the increased opportunities for that study which are now open to the student in our public Schools of Art.

This closer study of nature, leading to the production of work of a more realistic character than used to be admired, has, of course, not been confined to the schools of the Royal Academy.

The annual exhibitions of modern work, both here and in most foreign countries, but especially in France, have shown that artists all over the world have been aiming at a closer imitation of nature than was usual fifty years ago.

The pursuit of exactitude, indeed, has been carried so far as sometimes to exceed the bounds within which this imitation should properly be confined. It is this universal tendency towards realism in the most vital school of recent sculpture which has suggested the central idea of my lecture to you this evening.

In the face of this general movement I feel it is necessary for us to ask ourselves what the bounds of imitation are, and how far this devotion to realism is praiseworthy.

We all admit that a complete subjection of our aims to it would result in the production of work worthy only of a waxwork exhibition,—that is to say, ingenious and mechanical reproduction of objects, which might amuse us for a moment, but which would completely fail to satisfy our artistic cravings.

The fact that sculpture, or the formative art, is in one respect essentially imitative is, I think, a source of considerable danger to students of it, and the tendency to which I have referred, which has shown itself of late in all the arts, namely, the search for resemblance to individual forms of nature, although a step in the right direction, may lead to serious evil, and sculpture be degraded by a misconception of the ends of art.

In the history of art there have been epochs which we, who are at a sufficient distance to judge fairly, do consider as debased and bad in various ways.

The character of the work of these epochs has generally been due to the misuse of art in the attempt to make it express what was not within its field, for the extension of this field was evidently considered to show cleverness and originality then, as in our day.

I need, perhaps, only recall to you the work of Bernini, and the sculptors who followed him, to show to what an evil end extravagance can lead sculpture.

The Trevi fountain in Rome, erected from the designs of Niccolò Salvi in 1735, consists of a large florid architectural façade, from the centre of which a colossal figure of Neptune drives his car and horses and attendant Tritons over a mass of rocks and streams of real water, the whole composition covering an area much larger than this lecture-room. This work has been well described as a "pompos confusion of fable and fact, gods and pedlars, aqueducts and sea-monsters." But the most remarkable example is near Naples, and represents the classic fable of Diana and her nymphs discovered bathing by Actæon. This work cannot, of course, be called a group. It is situated in a palace garden, and consists of hundreds of tons of rocks and a flowing stream, and at least ten or twelve marble nymphs scattered about, all of them more or less agitated at being perceived by the shepherd Actæon in the distance.

This is a characteristic example of the use to which sculpture was put during the eighteenth century, in the attempt to make it rival the scenic effect produced by a picture. It was an effort in the direction of realism, in so far as

* A lecture by Mr. Hans Thornycroft, A.R.A., delivered to the students of the Royal Academy on the 15th inst.

the figures were relatively placed as a number of figures in nature might be.

In our own Westminster Abbey we have sad specimens of this utter absence of the sense of what is within the range of sculpture, for even a man of great genius like Roubiliac could not resist the temptation to make his work pictorial, going so far as to carve marble clouds above his statues. The pursuit of novelty, which is also a characteristic of our own time, is no doubt an influence which carries art further and further in new directions, and now especially in the direction of realism. Let us certainly have truth to nature, for art cannot be good without it, but let us not merely aim at the imitation of individual forms without thought or selection merely as opportunities for showing the dexterity with which we can handle our material.

Sir Joshua Reynolds, in one of his admirable discourses, says,—"Imitation is the means, and not the end of art." These are words which it is important to recollect, for they contain the truth of the whole matter, and should be a guide to you at your work, either when studying from nature or designing without it.

In this age of scientific accuracy, the artist has especial need to keep before him the means and end of art; for as yet that vigorous child of our century, modern science, although she ultimately will help him, does little but confuse the artist. She shows him so much in nature that he knows not what to select.

The time was when the artist could impose upon the spectator to a considerable extent, and insist that such and such a representation of nature was true, and did not violate Nature's laws.

He might, in fact, draw on his imagination, and by new combinations construct works that excited amazement. But I need hardly trouble to remind you that matters are now changed; it would be impossible nowadays for a painter to produce works so far removed from realistic forms as were those of Fuseli or Blake.

Science now, with the sun's immediate aid, makes an accurate drawing of an object in the fraction of a second, and any artist who attempts to make a drawing by hand of such an object is brought to task, and the accuracy of his drawing tested by comparison with the work of the unbiassed eye of the camera, which, although it may not give the proper values of tone, is accurate as regards scale and position in its transfer to the picture of the minutest details.

However hard a trial this may be to the artist, it is beneficial, and has its lesson; it teaches him to draw more truthfully, while, on the other hand, it proves to him that art must have an aim of its own, and that that aim cannot be mere copying with scientific exactness.

This was fairly demonstrated in a lecture given in this room just three years ago, when the American photographer, Mr. Muybridge, exhibited a series of instantaneous photographs taken of a horse in rapid movement. There were, I think, about twenty outline pictures taken consecutively during a single stride of the animal when at a gallop, from the commencement of the stride to its completion, so that it was possible to follow the action of any limb through its entire movement, until the same movement or step began again. In each of these twenty silhouettes, for there was no detail within the outline, the action of the limbs at a particular instant was exactly given, yet scarcely one of them gave to an observer the impression of the action of a horse; most of them were quite ludicrously false to the optical effect. The grace and rhythm of movement of a gallop were not in the least expressed.

The fact is that the impression the eye receives of rapid movement is a combination of successive actions, and to give that impression in a motionless form, as in a picture or statue, more than one instant of the action must be rendered, and the different limbs arranged to express those different successive instants.

It is, I think, an acknowledged fact that it is much easier to give apparent movement in making a drawing or statue of a horse, or any quadruped galloping or running, than in attempting the same with a man running. The latter is liable to look as if suspended in the air like a pair of compasses. With two limbs it is possible to express two moments of a stride, but that is a limited power; whereas in the quadruped four movements of the stride can be suggested, and these will more adequately

express the successive positions of the legs during the stride.

The more the student has observed the action of horses the more will he be able to know what moments of action to select in order to give apparent movement.

Science teaches man how to make use of the forces and laws in nature, and shows him their perfect consistency and harmony. But it is by means of art that the ever-changing and evanescent forms and effects in nature, which are constantly before man, and which astonish and perplex him, can alone be arrested and permanently expressed. Art can thus interpret nature to man and teach him to perceive her beauty.

The art of sculpture is a language whose special province is the expression of beauty of form. Its secondary province is the expression of sentiment and character. In order to remind you of the force of this language as an exponent of the beauty of the forms of nature, I will only ask you to call to mind almost any authentic piece of Greek sculpture, but more especially the statues from the pediments of the Parthenon in the British Museum and the Venus of Melos in the Louvre. It is by the imitation of nature's forms that these works speak to us.

The extent to which this imitation can be carried is the great difficulty the sculptor has to meet, and is the subject which I now wish to consider.

The question is, what are the forms in nature which present the best material for the sculptor's language, and how closely is he to imitate them?

The forms which constitute nature's highest organism, man, are, of course, the first and most important; next comes man's raiment, or that which clothes him; and then the forms of the lower animals. Now, how closely we are to imitate the forms in nature is extremely difficult to say; for the reason that the possibility of imitation is almost unlimited by certain mechanical methods, such as by moulding directly from nature and casting. A cast from nature, however, as we admit, is not satisfactory, not altogether because it is a mechanical cast, for a slavish copy made by hand might have a like effect. We should feel this latter to be a wonderful achievement and a feat of skill, yet there would be something wanting. There would be in the work an entire absence of the individual impress of the sculptor or his school, and in its place a preponderance of the individual peculiarities of the particular model cast or copied, scientifically interesting, but not artistically so. Indeed, we should not allow it to rank as a work of art.

At the other extreme it is possible to generalise and to imitate only the structural and essential forms, eliminating the individual and accidental in favour of the usual and typical, and this is the fault to which English sculpture particularly lieth.

So we see that two dangers lie, one on either hand of us,—the temptation to produce an absolute copy of nature, and the tendency to generalise until our work is so conventional as to be devoid of all value and character.

These dangers more especially beset the sculptor in the branches of his work other than portraiture, in which the individual and accidental are obviously essential.

But by what means are we to use the forms of nature to make our language of sculpture most eloquent and intelligible, and to fulfil the high aims which we consider as its province, the expression of beauty and grace, of sentiment and character?

Obviously, we must follow the forms of nature closely in order to interest the spectator, selecting those we think best for the purpose before us, combining them to make a harmonious composition, but never making a combination which would be impossible in nature, unless it be in the case of some well-recognised convention, such as when the wings of birds are attached to human backs to express super-human powers of movement. But for such deviation the artist must always have an intelligent reason.

Sometimes, owing to colour or transparency, the effect of nature is not at all represented by form, as, for instance, in the human eye, to express which the sculptor must flatten the convexity of the eyeball, or, if he wishes to make a realistic portrait of the eye, he must cut a cavity in his model of it in order to form a shadow indicating the dark of the pupil.

A mass of hair which is partially transparent cannot be represented by means of a solid material of the same size. It must necessarily be made less and often thinned down in order to indicate the form beneath.

A sculptor ceases to imitate also, when the form is such as to be unsuitable for reproduction in his material, perhaps impossible to be wrought out in it; or, at any rate, requiring an endless amount of labour to achieve an end, which may again be easily frustrated by accident. It may, indeed, be taken as a rule that we should not attempt in sculpture forms and effects which can be more adequately, and at the same time more permanently, rendered in another art. What may be a wonderful feat of labour and painstaking may prove at last to be an execrable work of art.

I remember, when a boy, being taken to see some famous china-works in Staffordshire, where, in the show-room of the establishment, there were arranged all the sample cups and saucers and prettily-painted dessert-dishes, and such like, but where, in the place of honour, trembling beneath a high glass-shade, sat a perfectly white bird of Paradise, life-size, in porcelain china. This was pointed out as the wonder of the place. The delicacy of the workmanship I can well recollect as extraordinary, for every detail of the elaborate creature had been built up bit by bit, and the long tail hung like a delicate frosted twig, and all in burnt china clay. I was told that it was not quite finished, as the workman had died before he could complete it, and that to do so had been the one idea of his life. The story seemed sad to me then, but it seems sadder now. Only a few months ago I was in a little china-shop in Hammersmith, looking over some odd pieces of ware, when in one corner I noticed a big, dusty glass shade, and under it,—dusty, too,—broken, and without tail, sat my old elaborate friend, the china bird of Paradise, but only a mere shattered skeleton of his former self. I thought of the good fellow who made it, but never completed it, and I felt glad that he could no longer see it.

This story seems to me to teach a lesson to the sculptor to be careful not to spend his time on the representation of what can be more readily and permanently expressed in another art.

If a work in sculpture is fragile and easily damaged, it might have been a better subject for a painter, on whose flat canvas can be put the lightest, and most delicate, and elaborate object in nature.

Of all forms, the nude human figure is the most essentially sculptural; for the reason that it consists of broad smooth surfaces, generally convex, undulating one to another, and sufficiently large, at least in the size of nature, to have strength to be permanent when imitated in the sculptor's brittle material of marble. So in this respect there is little danger in the treatment of flesh; but there are other difficulties, as we shall see presently.

But I wish to insist to you on the extreme value of broad flesh forms, and the exquisite gradations of light and shade which the nude presents to you. You must look upon these delicate gradations as the most beautiful words of your language. It is here alone that you can compete with, and I almost venture to say surpass, the power of the painter. He cannot express these forms so beautifully and absolutely as you can. Compare for a moment what you may happen to consider the finest pictorial rendering in the world of the nude human figure; compare this with the Lyssus, the Theseus, the upper part of the Venus of Melos, the Hermes of Praxiteles, or the Torso Belvidere. I might, but I will you must allow that a sculptor here obtains the higher position. The painter will be generous enough, I hope, to concede to us this advantage; for our field is contracted, whereas his includes almost all objects and effects, and extends as far as the eye can see.

When the figure is draped, it is only under peculiar circumstances that sculpture can retain this mastery, only when the coverings such as is not to destroy the form below it, and when it is in itself beautiful in form, and can take lines that are harmonious with the figure.

We can see an instance of this in the lovely group of the Fates, from the Parthenon, where the flesh forms are covered with a thin muslin-like drapery, arranged and treated with consummate skill, so as to still reveal the figure and the

movements of it. In these draperies the effect of nature is so truthfully represented in detail and small forms that the spectator, in his admiration and excited interest, overlooks the liberties the sculptor has taken with the manner in which the larger folds of the draperies fall. These he has kept close to the limbs, where, in nature, they certainly would fall away, and would obscure them. The form of the folds of nature could never be exactly like these carved ones, but the effect produced is like that which nature might be imagined to assume under the most favourable conditions.

In looking at this group one becomes convinced that the sculptor who made it had an ideal within him which he sought to express by the selection and representation of the most beautiful forms in nature at his disposal. He translated into the permanent material of marble nothing without the leave of nature, but accommodated nature to the material.

Although the large forms of the figure are visible almost throughout the group, still there is no appearance of scantiness of drapery, so perfect is the judgment with which the folds are arranged and massed. Even in its present fragmentary state, headless and almost armless, it seems to me by far the most beautiful group in the world; but how magnificent must it have been when, above the delicate drapery, rose the two lovely Greek heads side by side, one sympathetically touching the other, while a little lower, contrasting with the minuteness of the muslin folds, the generous rounded arms added the proper complement of flesh and a balance of mass to the composition of the group.

If we attempt to get an effect similar to the Greek statue or relief by placing a carefully made muslin Greek dress upon a living model, we soon discover the impossibility of it. This can be made a fair test, for it is possible to obtain dresses that are practically the same in form and texture as those used by the Athenian sculptor; and it is also possible, in England, to obtain models that are physically not unlike the Greeks. But the effect, I say, cannot be thus produced for the reason that the sculptor, in making the masterpiece of art to which I have alluded, selected and modified the folds of the real dress. He realistically adhered to the forms of nature with regard to the flesh, but not in the folds of garment. These are kept in subservience, yet not allowed to appear meagre and thin. The projection of the highest part of the folds away from the flesh is generally true to what it might be in nature, but the shadows are deeper. This is a convention, of course, arrived at, no doubt, in order to express the feeling which the spectator has when looking at nature, of the presence of the figure beneath the garment, which presence is given, in a living figure, by the slight movements and swaying of the folds, just revealing from time to time the important and structural forms.

Since the Greeks employed such conventions, and with such an admirable effect, and since, I argue, these can legitimately express nature, we may surely be forgiven if, in our effort to represent the impression which the human figure gives us, we select and modify the garments worn nowadays.

Before the reign of Charles II. it may be said that in England all costume represented in art was that of the time in which the work was produced. But during the reign of that monarch it became customary in sculpture to represent a person of important position, dressed either in the toga of the Roman citizen, or, if he were a soldier, in the dress of a Cæsar. This peculiar custom has been revived from time to time up to the beginning of our century, as we may see by many of the statues in the private squares in London, but of late there has been a hold stand made against it, and there at last seems to be a hope that we may again have sculpture that shall be a real representation of an Englishman as he lives.

All good art is representative of the age that produces it; so, manifestly, in representing that in which we live, we ought not to drape our statues as either the Greeks or Romans did. We know that the dress of the figures forming the procession of Athenians in the frieze of the Parthenon was the daily dress of Athens, and it seems to me that it is our duty to express in art the dress of our time, even though it may be difficult in many cases to persuade ourselves that it is aesthetically beautiful. We need not follow the fashion from year to year. I would go so far as to advise that we

ould choose the dress for a statue (if it is ideal and yet modern subject) from any costume that has been customary during any part of our life. We ought, at any rate, to have on the dress worn in its home.

I would like to remind you of the numerous works of sculpture which have been produced in France, of late by the just treatment of temporary costume.

Although we are sometimes startled, and annoyed perhaps, at the extremes of realistic art often to be seen in Paris, yet one cannot but admire with enthusiasm such portraits as those by Chapp and Delaplanche, or allegorical groups as those by Barrias, in high modern costume is boldly employed.

Several of these groups are commemorative of the defence which certain cities in France made against their enemies during the war of '70.

Subjects of everyday life have been modelled with a fine judgment and with success, by Dantan, Albert-Lefevre, Pech, and others. Lefevre's statue, entitled "Bread," is an excellent example of a realistic yet sculptural rendering of a robust and handsome young peasant woman carrying leaves of bread.

We find that the most sculptural garments possess nowadays are those in which fashion is least force, and where the dress has adapted itself most naturally to the occupation of the wearer, and the longer it has been worn the more worthy it is of your study. The folds stand of falling accidentally, first in this position and then in that, have discovered their proper place, and fall there with a certainty that has become a principle.

Even the thickest and most stubborn of materials, such as leather, becomes valuable to the artist when worn long enough; it is not necessary to accentuate the patches and holes and ugliness,—these are accidental, while the folds are essential. It is quite extraordinary how the human figure will assert its form through clothing after long wear. The effect is summed up, of course, the typical, and for that very reason, of most value to the sculptor. In this way a statue can be clothed, and the form will be sufficiently visible to retain its proportion and action.

The proper and true depth of fold and consequent shadow in the various parts of a garment covering the human figure can only be deduced in that which is well worn. To attempt to do so in clothing that is at all now is soon found to be hopeless.

Even in London one sees not unfrequently among the navvies, or those workmen who dig at the foundations of buildings, men who look sculptural in their wrinkled corduroy trousers, buckled in at the knee with a strap, in a loosely-fitting shirt, soft and pliable, not made into a hard, white board, to be worn in front like a sandwich-man's placard. The navvy's dress is adapted to his work, and is, we may conclude, but little affected by fashion.

As an instance of an improvement in costume of our own time,—an improvement, by reason that it is better adapted to the occupation of the wearer,—I will cite that of the cricketer, who, fifty years ago, when playing an important match, did not wear on his head the close-fitting cap now customary, but in its place wore that all cylindrical hox with which we are so well acquainted, and which we designate a chimney-pot, but which our friends the Americans prefer to call a long-sleeved hat.

The countryman is still in many places sculptural, and may be, I think, realistically treated, though in modelling him one need not imitate the textures of his dress and their contrasts; these essentially belong to the painter's art. They do not consist of form that we can all tangible, so are not for the sculptor. Often from the ease with which an effect can be obtained by the direct, though imperfect, imitation of textures as a means of giving contrast, an inexperienced student will employ this means to the neglect of the proper form, of which the textures are the mere surface. Texture is closely allied to colour, about the use of which in sculpture I now wish to say a word, since that is another element in the imitation of nature.

Polychromatic or many-coloured sculpture, seems to have been used in every age; and at first thought it, perhaps, appears to us as if colour might be a means to accomplish the end of adding another charm to beauty of form, and to make sculpture more than a partial representation of nature. It, moreover, has the argument in its favour of having been used by

the Greeks at the best period of their art. But we must bear in mind in what positions it was used, and for what purpose.

It was used decoratively in the frieze of the Parthenon at a height of 40 ft. above the spectator, at which elevation it was probably necessary to accentuate the flow of the design, and at the same time to harmonise with the highly-coloured building. This frieze, as you well know, was a continuous mural decoration running round the entire inner wall or cella of the temple, and for the figures to have had sufficient effect at that height without colour, would have necessitated making the projection and depth of relief so great as to destroy the apparent structure of the wall which carries the superimposed roof. The ceremonies connected with the polytheistic worship of the Greeks were sumptuous and brilliant, and, as in the Roman Catholic churches of the present day, the greater number of the statues immediately near the shrine or altar were coloured, in order to bring before the mind of the worshipper the presence of the deity, more distinctly than by the abstract and partial representation given by a colourless statue.

I have said that the sculptor ceases to imitate nature closely when the material does not admit of it, so that we get conventions due to material used in representation.

A convention which is admirable in one material would not, perhaps, be so in another. For instance, a support in the form of a stump of a tree or some accessory (although the subject might not require it) might be necessary in a marble statue to give sufficient strength, but would not be at all required in a bronze one. Also for the sake of compactness and consequent strength, the limbs in a marble statue should not be extended so as to become weak and unsupported; but in bronze there is no occasion for this restriction. So that bronze can be more extravagant, more elaborate,—can be built up piece by piece, can undertake a greater variety of subject, be more picturesque, more dramatic, more realistic than marble,—but since its dark colour does not admit of the delicate gradations and harmonies of form being perfectly seen, it will ever be less of the sculptor's material for the most beautiful and, therefore, the highest class of subject than statuary marble.

There is something about a block of marble that fascinates and almost invites a man to become a sculptor. Our first attempts with the hammer and chisel, however, prove that it is a serious matter to become even skilful in handling these tools.

This is, nevertheless, a training of the hand which every sculptor student ought, I think, to undergo. It is, I believe, a fact that a great number of those students who have taken the highest honours in sculpture in these schools have been good carvers of marble. It does not follow that every good carver will be a good designer, but he will be a better designer if he can carve and his work will be more workmanlike and solid.

Whilst on the question of materials, perhaps I may say a word or two about terra cotta. We have examples annually produced in which the dictum of Sir Joshua, whence we started, seems to be reversed, and "imitation is made the end of art." It is the facility with which much realism can be given in this material, and the consequent ease with which a meretricious effect can be obtained in it, which tempts many who are somewhat inexperienced in art to model in terra-cotta. The shrinking of the clay of about one-tenth of the linear measurement during firing in the furnace, and the chance of contortion and breakage, make this material unfavourable for employment. Although its field is wide, and beauty can sometimes be expressed in it, yet it is only really successful in portraying strongly-marked character, which does not lose by the somewhat unattractive surface of the dry, burnt clay. There have, however, been, both lately and during the Renaissance, extremely fine portrait busts made in terra-cotta; a great number of these latter are found to have a somewhat smoother surface than the modern ones. This smoothness depends considerably on the character of the clay and the amount of firing to which it is submitted, and although the effect is not so crisp and sharp as that of our modern examples, yet it is well to remember that a smooth surface is durable, and can be cleaned, whereas I fear many of the modern works of art in this material require a glass

shade over them to preserve their charm. But I think we have come to dislike glass shades, and to prefer that sculptures large and small should be permanent and not fragile. In small pieces of sculpture there is a great pleasure in being able to take the work into one's hand and examine it at will; this, of course, necessitates a durable material and a fairly smooth surface. Small bronzes have a great advantage in this respect, and happily the more a bronze is handled the more pleasant it is to look at, unless it is an antique, and has a corroded surface,—that is, unless the bronze is changed into an oxide of copper, and so is beautiful in its delicacy of colour. This lovely green is, of course, the heauty of decay. How far it is advisable to reproduce this effect in modern bronzes is a question; to do so is, perhaps, rather like a painter attempting to make old masters. The surface of bronze should be beautiful, but it should be made so by its form, and not by its colour.

I can imagine our modern houses containing with advantage a far greater number of small sculptures than they do at present.

The walls of most houses are covered with modern pictorial art in some form or other, but our rooms are devoid of sculpture, our mantelshelves and pieces of furniture are not decorated with it. Blue plates balanced on their edge in constant peril of their homogeneous existence occupy these sites. It should be one of the duties of the sculptor to try and displace these blue plates, and put small bronzes in their stead: he has only to make really good small statues, and he will do it, or, at any rate, he will get his small statues standing in front of the blue plates, which will serve as a good background for them.

You will find that wax is the best material in which to model small sketches and statuettes. It is sufficiently rigid to require but little support, yet plastic enough to be fashioned into any form that the sculptor's mind can conceive, and is capable of being finished in point of surface to the minutest detail. It can be modelled and cast in bronze, while the original model remains. This is not the case with clay, which must usually be destroyed during moulding.

Before concluding, let us once more consider what is the right procedure for a sculptor to pursue, should he attempt to make a statue possessing beauty and grace.

It is to be hoped that he has an idea or faint vision in his mind of what he is going to do before beginning his sketch. But let us suppose his sketch made and carried sufficiently far to indicate the idea and composition of the work. The frame or skeleton for the clay figure is set up, and the model arrives and tries to take the position of the sketch at the direction of the sculptor.

The model, though perhaps excellent in proportion, and good in detail of form, fails to embody what the sculptor has imagined, and, moreover, cannot perhaps assume the action suggested in the sketch. This is often a sad moment for the sculptor, for if he has not conceived his design truthfully, he suddenly becomes aware of the fact.

Now, what is he to do? Is he, in making his statue, to cast away his idea and sketch, and imitate the form of the model before him to the uttermost of his power? Or is he merely to enlarge his sketch to the size of his statue, and refer only to the model to correct serious errors of proportion?

The first method would lead to nothing but what a perfect cast from nature would give us, and would be at best only a study. The second would result in a work essentially conventional and mannered, constructed on knowledge previously acquired, probably from the antique, and would not possess enough nature in it to excite human interest.

We see examples in sculpture of both these methods, but our true course lies between their extremes.

When you have conceived an idea for a statue, and have fixed your idea in a sketch, then have nature before you as much as your purse will afford, and should you find that your sketch is essentially untrue and structurally impossible, let it give way to what nature dictates; you will gradually perceive that your idea can be expressed by an action that is possible to the model.

Do not confine yourself to one model alone; for your object, in this case, is not to make a portrait, but let every form possess the impression of having been worked out from

nature, and let your good taste be shown by the selection of the forms employed.

And, lastly, as regards the subject which you should choose, I will only say a word. Let it be worthy of representation, and not merely dependent on a passing fashion or conceived to satisfy the vulgar love of novelty. As sculptors and co-workers with the men who made those inspiring statues twenty-three centuries ago, set your faces against anything that may tend to make your art other than what would be an ennobling influence to your fellow-men.

Illustrations.

WE shall be glad to receive any drawings intended for the Royal Academy Exhibition, which their authors may wish to see illustrated in our pages, to be photolithographed before sending in to the Academy, and published (as far as possible) during the time the Exhibition is open. Where desired, we will make ourselves responsible for the delivery of such drawings at the Academy on the proper day, but cannot undertake to see to the return of them after the close of the Exhibition.

Drawings can be accepted, either in line for ordinary photo-lithography, or in colours for reproduction by other processes. It may be as well to observe, in regard to the question of time, that the processes for reproducing from coloured drawings require rather longer time than photo-lithography from line-drawings demands.

The receiving days at the Academy are March 27th, 28th, and 30th, for paintings and drawings, and March 31st for sculpture.

MERSEY TUNNEL RAILWAY STATIONS.

The line for which the Mersey Railway Company has Parliamentary powers commences by a junction with the London and North-Western and Great Western joint lines at Tranmere, Birkenhead, and after passing under the river Mersey extends to the Central Station in Liverpool, the whole length of the line being about three miles. The length of the tunnel is 1755 lineal yards, measured between the shafts, of which about 1,250 yards are actually below the river bed.

We have previously given some account of the work when in course of operation.*

The engineers are making special provision to insure a thoroughly satisfactory system of ventilation, and no expense nor forethought is being spared towards attaining this very important end.

The railway, when constructed, will accommodate the large traffic at present existing between Liverpool and Birkenhead, and, in addition to this, will bring the Great Western and North Western trains, which at present stop at the Birkenhead terminus, into the heart of Liverpool, and will also convey the traffic of the Great Northern, the Midland, and the Manchester, Sheffield, and Lincolnshire Railways directly into Birkenhead.

The Company have under view the necessity that will exist for important extensions, and are this year applying to Parliament for junctions with the lines of the Mersey Docks and Harbour Board on each side of the river, thus forming direct communication for goods traffic between the Docks of Liverpool and Birkenhead.

It is satisfactory to know that the cost of this railway per mile will not exceed one half that of the Metropolitan Railway in London, although the traffic will probably be quite as large and important.

The engineers are represented on the works by Mr. A. H. Irvine, the resident engineer, Messrs. Waddell, the contractors, being represented by Mr. James Prentice, their agent, and Mr. D. A. Davidson, their engineer.

The station buildings are being carried out from the designs and under the superintendence of Mr. G. E. Grayson, of Liverpool.

We give illustrations of two of them, viz.: James Street, Liverpool, and Hamilton-street, Birkenhead.

* *Builder*, March 15, 1884.

The level of the rails in James-street is 92 ft. below the street level, and in Hamilton-street 103 ft. 6 in.

In addition to the stone staircases there will be three passenger hoists, each accommodating eighty persons.

These hoists ascend to the lower booking halls, which are level with the foot-bridges crossing the main lines.

The James-street elevation is to be faced with white stone, and that of the Birkenhead station with red terra-cotta.

The stations internally including the booking halls will have the walls lined with glazed bricks.

The height and size of the towers have been regulated by the levels of the tanks required by Messrs. Easton & Anderson in connexion with their hydraulic machinery.

The upper floors of the James-street building are arranged for suites of offices, with a separate entrance, staircases, and passenger-lift.

TWO SEMI-DETACHED RESIDENCES, DRUMMOND-STREET, MONTREAL, CANADA.

THESE have been completed for Messrs. H. C. Scott and H. G. Strathy, during the past year, and are built of Montreal limestone, lined with brick.

The houses, although harmonising in character and grouping, differ in plan, as well as in elevation, thus giving an individuality to each.

The style adopted is an adaptation of that in vogue in France during the time of Francis I., but owing to the severe winters of Canada, heavy snowfall has to be considered, and a frequent descent of the mercury below zero, necessitating the preparation for, and providing of double windows, and other contrivances for equalising the temperature indoors, so that some modifications would have to be made in almost any European style which might be adopted.

These houses are heated throughout with hot water, and the principal rooms and staircases are finished in hard woods. Most of the painted and ornamental glass came from the studio and works of Messrs. Guthrie, Sauchiehall-street, Glasgow, and the gates, &c., were supplied by Messrs. Steel & Garland, and the Coalbrookdale Company, of London.

The cost of each house, exclusive of stabling, &c., was a little over 3,000*l.* sterling.

The architects are Messrs. Taylor & Gordon, of London and Montreal.

"ART AND WORK."

UNDER this title, Mr. Owen W. Davis is bringing out shortly a remarkably interesting collection of drawings of decorative work of various styles and periods. From the plates for this work we reproduce two, concerning which Mr. Davis sends the following remarks:

Italian Fountains, Vases, &c.

"These designs are taken from the celebrated 'Hypnerotomachia Poliphili'—a rare and costly Italian work, by Francis Colonna, a Dominican monk. The book was published at Venice in 1499, and was probably printed by Aldus. Although the written matter, which consists of a supposed contest between imagination and love, is a hotchpot of fact, fable, and antique lore, intermingled with amorous rhapsodies, the woodcuts with which the work is profusely illustrated are the best, in the simple style of line-drawing, that Italy has ever produced.

No. 1 is a frieze of amorini, dolphins, vases, &c., gracefully arranged with foliage; No. 2, a terminal vase; Nos. 3 and 6 are fountains; No. 4 is a lamp-stand; and Nos. 5 and 7 are ornamental vases.

The 'Poliphili' designs, which are evidently of the old Padua-Venetian School, have been attributed to Raffaele and Alessandro Botticelli, as well as Andrea Mantegna, but the British Museum catalogue ascribes the drawings to Bernini.*

Animals, Plants, &c., from Fifteenth-century Woodcuts.

These clever engravings, so full of motif in design, as well as spirited in execution, are

* We may say with Byron:—"Powers eternal! such names mingled!"—Ed.

obtained by the simplest means which an artist could employ. They are taken principally from the 'Ortus Sanitatis,' printed at Mentz in 1493, which is a work on Natural History, by Jacob Meydenbach. No. 1, a Water plant; No. 2, a hidden Fruit and Serpent; No. 3, Figs; No. 4, Dwarf Mallow; No. 5, a Water Subject; No. 6, Swans; No. 9, the Plant Magwort (*Botris*); Nos. 7 and 8 an Eagle and a Fish reproduced from the 'Herbal,' by Mattioli, a work of 1545 date.

We would call attention to the 'colours' thrown into the examples Nos. 1, 2, 4, and 6, the engraver having artistically cut the interfoliage in *intaglio*.

It is noteworthy that the two plates here published are dated respectively 'Meutz, 1493' and 'Venice, 1499,'—eight years' difference, at places not 400 miles apart.

Both illustrations are executed up to the earnest power of the artists employed in two separate countries."

SKETCHES FOR THE PUGIN TRAVELLING STUDENTSHIP

THE sketches of the south porch at Gloucester Cathedral and St. Margaret's Tower, Leicester (not St. Mary's), as it was unfortunately printed off on the plan before the mistake was discovered, are reproduced from pencil sketches by Mr. W. H. Bidlake, who has gained the Pugin Travelling Studentship at the Institute this year with a very excellent collection of drawings, from among which these are selected. In regard to the tower, Mr. Bidlake writes,—

"In Mediaeval times those in the diocese of Lincoln who enjoyed the luxury of a fire were subject to a tax of one farthing, known as 'smoke farthing' or 'Lincoln farthing.' The sum realised by this means was usually devoted to the maintenance and repair of the fabric of the cathedral, but sometimes that portion which was collected from the inhabitants of a local town, by special injunction of the bishop, diverted to defray the expense of any building of an ecclesiastical nature that was in progress in the neighbourhood. St. Margaret's, Leicester (which in the diocese of Lincoln), was such a privilege, and its tower has been built by 'smoke farthings,' the injunction of the bishop being extant."

ARCHITECTURAL SOCIETIES.

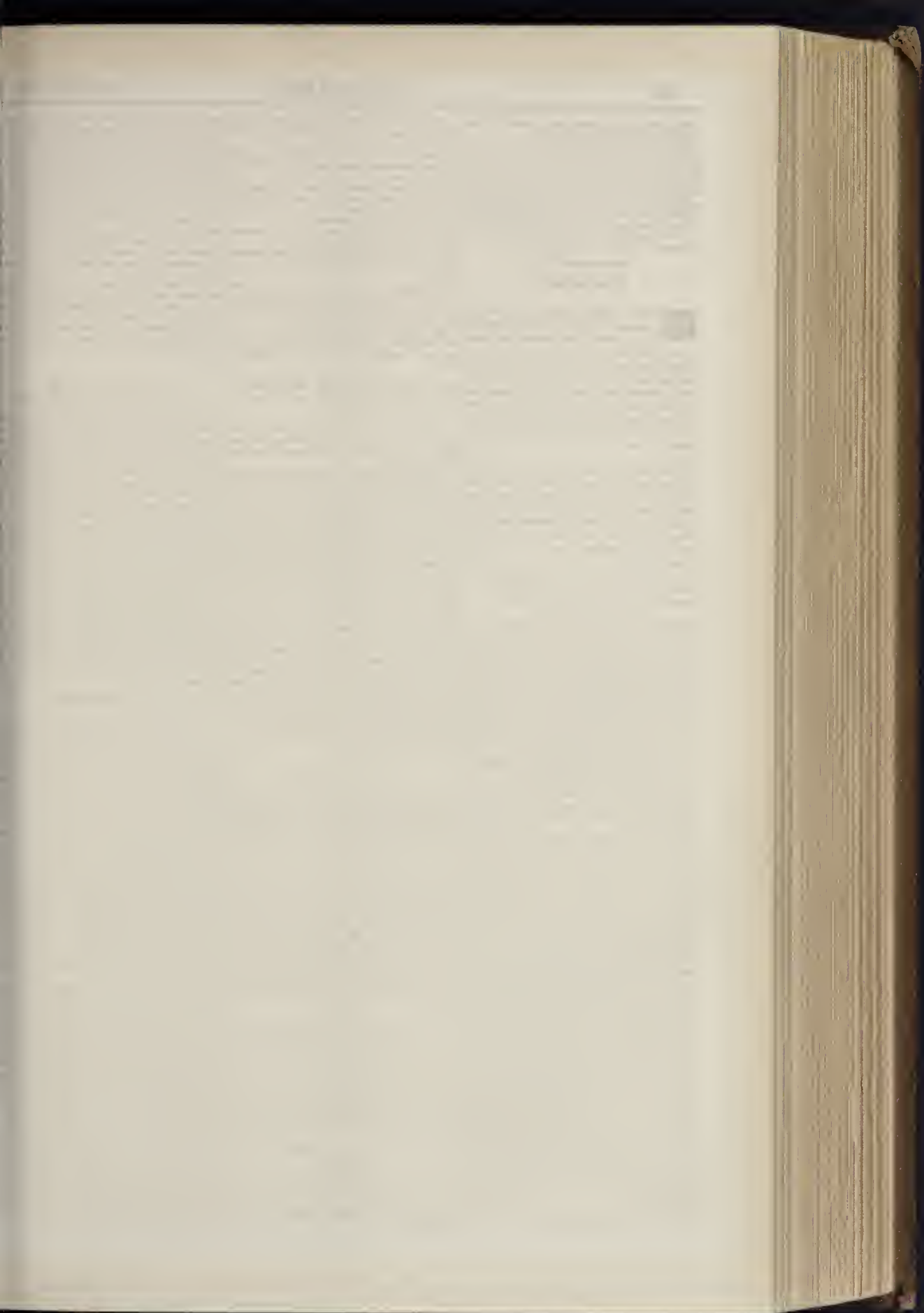
Leeds and Yorkshire Architectural Society.—At the meeting of this society, on Monday evening last, a paper on "Architectural Competitions" was read by Mr. Cole A. Adan, President of the London Architectural Association.

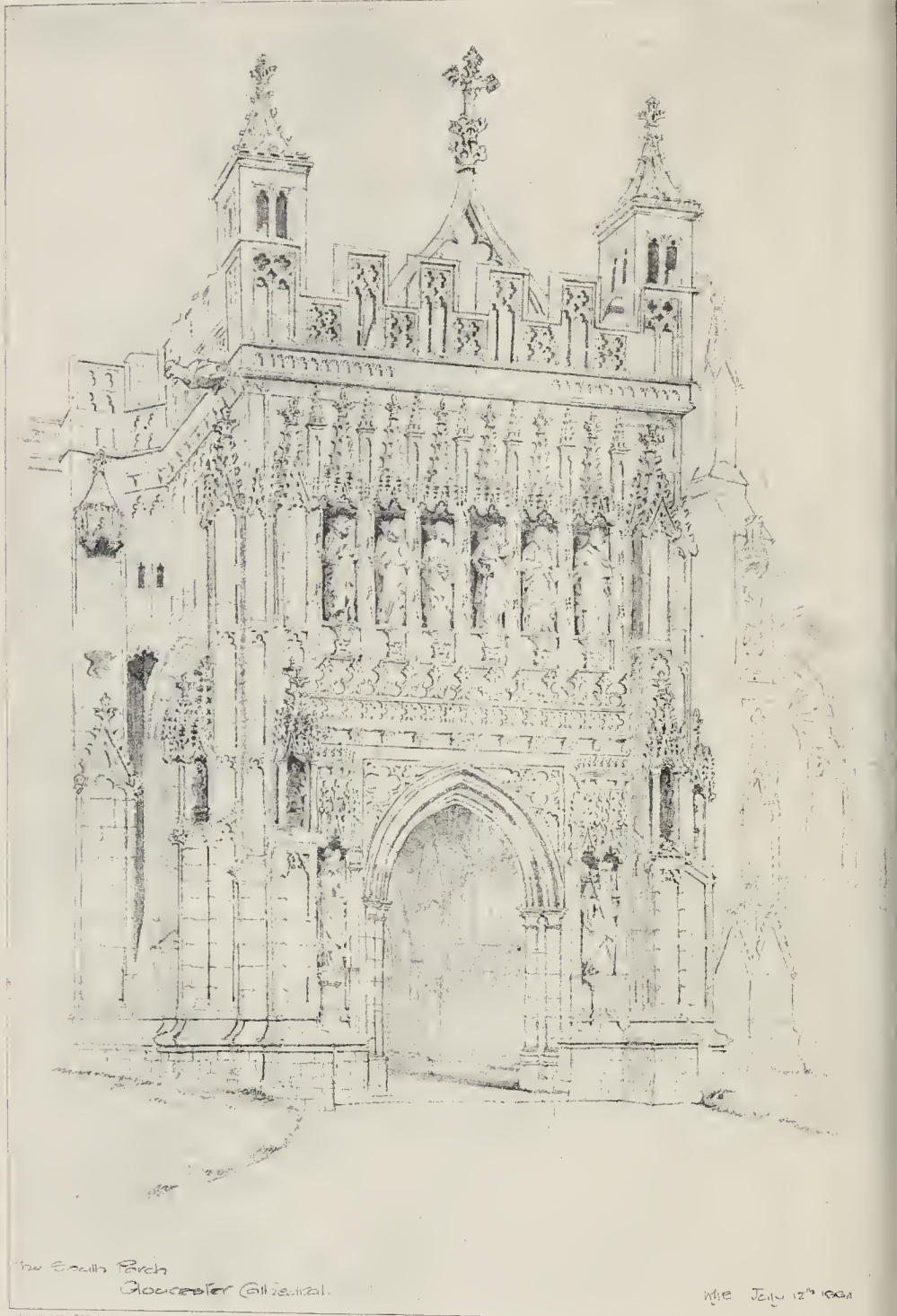
York Architectural Association.—At the meeting of this Association, on the 19th inst., Mr. H. Thorp, of Leeds, read a paper on "Colours in Decoration." Mr. Pollard, the President, occupied the chair.

Edinburgh Architectural Association.—The usual fortnightly meeting of the association was held in the Professional Hall, on Monday evening. The President, Mr. G. Washington Browne, was in the chair, and, after some preliminary business, introduced the lecturer, Mr. J. C. Watt, who took for his subject "The Poetic Aspects of Architecture." The lecture was concluded by a reference to the characteristics and emotions common to poetry and architecture, particularly sublimity, symbolism, and association.

Glasgow Architectural Association.—The lecture of the session was by Mr. William Paton Buchan, his subject being "Internal Plumber-work." There was a good attendance, and the vice-president occupied the chair. Plumber-work, Mr. Buchan said, was much less generally understood than the kindred subjects of drain and Sanitary Engineering, and slowly but surely ousting role of thumb. The long-wishes for sanitary regulations now proposed by the Corporation were, almost without exception, commended. These, if decided upon, would place Glasgow among the foremost of cities in this respect.

Dundee Institute of Architecture.—Prof. Canclley delivered an interesting lecture before the members of this Institute on the 18th inst. His subject was "Some Chemical Facts Connected with Plumber-work in Dwelling-houses." The lecture was chiefly devoted to a discussion of the corrosive action of various kinds of water on lead, copper, and zinc.





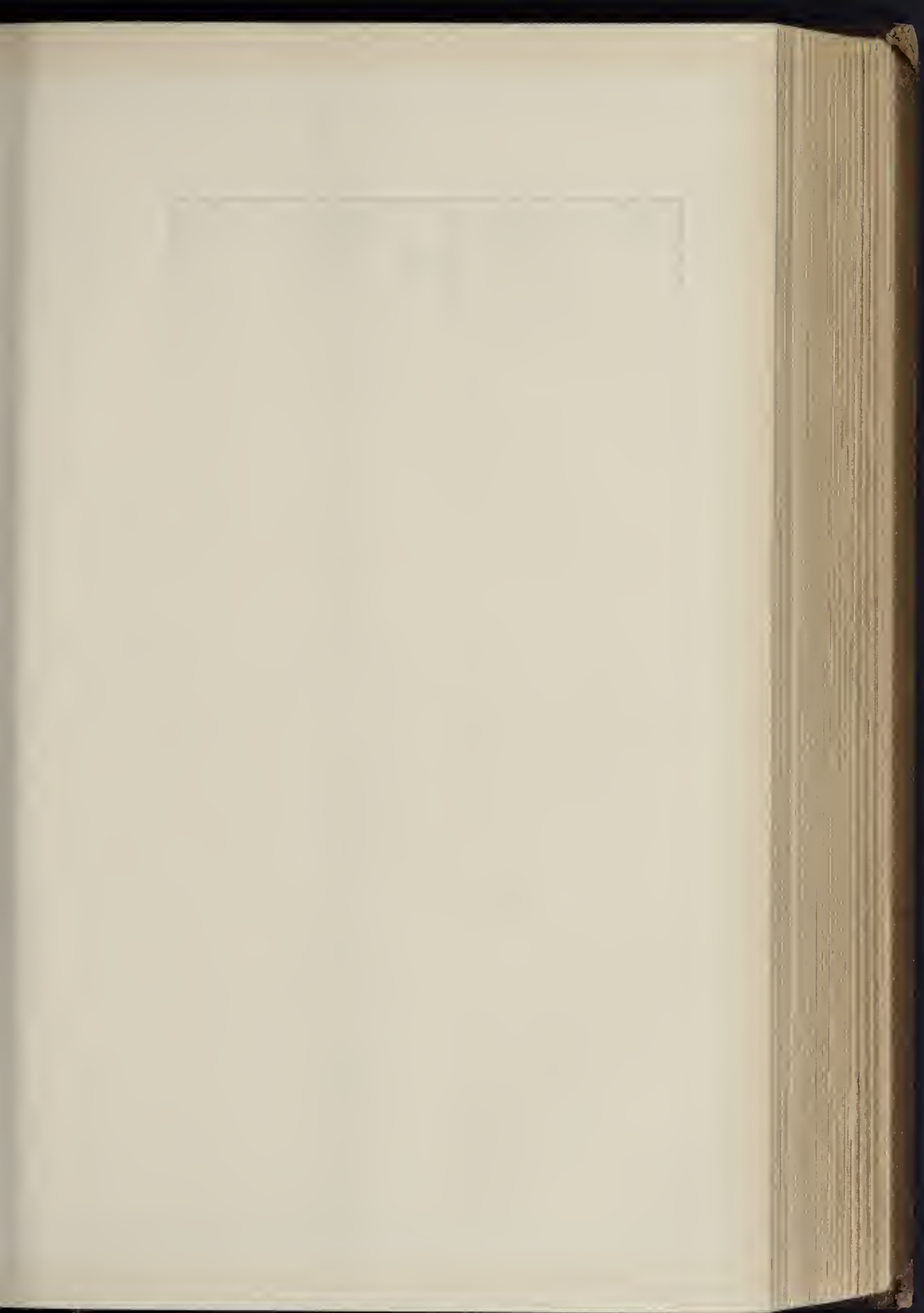
The South Porch
Gloucester Cathedral.

W.H.B. Jan 12th 1884

INK PHOTO. SPENCER & CO. LONDON

SOUTH PORCH, GLOUCESTER CATHEDRAL.

SKETCH BY MR. W. H. BIDLAKE.



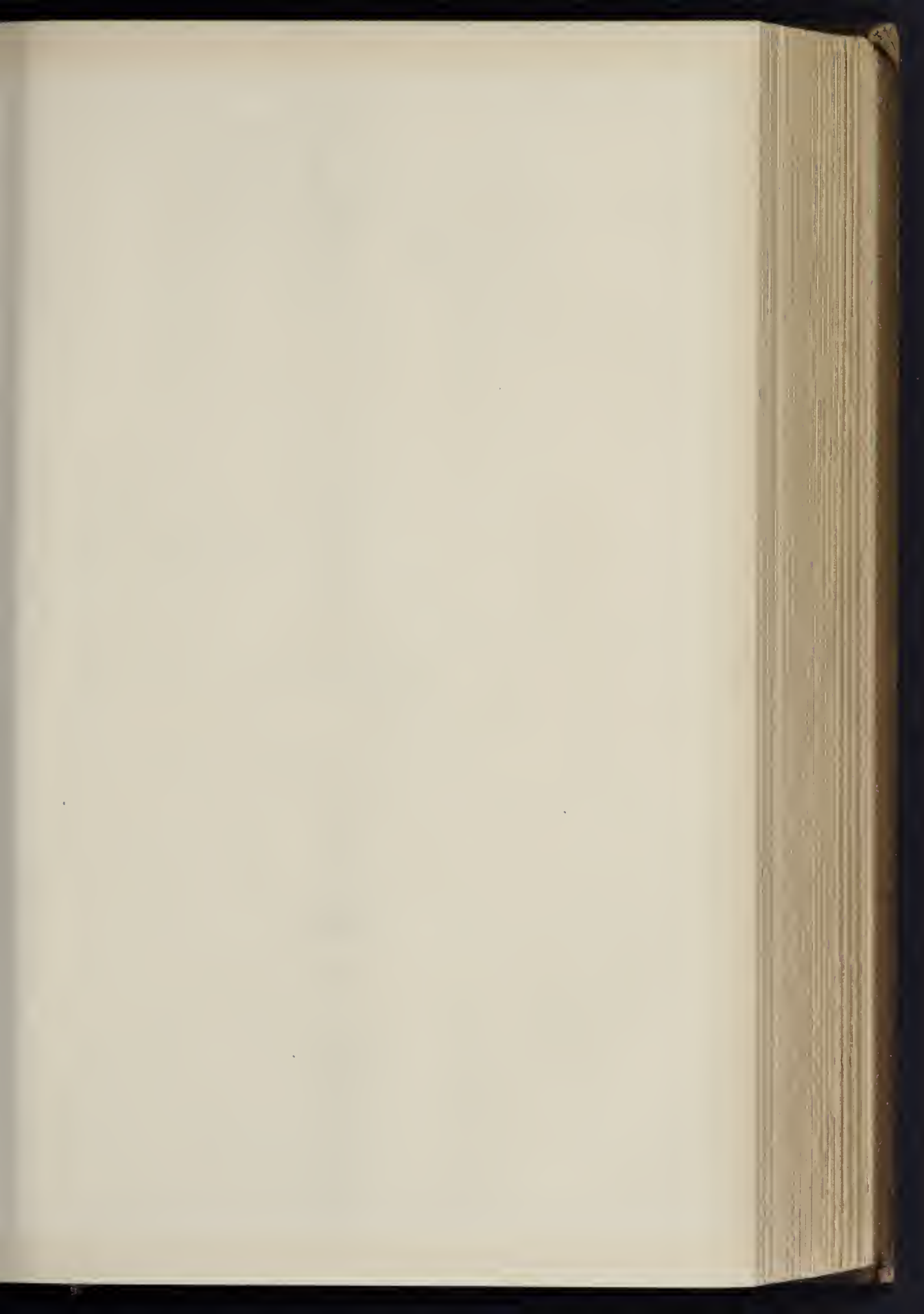


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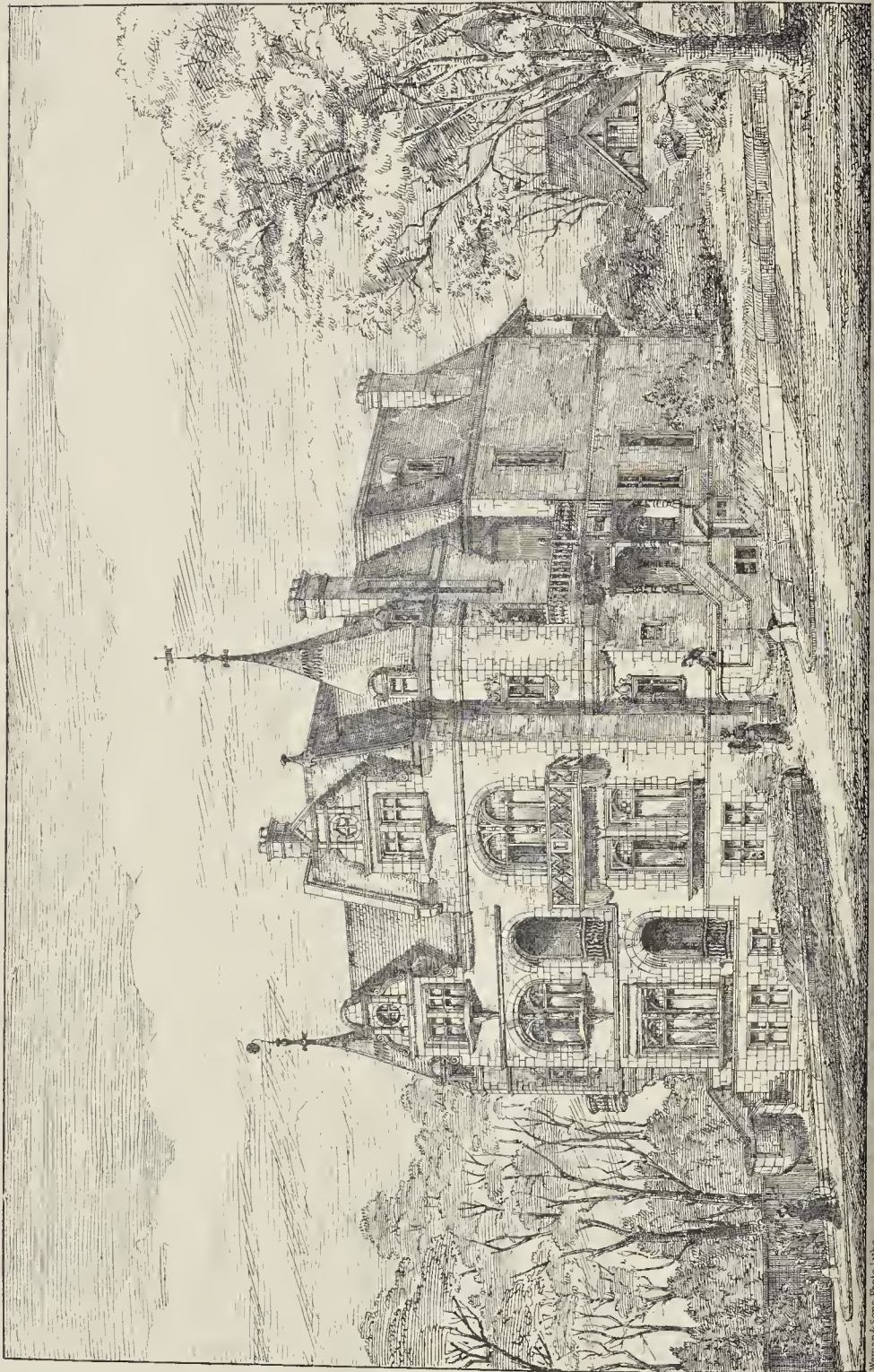
Owen W. Davis.

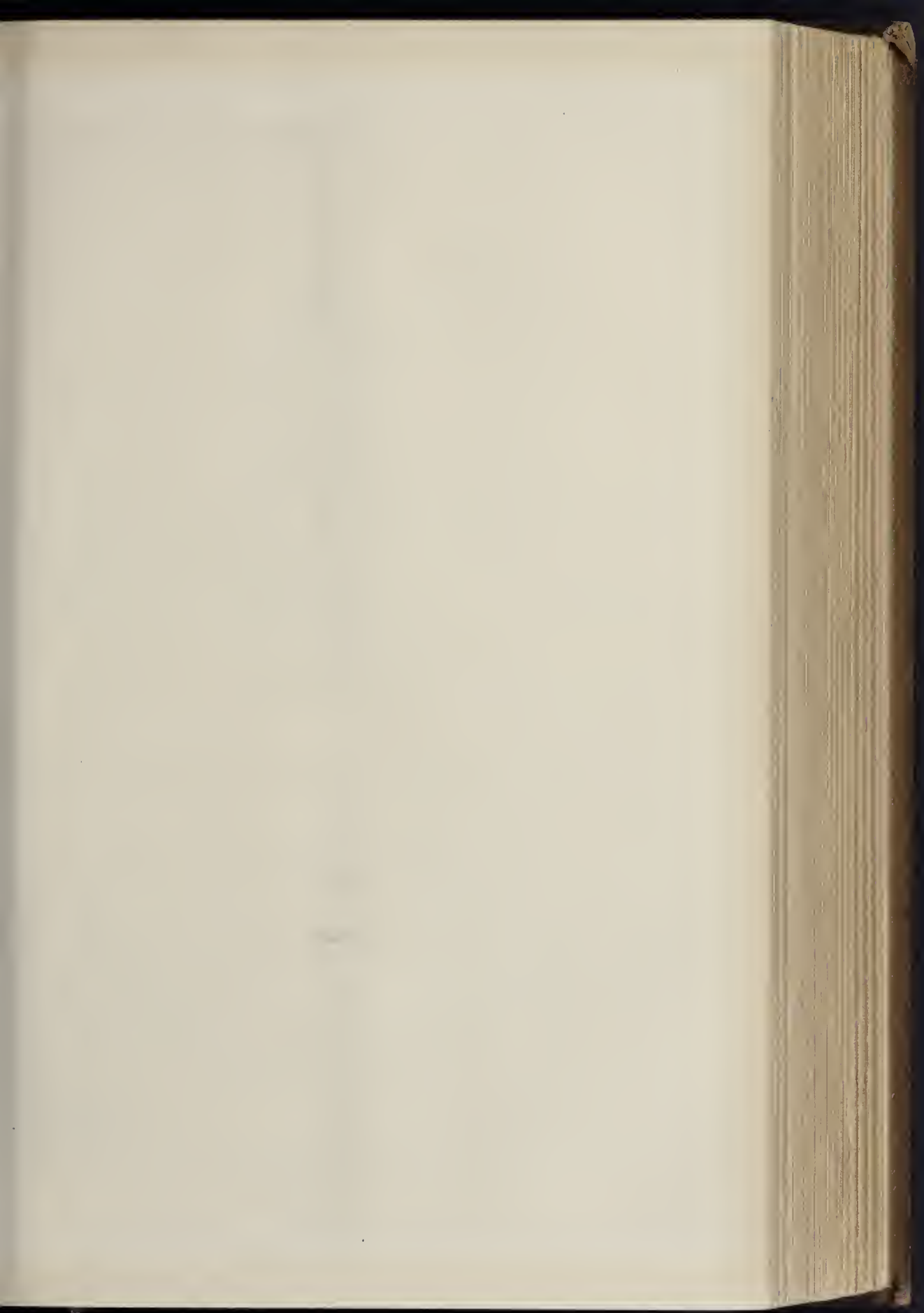
ITALIAN FOUNTAINS, VASES, ETC.

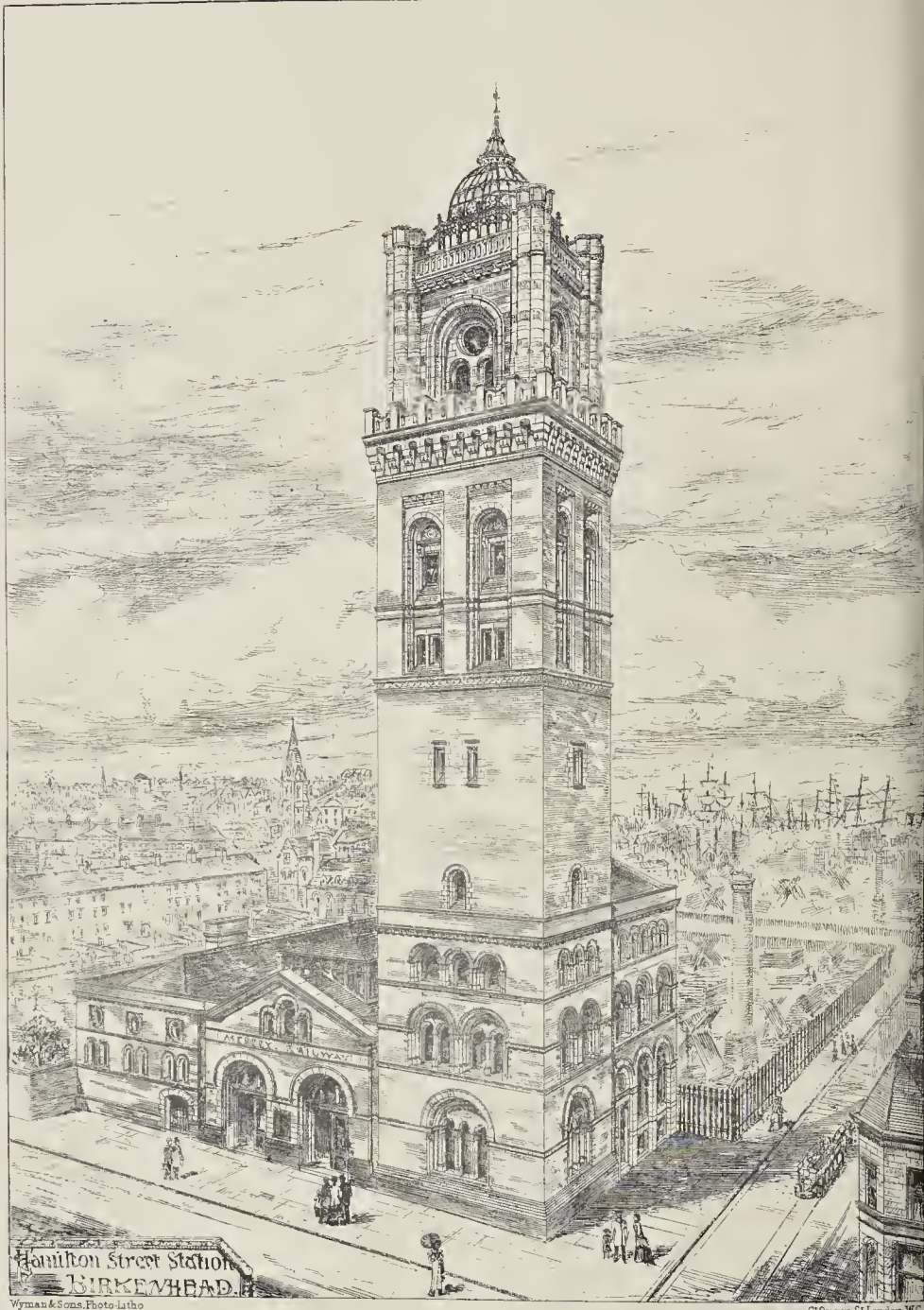
From the "Hyperonachia."



THE BUILDER, FEBRUARY 26, 1895.







Hamilton Street Station
BIRKENHEAD.

Wyman & Sons, Photo-Litho

© Queen St London W.C.

MERSEY TUNNEL RAILWAY STATION, BIRKENHEAD.

MR. G. E. GRAYSON, ARCHITECT.



MERSEY TUNNEL RAILWAY STATION, JAMES STREET, LIVERPOOL.

MR. G. E. GRAYSON, ARCHITECT.

Wyman & Sons, Photo Litho seen S^o London, W.C.

O'Queen S^o London W.C.



TRANSVERSE SECTION

G. E. GRAYSON ARCHT. LONDON

MERSEY TUNNEL RAILWAY STATIONS: SECTION OF JAMES STREET STATION.

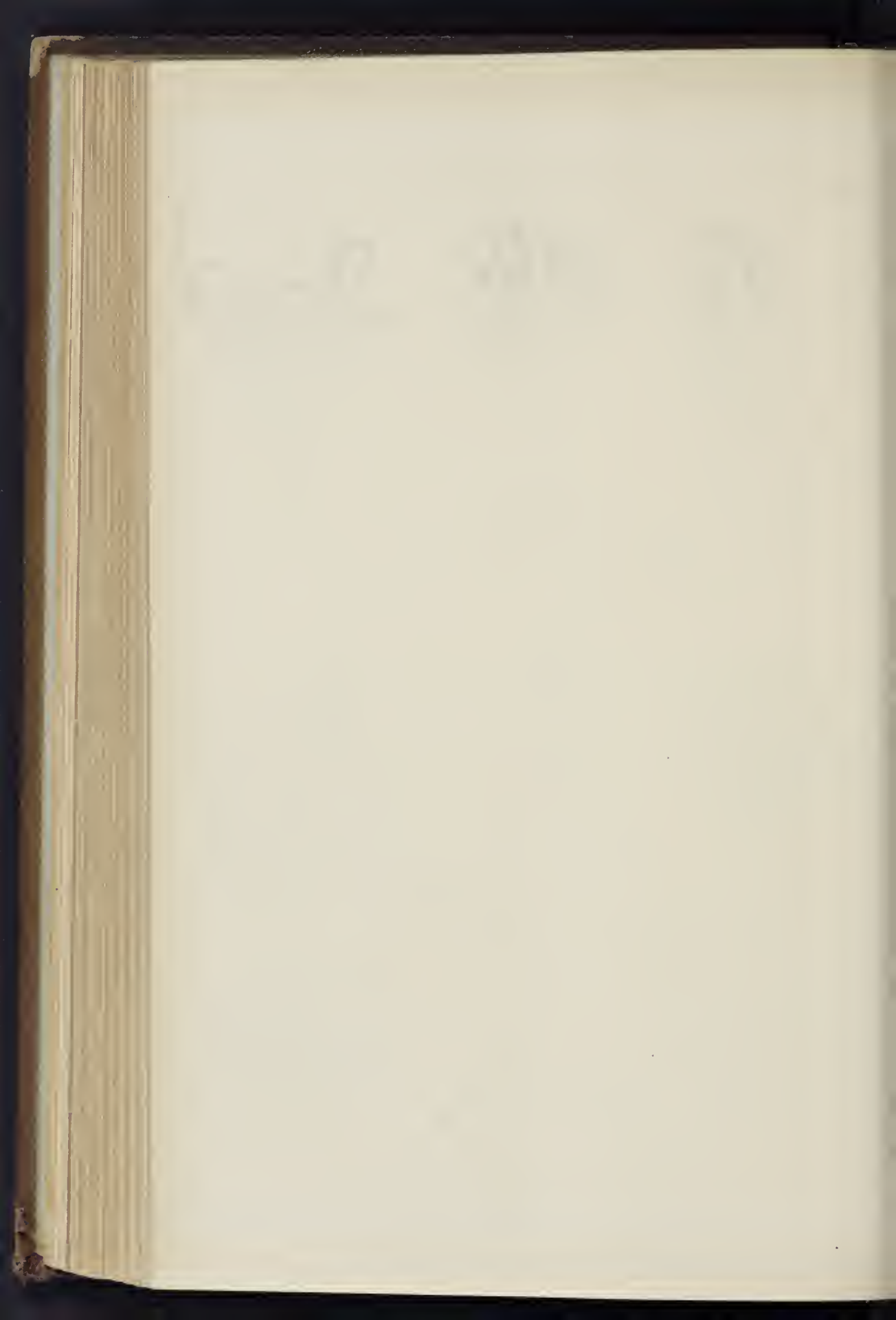
Mr. G. E. Grayson, Architect.



in k Sons, Printers, Queen St.

Owen W. Davis. del

ANIMALS, PLANTS, ETC., FIFTEENTH-CENTURY WOODCUTS.





TOWER AND PORCH, ST. MARY'S, LEICESTER.

SKETCH BY MR. W. H. BIDLAKE.

ROMAN RENAISSANCE.*

I beg to introduce to your notice some account of the ecclesiastical architecture of Rome during the sixteenth, seventeenth, and eighteenth centuries. My reason for choosing such a subject is that it was suggested by the competition for the new Oratory Church at Brompton, which took place in the year 1878; and in the particulars furnished for the guidance of the competitors the first clause was to the effect that the style should be "Italian Renaissance." In response to this invitation a number of gentlemen (about forty) furnished designs of unusual merit, but, on careful examination of the drawings during the time they were exhibited to the public, the impression conveyed to me was that the words "Italian Renaissance" were not quite grasped by some of the competitors, whose designs were in the style of the old basilicas, while others savoured of the Byzantine and Romanesque character. I thought, therefore, that as Rome is considerably removed from the city of London, and that to visit it means a sacrifice of a deal of time to the younger members of this Association, an account of some of the principal churches erected in that city during the before-mentioned periods would not be uninteresting. You are already fully aware that Gothic architecture never took root in this most interesting city of the world, for during the period of Pagan Rome such a style was never dreamed of; and, secondly, on the Romans being converted to Christianity, they found their ancient temples and basilicas very convenient and suitable for the functions of the newly-embraced faith, and so they continued to use them, restoring or rebuilding such portions as was demanded by the destroying hand of time, until the rebuilding of St. Peter's, about the year A.D. 1500, when our Perpendicular architecture reached the zenith of its glory. This circumstance was an event of considerable moment in the history of the revival of Classic architecture in Italy. Artists and sculptors (for I believe architecture was not practised at this time as a distinct profession) were called in from every direction, in some cases to patch up, and in others to pull down, the existing churches, and to furnish new designs after the model of the great cathedral, but on a very diminutive scale; that is to say, every church should, if means permitted, be crowned with a cupola; while in the other cases the dimensions and historical interests connected with such buildings as S. Paolo fuori le Mura (St. Paul outside the Walls), St. Giovanni in Laterano (St. John Lateran), S. Maria Maggiore (St. Mary Major), made the question of rebuilding too serious to be entertained, but they were, nevertheless, subjected to such additions and alterations after the new style that in some cases all traces of the original structure had fled. Take, for instance, S. Giovanni. This basilica was founded by Constantine at the instigation of St. Silvester in the fourth century, who is said to have personally assisted in digging the foundations. The façade was designed by Alessandro Gallilei in 1734, and the whole of the interior was metamorphosed by Borromini (who appears to have had the lion's share of architectural practice) in the same degree that Winchester Cathedral was under the direction of the talented Bishop, William of Wykeham. The dimensions of this church are very large, consisting of five aisles, originally divided by stone or marble columns, which in the middle of the seventeenth century showed signs of weakness, and Borromini was then consulted. In the emergency he suggested the idea of encasing the columns, and filling up every alternate arch with solid masonry, and facing the nave walls with plasters of the composite order, reaching from the floor to within a short distance of the ceiling. These solid piers were adorned with large niches of a very debased style of art, and in which were placed statues of the Apostles, of colossal dimensions. This arrangement was finally carried out, and if we could only overlook the shortcomings in the detail I think we must confess that the architect displayed high ability in his manner of dealing with the awkward task placed before him. The great ornament of this church is the first chapel on the left-hand side, and known as the Corsini Chapel. It is square on plan, but has

a large recess on each of the four sides, thus giving it the form of a Greek cross, the whole is surmounted by a cupola, and adorned with paintings and marble of the most precious description. It is really one of the treasures of Rome, and every architectural student who is privileged to visit that city should not forget to fix it indelibly on his mind as well worth seeing.

The next church of importance is that of S. Maria Maggiore, but as this basilica has experienced little or no alteration since the date it was founded, A.D. 352, I cannot dwell upon it here, except to allude to such portions as would fall under the title of this paper: consequently I beg to call your attention to the Chapel of the Blessed Sacrament, commonly called the Sixtine Chapel. It was erected from the designs and under the direction of Cavalier Fontana (one of the most gifted architects of his time), and in my estimation this work is not equalled by anything else in the city of Rome. Its plan is most beautifully conceived, and its interior elevation and decorative treatment is certainly equal in merit to the plan. It is one mass of marble, gold, and fresco, so beautifully and tastefully arranged that the eye of the most educated artist could not be offended at it. I have the good fortune to possess both a plan and a section of it, which are also displayed in De Rossi's collection of chapels. There can exist no doubt but that this gem is the acme of perfection in the Renaissance style of architecture, and what every architect at the period would have done if his ability and the means at his disposal permitted it. Its *ris-à-vis* is that known as the Borghese. It is very similar in plan to the other, but not so rich in treatment. It is, nevertheless, an important adjunct to this ancient and magnificent church, where any young and enthusiastic disciple of architecture could take up his quarters for a couple of months and well occupy his time by carefully delineating the multitude of precious works of art, both plastic and polychromic, which present themselves at every nook and corner within its sacred walls. I would now be anxious to dwell on the merits of San Paolo fuori le Mura, and also on those of San Lorenzo, but the subject of this paper will not permit me: consequently I must pass them over in silence and give place to recent structures, which more particularly concern my subject.

The plan of the churches during the period of the three centuries mentioned at the commencement of this paper was governed in no small degree by the site upon which the church was to be built. If the ground would permit, it was a repetition on a small scale of St. Peter's; that is to say, the plan should be rectangular,—the nave and transepts forming the cross, and the intersection being crowned by a dome, with the aisles utilised as chapels; in fact, very similar to that of the Oratory Church. And if the site was very irregular (which frequently happened), and would not permit of a Latin-cross plan, it was made either circular or octagonal, with all the outlying corners utilised as sacristies and offices, which, in most cases, were ingeniously dealt with, only we must bear in mind that it must have a cupola.

These octagonal or circular churches are so numerous, and so worthy of being imitated, that I think it would furnish quite sufficient material for a separate paper. In our own country, when an idea is entertained of erecting a church, a piece of ground is purchased that would, if possible, admit of the fabric standing detached, with light and air, and perhaps a burial-ground, surrounding it, but this arrangement in Rome was seldom if ever indulged in at this period, a custom arising, no doubt, from the fact that the city was surrounded by a wall, which naturally in troublesome times increased the value of the land to such an extent as to render this luxury impossible; so that, as a rule, they were packed in between and lacked up by a host of dwellings in such a manner as to deprive us of forming an idea of what the external architecture of these churches might have been, had circumstances permitted the architect the indulgence of an undisputed area (excepting the façades, to be alluded to hereafter). This misfortune may probably account for the conspicuous absence of side windows and the recourse to top lighting. If this assumption is correct, I must only repeat the old adage "That out of evil comes good,"

for we must all admit that the most satisfactory method of illuminating a large building is either by obtaining light from above or by some large opening over the entrance end. In the South of Europe this question is more easily disposed of than is possible in the City of London, in consequence of the brilliancy of the atmosphere with which the former is favoured. Our own St. Paul's to wit; for I do not hesitate to say that, did its cupola exist in Southern Italy, the cartoons which are now being exhibited to the public and placed *in situ*, intended as a suggestion for its future embellishment, would be fully seen and appreciated by the public, but which I fear (and I regret to say it as they are so beautiful) will be lost for ever in a region of darkness. The usual method of covering the churches of Rome is to give them a wagon-headed ceiling of concrete, penetrated by smaller jack-vaunts, a necessity caused by the clearstory windows. Now this arrangement of covering the nave gives the architect a considerable amount of responsibility and also anxiety, in consequence of the immense lateral thrust exercised by the vault, for it must be remembered that the builders of this age had not the opportunity of using Portland cement, but were confined to the ordinary lime and pozzolana and thin brick in use at this date, about 14 in. to 1½ in. thick; with these materials it was necessary that the vaulting should be of great thickness so as to secure efficient strength and stability. In one case, where I had the privilege of going up into the roof, it gave me an opportunity of making an examination of the material itself, and I found it composed of coarsely-made concrete, 2 ft. thick at the crown instead of 7 in., which I have ventured to risk at the Oratory Church. Notwithstanding this great thickness of material there was a rent running the whole length of the nave, threatening the utter destruction of the building, and to prevent such a catastrophe the springing of the vault was secured by wrought-iron ties, 3 in. square on section.

Having described the principles which actuated the architects of this age, I think I may now allude to and describe some of the churches erected by them, which I would consider as typical of the style of the period, and which could be more or less imitated with advantage in this country, only I must caution you to beware of the so-called ornament of the later period, for if you study that you will be sure to fall, as it is impossible for any one to imagine a more grotesque and monstrous medley than is exhibited scattered broadcast over some of these buildings and altars, utterly disfiguring and destroying what might have been, in the case of its absence, a very fair specimen of architecture. This disease arises from the thirst for light and shade, anything that would break the tranquillity of architectural lines; in fact, it may be summed up as a sculptor's notion of architecture, such as I have frequently seen in many cemeteries, designed and executed by "monumental masons." The refinement acquired by Greece was entirely ignored, and the glorious examples with which they were themselves surrounded were passed by unheeded. Severity, grace, and delicacy were all sacrificed for this carved rubbish, no matter how different it may be.

But notwithstanding these blemishes, the interiors of the churches of Rome have and will continue to excite an interest to the traveller which we certainly cannot boast of in the case of our few examples of Renaissance churches at home, because, in the first place, there is no admission to them except on Sundays, and even if it were otherwise, there remains little or nothing to be seen. The first church I shall describe is that of St. Ignazio, designed by Padre Oratio Grassi, and commenced 1626; it is one of the most important in the city, and belongs to the order of Jesuits, having an internal length of 270 ft. with a nave 60 ft. wide and 100 ft. high. The proportions of this church I consider excellent, and the general arrangement is very simple, having the cross formed by the nave and transepts; in each aisle are three chapels, with two additional ones on each side of the sanctuary, all crowned with a small cupola. The pilasters in the nave are of the Corinthian order, fluted, and rest on the floor, not on pedestals; this arrangement answers exceedingly well in a church where fixed benches and pews are practically unknown,

* Possibly the sculptors will demur to being classed with "monumental masons."—Ed.

* A paper by Mr. H. A. K. Gribble, read at the meeting of the Architectural Association on the 20th inst., as elsewhere mentioned.

organise an excursion or a series of excursions to Rome and other cities of pre-eminent interest to the student of architecture.

Mr. J. A. Gutch, in supporting the vote of thanks, remarked, with reference to internal colour-decoration, that such specimens as he had seen of it, at any rate in Gothic structures, did not encourage one to be enthusiastic about it. Very possibly in Classic structures, where there were larger masses, and the lines were not so numerous, the use of colour might be made more satisfactory, but in Gothic the multiplicity of the constructional features militated against the successful use of colour. In the Chapel of the Hospital of St. Cross, near Winchester, for example, the constructional lines had been quite obliterated or concealed by the colour which had been applied. Mr. Gribble had awarded the palm for Gothic steeples to Antwerp, but he (Mr. Gutch) could not agree in that award, although the Antwerp steeples were very wonderful; but he quite concurred in the enlogium which had been passed upon the steeple of St. Mary-le-Bow, Cheapside. While agreeing with what had been said as to the value of the study of the Renaissance churches, he thought it would be a long time before we had another era of Renaissance church-building in England.

Mr. G. Richards Julian believed that we were approaching a period in which Classic architecture would meet with increased favour. In his opinion, the reason why Classic architecture had hitherto so egregiously failed in this country was that our architects had allowed rules and formulae to become their masters instead of making them their servants. It should be remembered that the Italian Renaissance of the fifteenth century was coeval with the commencement of the modern world. We belonged to the modern world, and he believed that in the long run Renaissance architecture would not fail to assert itself and come to the front. But he was very sorry to see that in the present revival so very much attention was being paid to the Dutch and Early German Renaissance,—commonly called "Queen Anne," though it was not "Queen Anne." There was much that was picturesque and quaint in that kind of work, but the fault that he found with it was that the architects who designed it, instead of aiming at beauty of proportion and refinement of detail, aimed exclusively at mere "quaintness," which in the works copied from was often the result of grotesque proportions and coarse detail,—defects due to the ignorance of the old builders. It seemed to him to be a great pity that men of undoubted genius should allow themselves to imitate false proportions and ungraceful detail.

Mr. G. H. Bagrove, having said a few words as to what he regarded as the sometimes unhappy effect of entasis on pilasters, the motion for a vote of thanks to the reader of the paper was carried, with much applause, and Mr. Gribble briefly replied.

COMPETITIONS.

Proposed New Training College, Norwich.—The Committee of Management, with the assistance of their assessor, Mr. Ewan Christian, subject to certain modifications in respect of arrangement, and to conditions as to verification of estimate, have provisionally accepted the design of Messrs. Oliver & Leeson, of Newcastle-on-Tyne, architects. They desire to thank the other architects from whom they have received plans for the trouble they have taken in preparing their designs.

London Endowed Schools.—This competition has at last been decided. Forty-six designs were received, including one from an architect in Buffalo, U.S. The governors examined them in the first instance, and made a selection of six, but afterwards called in Mr. Reyle, architect to the Manchester School Board, and Mr. Lewis, of Newcastle, to give independent reports on the whole forty-six designs. Each of the reports placed the design marked "Bona fide" first, on the ground of excellence of plan and architectural treatment, but expressed doubts whether it could be executed for the stipulated sum of 2,000l. The governors, therefore, called upon the author (who was found to be Mr. Charles Bell, F.R.I.B.A., of London) to prove his estimate at his own cost before adopting his plans. This Mr. Bell has done by obtaining estimates, the lowest being 1,784l., to which was added the cost of desks, bell, and sundry

fittings, amounting to 268l., making a total of 2,047l., including cost of quantities, without which the amount would be 1,997l. The governors, therefore, have appointed Mr. Bell their architect, and the works will be proceeded with at once in strict accordance with the competition plans.

Newbury District Hospital.—Designs by ninety-four architects were received in this competition, and were carefully inspected by Mr. Alfred Waterhouse, A.R.A., who selected eight designs for further consideration, viz., those by the following:—Messrs. Beazley & Burrows, Mr. C. W. Montford, Messrs. Newman & Newman, Mr. J. B. Phillips, Mr. H. G. Turner, Messrs. Webb & Tubbs, and Mr. W. H. Woodruffe. Mr. Waterhouse eventually gave his decision in favour of Mr. Henry G. Turner, of 1, Great James-street, London, W.C., and the Trustees, acting on this advice, have determined to adopt Mr. Turner's plans and employ him as their architect.

Abingdon Cottage Hospital.—The design of Mr. Charles Bell, F.R.I.B.A., of London, has been selected for the building out of six submitted in limited competition. The hospital will be erected at the cost of Mr. J. C. Clarke, M.P.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

The eighteenth annual meeting of this excellent Institution was held on Tuesday evening last at the new offices, 21, New Bridge-street. The President elect, Mr. James Greenwood (of the firm of J. & J. Greenwood), in the chair, supported by the outgoing President, Mr. Joseph Randall (Kirk & Randall), and Messrs. Thos. F. Rider, Thos. Stirling, T. Bishop, E. Brooks, J. Robson, Burchell, C. K. Turpin, G. Bugg, and other friends and supporters. Letters expressing the regret of their writers at their inability to be present were read from Mr. Edward Conder and Mr. Arthur Cates, F.R.I.B.A., the latter congratulating the committee on being able to present so gratifying a report.

The report and balance-sheet, read by the secretary, Mr. H. J. Wheatley, showed that the Institution has been increasingly successful during the past year in enlisting sympathy and support, though, as was pointed out by one or two of the speakers at the meeting, there are large numbers of builders' clerks who do not subscribe to the Institution. The report, after expressing the indebtedness of the Institution to the outgoing President, Mr. Joseph Randall, stated that the amount of the annual subscriptions is to the charity during the year was 271l. 15s.; of donations, 397l. 7s.; and of dividends on Stock, 70l. 2s., making altogether the sum of 739l. 4s., being an increase of 88l. 7s. 5d. over the total of the preceding year. In addition to the foregoing amounts, the committee have received the sum of 99l. 4s. 1d., being the legacy (less duty) bequeathed by the late William Phillip Ward, whose nephew, Mr. Thomas Peto Ward, was directly instrumental in founding the Institution. The disbursements during the year amounted to 266l. 18s., expended in pensions and temporary relief; while the general expenses for rent, printing, advertising, secretary's salary, collector's commission, &c., amounted to 23l. 10s. On the course of the year, two additional pensioners (viz., Mrs. M. E. Robinson and Mrs. A. P. Friend) have been elected on the Relief Fund, bringing up the total number of pensioners to fourteen, the males receiving 25l., and the females 20l., per annum. An election had also taken place in connection with the Orphan Fund, the result being that Edith A. M. Friend was elected and was duly nominated a scholar in the Orphan Working School (per presentation of the Institution), in succession to Ethel M. Jeffreys, whose school-term expired at Christmas. At the annual festival, held at the Holborn Restaurant, the sum of 418l. 2s. 6d. was obtained in response to the earnest appeal of the President of the year (Mr. Joseph Randall). The report concluded with the announcement that Mr. James Greenwood had consented to accept the office of President for the coming year.

The Chairman, in moving the adoption of the report, expressed his determination to do all he could to further the prosperity of the Institution, especially in the way of setting forth its claims upon builders' clerks as a body.

Mr. Thomas F. Rider, in seconding the motion, suggested that the Institution, prosperous as it was, might be still more useful and prosperous if means were taken to make its objects widely known. Possibly, too, the time had arrived when the committee might take into consideration the advisability of increasing the pensions from 25l. to 30l. for the men, and from 20l. to 25l. for the women.

The report and balance-sheet were unanimously adopted, and on the motion of Mr. Thomas Stirling, seconded by Mr. Edwin Brooks, a vote of thanks was given to Mr. Randall for his services as President during the past year.

On the motion of Mr. Burchell, seconded by Mr. G. Bugg, Mr. James Greenwood was elected

President; Mr. Edwin Brooks was re-elected treasurer; Messrs. G. Bugg, B. C. Fox, J. C. Holding, E. W. Holland, E. C. Roe, and T. W. Winney, were re-elected to serve on the committee; and Messrs. S. J. Thacker, T. Stirling, and T. Bishop were re-elected auditors; and a vote of thanks (proposed by Mr. E. C. Roe, and seconded by C. K. Turpin) was given to Mr. Greenwood for presiding.

ELECTION OF A DISTRICT SURVEYOR.

At the meeting of the Metropolitan Board of Works on the 20th inst., the first business was the election of a District Surveyor for the District of South-east Deptford, in the room of the late Mr. John Whichcote. There were thirty-one candidates, viz., Messrs. A. Ashbridge, T. Batterbury, H. H. Bridgman, C. W. Brooks, H. Cheston, S. F. Clarkson, J. S. Edmeston, G. Edwards, R. F. C. Francis, W. Grellier, J. Hamilton, W. J. Hardcastle, A. Harland, E. Hazelhurst, G. Inskip, G. Jackson, L. Karslake, G. A. Lean, W. H. Lees, H. Lovegrove, H. McLauchlan, E. Marsland, T. E. Mundy, R. C. Murray, W. H. Nash, O. Renton, W. Smallpeice, W. L. Spiers, W. H. Stevens, H. W. Stock, and E. Street. These were first reduced in the usual way by voting on all the candidates, and retaining the six who received the highest number of votes, who were Messrs. A. Ashbridge (27 votes), S. F. Clarkson (22), W. J. Hardcastle (25), W. H. Lees (29), E. Marsland (25), E. Street (26). The subsequent voting was as follows:—

	Second	Third	Fourth	Fifth	Final
	Vote.	Vote.	Vote.	Vote.	Vote.
Ashbridge.....	27	21	—	—	—
Clarkson.....	16	10	—	—	—
Hardcastle.....	15	—	—	—	—
Lees.....	29	30	30	—	—
Marsland.....	24	21	24	21	16
Street.....	24	21	18	11	—

Mr. Lees was therefore declared elected.

THE "MAGASINS DU PRINTEMPS."

SIR,—Permit me to compliment you and your artist, Mr. Cooper, on the very excellent example of wood engraving,—the "Magasins du Printemps,"—in the *Builder* of the 21st instant. For an architectural illustration nothing could be better. J. MURGATROYD, F.R.I.B.A.

Manchester, Feb. 23, 1885.

** We have had other evidence that the views we expressed in our leading article of January 3rd as to the merits of wood-engraving as a means of illustration are shared by some at least of the architectural profession; and Mr. Cooper certainly merits a compliment for thorough and conscientious execution of this class of work.

THE ROYAL ARMS.

SIR,—The circumstances following may be worthy of your notice in connexion with Mr. E. Cockburn's letters printed in the *Builder* of the 24th of January last [p. 152] and the 21st of February current [p. 284]. A few days before the royal review which was held on the 25th of August, 1881, in the Queen's Park, Edinburgh, her Majesty ordered that the standard to be hoisted at the saluting-point should be the Royal Standard of Scotland, and not that of England, bearing in its first and fourth quarters "the ruddy lion rampant in gold." Our sovereign's interposition proved the more grateful, inasmuch as many countrymen's susceptibilities had suffered through the raising of the English standard on a similar occasion, "in that" same place, about twenty-five years ago. M. OF M.

SIR,—In thanking Mr. Cockburn for the trouble he has taken in answering my inquiry about the Royal Arms in Scotland, permit me to say that Lower is the authority I referred to, but owing to his "Curiosities" not being indexed it was only by accident that I came across it a few days since. It mentions that on the accession of James VI. to the English throne a great controversy arose between the Heralds of the two nations as to which should use the first quarter, and that the matter was referred to Sir William Segar, who produced a learned treatise of *imaginary heraldry* by tracing the lions of England and Scotland back to 1500 years before the Christian era! Much must have been highly gratifying to the dwellers North and South of the Tweed respectively, and to his Majesty in particular. J. B.

"Black, White, and Red Lead."—This was the title of the third of the present series of free lectures to artisans, which was delivered by Professor Church at Carpenters' Hall, on Wednesday evening. We defer our report.

"NON-ACCEPTANCE OF LOWEST TENDER."

SIR,—With reference to the letters of "Fairplay," 133, Mr. Wm. White, F.S.A., p. 217, and Mr. W. Hoffmann Wood, F.G.S., p. 252, of your journal, an either of the two latter gentlemen quote a case where damages have been obtained by a contractor who was invited, and whose tender, although the lowest, was not accepted? I was invited by a firm of architects at Bedford to tender for the erection of a steam-mill at that place; and, although my tender was the lowest (and verbally accepted), I received two days later a letter from the architects that their client had accepted a higher tender, and upon asking for an explanation of such extraordinary proceedings, was told that it was on the ground that the accepted party was a neighbour.

I may add that at the foot of the invitation were these words,—"The lowest tender will not necessarily be accepted."

CONTRACTOR.

SIR,—The statement I made in my letter of the 14th inst. [*Builder*, p. 252] is perfectly correct. I shall be glad to give "Bona Fides" my authority if he will write to me.

W. HOFFMANN WOOD, F.G.S.
14, Park-square, Leeds. Feb. 24.

FIREPROOF FLOORS.

SIR,—We note that in your otherwise favourable notice of our new Illustrated Catalogue of Constructive Ironwork in the *Builder* of last week [p. 253], you take exception to the fact that the iron beams shown in concrete floors have equal flanges at top and bottom, instead of having upper flanges of reduced area.

Without entering on the question of the relative merits on the flanges of joists thus used, we may point out that rolled joists of unequal flanges are not made, as such sections would be inapplicable to the majority of purposes for which iron beams are employed.

Of course, in cast-iron girders this difficulty would not occur, but equally cast-iron girders are not suitable for fireproof floors. With wrought-iron beams it is a different matter, as the rolls from which they are produced would have to be specially cut at very considerable expense to make this alteration.

ROWNSON, DREW, & Co.

DAMP DWELLINGS.

SIR,—In reference to Mr. Bird's letter (p. 252), "water finds its way through the roof, it may run down the rafter and be deposited on the top of the damp wall. See that the roof is sound, also the gutters.

If it should be unmistakable that the damp drives through the wall, give the outer surface a good coat of the following solution every three years:—one-third of a pound of paraffin wax to one gallon of benzoline. The wax must be dissolved in a portion of the benzoline over a slow fire, and must be applied on a dry warm day. Keep the solution from the air, as the benzoline evaporates rapidly. Pour out a small quantity for use, and add more benzoline as it evaporates. The paper should be washed off and not re-papered for twelve months, as all moisture at present in the wall will have to dry out inwards.

X.

The Student's Column.

DESCRIPTIVE GEOMETRY.—IV.

IN the early French Renaissance, roofs are seldom made to mitre at 45 degrees, but the narrow side is generally steeper than the long side; this is perhaps the secret of their elegance.

We may, therefore, have to find the intersection in plan and elevation of two roofs of different slopes, and even in cases where the

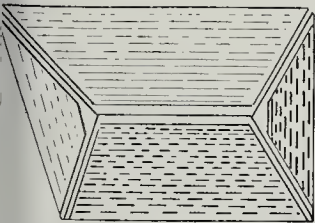


Fig. 20.

* Then why are they not made for this special purpose? is a waste of material, and an inert weight on the connection, to put them with large top-flanges into concrete, unless it is very bad concrete. A beam in good concrete really requires no top-flange.—Ed.

walls of the building, and therefore the eaves of the roof, are not at right angles, as in fig. 20.

The two following problems will show the method to be used:—

Find the intersection of the planes P and Q, of which the vertical traces belong to different elevations.

In this case we have two ground-lines L T and L' T', the horizontal traces of the planes

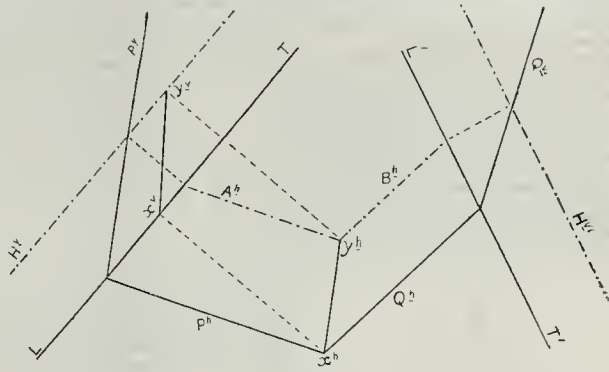


Fig. 21.

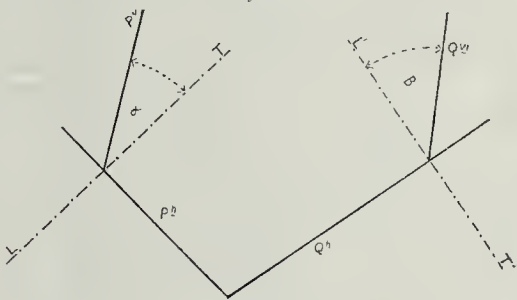


Fig. 22.

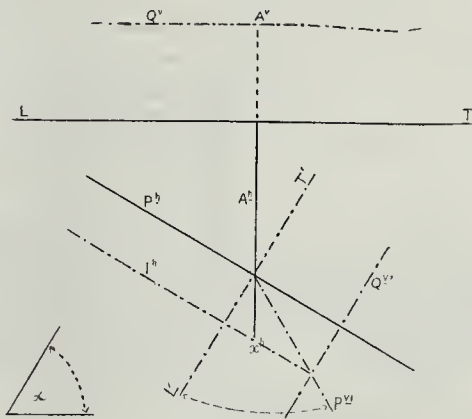


Fig. 23.

will be P^h and Q^h , but the vertical traces will be for the one P^v , for the other Q^h , which signifies that the trace of Q belongs to the elevation on line L' T'. To find the intersection of the planes P and Q we use an auxiliary plane, H, of which we can readily draw the intersections A and B with the planes given, for being horizontal lines, their plans A^h and B^h are parallel to the horizontal traces P^h and Q^h . The point y, where A and B meet belongs to the intersection of which x is another point; therefore the line x y is the intersection required, which we can draw both on the plan and on one of the elevations. (See fig. 21.)

The second problem is that of our Renaissance roofs.

Find the intersection of the planes P and Q given by their horizontal traces (eaves in case of roofs), and their respective slopes α and β .

We solve that problem by cutting the planes by two elevation planes on the lines L T and L' T' at right angles with the traces P^h and Q^h ; and, thanks to the angles of slope given α and β , we can readily draw the vertical traces

P^v and Q^v of the planes, so that the problem is brought back to the preceding one. (See fig. 22.)

Find in a roof plan the point where a straight line perpendicular to the elevation enters a roof the eaves and slope of which are given.

This is again solved by means of both an auxiliary elevation and an auxiliary plane: Let P^h be the eaves of the roof, the angle α its slope, L T the ground-line of the elevation, A the straight line the elevation of which is only a point A'. If we intersect our roof by an auxiliary elevation on the ground-line L' T' at right angle with the eaves we know its trace

P¹, thanks to the angle *a* of its slope. If we suppose an auxiliary horizontal plane, Q, passing by the line A, its trace on our elevation will be Q¹, and on our auxiliary elevation it will be Q² at the same height over L¹T¹ as Q¹ is over L.T. On the auxiliary elevation we see where the horizontal plane Q cuts our roof, and we can easily draw the plan L² of its intersection, for it is parallel to the eaves, the point x² is therefore the plan of the point where the line A enters the surface of the roof. (See fig. 23.)

Find the intersection of any straight line, A, with a plane, P, given by its traces.

For this you take an auxiliary elevation, the ground-line of which is A². This elevation plane will, of course, contain the line A itself. You get A² by drawing the elevation of one of its points b, b¹ being at the same height above A¹ as b¹ was above L.T. If we intersect the plane P by a horizontal auxiliary plane Q, we shall get a horizontal line l of P, which will cut the auxiliary elevation plane in c², through which the new trace P² passes. The point x², where this trace and the line A² meet, is the point of intersection required; its plan will be x² and its elevation x² at the same height above L.T. as x² was above A². (See fig. 24.)

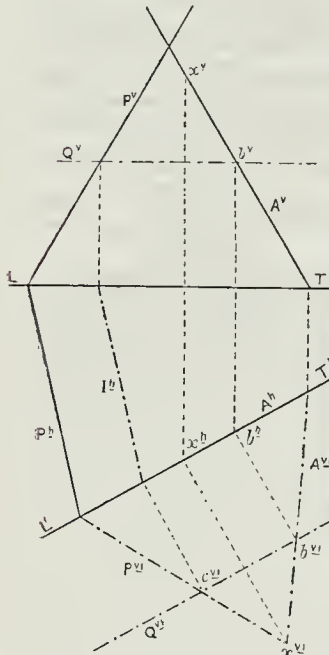


Fig. 24.

There are different ways of solving the above problem, but they all rest on the same principle; viz., take through the line an auxiliary plane, find the intersection of that auxiliary plane with the plane given. Where this intersection and the given line meet is the point required.

Books.

Spon's Architect's, Builder's, and Contractor's Pocket-book of Prices and Memoranda for 1885. Edited by W. Younge, Architect. Twelfth edition. London and New York: E. F. and N. Spon. 1885.

This very useful little book, which is really a "pocket" book, and compresses a great deal of information into a most conveniently small volume, is one of the most useful of the kind to architects, not so much on account of its price lists as for the amount and variety of useful memoranda on materials and methods and formulae which it contains. Some of the items are old-fashioned; the "orders" still appear in their pure Vitruvian form, and the words "Doric order" in the index still direct the reader to a form of architecture which no one

now overthinks of when speaking of "Doric." A tyro getting hold of the book might be entirely misled by this. Of course no architect would be likely to refer to a pocket-hook of this kind for "the orders"; but if this is retained as part of the contents of the book there should, at least, be some reference to the fact that the orders as given are Roman only, and that there is such a thing as Greek Doric, or rather Doric proper, with which the Vitruvian so-called Doric has really no affinity whatever. We have called attention to this before. The notes for arriving at the weight of castings are likely to lead some readers astray, if the pattern is of deal, as this varies so much in weight, some Gelfe deals being nearly as heavy as pitch-pine; patterns should be made of pine. There are also some notes on "Smoky Chimneys," page 32, that we think might be far added to. We live in a time of plenty, so far as advertised chimney-curers go, but the "universal cure" has not yet been made, though there are a good many calling themselves "universal," and they nearly all are chimney-tops, where, undoubtedly, in nineteen cases out of twenty, the chimney itself must be cured.

There are many new formulae and tables of strengths that are given from the best sources, and there are many well-known ones that altogether make up a great amount of useful information, and fill the first half of the book, in which the subjects are arranged alphabetically. The second part is devoted to a schedule of prices. We notice some notes on the value or cost of walling built of concrete blocks, the prices of which are good, but the prices of the "patent" concrete floors are very high, although they are the makers' own prices. In all cases it should be clearly shown whether the prices include contractor's profit; those on page 243 for brickwork seem in some cases low, if they are inclusive of this, while those on page 246 are high at 14s. 10s. per rod if all labour beyond laying is to be priced, and in many cases the prices are too high for use in valuing ordinary contract work.

The prices of timber are the most complete of any given by price-books. A distinction is drawn between doors and other joiner's work, and steam-mad joinery. Nearly all joiner's work in the present times is made by machinery, being finished only by hand. The prices of the joiner's work are decidedly too high. This is, however, a fault we find in all price-hooks.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

3,513, Pressing Bricks, Coal, &c. W. Johnson.

This machine consists of a standard, in front of which is a sliding carriage with a plunger or block, to which is attached the "former" or pressing plate. An oscillating beam coupled to the plunger by a short rod gives motion to the carriage from the crank shaft. The brick or other substance to be pressed is pushed forward by a bell-crank lever, and is forced out of the form by another lever actuated by a cam driven from the main crank-shaft.

6,007, Noria or Bucket Mechanism for Raising Liquids. J. Welton.

This consists of a chain of buckets which discharge into a wheel with spiral blades, which carry the water to the discharge at the centre. There is a cone inside which directs the discharge on one side, and notches in the wheel to receive the bolts of the chain. If the chain should break for any reason so as to catch it. Hooks or bars projecting from the buckets pivot on notches in the wheel to effect the discharge. There are cross-bars in buckets to prevent solid blocks passing and blades to prevent the buckets upsetting on entering the water.

7,597, Water Waste Preventer and After-Flush combined. H. Trotter.

Refers to a water-waste preventing apparatus and an after-flush combined for water-closets; it may be fitted to any cistern. To the bottom of the cistern below the discharge-valve is fitted a casing. In this casing there is a small conical cistern provided with an air-pipe, and with a valve at the bottom which is closed on pulling the chain. The conical cistern is raised by the pull rod or chain till it lifts the discharge-valve. The discharge-valve delivers into the conical cistern and overflows into the down-pipe. When the rod is released the main discharge-valve closes, and the valve at the bottom of the conical vessel opens and delivers the after-flush.

1,763, Improvements in Household Fire-escapes. W. H. Gaze.

This is a closed up fire-escape, which opens out in sections from any floor-level, but is protected from

being opened from the ground level by a locking arrangement. The steps are of iron tube, and the sides are of angle iron. Segmental stays are fitted at intervals above the level of each window-sill. These stiffen and support the structure when opened out for use.

928, Tip-Wagon. C. Batten.

The wagon tips on a pivot fixed to the under-frame near the rear end of the vehicle. Two standards one on either side of the wagon, each carrying a small roller or pulley-wheel, is fixed to the framing near the tail-board. When the van is tipped the rollers move along the rollers, and the tail-board is moved outward and upward. On bringing back the wagon the tail-board is returned to the closed position.

2,149, Slide Rule. L. G. Ram.

The rule consists of two pieces of wood held together by metal strips. A sliding scale is between them, and the two rules carry ivory sliders between them. The scales are for engineering calculations, and are marked with strains and stresses, loads, &c.

3,220, Flush Pan Closet. John Friend.

This water-closet is formed in a cylindrical plunger chamber in connexion with the closet basin. The plunger is made of tinned copper in the form of a taper pipe 3 in. in diameter, and 2 in. at the bottom, and is securely trapped by a cap on the top which carries off waste or overflow. A disc of rubber on flexible material is secured to the end of the plunger to serve as a valve which fits into a conical valve seat. A crank is attached to the plunger for lifting the valve in the cistern above, which is fitted with the usual service-box.

3,123, Use of Iron Plates in place of Brick Jamb's in fixing Grates and Chimney-pieces. W. T. Allen.

Consists of wrought or cast iron plates fixed perpendicularly on each side of an ordinary grate, and to extend to the back of the flue with another plate of the same material, having its face moulded, fixed horizontally across the top of, and to rest on, the side plates, and fastened to them. The horizontal plate extends from the back of the flue, and projects so as to form the chimney-piece. The plate also contains an aperture for the flue.

5,928, Builder's Stage. J. E. Doughty and P. E. Kranich.

This is a builder's stage attachable to and serving to strengthen ladders. A wooden platform, with channel iron sides, is hinged to an angle iron frame. This frame is hooked at the top to fit on the spokes of a ladder, and is further secured to the ladder by a cross-bar. The platform is fixed at any desired elevation or inclination by thumbscrews, passing through guides attached to the platform, and through the pivoted stays. A rack sliding frame, with a padded end, bears on the wall, and serves to stiffen the ladder, and is secured by a catch, which which can be withdrawn by a sliding rod under the platform.

APPLICATIONS FOR LETTERS PATENT.

Feb. 6.—1,651, J. Elam, Improved Fire Grates, &c.—1,678, A. Marriott, Heating Buildings by Means of Hot-water or Steam.—1,683, A. M. Clark, Improvements in Lathing.

Feb. 7.—1,729, J. Morrison, jun., and A. Enley, Excavating or Digging Machines.—1,734, E. Busbally, an Improved Cowl.

Feb. 9.—1,747, T. Perrott, Moistening and Improving the Surfaces of Grindstones, &c.—1,749, H. Stockman, Improvements in Water Meters.—1,763, J. Rowe, Improvements in Riveted Joints.—1,777, G. H. Chubb and G. Exton, Door Locks, Latches, and Furniture.—1,778, J. Thomlinson, Manufacture of Plaster or Cement.

Feb. 10.—1,799, A. Keighley and A. Watson, Holdfasts for Carpenters, Joiners, Cabinetmakers, &c.—1,815, W. Beckett, Circular Saws.—1,848, F. Podany, New File.—1,862, J. Wilsen, jun., Securing Door, Cupboard, and other Knobs to their Spindles.—1,872, A. Putney, Improvements in Wood Flooring.

Feb. 11.—1,888, G. Ellis, Portable Pavement or Flooring.—1,893, G. Hammond, Mitre Frame Cramp.

Feb. 12.—1,925, J. Cooper, Joint for Socket-pipes.—1,928, T. Gelder and J. Wilson, Draw Plate for Fire Ranges.—1,949, J. Easby, Automatic Stenographic Apparatus.—1,957, H. Moorwood and J. Watson, Dog Grates and Fireplaces.—1,961, W. Holt, Chimney-tops and Flues.—1,975, J. Watson and J. Spoor, Kilns for Burning Portland Cement, &c.

Feb. 13.—1,983, H. Gresham, Security Stops or Catches for Windows.—1,986, F. Merritt, Prevention and Cure of Smoky Chimneys and Ventilating Pipes or Buildings.—2,009, R. Perrott, Boller for Circulating Hot Water, suited to Kitchen Ranges and other Fires.—2,035, C. Price, Kilns for Burning and Drying Bricks, &c.—2,041, J. Horne and S. Holyman, Ventilating Houses, Rooms, Sewers, Drains, &c.

Feb. 14.—2,045, D. Bagnins, Locks and Night Latches.—2,057, S. Cowart, Improvements in Drain Traps.—2,064, A. Billings and A. Dicketts, Fixing Lead Soil and Ventilating Pipes.—2,069, J. Jeavons and G. Reynolds, Portable Dustbins.—2,092, A. Campbell and G. Ash, Catches of Door Locks or Fastenings.—2,095, J. Doulton, Fireproof Floors.

17.-2,153, L. Brode and T. Benkin, In-Hydraulic Cement.—2,160, E. Colson, Wall Bricks, &c.—2,161, H. E. E. Apparatus for Starry or Slip in the Manufacture of Portland Bricks.—2,175, L. Groth, a New Rate.—2,183, A. Bonit, Appliances for Clean-out-closets, Sinks, &c.
 18.-2,223, J. Gilson, Securing Slates to and other Parts of Buildings.—2,235, H. J. Manufacturer of Lath, Plaster, and Plaster
 2,247, J. Home and S. Holliman, Chimney-Preventing Down-draughts.
 19.-2,259, T. Cadipin, Preventing Stoves racking when in use.—2,260, W. Crosskey and Peterson, Adjustable Locking Spanner.—2,293, W. Combined Bedstead, Toilet Stand, Ward-land Sideboard or Chiffonier.—2,304, J. Turner, Choice of Material for Covering and Decorating Walls, &c.—2,306, H. Hunt, Improvements
 chens.

ROVISIONAL SPECIFICATIONS ACCEPTED.

15, J. Walker, Turn Buttons and Plates for ing Doors and Windows.—15,384, J. Jenkins, Rates and Purposes.—15,385, F. McMan and Balancing and Securing Sliding Window
 16.-340, R. Rosshorugh, Manufacture of or Coated Bricks.—352, J. Snowden and S. W. Panelling and Pressing Bricks.—386, J. Reproducing Ornamental Designs.—400, A. W. Mouthpieces and Dies used in the Manu- of Clay Bricks, &c.—996, J. Stanley, Manu- of Agents or Cold Drains.—504, L. Smith, ing and Rattling of Windows.—16,624, J. Jean, Apparatus for Cleaning Sinks, &c.— J. Watts, Smoke Tests for Pipes for es.—102, C. Holt, Apparatus for "Drawing" in Fires and Preserving the Bars.—108, F. son, Pocket Saws.—353, W. Hollis, Comb- Wardrobe, Cupboard or Bookcase.—520, J. Smith, Apparatus for Cold Drains.—520, W. Window Rack Pulleys.—623, E. Bailey, ing Door and Other Knobs and Handles.—796, Knobs and Others, Pivot and Weather Bar- cement for Swing and Reversible Windows.— J. Shields, Joining Lead Pipes.—890, J. nie, Appliances for Repairing and Binding es.—50, H. Walker and G. Clark, Fire —1,039, E. Hill, Hanging and Supporting es Sashes.—1,000, D. Ward and G. Hayward, Chisels and Gouges.—1,148, A. Mackie, Check.—1,166, H. Walker and G. Clark, n Ranges.—1,203, E. Heathcote, Kitchen s.—1,269, E. Beal, Window Fastenings.— F. Andes, Apparatus for Flushing Water- es.—1,635, J. Kennard, Water-meters.—16,722, es, Construction of Girders.—18,378, J. Smith, sion for Imitating Carved and Moulded work.—212, H. Salome, Carrier for Wood Turn- es.—388, T. Softley, Self-closing Doors and —695, W. Hacking, Portable Soldering Appa- —1,176, H. Gunningham, Apparatus for Cool- ment, &c.—1,230, G. Turahill, Improvements chen Ranges.—16,775, H. Smith, Fire-proof es for gaining Access to Buildings on Fire, and tinguishing Appliances for use therewith.— J. C. Pepper, Lavatory or Wash-hand Basin.— J. Julian and T. Phillips, Water-waste Pur- Apparatus.—1,165, G. Ganod, Automatic es, Cates, or Doors, for Closing the Openings ets and Lifts.—1,172, W. Harling, Surveying es.—1,212, J. Gray, Apparatus for Facilitating cent of Factory and other Chimneys by Work- or Repairs, &c.—1,291, H. Walker and R. Hydraulic Lifts.—1,354, J. Dinning, Deter- osition for Removing Old Paint, Varnish, &c., from Wood, Plaster, or other Surfaces.— H. De Berenger, Plaster Ceilings and Walls. J. Bonnison, Improvements in Domestic chens Fireplaces.—1,539, J. Walker and H. Y., Attaching Door and other Knobs to es.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.
 5, A. Achurch, Machines for Trenching Land training Purposes.—6,184, A. M. Clark, Com- on Locks.—6,467, W. Morris, Improvements lges.—6,806, J. Hall, Improvements in Fire- —6,857, G. Beamish, Construction of Break- ing, Retaining-walls, &c.—7,690, W. Wyatt, ing the Hoop of a Barrel.—8,307, Improved ent or Flooring.—8,624, C. Taring, Folding —3,741, J. Parker, Improved Door Locks.— K. Adams, Appliances for Sliding Window- and Converting same into Revolving Sashes. C. Newton, Water Cisterns.—6,355, W. nson, Ventilating and Warming Rooms.— A. Henderson, Metal Roofing Tiles.—6,552, adler, Improved Roofing Tiles.—7,144, G. W. Long, Improvements in Closets or s.—4,764, J. Johnson and W. Urton, Hold- ers, Slide, Flush, and Knob Bolts for Doors, &c.— J. Walsh, Portable Hand Bolt for Doors or s.—535, R. Henry, Window Sash-line Fas- —621, E. V. Bailey and Others, Rack Pulleys.

—669, P. Walker, Manufacture of Tiles, &c., from Portland or other Cement.—5,331, J. Friend, Water Waste-preventer.—6,919, J. Kent, Water-closet Dis- infecting Apparatus.—6,960, A. Overfield, Door Locks or Latches, and Knobs or Handles for same.—7,023, J. Clements, Improved Chimney Top.—7,061, J. Cartwright, Stench or Drain Traps.—7,059, W. Moyes, Sen, and Others, Improvements in Urinals and Water-closets.—7,125, F. Brown, Stove Grates or Fireplaces.—7,995 and 7,997, J. Jones, Concrete or Artificial Stone for Paving, &c.—7,419, C. Mackintosh and W. Richards, Improved Hinge.—13,878, W. Lake, Improvements in Bakers' Ovens.—16,000, H. Allison, Manufacture of Artificial Stone, and treating the Surface of same.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

FEBRUARY 12.	
By BAXTER, PAINES, & LEPPEE.	
Bromley, Tyning-road—Two cottages, 79 years, ground-rent 5s.	£250
Dowry, Kent—Two cottages, 45 years, ground-rent 2s.	160
FEBRUARY 16.	
By McLELLAN & SONS.	
Clapham—136, High-street, 9 years, no ground-rent Kennington—29 and 28, Oxford-terrace, 40 years, ground-rent 13s.	760
Brixton—37, Cowley-road, 16 years, ground-rent 4s. 12s. 6d.	720
Waltham—61, St. Paul's-road, 41 years, ground-rent 6s.	230
FEBRUARY 17.	
By DERRIHAM, TAYSON, FLEMING, & BRIDGEMAN.	
Whitechapel—139 and 136, High-street, freehold site, containing 2,970 square feet.	4,010
Camberwell—46 and 48, Benhill-road, freehold	300
No. 24, Elmington-road, 82 years, ground-rent 4s. 10s.	850
Peckham—16, Queen's-road, 25 years, ground-rent 6s. 10s. 6d.	265
Battersea—Leasehold ground-rents of 25s. per annum, 65 years	430
By ROGERS, CHAPMAN, & THOMAS.	
Belgravia—11, Lower Belgrave-street, 17 years, ground-rent 5s.	625
South Kensington—2 and 3, Moreton-terrace, 88 years, ground-rent 40s.	4,210
Regent's Park—23, Chamberland Market, 40 years, ground-rent 4s.	410
Battersea—10, 12, and 14, Creek-street, 45 years, ground-rent 18s.	395
No. 46 to 62 even, Park-grove, 79 years, ground-rent 36s.	1,885
By W. W. SAUNDERS.	
Camden Town—18, Golding-street, 59 years, ground-rent 6s.	580
By W. H. MOORE.	
Camden-square—30, North-villas, 77 years, ground-rent 11s.	800
No. 18, South-villas, and a ground-rent of 3s. per annum, 77 years, ground-rent 8s.	500
Fitzroy-square—68 and 80, Charlotte-street, 17 years, ground-rent 76s.	370
FEBRUARY 18.	
By BRADEE & CO.	
Barking—A freehold residence, end 3s. 2r. (p.	2,500
Plot of freehold land, 2 acres	1,500
No. 8, 10, and 12, The Broadway, freehold	1,200
No. 2, 3, 4, 10, 11, and 12, Back-lane, freehold ..	560
By RICE BROTHERS.	
South Lambeth—129, Harrington-road, 20 years, ground-rent 36s.	130
Wandsworth—1, Brooklands-road, 24 years, ground-rent 4s.	135
Battersea—3, 9, 10, and 11, Sussex-street, 43 years, ground-rent 8s. 18s.	815
By HERRY, WAGGOTT, & BLACKBURN.	
Stratford—67, Windmill-lane, 65 years, ground-rent 8s.	345
Regent-street—27, Foubler's place, freehold	1,430
Pimlico—2, Blandford-street, 40 years, ground-rent, 8s.	500
FEBRUARY 20.	
By NOTTON, TRIST, WATNEY, & CO.	
Portman-square—73 and 74, Crawford-street, 20 years, ground-rent 10s.	1,340
Overton, Herts—Freehold house and stabling	569
By MURRELL & SCOBELL.	
Hampstead—6, Holly Mount, copyhold	320
Camden Town—An improved rent of 16s. a year for 19 years, and 70s. 7d. a year for 18 years	170
One-fourth share of copyhold ground-rents of 1,270l. a year, but increasing to 1,361l. per annum, with reversions in from 17 to 45 years	7,470
Margate, Thanet-road—Two plots of freehold land	270

MEETINGS.

SATURDAY, FEB. 28.
 Architectural Association.—Visit to Houses in Collingham-gardens end St. Paul's School, Kensington. Assemble at School at 3 p.m.
 Builders' Foremen and Clerks of Works Institution.—Annual Dinner, Holborn Restaurant, 6.30 p.m.
 London Sanitary Protection Association.—Annual Meeting, 4 p.m.
 MONDAY, MARCH 2.
 Royal Institute of British Architects.—Special General Meeting of Members, to elect the Royal Gold Medalist, 8 p.m.
 Royal Academy.—Mr. G. Aitchison, A.R.A., on "Staircases." I. 8 p.m.
 Society of Arts (Cantor Lectures).—Mr. J. M. Thomson on "The Chemistry of Pigments." II. 8 p.m.
 Female School of Art.—Distribution of Prizes by the Duchess of Westminster in Prince's Hall, Piccadilly, 3 p.m.
 Victoria Institute.—Mr. J. Hassall on the question, "Was Primitive Man a Savage?" 8 p.m.

Society of Engineers.—Mr. Arthur Biggs on "American Engineering Enterprise." 7.30 p.m.
 Royal Institute of the Architects of Ireland (Dublin).—Council.
 Archæological Section, Philosophical Society of Glasgow.—Mr. David Barclay on "The Cleansing of the River, and a Substitute for Water-closets."
 Clerks of Works Association.—Mr. G. R. Webster on "A Simple Method of Perspective Drawing." 7 p.m.

TUESDAY, MARCH 3.
 Birmingham Architectural Association.—Mr. W. Donthday on "Symbolism in Art." 7.30 p.m.
 Institution of Civil Engineers.—Mr. W. Strondley on "Locomotive Engines." 8 p.m.
 Society of Biblical Archaeology.—M. Edmond Naville on "The Inscription of the Destruction of Mankid, on the Tomb of Ramesses III." 8 p.m.

WEDNESDAY, MARCH 4.
 Royal Academy.—Mr. Alfred Waterhouse, A.R.A., on "Westminster Abbey." 8 p.m.
 Builders' Foremen and Clerks of Works Institution.—Ordinary meeting, 8.30.
 Carpenters' Hall, London Wall (Free Lectures to Artisans).—Mr. Thomas Bishill, F.R.I.B.A., on "The Shoring of Buildings." 8 p.m.
 British Archæological Association.—(1) Mr. E. J. L. Scott on "Early MSB. relating to Tenby and its Locality." (2) Mr. H. Syer Cuming on "The Old Traders' Signs in Peterborough." 8 p.m.
 British Museum.—Mr. W. St. C. Boscaawen on "Assyrian and Babylonian Antiquities." II. 2.30 p.m.
 Society of Arts.—Professor H. S. Hele Shaw on "The Evolution of Machines." 8 p.m.

THURSDAY, MARCH 5.
 Institution of Civil Engineers.—(Students' Meeting).—Professor Urwin on "Water-Motors." 8 p.m.
 Society of Antiquaries.—Ballot for the Election of Fellows, 8.30 p.m.
 Royal Archæological Institute.—(1) Mr. W. T. Watkin on "Roman Inscriptions discovered in Britain in 1884." (2) Mr. J. L. Stalshmidt on "Church Bells." 4 p.m.

FRIDAY, MARCH 6.
 Royal Academy.—Mr. G. Aitchison, A.R.A., on "Staircases." II. 8 p.m.
 Architectural Association.—Mr. John Slater, B.A., on "Building Stones." 7.30 p.m.
 Royal Institution.—Prof. C. T. Newton, C.B., on "The German Discoveries at Pergamum." 8 p.m.
 Lincoln Diocesan Architectural Society.—By Museum.—Prof. J. F. Hodgkiss on "Medieval English Remains." III. The Monk. 2 p.m.

SATURDAY, MARCH 7.
 Edinburgh Architectural Association.—Visit to Corstorphine Church and neighborhood.

Miscellaneous.

Surrey Archeological Society.—The annual general meeting of this Society was held on Wednesday last, the 25th inst., at 8, Danes' Inn, Strand, and was numerously attended by the members. Viscount Midleton, President of the Society, occupied the chair, and moved the adoption of the report of the council and the balance-sheet. Among other matters, the council, in the report, expressed regret at the death of H.R.H. the Duke of Albany, late President of the Society, and Mr. R. A. Godwin-Austen, F.R.S., a member of the council; in the place of the former they had elected Viscount Midleton as President of the Society. A discussion ensued, in which Messrs. Granville Leveson-Gower, F.S.A., R. G. Rice, Curling, Ralph Nevill, F.S.A., H. Maude-Lay, Major Heales, and the Rev. R. M. Blakiston took part. One subject discussed was the desirability of forming a County Museum and Library, which was strongly urged. It was resolved to refer the suggestion to the council, and ultimately the report and balance-sheet were unanimously adopted. The retiring members of the council, and the other officers of the Society, including the auditors, Messrs. J. T. Lacey and W. F. Potter, and the honorary secretary, Mr. Thomas Milhorn, were re-elected, and the proceedings closed with a vote of thanks to the President.

Large Sale of Building Land at Lewisham.—On Monday evening Mr. Richard J. Collier conducted a very successful sale of building land, at the Plough Tavern, Lewisham. The property submitted comprised the second portion of the Priory Estate, at Lewisham, containing sixty-nine lots. There was a very large attendance, and preliminary to the several lots being offered Mr. Collier announced that the Priory Mansion had been subdivided into two houses, and that, in consequence, the ancient residence, which possessed a special historical interest, would be preserved. He added that half the mansion, with eleven plots, had been previously sold. At the sale on Monday all the plots, with the exception of eight, were sold at prices much better than those obtained at the previous sale, the front lot, containing 18ft. frontage and 100 ft. deep, selling for 150l. each, whilst the majority of the back lots realised about 4l. per foot frontage. The kitchen garden, and remaining portion of the mansion were bought in. The total proceeds of the sale amounted to about 5,000l.

British Archaeological Association.—At the meeting of this Association on the 18th inst., Mr. Thomas Morgan, F.S.A., in the chair, it was announced that the unsafe condition of the ruins of Carew Castle, noticed during the recent Congress at Tenby, had been reported to the owner, Mr. E. G. Carew, of Cromcombe Court, and that works of repair had been arranged for. These will be strictly limited to the upholding of the building, to prevent injury by frost or tempest, and nothing will be done to take off the appearance of the building as a ruin. Mr. Loftus Brock, F.S.A., reported the existence of a large portion of old London wall, now visible in the street of the same name, at Moorgate, just to the west of All Hallows Church. It is now revealed by recent excavations for buildings, having been buried by the accumulated earth of centuries. A paper on "The Roman Baths of Bath" was then read by the Chairman. After referring to Mr. Irvine's conjectural restoration, which appears to be well supported by more recent discoveries, the lecturer proceeded to describe in detail the whole of the building now revealed, tracing the portions uncovered from their first discovery. The paper was illustrated by several paintings and drawings prepared by the Misses Morgan. Another portion was then read of the paper prepared by the Rev. G. F. Browne on the remarkable Cross in Leeds Church. The shaft is covered with figure subjects having reference to old Norwegian or Scandinavian myths unique in England.

The Surveyors' and Auctioneers' Clerks' Provident Association.—We have received the first annual report and financial statement of this Association, which has its registered office at the Auction Mart, Tokenhouse-yard, E.C. The President is Mr. Daniel Watney, and the list of Vice-Presidents includes the names of many well-known surveyors and auctioneers. The report gives the result of twelve months' work ending 31st of December, 1887. The appeal for subscriptions to form the reserve fund of the Association has resulted in the receipt of a gross sum of 1,431l. 2s., of which 1,365l. is from donations and 86l. 2s. from annual subscriptions. This sum has been appropriated to the various objects entitled to it under the rules; the greater part to the benevolent and superannuation funds. The members' subscriptions amounted to 32l. 7s. 9d. The committee express their sense of obligation to the donors who have so generously provided a fund which gives the Association a present secure position, and must have an important influence on its prospects. About sixty applications for membership have been received. Of these twenty-four were not completed, eighteen having fallen through, and six being declined, or deferred for a time, on medical grounds. The Committee appeal to employers to direct the attention of their clerks to the Association, and to the advantages offered to them by a society so intimately connected with the profession. The Committee deplore the loss of Mr. George Trist, one of the trustees, who was a liberal subscriber to the Association.

Paper made from Sawdust.—A roller pulp machine has been invented by Mr. Pond, of Rutland, Vermont, by which sawdust, shavings, chips, and pieces of wood can be made with great rapidity into a pulp of clean, fine fibre. The machine will also manipulate the stalks of cotton, sugarcane, wild hemp, &c., at the rate of from 2 tons to 3 tons of dry pulp per diem. The resulting pulp is stated to be far superior to any other form of wood pulp, because the fibre is preserved intact and the cellulose is left with it, giving it great strength, softness, and pliability. The tensile strength per square inch of newspaper, which contains from 50 to 75 per cent. of ground wood pulp, is said to be from 8 lb. to 12 lb., and to stand a test of 17 lb. to the square inch, showing that it is much stronger than paper made from one-third rags. The woods most adapted to the process are the soft woods, such as spruce, fir, pine, poplar, and hemlock, the latter making the strongest fibre, being quite equal to jute in strength. Besides the manufacture of paper, the pulp can also be utilised for woodware, such as pails, barrels, and mouldings.—*Iron.*

Iron Buildings for the Soudan.—Messrs. Clark, Bennett, & Co. (Limited), of Rathbone-place, W., have received instructions from the War Office to erect and ship in fourteen days thirteen corrugated iron buildings for stores for service in the Soudan, covering an area of about 25,000 super. feet.

The Tower of St. Magnus' Church, London Bridge.—Owing to the dilapidated state of the stonework, the rector and churchwardens have found it necessary to undertake the work of restoration of the tower of the Church of St. Magnus the Martyr, Lower Thames-street. Upon completion of the scaffolding, the architect was called upon to survey and report to the vestry upon its state, which was found to be much worse than was at first anticipated, requiring a large portion of its cornice to be reinstated, many of them being split and splintered off at the joints, owing to the regrettable practice of inserting iron cramps into the stone when the tower was built. The cramps will be removed wherever practicable, and reinstatements made throughout in solid Portland stone. The restoration of the tower has been undertaken by the well-known church builders, Messrs. Dove Brothers, of Islington, under the direction of Mr. A. Billing, of Bank-chambers, Tooley-street, S.E.

A Conference on Cholera.—A conference of representatives of the principal countries of Europe will shortly be held, at the invitation of the Italian Government, in Rome, for the purpose of discussing the steps which it is advisable to take in the event of an outbreak of cholera occurring. We understand, although no definite arrangement has yet been arrived at, that England will be represented by Sir W. G. Hunter, K.C.M.G., and Dr. Thorne Thorne, of the Medical Department of the Local Government Board. Should the rumour regarding the appointment of English representatives be confirmed, we congratulate the Government upon the choice it has made, feeling sure that the opinion of the medical profession and sanitarians of this country will be fully and clearly enunciated, although we can perhaps hardly hope for many, if any, new precautions to be adopted in the event of a cholera epidemic.—*London.*

Colonial and Indian Exhibition, London, 1886.—Messrs. Henry S. King & Co. have received the appointment of sole official agents for India. Mr. C. Pardon Clarke, C.I.E., Keeper of the India Section of the South Kensington Museum, has, by special permission of the Lords of the Committee of Council on Education, departed for Bombay charged with a special mission by H.R.H. the Prince of Wales, Executive President of the Exhibition. Mr. Clarke's special duty will be to make arrangements for the illustration on a large scale of the handicrafts of India by the selection of native artisans, who will be brought to England, and work at their several trades in the exhibition.—*Overland Mail.*

Serious Fire at a Builder's.—One of the most alarming fires that had ever been witnessed in Newbury and district occurred on Saturday morning, the 21st inst., at four o'clock. The whole of the Albert Steam Joinery Works and Moulding Mills, the property of Mr. Samuel Elliott, were completely destroyed. The works are situated to the north of the town, and occupied several acres. The true origin of the fire is unknown, but it is supposed the bearings got heated. The destruction to the machinery alone is estimated at 8,000l. The total loss is estimated between 25,000l. and 30,000l.

The Blackburn and East Lancashire Infirmary.—The annual meeting of the Governors of this Institution was held a few days ago. The Board of Management, in their report, refer with satisfaction to the recent enlargement of the Infirmary. The cost of the new wing and lodges was 4,897l. 15s. 6d. The entire cost has been defrayed. The wing and lodges were erected by Messrs. Thomas Higson & Sons, from the plans and under the superintendence of Mr. A. W. R. Simpson, of Blackburn, architect to the Board.

The Chemistry of Pigments.—The first of a course of two Cantor Lectures on this subject was given in the hall of the Society of Arts on Monday evening last, by Mr. J. M. Thomson, F.C.S. The lecture dealt with the nature and division of colours, the deleterious actions on white pigments, and methods for counteracting the same. The second lecture, to be delivered on Monday evening next, March 2, will be devoted to an examination into the chemistry of coloured pigments and of certain organic and special pigments.

The Female School of Art.—The annual distribution of prizes to the students of the Female School of Art will take place in the Prince's Hall, Piccadilly, on Monday afternoon next. The Duchess of Westminster will officiate.

Lower Clapton.—Upton House "Ty School, the first industrial, or rather, "tr school, built by the School Board for Lower Clapton, has just been erected in the Urawich Lower Clapton. It has a frontage of 100 ft. and with the kitchen garden, drill-yard, occupies nearly an acre of ground. It is of stocks, with red facings, arches, &c., the main entrance being of Portland stone and oak doors. Although not an ordinary "B school, it nevertheless partakes largely of the same style. The architect is Mr. E. R. R. The builder is Mr. C. Cox, St. George's V Hackney, and the clerk of works, Mr. V. Butson. The numerous details connected with this class of building have been carefully studied. The governor's house is complete, though separate from the main building. The apartments of the labour-masters, &c., at the back of the centre of the main building, and command a complete view of both of the dormitories, sick and day wards, school class rooms, large dining-hall, bath-lavatory, laundry, and workshops, besides various stores, &c. The kitchen and connected therewith are complete in arrangement, and the reception and disinfecting are quite distinct. The drainage has been carried out in two separate systems, or soil and the other for surface-water, &c., various inlets to the latter being carried side, and delivered over stoneware (Donlton's) underneath stones with gratings. Messrs. Longden & Co. have executed the heating, cooking, and laundry apparatus (all of which are worked by steam), as also fire hydrants, &c. The lavatory is furnished with three rows of Butson's Patent Lavi Apparatus; gas-fittings are by Messrs. St & Sons; the electric bells and speaking-connecting the entire building, by Messrs. & Co.; the disinfecting apparatus by M. Benham & Sons; and the tar-paving by M. Hobman & Co.

Craven House, Northumberland-av. Messrs. Archibald Smith & Stevens, hydraulic engineers, of Queen's-road, Battersea, has been instructed to erect one of Stevens' Major's patent hydraulic suspended passenger lifts at Craven House, Northumberland-av. This will be worked by water supplied to the mains of the London Hydraulic Engineering Company.

TENDERS.

For the superstructure of a block of offices at the corner of London Wall and Little Winchester-street, E.C. F. T. Pilkington, architect. Quantities by Mr. Barnett:—
 Saunders 231,380 0
 Higgs & Hill 23,793 0
 Shurmer 23,100 0
 Lawrence 23,795 0
 Bayes 22,500 0
 McGregory 22,500 0
 Reading 22,480 0
 Simpson & Co. 22,230 0
 Shaw 22,064 0
 Perry & Co. 21,835 0
 J. O. Richardson 21,670 0
 Brown & Son 21,590 0
 Hobbs 21,550 0
 Mowlem & Co. 21,500 0
 Gearty 21,434 0
 Merton 21,137 0
 Brass & Son 20,873 0

For the erection and completion of two small blocks at the Broadway, Crouch End. Mr. W. Smith, architect:—
 Cowley 4394 10
 Hirst 385 0
 Mattock Bros. 345 0
 Darnford & Langham 293 0
 J. O. Richardson (accepted) 293 0

Accepted for alterations and additions to a warehouse, Crown-court, Milton-street, E.C. Mr. W. Pate, architect:—
 J. O. Richardson 2479 0
 [No competition]

For building five shops in the Old Kent-road, S.E. Mr. T. Bachhouse, Mr. W. C. Reed, architect, Adelphi-place, London Bridge:—
 Legg 41,990 0
 Smith 1,497 0
 Cross 1,397 0
 Marriages 1,250 0

For alterations to shop-fronts and houses in E street, S.E., for Mr. T. Bachhouse, Mr. W. C. Reed, architect:—
 Greenow 2,385 0
 Batey 250 0
 Wood 199 0
 Kemp 168 0

For repairs to premises, High-street, Bromley, E. Mr. Robert Higgs, architect and surveyor, 7, Katharine-street, Croydon:—
 Tucker 2,298 0
 Barrell 227 0
 Maffett 210 0
 Grubb (accepted) 178 0

PETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Table with 4 columns: Nature of Work, By whom required, Premium, Designs to be delivered, Page. Includes entry for 'of a Pier' by Met. Asylums Board.

CONTRACTS.

Table with 5 columns: Nature of Work, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page. Includes entries for paving, building houses, and various materials.

PUBLIC APPOINTMENTS.

Table with 5 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page. Includes entry for 'the Works' by Croymond Union.

Accepted for supplying about 150 tons of iron pipes and special castings for the Claines Local Board, Worcester.

Table listing quantities of iron pipes and castings: 6-inch pipes, 4-inch pipes, 3-inch pipes, Special castings (flange), Special castings (plain).

For building house, 'The Chestnuts' and stabling at Ashford, Middlesex, for Mr. J. Coppin.

Table listing quantities of building materials: Gibson, Southall; Staines & Son, Great Eastern-street; Richardson, New Hampton; Lucas & Son, Kensington-square; Johnson, Wandsworth; Kearsley, L'Abbeville.

For the erection of Longton Endowed Schools, Mr. Charles Bell, architect, London.

Table listing quantities of building materials for Longton Endowed Schools: Bromage, Fenton; Barlow, Stoke; Collis, Longton; Insip, Longton; Gallimore, Newcastle; Yoxall & Heath, Trent; Cope, Turnstall.

For the erection of Board Schools at Herne Bay, Kent, for the Herne School Board.

Table listing quantities of building materials for Board Schools at Herne Bay: Schofield; Martin, Wells & Co.; Allen & Sons; Ingleton; Ansell; Rodda; Amos & Foad; Cloake & Weston; Strubsole; Siff; Smith & Sons; Corneius; Wise; Greenwood; Adams, Herne Bay.

For new front at 213, Oxford street, for Mr. A. Gianella, Mr. Banister Fletcher, architect.

Table listing quantities of building materials for new front at 213, Oxford street: Perry & Co.; B. E. Nightingale.

For first portion of villa residences in Belle-Vue-road, Hendon. Mr. Banister Fletcher, architect.

Table listing quantities of building materials for villa residences in Belle-Vue-road: J. Elacott.

For the erection of five houses on the Beaver Estate, Ashford, Kent, for Mr. C. F. Herbert.

Table listing quantities of building materials for five houses on the Beaver Estate: Bingham, Headcorn; Wood, Ashford; Goldfinch, Whitstable; Warrington, Teutenden; Uarwin, Folkestone; Brooks, Folkestone; Paigham, Great Chart; Jeal, Sandgate; Castle, Folkestone; Giles F. W. Ashford.

For erecting house, shop, warehouse, and factory, No. 21, Bishopgate, for Mr. Henry Mead.

Table listing quantities of building materials for house, shop, warehouse, and factory: E. Conder; Dove Bros.; W. Shurmer; C. Forrest; E. Lawrence & Sons; Colls & Sons; J. H. Johnson; Wm. Brass & Son; W. & F. Croaker; Ashby & Horner; J. Chessum; Stimpson & Co.; E. B. Nightingale; J. & J. Greenwood; Jackson & Todd; Matlock Bros.; W. Scrivener & Co.

For excavators, bricklayers, masons, carpenters, joiners, slaters, plasterers, and smith's work, in the erection of a shop and dwelling-house in Fisherton-street, Salisbury, for Mr. F. C. Carter.

Table listing quantities of building materials for shop and dwelling-house in Fisherton-street: George Dolman, Salisbury; Edward Witt, Salisbury; Gilbert Harris, Salisbury; W. J. & C. S. Young, Salisbury.

Accepted for rebuilding two shops and houses at Easter-place, Holloway-road, Messrs. Roberts & Barnard, surveyors, Chancery-lane.

Table listing quantities of building materials for rebuilding two shops and houses: J. Beale.

Accepted for enlarging class-rooms, &c., at Board Schools, Reading, Messrs. Morris & Stallwood, architects.

Table listing quantities of building materials for enlarging class-rooms: J. H. Margraves.

For pulling down and re-building the Queen's Head public-house, Charlotte-street, Commercial-road, E., for Messrs. Truman, Hanbury, Buxton & Co. Mr. J. T. Newman, architect, 2, Fenchurch-street, Fenchurch-street. Quantities by Messrs. Curtis & Sons:—

Robert Marr	£2,049 0 0
W. Shurmur	2,043 0 0
J. Morter	2,031 0 0
Hearle & Son (accepted)	1,855 0 0

For alterations at the Lord Raglan Tavern, Shernhall-street, Walthamstow, Essex, for Mr. Sharp. Mr. H. F. Simmonds, architect, Cambridge Heath:—

Wood	£485 0 0
Hughes	460 0 0
Mower	437 0 0
Jennings	435 0 0
Ling & Needham	363 0 0
Lipscomb	352 0 0
Barton	325 0 0
Probert (accepted)	390 0 0

For erecting a new office in East St. Helen's street, Abingdon, for Messrs. Sedgfield & Fryce, solicitors. Mr. John George T. West, architect, Abingdon:—

Thomas Barrett, Abingdon (accepted)	£146 0 0
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* The lowest of two tenders received.

For alterations and repairs at a house in Bridge-street, Abingdon, for Miss E. Mundy, of the Manor House, Culham. Mr. John George T. West, architect, Abingdon:—

James Walter, Oxford	£320 0 0
J. Dover, Oxford	280 0 0
E. Williams, Abingdon	289 0 0
C. Hunt, Abingdon	279 0 0
George Thatcher, Abingdon	249 0 0
D. Stroud, Abingdon (accepted)	256 0 0
Thomas Barrett, Abingdon	220 0 0

For alterations and repairs to the Butchers' Arms Inn, Uffington, for Messrs. T. and J. W. Townsend, brewers and millers, of Abingdon. Mr. John George T. West, architect, Abingdon:—

John Willis, Faringdon	£475 0 0
Shepherd, Faringdon	409 0 0
Alfred Parker, Faringdon	376 0 0
C. Aldworth, Hanger	371 11 6
W. & J. Wheeler, Faringdon	295 0 0
J. Wheeler, Wantage	289 1 6
E. Williams, Abingdon	279 0 0
Thomas Barrett, Abingdon (accepted)	299 0 0

Accepted for new shop-front and fittings at 182, Kentish Town-road, for Messrs. Hull & King:—

R. A. Lamprell, Brighton	£265 12 0
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Accepted for new shop-fittings, No. 2, East-street, Taunton, for Messrs. Hull & King:—

R. A. Lamprell, Brighton	£188 0 0
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For laying 550 feet of pipe-sewer and manholes and ventilators in Middle-road, Howe Park, Wood Green, N., for the Directors of the National Liberal Land Company. Mr. George Pooley, surveyor:—

J. C. Trueman	£145 0 0
S. Clifton	129 0 0
W. Carter	114 12 0
T. Adams	98 10 0
W. Nicholls (accepted)	93 0 0

For new shed, together with store room, subway, and appurtenances, at Oatsroy Mills, Midgeley, near Halifax. Mr. T. L. Patchett, architect, Halifax. Quantities by architect:—

Mason's Work (labour only).
Joseph Gaukrodger, Warley, near Halifax.
Fronfounder's Work
Wood Brothers, Sowerby Bridge.
Plumber's and Glazier's Work.
William Alderson, Luddenden.
Plasterer's and Slater's Work.
J. & T. Alderson, Luddenden.
Carpenter's and Joiner's Work.
(Day-work.)
[Total of work let, £1,512.]

Accepted for the erection of four houses, West Side Estate, Clapham Common. Mr. Frederick Lea, architect:—

J. B. Gerrans	£1,400 0 0
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Accepted for the conversion of house, 118, St. John's-hill, S.W., into shop. Mr. Frederick Lea, architect:—

J. B. Gerrans	£355 0 0
---------------	----------

For rebuilding the Queen's Head public-house, Charlotte-street, Whitechapel, E., for Messrs. Truman, Hanbury, & Co. Mr. J. T. Newman, architect:—

If Concrete	If Wood
Floors.	Floors.
R. Marr	£2,490 0 0
W. Shurmur	2,043 0 0
J. Morter	2,031 0 0
Hearle & Son	1,855 0 0
* Accepted.	

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O. F.—H. R. B.—C. F. M.—A. S.—O. C. H.—"Sanatarium" (correspondent should send name, whether for publication or not).
W. W.—P. L. B. (quotes received).—J. P. Madrid.—C. F. (cannot advise on mere descriptions).—M. M. M. Roxburgh, Man.—R. G. P. (next week).—T. B. & Co.—S. W. & P.—W. A. W.

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The Builder.

VOL. XLVIII. No. 2186.

SAURDAY, MARCH 7, 1885.

ILLUSTRATIONS.

Westminster Abbey.—Illustrations in connexion with Mr. Waterhouse's Lecture at the Royal Academy:—

Screen surrounding the Tomb of Henry VII., measured and drawn by Mr. H. O. Cresswell	358-359
Second Bay in Sarracian, measured and drawn by Mr. E. Evelyn White	342-343
Inferior Face of the South Transept, measured and drawn by Mr. J. Atwood Slater	345-347
Two Eastern Bays, North Walk of Cloisters, measured and drawn by Mr. F. McLaren	350-351
Westminster Abbey in the Seventeenth Century, from a Print by Hollar	354
Elevation of the Chapter-house Doorway, measured and drawn by Mr. E. C. Shearman	355

CONTENTS.

Railway Rates	327	Free Lectures to Artisans at Carpenters' Hall: Black, White, and Red Lead	357	"Non-Acceptance of Lowest Tender"	359
Note	328	Public Works at Brussels	357	Recent Patents	359
Letter from Paris	330	Architectural Societies	357	The Student's Column: Descriptive Geometry.—V.	360
Westminster Abbey (with Plan)	331	The Folk-Lore and Art of Old Japan	358	Books: Laxton's Builder's Price Book for 1885.	361
Architectural Association	333	Provident Institution of Builders' Foremen and Clerks of Works	358	Recent Sales of Property	361
Royal Institute of British Architects: Medals and Prizes, 1885	334	Westminster Hall (with Plan)	358	Meetings	362
On Greek Architecture	334	Tredgold's Carpentry	339	Scottish Memorial to Archbishop Talbot	362
Illustrations of Westminster Abbey	335	Taxation of Surveyors' Charges in Compensation Cases	340	Miscellaneous	362
Central Association of Master Builders	339				

Railway Rates.

THE interest taken in this question is growing rapidly, and the national character of it is being increasingly recognised by the public at large. So long as it was regarded as a contest between the Railway Companies and Trade Associations, it attracted little notice outside commercial circles, but the more the Bills were studied the more apparent it became that there were few classes who were not more or less affected by their provisions; though to no class, perhaps, can the question be so practically important as to builders, contractors, and manufacturers and purveyors of building material, who are constantly sending heavy loads by rail all over the country. The columns of the daily press have been thrown open for the discussion of the subject, and much has been said on both sides upon the many points involved. As the question will now be shortly before Parliament, a brief sketch of the more important of these points, with a *résumé* of the arguments for and against them, may prove of interest. The nine companies who are introducing these Bills state that they are doing so in accordance with the recommendations of the select Committee of 1881-2, and that they are framed generally so as to carry out the suggestions of that body. There is not the slightest doubt, however, that the Bill pronounced by the President of the Board of Trade last year as stimulated them to action. In fact, the Chairman of the Great Western, at their half-yearly meeting, stated that their desire was to meet, as far as possible, the views expressed in the course of the negotiations over the Bill referred to. That measure was framed in conformance with the memorials of trade associations showing that Parliamentary inquiry into railway rates had become imperative, and, as Mr. Chamberlain had to abandon it, the present Bills may be regarded as the answer of the railway companies to the traders' challenge. We have already mentioned the four principal objections taken to the Bills, and may take these as heads for our remarks:—

1. That the companies are, by their Bills, seeking a general increase of their merchandise rates. It is a well-known fact, and one that is frequently brought forward in railway law cases, that the companies do not always charge the maximum rates authorised under the existing Acts. That is to say, they have a right to charge such high rates that in some cases they are too high to be enforced,—the

traffic will not bear it. They now seek for confirmation of these powers, and, in some cases, for authority for still higher rates. The companies say that, in looking at the proposed rates, they should be compared with the maximum charges at present authorised, and not with the actual rates now in force, and that such a comparison would show but little difference except where their present powers are insufficient to pay them. They further say that they are willing to leave those cases in which they ask for increased powers in the hands of a Parliamentary Committee. In the present depressed state of trade this is naturally regarded with alarm. By the companies' own argument it is allowed that the present actual rates are below their statutory powers, and yet complaints come in from all quarters that these rates are excessive, and are destroying trade and driving it away altogether from various manufacturing districts. The companies, in seeking powers to retain, and in some cases advance, their maximum rates, give the impression that, so soon as opportunity offers, they will advance the present actual rates; and, though they claim to be merely framing simple and equitable mileage scales, there is no sign of any abatement in the opposition on this head.

2. That the proposed classification is improper and unjust to traders. The classification referred to is framed on the basis of the Railway Clearing House classification, which has been used by all the railways of any importance for many years. The legal classifications of goods are hardly worth the name, so few articles being enumerated. They are really of no service whatever,—except for lawyers to fall back upon in cases of disputed rates, when they find that it suits their purpose. The classification to be submitted to Parliament is elaborate and comprehensive, and makes provision for nearly all articles of commerce that can be mentioned. It is the result of the whole experience of the past, as the Railway Clearing House add to their classification every year new or hitherto unprovided-for articles of commerce. There are eight classes, viz.:—two for heavy mineral traffic, designated M(a) and M(b); special class (S) for other heavy and undamageable articles; and classes 1 to 5 for general merchandise.

This is a decided improvement upon the old system, and if the unfair provisions complained of were modified the rejection of the Bills on this count would not be advisable. In reality, the rates are at the present time governed almost as much by the Railway Clearing House classification as by Acts of Parliament, and had not the companies taken the opportunity of advancing certain articles a class higher

there would have been but little objection to this clause; but they have taken the course just indicated; and this, it will be seen, involves a further increase in the freightage of articles so dealt with. In this matter, again, the companies rely upon a full inquiry in committee resulting in any defects in the classification being rectified, claiming that it has been compiled with great care and difficulty, in order to replace the antiquated measures regarded as useless by both parties.

3. That under the Bills preferential rates for foreign produce will be legalised and extended. This is hardly correct, as the question is not dealt with by the Bills at all. The point is, that it ought to be. We cannot conceive that Parliament would object to the insertion of clauses restraining the companies from continuing to give our foreign competitors this undue preference in the matter of freightage, if it is proved that home trade is thereby prejudiced. The companies look at it in this light. They are obliged (they say) to quote low rates for import and export traffic to large freighters to meet the demands of competing ports, and they do so without any wish to put home trade at a disadvantage. Mr. Oakley says these rates can equally be made whether the Bills pass or not, but he will find that this position will be assailed. Mr. Magniac's remarks upon this subject in a speech recently delivered at a meeting of the London Chamber of Commerce (at which Sir Edward Watkin was present) are very significant. He said that he considered it an injustice that a preferential rate should be given to foreign goods, and urged all commercial men to protest against this; and his remarks were received with applause. This point is certainly one which requires close attention, but we cannot see that it is affected by the measures under consideration.

4. That the right of the companies to charge station terminals will be recognised. This is the most important point involved, and the one upon which the opponents of the Bills seek their entire rejection. The companies claim the right to charge for services rendered at the forwarding and receiving stations, in addition to the mileage rates. As the law stands at present, they are only authorised to charge so much per mile, inclusive of all incidental services; but, as a matter of fact, they always charge for terminals,—that is, when dividing the receipts for through traffic, a certain sum is put aside to cover these services, the remainder being divided between the companies interested according to the distance conveyed. They are enabled to do this through the circumstance already dwelt upon,—viz., their powers being so frequently in excess of the rates employed. When called to account for

high rates, they can, in such cases as these, maintain their position by showing that they are within the limit. Sometimes, on the other hand, their powers are found to have been exceeded, and a statement is handed in showing how the rate is made up, when they try hard to get a judgment affirming their right to the items set down for terminals. Though the decisions of the courts have invariably been against the companies, one, at least, of the Railway Commissioners has confessed to considerable doubts as to the intention of Parliament with regard to these charges. We refer to Mr. Price, who, in delivering judgment in a case of this nature, stated that he was convinced that Parliament did intend to grant something for the use of stations at the time of passing the old Acts, but failed to express their intention in a sufficiently clear manner to enable him to give a decision in favour of the companies. After such remarks as these, it is but natural that the latter should redouble their efforts to obtain Parliamentary sanction for these charges; and accordingly clauses are inserted in the Bills under notice, to enable them to charge for terminals, the amounts to be such as the Railway Commissioners may consider reasonable. Now, as to the objections under this head. It must be remembered that these charges are to be in addition to the scale rates, it being allowed that the latter, in long distances, are too high to be used. It is, therefore, more upon short distances that the companies require power to add terminal charges. The opposition to the clauses is in consequence of the amounts to be added being left to the companies, subject to the approval of the Commissioners upon a case being brought before them. In this respect, the matter would remain as before,—a costly inquiry being necessary in every case to ascertain the opinion of the Commissioners as to the reasonableness of the demands. Recent law cases have shown that most exorbitant terminal charges are included in the rates. Again, when pressed, the companies will produce an analysis of the rate in dispute, showing the proportion going for terminals, to the sixteenth of a penny. This occurred in the case of Kempton & Great Western Railway,—which case, it may be mentioned, has again been re-opened at the instance of the defendants, showing the wearisome nature of a contest of this nature. In this case the rate was, we believe, 8s. 4d. per ton,—it was certainly exactly so many pence per cwt. (thus being convenient for calculation),—and it is quite safe to doubt very strongly if sixteenths of a penny per ton were thought of when the rate was quoted. It naturally follows that traders look very suspiciously upon analyses of this kind. It is certain that the amount of terminal charges would vary considerably in the case of different stations; as the cost of construction and maintenance, local rates, &c., is very different. The cost of cartage, too, is a great factor in determining these charges, as in large towns this amounts to some two or three times the sum for which it can be performed in smaller ones.

Altogether the question is a very complex one, and a satisfactory solution of it would be very acceptable to all concerned. But, whether rightly or wrongly, everybody is afraid that the effect of the Bills will be to increase the already heavy charges for freightage by rail. It is beyond question that, if they chose, the companies could advance many rates forthwith, without waiting for new powers, and no legislation can be regarded as satisfactory that would, in the slightest degree, add to the yoke. The Chairman of the North-Eastern says that he believes that for certain articles reductions will be effected, and that the cattle tolls,—which, it was feared, would be advanced,—will remain unaltered. Mr. Oakley, the Hon. Secretary of the Railway Association, asserts that the companies have not the slightest intention of acting against the interests of trade or agriculture; but the opponents of the Bills remain unconvinced. Every day brings additions to their ranks, opposition coming from all classes. Not the least significant is that of the Common Council of London, who, on the 12th day of

February, at a meeting presided over by the Lord Mayor, decided to oppose the Bills "in all their phases," and to communicate with other public bodies to secure united action. The same feeling seems to pervade all meetings held to consider the subject, except, of course, the half-yearly meetings of the Railway Companies themselves. The shareholders have, in most cases, had the principles of the proposed measures explained to them, and have agreed to the Bills being submitted; the London and North Western Company, however, having decided to hold a special general meeting for the consideration of theirs. The struggle will, doubtless, be confined to those interested in the matter, as Mr. Chamberlain, replying to a deputation which waited upon him in the early part of February, advised the opponents of the Bills to impress their objections upon their members, so that the latter would be in a position to submit them fully to Parliament. It may be inferred from this that the Government do not intend to interfere, Mr. Chamberlain, probably, having had enough trouble already over railway legislation. His suggestion is being carried out, and, at a meeting at Manchester on February 10, Mr. Agnew, M.P., was sanguine enough to assure his hearers that the Bills would never reach a second reading.

NOTES.

THE awards of the Institute of Architects for the Soane Medalion, the Tite Prize, and the Silver Medal for measured drawings of existing buildings, are mentioned in another column. The drawings have been on view at the Institute during the week. We concur in the selection in every case, but only with un-mixed satisfaction in the case of the silver medal. Mr. Coxhead's drawings of St. Mary Ottery are an admirable set, representing a great deal of labour, and very well drawn. For the Tite Prize Mr. Campbell's design was the only one that could be selected; it is far beyond all the others in ability, but it is very French Italian, so to speak, and there is rather too much of the "Casino" style about it. Not one of the competitors seems to have realised what sort of thing it was which was intended to be promoted by the bequest of Sir William Tite, who would be rather aghast if he could see the kind of work which is supposed to come under the head of "Italian Architecture." Mr. Mitchell's Soane design hits best the idea of a municipal mansion, and has the most force and character of the set, though it is too palpable an imitation of the style of drawing and detail of an eminent artistic architect. "Acanthus," to which the Medal of Merit has been given, is a grandiose palatial Italian design, sufficiently suitable to the occasion. "Semper pulchrior" is a very elaborate and finely-drawn *rifacimento* of Francis I. architecture, not unsuitable to the purpose; and there is character in the design "Weave truth with trust"; the drawing of the perspective barely does justice to the design. Most of the designs are a little too grandiose for the subject; and "Labor" is a town-hall rather than a mansion. It is a pity that the Council gave so many subsidiary medals for the measured drawings; several of the sets were very good; but to reward nearly all the competitors is lessening the value of the first prize.

THE thirteenth annual Congress of French Architects will open at the Hemicycle of the Ecole des Beaux Arts, on the 8th of June, and close on the 13th of June. The programme will include some interesting visits, among others to the "Imprimerie et la Librairie" the hospital constructed at the castle of the Duchesse de Galliera, at Clamart, the suburbs and other portions of the Louvre, and the architectural monuments of Rouen. Among the papers and discussions, besides the notice of architecture at the *Salon*, and of the "Congrès des Sociétés Savantes," at the Sorbonne, and the annual report as to prizes granted by the Société, there will be an archaeological paper by a member of the "Académie

des Inscriptions et Belles Lettres," a study on ceramic art, and a notice of the life and works of the late M. Paul Aladie. The programme of the Congress, which is in preparation by the secretaries of the "Société Centrale des Architectes," will shortly be published, giving the names of the architects who will direct the visits to buildings, as well as those of the readers of papers. A general meeting of the supporters of the "Caisse de Defence Mutuelle des Architectes" (now numbering 130) will be held during the Congress, for the purpose of settling definitely the constitution of that Association.

THE case of Spackman *versus* the Plumstead District Board of Works, which was before the House of Lords on the 26th ult., is of considerable importance to builders. The appellant had erected certain one-story shops on the forecourts of some houses in Lee High-road, which were considered by the Plumstead District Board to be beyond the general line of buildings, and the Board took proceedings under the 75th Section of the Metropolitan Management Act, 1862. On the hearing at the police-court, the magistrate, Mr. Marsham decided that he was not bound to accept the certificate of the Superintending Architect of the Metropolitan Board of Works with regard to the general line of buildings in the road as conclusive, and that he was at liberty to decide a line for himself, taking into consideration the line of buildings in other portions of the road not dealt with by the Superintending Architect's certificate. The Plumstead District Board, being dissatisfied with this decision asked for and obtained a case for the consideration of the Queen's Bench Division, who reversed the magistrate's decision, holding that the magistrate was bound to accept the Superintending Architect's certificate as final. This judgment was upheld by the Court of Appeal, the Master of the Rolls, however, dissenting. Mr. Justice Fry, in giving judgment, remarked that the Superintending Architect was, in his opinion, a better judge of technical questions than a magistrate, and that if his decisions were acted upon a more uniform practice would obtain with regard to lines of frontage that would be the case if the matters in dispute were subject to the judgment of different persons. This decision was upheld by the House of Lords, the peers present being the Lord Chancellor, Lord Watson, Lord Bramwell and Lord Fitzgerald, and the appeal was dismissed with costs. The question was consequently remitted to the magistrate to decide, in accordance with the finding of the Court of Appeal.

THE of the many travellers in North Italy give heed to the wonderful system of irrigation canals in Piedmont, which yield 125,550 gallons of water per second, distributed over 1,680,400 acres of land, while those of Lombardy yield 95,355 gallons over 1,680,400 acres. The Cavour Canal, constructed within the last few years, draws its supply from the rivers Po and Dora Baltea, and has a flow of 29,200 gallons per second, watering 40,000 acres at a cost of 32,000*l.* per mile, or a total of 1,600,000*l.* Its volume is now to be increased by 5,300 gallons per second. A smaller subsidiary canal gives 18,540 gallons per second, and cost 24,154*l.* per mile. The canals in this district are not only used for irrigation, but also for motive power, by which the water is raised to higher levels. On the steep slope of the Dora Baltea near Turin, three canals,—the Toreia, Aghiano and Rothe,—flow parallel to each other, though on different levels, the water of all these being used at the top of the hill, 62 ft. above the highest of them. A stream of 154 gallons per second is diverted from the Toreia Canal, and carried down the hill by a lead pipe, until it meets the Aghiano Canal. Here it is pumped up to the summit level by eight pumps worked by four turbines driven by a fall of water taken from the Aghiano, and allowed to fall into the Rothe, by joining which, it is available for irrigation. By this means not a drop is wasted. The Italian engineers have gone on the principle of constructing the works

on a vast scale, so as to have everything on a uniform arrangement, and avoid constant alterations, and by this means they have succeeded in utilising every drop of water and making North Italy a marvel of fertility.

THE mode in which not only architecture, but also landscape as affected by architecture, have been at various times profoundly modified by religious or political change, or by scientific discovery, is often overlooked. It was wholly ignored by many of the greatest Italian painters, who were wont to enrich their charming little views of Palestine in the time of Herod the Great with the turrets and spires of Catholic Italy. One of the latest examples of a silent but very noticeable change of the kind that has come to our knowledge is that of the introduction of corrugated iron, as a roofing material, into Southern Africa. Where springs or wells allow of the rich vegetation that rewards the industry of the Dutch colonists, among wastes of interminable sand, rise fruit or forest trees of exotic growth. Beneath their shade the farm-house,—the church, the store, the shanty, rise,—usually built of red brick, and roofed with plates of corrugated iron. As we can remember the first introduction of this material into our own country, some forty years ago, it is evident that this transformation of the African landscape must be of comparatively modern origin. Contemporaneously, and possibly with less obvious reason, the black and brown natives of the country have clothed themselves in European attire, shabby and ill-fitting trousers by no means adding to the picturesque ensemble of the scene.

IN reference to the discussion on "Roof Coverings" at the recent meeting of the Institute of Architects, Messrs. Barton & Sons, of Broseley, ask us to call attention to the fact that data as to the behaviour of the old hand-made roofing tiles in bad weather would not necessarily hold good in regard to the same class of tile as now made by machinery, with the angles all mechanically equal. They add some practical remarks as to the laying of tiles, which may be useful:—"Care should be taken that the tiles are put close up to each other, or the consequence is that they overrun each other, and in a very short distance along the course and in a very short distance along the course the overrun is sufficient to cause a straight joint, which, of course, can never be weather-proof. As every one knows, there is a slight difference in the shrinkage in burning, and the tiles will sometimes vary a little in width, causing an overrun, but the introduction of a special made narrower tile at intervals will restore the truth of joint. In this neighbourhood many roofs are covered with seconds or even thirds tiles, not good enough for the market, but being laid quite dry without any rendering, pointing, or torching, but with great care as to breaking joint, the roofs are weather-proof."

THE owners of the Marylebone Theatre were fined 25*l.* on Monday last by Mr. De Rutzen for neglecting to comply with a notice served upon them by the Metropolitan Board of Works requiring them to make certain structural alterations to the theatre in order to secure the reasonable safety of the public. The alterations which had not been carried out were the removal of the whole of the dressing-rooms, lumber-rooms, and store-rooms under the stage and auditorium; the construction of an additional staircase to the gallery; and the removal of the handrail and balusters of the principal staircase and the substitution of a close balustrade of brick or stone.

A SERIOUS accident has happened at Bournemouth from the sudden fall of part of a building in course of erection as a hydro-pathic establishment, on the West Cliff. A local paper says:—

"Between thirty and forty workmen, including bricklayers, carpenters, and labourers, were at work there on Saturday, several of them being engaged on some scaffolding on the fourth story. Suddenly, and from some unexplained cause, the chimney-stack gave way, and carrying with it a

large portion of a party-wall, together with an iron girder of unusual strength (about 7 cwt.), fell with a loud crash to the ground beneath, a distance of about 50 ft. The wooden joists of the two floors were, of course, completely smashed by the falling mass of brickwork, the weight of which is estimated at between eight and nine tons. Unfortunately five men were knocked from the scaffold, and fell with the brickwork, being more or less buried in the debris at the bottom. To use the words of a spectator, who, a moment before the accident, was counting the men at work on the building, the bricks came toppling down like a pack of cards, carrying the men with them."

From what we hear, we suspect that this was one of the cases in which buildings at Bournemouth (a great field of building speculation) are carried out by men who have taken up the trade of contractor without any of the special knowledge requisite to carry out buildings properly and safely. The injuries done to some of the men were very severe, and should any one of them not recover, we shall learn who is to blame; otherwise probably not. Should there not be a coroner's inquest on serious injuries as well as on deaths?

A CORRESPONDENT sends us the following advertisement:—

"BOROUGH OF LOUTH.—The Town Council will on the 10th day of March, 1885, APPOINT A BOROUGH SURVEYOR, at a Salary of 55*l.* No extras will be allowed.—For duties and further particulars apply to me. By order,

THOS. FALKNER ALLISON, Town Clerk,
Town Clerk's Office, Louth, 11th Feb., 1885."

What is the meaning of this? Is it expected that any one with the knowledge and experience to fill such a post adequately will accept such a salary?

THE Benchers of Gray's Inn recently pulled down and rebuilt the lofty wall on the west side of Gray's Inn-road, in front of Raymond's-buildings, but made no attempt to lighten its appearance by placing a dwarf wall and a palisade in lieu of the present wall, as they might have done. Looking to their indifference to the public advantage, it is perhaps too much to ask them to permit a glimpse to be obtained of their garden by the removal of the high wall on the south side of Theohald's-road, and the erection of a dwarf wall with an iron railing in place of the present unaccommodating enclosure to the garden. Let them call to mind what Lord Bacon, who once resided in Gray's Inn, says of the benefits derived from the contemplation of a garden.

THE Paris Society for the Protection of Works of Art (La Société des Amis des Monuments Parisiens) appears to be doing a good deal of work. Among the subjects considered at their last meeting were,—the restoration of the Porte St. Denis, the Hôtel Juigné (formerly the Hôtel Mazarin), the formation of a committee for protecting works of art by legislation, a hitherto unknown work of Philibert de Porme, the hemicycle of Delacroix at the Palais des Beaux Arts, the nomination of a committee to overlook future improvements and lines of frontage, a proposed site for the statue of Diderot, cleaning and scraping buildings, the arrangement of cemeteries, a communication from the English Society for the Protection of Ancient Buildings, topographical street names, and others. Among the members best known in England are MM. Cahanel and Yvon, as representing the painters, and MM. Garnier, Charles Lucas, Ruprich-Robert, Questel, and Vandremere, as representing the architects. Through the intervention of the society, the Porte St. Martin is to be repaired instead of being restored, as was at first proposed; and the front of the Hôtel de Chinay, 17, Quai Malaquais, formerly the Hôtel Mazarin, which has been recently purchased by the Government for the purpose of enlarging the École des Beaux Arts, is to remain untouched. The courtyard of the hôtel is to be covered with a glazed roof, and will be converted into a museum.

THE *Bulletin Mensuel* of the "Société Centrale des Architectes" contains a notice of Mr. W. H. White's book on "Archite-

cture and Public Buildings," by M. Charles Lucas. The book was noticed at length in our columns July 9, 1884. Our Paris *confère* thinks that Mr. White may have taken a somewhat too pessimist view of the state of public architecture in England; but it is worth note, as the accuracy of the facts and conclusions about architecture in Paris has been called in question by some reviewers in this country, that M. Lucas especially commends the accuracy of the work, which, he says, gives a real authority to it; and he regrets that the book was not written by a Frenchman, or, at least, translated into French. It appears to have attracted a great deal of notice in France.

THE current number of the *English Illustrated Magazine* contains a very interesting article, both artistic and practical, by Mr. Geo. Simonds, the sculptor, on the system of bronze casting à *cire perdue*, the only system by which true justice can be done to a work of fine art in bronze. It is illustrated by some sections showing the way in which the moulds for large statues are built up, and the arrangement of the conduits for pouring in the molten metal. It is an article of real value and interest.

TWO important pictures illustrative of Biblical subjects were simultaneously open to private view last Saturday; paintings so utterly opposite in their object and method that there was a kind of unconscious irony in the coincidence. One of these, at the Gallery of the Fine Art Society, in New Bond-street, was Mr. Holman Hunt's painting of the "Triumph of the Innocents," his second painting of the subject; the first one having occupied him long years of struggle with a mechanically defective canvas, or rather sheeting, which strained and distorted the work. The first picture is now in the way of being made good; but, in the meantime, the second has been painted, and Mr. Ruskin says it is the greatest sacred picture of the day. We can only say this would be, to our thinking, tantamount to a confession that "sacred pictures" are things *passés*. The painting represents the flight into Egypt, with the addition of an attendant band of the spirits of the murdered "Innocents," very plump and fleshy little spirits; but forming a bright galaxy of movement and colour round the central group. The spiritual children advance on a flood of spiritual water, which has a way of rolling out into great spherical bubbles within which are portrayed future events. Joseph, with his carpenter's basket and spare shoes slung on his back, is turning round, so we are told, to see if there are any signs of pursuit. Signal fires, "still lighted in Syria in time of trouble," are burning on the hills. Dogs come out of the mill-house to hark at the passers-by, as we suppose they "still do in Syria." It is needless to say that there is a great deal of superb painting of detail in the picture, unsurpassable in this way in its thoroughness; a wondrous light in the stars, a conscientious thoroughness in the execution of minor details, for it is Mr. Hunt's work. But in regard to the intellectual objects of painting, it is a picture only suited to the interest of children, or persons of very childlike perceptions. It is melancholy to see such technical power and such earnestness of work expended on the production only of an illogical blending of superstitious legend with over-acted realism, which will lose all the little interest it has before the present generation has lived its life out.

THE other work referred to, Munkacsy's "Calvary," which is being exhibited at the Egyptian Hall, Piccadilly, and which is probably one of the largest easel pictures ever painted, is the very antipodes of Mr. Hunt's picture in feeling and intention. Munkacsy aims at giving the event as it may have happened, without any assumption of the supernatural in any way. In remarking upon his former large work, "Christ before Pilate," we spoke of the remarkable realisation of the various personages and types of men repre-

sented. This is hardly so strongly seen in the present picture. What one feels most strongly in it, perhaps, is the painful accentuation of the reality of the punishment of crucifixion, the most cruel mode of execution ever practised by a civilised people. The groups round the cross,—the women, the Roman soldiers, with their air of perfunctory attendance "on duty," and the Rabbin discussing the matter, are thoroughly and powerfully rendered. But the general impression left by the picture is that it is not so much pathetic as painful. It illustrates, however, to a certain extent, what we regard as the true attitude of modern painting in dealing with religious narrative,—the historical and human attitude rather than the mystical; but something more, no doubt, is required, and that something Munkacsy does not seem to possess. The picture has no feeling. The extravagant laudations of it in print, put into the hands of visitors, are in very bad taste.

LETTER FROM PARIS.

We have already sufficiently noticed the industrial crisis which is throwing Paris off its balance, and it is unnecessary to insist on the desirability of opening as soon as possible the large labour-yards for the great public works which are needed. The question is not only an economic but a political one, and the situation is so grave that it is strange to find the Government so little occupied with it. The partial suppression of the fortifications of Paris, of which we spoke in our last letter, appears precisely the occasion ready to hand to furnish for a long time profitable employment to unemployed labour. The uselessness of this fortified *enceinte* is by this time demonstrated, and the bastions constructed not long since by M. Thiers having proved unequal, in 1871, to the task of repelling the German army, have, in fact, served no one's purpose except that of the Commune armed against the regular Government.

Great disappointment has accordingly been felt here that, in spite of the promises of his predecessors, the new Minister of War has opposed his formal *non possumus* to the claims of the Paris municipality. All the plans which it had been in some way authorised to carry out, all the projects which it had preferred, are cut short by the veto of the Committee of Fortifications, and the question seems only too likely to be buried for good and all.

In the mean time, while the stoppage of work continues and the distress is general, we are looking here and there for palliatives. The directors of the leading journals of Paris have taken the initiative in a *fête de bienfaisance* which is to be held on the 1st of April next. The Municipal Council have liberally put at the disposal of the committee the great range of rooms, scarcely completed, of the new Hôtel de Ville; there is to be a ball and a concert; the price of entry will be 20 francs, and 20,000 tickets will be put in circulation. The committee hope that, in spite of the pretty high price, curiosity will draw a great many persons, especially foreigners, to this monster *soirée*, of which the programme is really very attractive. We may add that M. Alphand, Directeur-Général de Travaux de Paris, is charged with the organisation of the *fête*. The name of this incomparable "metteur en scène" is a guarantee of success and of help for the poor of Paris.

Speaking of extensive works, we may observe that the contracts for the Gare St. Lazare, the enlargement of which we have already announced, have been let since 26th of February, and the work is now in full swing. This important work is under the care of M. Juste Lisch, Inspecteur-Général des Monuments Historiques, who is charged by the Compagnie de l'Etat to construct a monumental railway station between the Rue d'Amsterdam and the Rue de Rome.

How long shall we have, each month, fresh losses to mourn in the world of art? This month it is M. Du Sommerard, whose reputation was European, and whose unceasing care from 1814 to his death was to increase the treasures collected in the Musée de Cluny by his father, in collaboration with whom he wrote that extraordinary work of erudition on *Les Arts du Moyen-Age*. M. Du Sommerard had succeeded Chas. Blanc as member of the Académie des Beaux Arts. His death leaves a great void, and the Government are in great difficulty about a successor to him at the

Musée de Cluny. M. Alfred Darcel, Director of Les Gobelins, is, however, much talked of for the post. In that case, the administration of the latter establishment will be entrusted to M. Gerspach, chief of the Service des Manufactures Nationales.

The city of Paris, in its turn, has lost in the Comte de Licsville, joint curator of the Municipal Library, a patient collector, to whom we are indebted for the Musée de la Revolution, installed at the Hôtel Carnavalet. M. de Licsville, who had devoted his fortune to that curious collection of books, falence, fans, engravings, and jewels, had besides deposited at the Musée de Sèvres and at the Union Centrale des Arts Décoratifs a crowd of objects of great interest. He has left to the Municipality his house for the purpose of founding a school of design.

We will not quit this sad obituary subject without a word for another modest and conscientious artist, L'Heritier, the celebrated comic actor, who died the other day at the age of 78, and who has gladdened the hearts of several generations of playgoers. He formed part of that pleiad of actors now disappeared, who have distinguished the Palais Royal Theatre, —Grassot, Ravel, Numa, Alcide Touzé, Gil-Pérez, and Hyacinthe. The latter still plays, in spite of his advanced age, but is only the shadow of his former self.

The theatrical question plays a great part here. More than any other, perhaps, the population of Paris is greedy of spectacle. It is true there has been lately a notable veering about of public taste, formerly directed almost exclusively to the drama. There is now a great run on music, and the popular concerts directed by MM. Colonne, Benjamin Godard, and Lamoureux are very successful. Accordingly, the municipal administration, wishing to satisfy these new tendencies, has resolved to request the National Academy of Music to give, with the aid of certain subsidies from the municipality, thirty-six popular representations at low prices. The Municipal Council has looked favourably on this innovation, which will shortly be voted, and will permit slender purses and small fortunes to realise the splendour of the new opera house and the beauty of great Classic works hitherto reserved for a privileged class, at the same time that it will develop in the Republic the taste for serious musical art. This is not the only encouragement which the City of Paris has given to the art of music. It has instituted a great competition among all French artists for the composition of a grand symphony for orchestra, *solo*, and chorus. The scores to the number of seventeen are at present submitted to a jury of eminent composers, including Saint-Saëns, Mosseuet, Delibes, &c. The successful candidate, whose work will be performed at the cost of the municipality, will receive also a prize of 10,000 francs.

From the Opera House at Paris to the Theatre at Nice is a transition the more easy since the new building, which was inaugurated on the 7th February last, is, in some sort, a copy of the work of M. Charles Garnier. It will, no doubt, be remembered that the Theatre at Nice was destroyed in the terrible fire which had so many victims. The construction which has replaced it is the work of M. Aune, who has directed his special attention to expedients for avoiding such a catastrophe in future.* The interior decoration is very rich, and special mention is made of the lighting apparatus, the lustres, brackets, and candelabra executed at the foundry of the brothers Thiebaut, from the designs of Jules Coutan, a young sculptor of great talent.

For some years past the civil buildings of Paris and its neighbourhood have been the object of very important artistic work, and an important competition, organised by the Department of the Seine, for the decoration of the Mairie, at Courbevoie, has just been decided.

The prize has been carried off by M. Seon, pupil of M. Puvis de Chavannes, who, after the first decision, had for competitors MM. Delahaye and Picard, pupils of MM. Bonlange and Gérôme, and M. Chartran, pupil of M. Cabanel, and holder of the Grand Prix de Rome. The compositions of these different artists, which have been exhibited at the Hôtel de Ville of Paris, show much talent and technical ability; but these good qualities are spoiled by incredible

faults of composition. There is, especially, a *mélange* of realism and allegory, which appears the more out of place because the public taste has drifted far away from the Classic reminiscences and Academic traditions of the Ecole des Beaux Arts and the Villa Medici. Thus, for example, to symbolise betrothal, one of the competitors shows us, by the side of a young peasant girl fully dressed in modern costume, a veritable Arcadian *berger*, scarcely covered at all with the traditional animal's hide. The result is a contrast the more absurd, that the artist has given, as framework to his eclogue, a landscape sketched from actual locality. This contrast of nudity and modern dress is not only ridiculous, but almost improper.

It is also as the result of a public competition that there was executed the monument to Ledru Rollin, which was solemnly inaugurated on the 24th on the Place Voltaire. The statue of the celebrated tribune is the work of a young artist, —M. Steiner. It occupies the pedestal on which, before the war, stood the statue of Prince Eugene, now installed in the Jardin des Invalides.

While we are awaiting the annual *Salon*, exhibitions follow one upon another. After that of the water-colour artists, of which we spoke, here is a Union of lady artists, painters, and sculptors, about to open at the Palais de l'Industrie its fourth exhibition, which comprises nearly 300 works. There are some remarkable things there. Among them may be mentioned the very original sea pieces of Madame Elodie La Villette, the paintings of Mesdames Besnard, Ronner, and Annie Ayrton. Among the sculptures we may mention those of Madame Léon Bertain, President of the said Society, and of Claude Vignon (pseudonym of Madame Rouvier, the wife of the Minister of Commerce). The Society has consecrated two rooms to the work of a young Russian lady-artist, Mlle. de Bashkirtsaï, who died recently, and whose mother is about to found an annual scholarship for a poor artist who has obtained an award in the *Salon*.

We may mention, also, the exhibition of the works of Gustave Doré in the Boulevard St. Germain (from the 2nd of March to the 2nd of April); that of the works of Bastien-Lepage, which will be very shortly organised on the Quai Malaquais, in the rooms of the Hôtel Chimay, which the State is shortly about to acquire in order to enlarge the Ecole des Beaux Arts.

Lastly, from the 9th of March to the 9th of April, there will be held, in the Pavillon de Flore, an exhibition of works in black and white, which will include crayons, engravings, and drawings generally.

We are going to have at the Hôtel de Ville, where we are actively occupied with preparations for the *great fête* mentioned just now, a fine equestrian statue in bronze modelled by M. Fremiet. This eminent artist, from whom the Municipal Council have commissioned a grand candelabrum for the decoration of the State staircase, instead of confining himself to the ordinary vulgar caryatide holding a certain number of lamps, has conceived the happy idea of modelling a herald-at-arms, on horseback, in the costume of the fifteenth century, having on his body-armor the arms of the city executed in coloured enamel, and holding aloft a chandelier in his hand. This will give the principal light to the staircase. It is to be regretted that M. Fremiet has given to his work a green *patine* of a glaring tone which makes it look rather like plaster painted. But that is the one fault one can find, and it is not the less a bold work, of grand movement and frankly original.*

This "illuminating function" given to a statue recalls to our memory the celebrated colossal "Liberty" executed by M. Bartoldi for the City of New York. We learn that some Americans propose to offer to France, by public subscription, a reduction of this work, which will still not be less than 8 metres in height, and will be set up in Paris, in the Sixteenth Arrondissement, Place des États-Unis. The statue will be cast at the M.M. Thiebaut's foundry.

We conclude by announcing the recent creation, at the Gobelins, of a Museum of Tapestries, which will enable the public to appreciate the marvellous riches of our national manufacture. It is to M. Kaempfen, Directeur des Beaux Arts, that we owe the initiation of this excellent foundation, which will probably be of real service.

* An elevation and section of M. Aune's design will be found among the illustrations in the *Builder* of January 5, 1884.

* We hope to illustrate this work shortly.

WESTMINSTER ABBEY.*

I HAVE taken our glorious Abbey Church of St. Peter at Westminster as the subject of what I shall have to say to you to-night, not because of the novelty of the theme, but because the abbey is in our midst, and because it has no equal either for beauty or historical associations. We, the present students and lecturers of the Academy, may contemplate afresh, for our own interest and profit, that noble pile, "the most lovely and lovable thing in Christendom," as Street called it, which has afforded so much instruction and delight to those who have preceded us in this room.

I must at the outset acknowledge my obligations to the works of Sir Gilbert Scott, who not only restored the unrivalled chapter-house and refitted the choir, but made the whole fabric and every treasure it contains the objects of his unceasing care and loving regard, and who was never tired, as Professor of Architecture, of bringing its beauties before the students of the Royal Academy, as the best illustrations of the marvellous Mediæval art to which he devoted his life.†

Any interest my lecture may have, will I am sure, owe much to the beautiful drawings by Messrs. Vacher, Milner Allen, McLaren, and Slater, which are hung upon the walls. The plaster casts of carving in the Abbey, and

as acolytes on the occasion left such tangible proofs of their presence in the droppings of their candles, as to remove all doubt of the voracity of Eddric, the Thames fisherman, who acted as ferryman to the Apostle, and witnessed the supernatural consecration.

You will, doubtless, remember that Ethelred and his consort, the beautiful Norman princess Emma, took refuge from the Danes in the Queen's fatherland, Normandy. There their son Edward (afterwards the Confessor) was brought up, and after living twenty-five years in the Norman Court, and witnessing the erection of those imposing churches at Caen, which even now excite our admiration, was induced in 1041 to recross the Channel and re-establish in his own person the Saxon line on the throne of this country.

Edward rebuilt the church at Westminster in 1049-55, establishing there a Benedictine monastery in fulfillment of a vow. And, though little or nothing of his church, the first of cruciform plan erected in England, has come down to us, it is fair to presume that its characteristics were those of an early Norman church of enormous dimensions and daring construction, rather than of the last of those more primitive buildings, modest in size and rude in design, which we suppose to have been the rule in the Saxon period. In fact, we know from ancient contemporary documents that the choir was lofty,

minster School-room), the lower part of the walls of the refectory, on the south side of the cloister, and the bases of a column or two within the church itself, but the Bayeux tapestry gives us an outline of the Saxon church as it existed in its glory.

As the Confessor had made of the abbey a Royal Chapel, so Henry III. conceived the idea that the church should become a royal hurrying-place. At least such became his determination during the fifty years in which the Royal Abbey Church was in course of rebuilding. The king was fond of ritual. His visits across the Channel made him acquainted with the already achieved glories of the cathedrals of Amiens, Beauvais, and Reims. His enthusiasm for church services and for art combined to make his wish that his church should be incomparable for beauty, a natural one. Besides the native masons employed on the church, a host of foreign artists were invited to expend their skill on the monuments and furniture of the fabric.

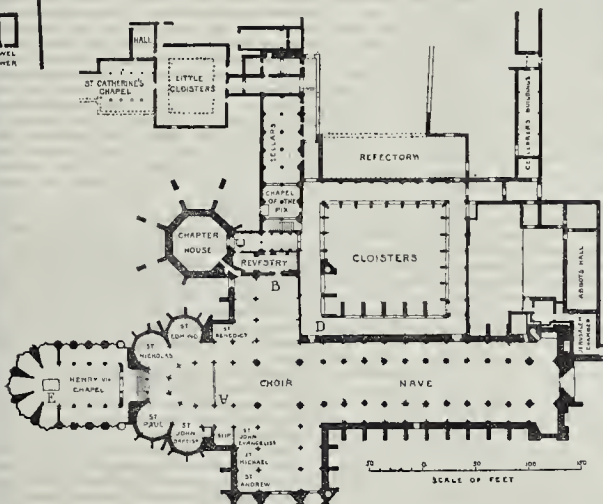
In the course of his long reign Henry III. finished the Lady-chapel, the Confessor's shrine behind the high altar, the whole of the surrounding east end, the transepts, including the first bay westward from the crossing, and the chapter-house, with its vestibule and the revery or Chapel of St. Faith. Edward I., his successor, erected the next four bays westward in the nave, the corresponding portion of the north walk of the cloisters, and the south end of the east walk beyond the part which belongs properly speaking to the south arm of the transept, and which, as carrying the triforium, was built naturally with it by Henry III.

The remaining six bays of the nave were erected by different abbots, Abbot Littleton in Richard II.'s time building the lower portion of the western towers. He also added the refectory or college hall on the Confessor's substructure, the abbot's house, the Jerusalem Chamber, and the rest of the cloisters; while on the north side he built Solomon's porch in front of the grand portal at the end of the north transept. In fact, after Henry III. we owe more to him than to any other of the abbey builders. While the nave was in course of construction Henry V. had erected his picturesque shrine over the ambulatory. The great west window appears to have been put in by Abbot Estney in 1498. In 1502 Henry VII. pulled down the Lady-chapel of Henry III., and erected on its site the wonderful mortuary-chapel which bears his name. The upper parts of the western towers were only completed in 1714 by Sir Christopher Wren. Before beginning to build he took down some of Littleton's work, shown in Hollar's view you have in your hands, and used the material thus at his disposal in repairing the south-western haies of the nave, putting the abbot's Perpendicular mouldings inwards. These have been discovered in the recent restoration, and will be useful in determining the real contour of the mouldings of the lower part of the tower.

Having now reminded you of the most important dates of the building, I must say a few words about the materials of which it is composed.

The stone most largely used in building the Abbey was the green sandstone called "Firestone" from its resistance to fire. It came from "Godstone" in Surrey,—a name implying the sacred use to which the stone was put. It was of a fine warm greenish yellow tone, and easily worked. Associated with it was chalk from the lower beds at Merstham in Surrey, and elsewhere,—an excellent material when kept from damp, most perishable when subjected to it. The excellent effect of colour produced in the filling in of the vaults both in the cloisters and the church itself is due to the alternate banding of these stones. In addition, the curious in such matters may find *trufa*, a coarse, loosely compacted, and very light limestone used in the east wall of the dormitory, where the Westminster boys now have their gymnasium. Caen stone was also used, or an oolite from Normandy very like Caen, which was really one of the most easily procurable stones for building in London, owing to the difficulties of land transit in those days.

The Early Norman ashlar work of the Confessor is easily to be distinguished by its surface being covered by coarse diagonal tool marks, and by the wide mortar joints between the squared stone, $\frac{1}{2}$ in. and sometimes $\frac{1}{4}$ in. wide. The corresponding work of the Plantagenets, on the contrary, is characterised by fine vertical tool-marks, and by thin $\frac{1}{4}$ in. joints.



Plan of Westminster Abbey.

the specimens of stone and marble used therein, are kindly lent by Mr. Brindley. I am able to present you with seven hand illustrations, due to the courtesy of the Editor of the *Builder*. They are most of them reproductions of drawings made by pupils of the Academy.

First, I must give you in a few words the history of this remarkable structure. On two great metropolitan churches sprang into existence almost at identically the same time. It appears that Ethelbert in 610 founded St. Paul's Cathedral at about the time when King Sebert, who died in 616, is credited with the first building of the church of the rival Apostle, St. Peter, on the then so-called Thorney Island. This was a tract, a part of peat and in part of gravel, covered with scrubby vegetation, lying between the Thames and the mouth of the brook Eye, which, flowing from Hampstead, passes through Tyburn (the Eye burn), and, disguised as a sewer, it is said, under Buckingham Palace itself, falls into the Thames where Great College-street runs out Abingdon-street. I need hardly repeat to you at length the familiar legend of the consecration of the church by St. Peter himself, on the eve of the day on which Bishop Mellitus, the companion of St. Augustine, was to have one it; nor how the angelic host who assisted

was vaulted, turned circular to the east (that is to say, was apsidal, had double vaulted aisles in two stories, one above the other, had a crossing or transept, with a lofty tower, whose timber roof, like the other roofs of the church, was covered with lead, and had five large bells.

That, further, the Confessor built a cloister, a chapter-house, vaulted and round, a refectory, a dormitory, and the usual monastic offices. Moreover, it appears that as the western end of the original early Saxon pile was left standing to avoid interrupting the services during the building of Edward's church, the latter must have been somewhat to the east of it. That Edward's church was conceived on a grand scale, and occupied, with what may have been left of the earlier Saxon nave, substantially the same ground as the present structure, is proved by certain structural facts, among others, by the remains of Edward's dormitory abutting against the present south transept wall in the usual manner, and also by the remains of the south wall of his cloisters, extending almost as far West as the present limits of the nave (and cloisters, I believe, always stopped in that direction short of the nave); and, lastly, by the fact that the Lady-chapel of Henry III., erected some years before he began the rebuilding of the church (and only pulled down to make way for Henry VII.'s Chapel), was placed adjoining the apse of the Confessor.

Of the buildings of the Confessor, nothing now remains to us but the Chapel of the Pyx, the cellars under the dormitory (now the West-

* A lecture by Mr. Waterhouse, A.R.A., delivered to the students of the Royal Academy on Wednesday evening last.

† To his son, Mr. John Oldrid Scott, I am indebted for the loan of most of the large drawings on the walls, which were prepared by his father to illustrate papers read here elsewhere.

In addition to the fire-stone, the chalk, the tufa, and the Normandy oolite, which appear to have been used by all the great builders of the abbey,—Edward the Confessor, Henry III., and his successors,—Purbeck marble was largely employed for the detached shafts and frequently for both bases and capitals, sometimes also for the piers themselves, though, owing to its extreme hardness, it was seldom used when elaborate carving was intended. There is a notable exception to this in the central pier to the Chapter-house, which has a splendidly-carved capital in Purbeck. The old Purbeck was much richer and more varied in colour than that now to be obtained. A sample of the original polish still lingers in the Chapel of St. Michael, north transept. It was introduced also into the pavements for steps, and, as you will see, it played an important part in the priceless pavements of the shrine of the Confessor and the Sacrament. Owing to its decay externally Sir Gilbert has substituted for it a Derbyshire fossil marble in the new north porch.

Abbot Litlington, in the fourteenth century, appears to have used Roche Abbey stone, and Abbot Islip in the sixteenth, an oolite from Oxfordshire, in the north-west tower. In the upper part of the western towers, rebuilt by Sir Christopher Wren, Portland stone was employed. This stone, though too cold in colour, is unequalled for durability in London, and its use was continued, as I find the six western clearstory windows on the south side were rebuilt externally with it in 1730. But the surveyors of the abbey after Wren, Dickinson (who restored the great rose-window of the north transept and who has buried within the north porch) and Tufnel, are said to have employed, in their day, the Oxfordshire stone. The so-called restoration undertaken by the latter surveyor was, after all, chiefly demolition, for it was he who scraped off the exposed surface of the stone externally to get rid of the decay, thereby destroying the contour of the mouldings, reducing their size and effect, and, by exposing another surface to the corroding air, leading to the necessity, in our day, of replacing much of the masonry with entirely new work to save the fabric from utter ruin and accident to passers-by.

Sir Gilbert Scott appears to have used Ketton or Mansfield Woodhouse stone in his excellent restoration of the south walk of the cloisters, Tadcaster in the west walk, Bath for the front of buttresses north side of nave, Tishury in the Chapter-house, and Chilmark from the Trough or Wardor beds elsewhere.

This latter admirable stone has been selected by Mr. Pearson, the present architect, for the works he has now in hand.

You will see, therefore, that Westminster Abbey is practically a geological museum of the greatest interest and value to the architect practising in London, enabling him to watch the effect of its climate on almost every description of building stone in common use, except it be the millstone grit and other sandstones so much used in the North.

The terrible effects of our present climate upon stone are strikingly exemplified by an incident which occurred in taking down the Chapter-house. There some ashlar was found of Henry III.'s work, with delicate masons' marks or scratchings which had been exposed for three centuries without any deterioration, and afterwards cased with brickwork. When discovered by Sir Gilbert these stones were again used in re-building the Chapter-house with their old surfaces again exposed, but the nineteenth-century atmosphere of Westminster destroyed the marks in less than a year. There were no potteries in Lambeth in the early days of the abbey; now the abbey officials declare they know glazing days at Lambeth from the sulphurous taste of the air.

The danger of using lead in joints is strikingly shown in various parts of the fabric,—at least, molten lead. Sheet lead, as now used, would not have done the mischief we have to deplore,—the destruction of so many of the neck-moulds of the smaller capitals. The material destroyed is Purbeck marble, a calcareous stone. The lead was applied through a small hole drilled in the bell of the capital. The heat of the molten metal, doubtless partly calcined the stone, and rendered it friable. The weight which the capital had to sustain gradually squeezed out the lead, which, curling up, has in numberless instances broken off the delicate neck-mould.

You will notice the tie-rods which go from pier to pier in the east end of the church and at the crossing. These were built in originally,

and go right through the piers; for it will be observed that these rods do not keep to an exactly uniform horizontal line around the church, the upper rods terminating in eyes which drop into books forged on the beads of the lower rods, which pass through the piers. In the Chapter-house when taken down, they were found, as the strain was not direct, to be attached to rings embedded in the masonry of the piers, the attachments being made in the same way with hooks and eyes. In one part of the ambulatory rods of oak, about 5 in. square in section, are wedged in between the caps of the columns, their ends abutting against lead pads. These rods have the reputation of being 400 years old, and probably took the place of the wrought-iron rods where likely to be subjected to compression merely in case of any bulging of the masonry, and not to tensile strain.

Two courses of 1½-in. chain bond go right through the walls, one at the springing of the arches of aisle windows, and another half-way down the windows. Across the glass they acted as stay-bars to the glazing. No doubt there are other courses of ties in the walls at greater altitude.

As before mentioned, there is an interesting morsel of the early church of the Confessor yet remaining, but quite concealed from ordinary observation. Just in front of the tomb of Edward Crouchback, on the south side of the sacrum, is a trap-door of marble in the modern pavement. If that be raised, and a light lowered into the dark space below, the first course of the drum of a column, with a base of two shallow circular members on a square block, is seen. That is part of the church of the Confessor. This late discovery proves two things; that his nave was narrower than the present one by 10 ft., that the pavement of it was scraped by 3 ft. or 4 ft., and taken in conjunction with the base of another column discovered *in situ* also on the north side, that the lines of the arcade converged rapidly towards the east. This is a remarkable arrangement, and was most likely productive of a happy effect when looking towards the altar. Though Edward's nave was thus only about 23 ft. wide, his bays, if the one in question may be taken as a fair specimen, were 18 ft. 9 in. centre to centre, instead of 17 ft., the average dimension of one of Henry's bays, but then they were spanned by semicircular, not pointed, arches.

To return to the building erected by Henry III. in the middle of the thirteenth century, to us the centre of attraction. It is peculiarly fortunate for us as Englishmen that the Royal Abbey Church was rebuilt when it was. Reims, Beauvais, and Amiens had just reared their splendid cathedrals, in which the Romanesque, or round-arched Gothic of the twelfth century, had given way, by an entirely natural and logical series of changes, to the fully-developed Pointed style. This effected all at once a revolution in architecture in this country, as in France. In English work, however, the windows, as a rule, were kept detached, singly or in groups, and were emphasised or adorned by a profusion of surrounding mouldings of exceeding delicacy and beauty, the use of the circular abacus in the capitals adding to the elegance of the work. It was only when the openings were unplugged (in the triforium or the bellries, for instance) that they continued to be grouped together under a comprising arch, and divided by detached shafts, as in the earlier Romanesque or Norman style. Glazed windows in England were then mostly of single lights. While the English builders were perfecting their single lights, the French were turning their attention to the mullioned and tracery window. At first their efforts were somewhat clumsy,—at any rate, when they forsook what is called "plate" tracery. The piercings in the window-heads consist exclusively of geometric figures, as circles, quatrefoils, or cinquefoils. At length at Reims, in the middle of the thirteenth century, or rather earlier, our neighbours the French achieved a great success in what is called bar tracery. In the two-light window of the apse there we find not only the head filled with a circle subdivided by six cusps or foils; but in addition the spandrels and gussets are all pierced, and the mouldings of the millions are carried all round the circle, as well as the two main divisions of the window.

It appears, therefore, that we are indebted to French architects for this bar tracery, and that in all probability because our own artists were concentrating their energies in another direc-

tion and achieving results equal to, or surpassing in beauty, the efforts of their French brethren. Our neighbours in the same time were developing another feature very characteristic of their productions when compared with our own, the chevet round the apse, handed down to the thirteenth century from the preceding century, but discarded generally in England, we should suppose from its interfering with the splendid grouping of our Early English windows, which could only be fitly displayed in a flat wall.

In all probability the Confessor's church had simply an apse, terminating the eastern end of the cross, with square ends to the aisles, after the plan of St. Stephen's, at Caen. Soon after this, however, the aisles were continued round the apse. We see it in our own Norman and Transitional work, as at Norwich and Bury and at St. Bartholomew's, Smithfield, but rarely afterwards.

The French then began to group around their chevets a number of radiating chapels arranged as polygons, so that they exactly fitted each other; their axes radiating from the centre of the apse. This involved great complexity of plan, produced varied effects of light and shade, and was brought to perfection in Reims, Amiens, Beauvais, and in other churches founded on these. These three great examples were probably the churches which served as Henry's models; for, though the Lady-chapel was begun in 1220, the rebuilding of the church itself did not begin till 1245, after Amiens had been twenty-five years in building. It would appear probable that Henry's English architect had been sent to study these stupendous works, for the new abbey took their form in apse, chevet, radiating chapels, and har-tracery windows of the Reims type, though in detail it was essentially English. The bar tracery, if this were, indeed, its first introduction into this country, took ultimate root here; not so the radiating chapels, of which there is hardly another example.

The difference of plan is interesting. In Reims the chevet follows the five sides of a decagon, and is a very simple affair. Westminster, on the other hand, is more complex and beautiful in effect. The sides of the apse are five in number, as at Reims, but instead of being five sides of a decagon the three eastermost are sides of an octagon, and the others incline slightly to meet the octagonal end from the straight sides of the church. This is very subtle, and gives a gentler transition from the straight walls of the main arcades into the circular form of the apse. This is one of the lessons which the abbey gives to the architectural student. This peculiar plan, you will observe, also prevents the apsidal arcade being so crowded as in the French churches, because to the east of the transverse line from the centre of each of the apse proper radiates there are but two semi-arches and three whole ones, four altogether, instead of five as at Reims; and the same holds with regard to the arches opening into the radial chapels, which are thus much wider than the ordinary bays of the church, whereas at Reims they are the same width.

At Cologne the apse takes the form of half dodecagon. It is consequently very crowded; the arches not being twice the width of the piers, except the two first bays, which are only half in the apse, and which fall inwards, as at Westminster.

No French example that I know of presents so cunning a treatment of the apsidal east end, except it be St. Ouen, at Ronen, which follows the Westminster treatment at a much later date. In another very important particular the church differs from the usual arrangement. The triforium, instead of being covered with a sloping roof descending from below the sills of the clearstory windows to the parapet over the windows of the aisles, has a flat timber lead-covered roof. Was it ever intended to vault this triforium roof? I think so, as we see in the earlier parts of the gallery detached shafts against the piers between the open arcading, and which stop suddenly below the roof. The triforium thus formed might have been in imitation of that which existed in the church of the Confessor, as such festoons were not uncommon in Romanesque work, and were used for the accommodation of worshippers where not so elevated from the floor of the church as in the case in our present abbey. Whatever may have been the motive in giving such dignity to the triforium, there is no question as to its beauty in itself, at any rate internally, or to the

ewilding charm of the views of the nave and pise when seen from the parts of the triforium near the crossing. At this height the spectator is not so much distracted by the garish modern monuments, and he is able to calmly contemplate the unity and splendour of the fabric itself. The triforium is lighted by windows whose quadrilateral arches spring from their sills without any intervening jambs, and are filled by three circles, each decorated with an inner order arranged as a cinquefoil like almost all the other tracery of the abbey.

The triforium arcade is perhaps the most noticeable feature in the church. Its richness and complexity is due to its being double. Each bay has two principal arches, with beautiful carving or diaper on the vousoirs. Within each of these arches are two others, delicately moulded, supported by a detached central shaft of Purbeck, with cap and base of the same material. These inner arches are cusped, and support a circle enclosing the customary cinquefoil. Behind all this, and detached by the distance of 2 ft., is its exact counterpart. In neither range of arches, however, has "the lamp of sacrifice" aided the builder to mould them on the triforium side, except in that part of the nave erected in Richard II.'s time. Seen from below, nothing can exceed the beauty of this triforium. It is perhaps a trifle too beautiful for so great a repetition. Through the courtesy of Mr. Fisher, you can compare this triforium with that of the Angel Choir at Lincoln, in his two remarkable drawings.

The abbot in Richard II.'s reign built the north westernmost windows of the triforium on the south side, and it is curious to observe that they have reversed the cinquefoil tracery in the heads of these windows to their normal position, with a circle at the crown, whereas the previous builders had for some reason placed a cusp at the crown and a circle at the base of each of these figures. This was a rather bold departure from precedent for the abbey, where one does not observe many of the usual characteristics of the architecture of Edward I. and Richard II., owing to their raising as he mentioned to their setting aside their natural predilections in favour of the style of their day to secure the unity of the building. Both Edward and Richard, therefore, though employing their own mouldings, carried the main features of the Henry III. work right down the nave, so that there is no break in the grand rhythm of the building, though, on careful inspection, there is no doubt as to where each builder began and left off. The story they told was exactly Henry's story, but the language used was their own. In the south and west walks of the cloisters you see exactly the same restraining influence at work. The openings are filled in with the geometric forms of a previous century, but the caps of the columns and other details are of Richard's own time, so that, though the student would not go to Westminster Abbey to learn the ordinary progression of the styles, he may go there with profit to learn the far higher lesson of how to sink self in labouring with others in a common cause.

Another slight change in the mode of treatment may be remarked in the mode of treatment of the triforium. Edward, and indeed Henry, did not put bosses to the tips of their cusps, but Richard did. Wren, when he restored Richard's work omitted them. Perhaps he did not care for Gothic carving, nor for Gothic mouldings. In fact, we know he did not, since he replaced with hideous acorns some of the little capitals on the window mullions. These are being replaced, and with excellent effect by Mr. Pearson on the south side of the nave, also the sensible mouldings of the great quatrefoils which in the fourteenth century took the place of the cinquefoils in the heads of these aisle windows. These mouldings die away on a broad spay towards the lower part of the quatrefoil, where they would not be seen from below, and where they would interfere with the proper throwing off of the rain.

The two last triforium windows west (south side) appear never to have been glazed. The rasonry was finished, and then subsequently they were bricked up, for what reason does not appear. Wren wanted to return one of his classical intermediate cornices against the last window, so he removed a few of the bricks and mitred his cornice into the moulding of the window, of course in a workmanlike manner, but did not remove more of the brickwork than he could avoid. He left that to Mr. Pearson, who has glazed them for the first time.

After the triforium perhaps the most beautiful feature is the wall arcading. Observe the beauty of its mouldings, of its bold trefoiled pointed arches, the plain spandrels between these and the circumscribing arch having once been resplendent with colour. The larger spaces or spandrels over these circumscribing arches are filled with exquisite sculpture, either conventional or natural foliage with here and there a figure. The capitals also of the slender Purbeck shafts of the arcading carry sometimes natural foliage, sometimes conventional forms, and in some of these latter Sir Gilbert Scott thinks he discovered the hand of a French carver, from the stalks carrying, not as in English work of the time, conventional, but little tufts of natural foliage, as at the Ste. Chapelle, and in other French work of the middle of the thirteenth century. In other capitals you will find the naturalism more arrowed, and leaves and stalks flung more carelessly on the bells of the capitals, which, however, whether carved by English or French workmen, had always their delicately-moulded circular abacus.

I have before spoken to you on the subject of architectural proportion based on geometry, disparaging to a certain extent the idea that certain relative dimensions in the height, length, and breadth of interiors are productive of beauty, inasmuch as it is quite possible to make two apartments of exactly the same relative dimensions, of which one shall be of acknowledged perfect proportion and the other bidiously the reverse by simply unduly emphasising some of its subordinate parts either by exaggerated size, proportion, or depth of mouldings, or by striking contrasts of colour. On the other hand, though, perhaps, not so easily, it will be possible by the same means to impart to an interior a satisfactory sense of proportion, which might hitherto have been lacking. It is astonishing how little change is required to alter not only the architectural, but the acoustic effect of apartments of exactly the same size and proportion. In my own experience, a curious instance of this is in the Manchester Assize Courts, where the two principal courts are of precisely the same size. One of them has always borne a good character for its acoustic properties, whether comparatively empty or crowded; the other has to be filled in order to be satisfactory in this respect. The latter is divided into seven bays longitudinally, by five transversely; the other, the success, into five by three; but then the latter has a large massive central gaselier which breaks the sound waves, the other four very attenuated specimens of Mr. Skidmore's art.

Though, therefore, I do not think that mere general proportion can ever be insisted on as an infallible guide to success, either in architectural beauty or acoustic excellence, it is well worth the student's while to ascertain what are the proportions of celebrated buildings, as well as the size of their mouldings, with reference to the building itself.

Now, in the case before us, taking the distance between the centres of the columns as the width of the nave, or the elementary scale, we find that the height of the apex of the vaulting from the pavement of the church is as nearly as possible three equilateral triangles placed one above another, the base of all being the width of the nave. The triforium string-course is one half this total height, or a triangle and a half.

In the Chapter-house, measuring from the centre of the central shaft to any of its angles for the elementary measure, and inscribing thereon an equilateral triangle, it will be found that the bosses of the vaultings are just the height of two of these figures from the pavement; or the proportion of a regular *vesica piscis*.

You will not allow the discordant colouring of the glass in the windows at the ends of the transepts to prevent your noticing the architecture there. The lines of the general design are here continued, but diversity is likewise secured, and a truly admirable effect produced. Neither of the rose-windows is original. That in the south transept was renewed in the fifteenth century, and again in the seventeenth, about forty years, as Sir Christopher Wren informs us, before the date of his report. In general design, however, there are good reasons for supposing that the original form has been pretty closely adhered to. It appears there was found on the Chapter-house floor (I cannot find it now) the pattern of a wheel-window on four tiles of

thirteenth-century work, which bears a most striking resemblance in all its intricate subdivided tracery to the rose-window in question. This is strong corroborative evidence.

The north window, however, is of the eighteenth century, and cannot much resemble its predecessor. There is fine figure sculpture, representing angels censuring, in the triforium at the ends of the transepts, and on the window jambs below, the latter now much effaced, and, in some cases, hardly to be discovered in the gloom which the heavily-coloured opaque glass throws over this part of the church.

I have hitherto chiefly spoken of the work of Henry III., supplanting the older edifice of the Confessor built two centuries before. Henry's work terminated in 1269, just west of the crossing. I suppose that the eleventh-century nave existed up to this time. Edward I. continued the rebuilding of the nave for the next five years. You will see certain diversities of treatment in details, but the design, on the whole, remains the same. The columns have four attached and four detached Purbeck shafts, instead of merely four detached Purbeck shafts round a central cylinder in Henry's work. The Edwardian vaulting ribs are more complex and of different section, not to be compared, in my opinion, with the severe beauty of the earlier work; the capitals of the wall arcade are moulded, of Purbeck, not carved, and shields have been introduced into the foliage which adorns the spandrels. The modern monuments have, however, left but little of these original beauties of the abbey for your study in the nave. Those shields which remain carry the arms of the great men of the day.

The capitals of the window shafts are likewise simply moulded, instead of being carved, in Edward I. work. The bosses of the vaulting ribs, on the other hand, in his time were exceedingly elaborate and beautiful.

Still going west we come to the work of Richard II., or rather of the abbot in his reign. There you will see in the aisle windows the cinquefoil filling to the upper circle gives place to the somewhat gaping quatrefoil before mentioned; the window-shafts have octagonal instead of circular shafts, and other slight changes may be discovered by the attentive observer, though the general design remains the same.*

ARCHITECTURAL ASSOCIATION.

This Association last Saturday visited the new St. Paul's School, West Kensington, over which they were conducted by Mr. Waterhouse, A.R.A., the architect of the building. This was the second visit paid to the School by the Association, as they previously inspected them in 1883, when in progress. The buildings have now been completed by Messrs. Parnell & Son, of Rugby, the contractors. Mr. Leeds is the ventilating engineer for the structure, and explained to the party the arrangements for heating and ventilation. The schools were illustrated in the *Builder* of August 26th, 1882. The school was founded by Dean Colset, in 1512, and twice rebuilt on the original site in St. Paul's Churchyard. Among its former scholars are included the names of Milton, Leland, Halley (of the Comet), Strype, Pepys, and the first Duke of Marlborough.

Mr. H. D. Appleton then proceeded with the members to inspect four houses in course of erection on the Collingham Gardens Estate, South Kensington, from designs by Messrs. Ernest George & Peto, architects, the contractors being Messrs. Peto Bros., builders. The members were received by Mr. W. Jacobs, foreman to Messrs. Peto, who explained the plans and details.

Mr. Edward W. Wyon died last week at the age of 74 years. He was the youngest son of Thomas Wyon, the Chief Engraver of Seals to George III. and George IV. His early life was chiefly devoted to gem modelling, and he assisted in many of the important works of his brother Benjamin, who succeeded their father as Seal-Engraver-in-Chief. In later years he produced his larger works, notably Britomarte for the Egyptian Hall of the Mansion House, Edward III. and Queen Philippa in the Drapers' Hall, and many other statues. The lunettes in his relief in the dome of the National Gallery are from his hands.

* The remainder of the lecture, together with some additional illustrations, in our next.

ROYAL INSTITUTE OF BRITISH
ARCHITECTS.
MEDALS AND PRIZES, 1885.

At a special meeting of members, held on Monday evening last, Mr. Ewan Christian, President, in the chair, the awards of medals and prizes were considered.

The Royal Gold Medal, 1885.—The following resolution, moved by the President, was carried by acclamation, namely, "That, subject to her Majesty's gracious sanction, the Royal Gold Medal for the year 1885 be presented to Henry Schliemann, F.S.A., Hon. Corr. Member (Athens), Hon. D.C.L. (Oxon), &c."

The adjudication of medals and other prizes was then proceeded with.

The Tite Prize (value 30l.).—Subject, a grand pavilion in a fashionable watering-place (seven competitors). Medal awarded to the author of the design bearing the motto "Spes dulce malum," who was found to be Mr. John Archibald Campbell, of 16, Woodside-crescent, Glasgow.

The Grissell Gold Medal.—Subject in Iron Construction, Central Hall of a Fruit and Vegetable Market.—The Secretary announced that no design had been submitted for this medal.

The Soane Medallion and 50l.—Subject, a Municipal Mansion (thirteen competitors).—The recommendations of the Council respecting the award of the Soane Medallion and (subject to the usual conditions) 50l. were that the medal, &c., be awarded to the author of the design bearing the motto "Here we are again!" (Mr. Arnold Bidlake Mitchell, of 36, Pembury-road, Clapton); a Medal of Merit to the author of the design bearing the motto "Acanthus" (Mr. Alfred A. Cox, of 16, St. George's-terrace, Queen's Gate, S.W.); and a Medal of Merit to the author of the design bearing the motto "Forward" (Mr. John Thompson, of 3, Selwood Terrace, Onslow-gardens, S.W.).

The Institute Medal and Ten Guinea (Measured Drawings).—Six competitors. Upon the recommendation of the Council, it was resolved that the Institute Medal and ten guineas be awarded to the author of the drawings bearing the motto "Forward," for his drawings of the Church of Ottery St. Mary, Devon. The name and address of the successful candidate were found to be Mr. Ernest A. Coxhead, Montrose-villa, Grove-road, Eastbourne. It was also resolved that a Medal of Merit and ten guineas be awarded to the author of the drawings bearing the motto "Spectentratione," for his drawings of King's College, Aberdeen. The author was found to be Mr. James Cromar Watt, of 71, Dee-street, Aberdeen. It was resolved that a Medal of Merit be awarded to the author of the drawings bearing the motto "Hope," for his drawings of Woodsome Hall, near Huddersfield. The author was found to be Mr. John Holmes Greaves, of 15, Park-row, Leeds. And that a Medal of Merit be awarded to the author of the drawings bearing the motto "Ars," for his drawings of All Saints Church, Walsoken, Norfolk. The author was found to be Mr. A. G. Adams, of 1, Ely-place-crescent, Wisbeach. It was further resolved that a Certificate of Honour be awarded to the author of the drawings bearing the motto "Perseverando," for his drawings of Wenlock Priory, Shropshire. The author was found to be Mr. Thomas Locke Worthington, 25, Bransnose-street, Manchester.

The Institute Medal and Ten Guinea: Essays. Subject, Pediments and Gables. (One competitor).—On the recommendation of the Council it was resolved not to award this prize.

The President then stated that the Council had that day given consideration to a wish formulated by the Medals and Prizes Committee that the sum of money, namely, ten guineas, which accompanied the Institute Medal for essays, should be largely increased in amount; and the Council recommended that for the said prize next year the sum of twenty-five guineas should be offered as well as the medal. After a somewhat long discussion, the matters touched upon therein by the President and the other speakers were left to the Council to consider and settle.

Subjects for Medals and other Prizes, 1885-86.—The recommendations of the Council, in the matter of the subjects for medals and other prizes to be competed for during the session of 1885-86 were then discussed, and the Council were requested by the meeting to take note of

the various opinions expressed by members upon the character of the subjects recommended for adoption, and to consider and settle the same.

The proceedings being then at an end, the meeting adjourned.

ON GREEK ARCHITECTURE.*

I HAVE chosen a very ambitious title for this lecture, but it seemed best to make the title as comprehensive as possible, because it is obviously impossible in one evening to do more than take a general view. I will now endeavour to point out the heads which I propose to work out more fully, viz., firstly, to consider why it is so important to study this style; and then to glance very rapidly at the sources from which it was derived, and the phases it went through.

Then to refer to the characteristics of the different orders in succession, and to mention some of the principal monuments in each period.

Afterwards to endeavour to find the secret to which we owe the beauties which are recognised by all intelligent critics, whether by careful adjustment of light and shade, or by proportion, or by more delicate optical refinements than have anywhere else been practised.

Greek architecture has had so many admirers that it might seem almost needless to bring forward reasons why it should be studied; but there are also, undoubtedly, persons who have occupied high places in literature and in the arts who have spoken slightly of it, and the term Grecian has been often used opprobriously by the too exclusive followers of the Gothic. I do not for a moment contend that Classical interpolations in Gothic works, where they have no business to be, may not have given reason for opposition to particular cases of intrusion; but we must all have heard or read of general denunciation of Greek architecture, which can only prove in their authors inability to see more than one side, or rather only part of a side, of the palace of art.

It is true that we have made many unsatisfactory attempts to introduce Greek architecture into our ecclesiastical and domestic works. I do not admit that they are all entire failures, but no doubt there are a great many. But this is almost a necessary result of merely copying the features of a by-gone style, adapted to conditions different to our own.

But the Classical copyist has no monopoly of failure. Many of our experiments in Medieval architecture have been equally misapplied.

Our proper object in studying ancient architecture should not be for the purpose of collecting "bits that will come in well," but that we should imbibe the principles of so great and noble a style as that of Greece; and as in whatever style we work we must use certain details by way of expression, it is important that we should well understand the aim and success of those of Greek architecture, which was the base and root of all modern work whether Classical or Gothic. The analogy of language is just to the point. Who would say that because Greek is to some extent a dead language, it is of no consequence that our scholars should study it? There is not only a great reward for those who can read Homer and Thucydides in their own language, but the person who is familiar with such authors will express himself better in his own than if he had been ignorant of them. In the same way in architecture, merely to understand such a building as the Parthenon is a great pleasure and advantage, but to be imbued with its spirit and art principles cannot fail to have a useful effect upon a designer. But your presence here shows me that it is not necessary to occupy any more of your time with an apology.

Firstly, let me acknowledge, with thanks, the loan of many of the diagrams on the wall. For some of them I am indebted to Professor Donaldson; for others, to the collection left to the Royal Academy by Professor Cockerell; and for those illustrating the Erechtheum and the general views of Athens, to Mr. Fergusson.

In seeking for the derivation of Greek architecture, we must at once notice the two main branches, the Doric and the Ionic. In point of absolute date, the Ionic seems to have first occupied the ground, although we have no temple architecture to which so great an antiquity can be assigned as to some of the Doric structures. A leading tribe of the

* A lecture by Mr. F. C. Penrose, M.A., delivered to the students of the Royal Academy on the 27th ult.

Pelagic family, and in immediate relationship with the Hæmeric families of Argos, occupied Ionia, in Asia Minor. These Greeks, whether in Asia or Europe, must have had much connexion with the Phœnicians,—a people so celebrated for its art development, that Solomon when building his temple, sought for the assistance. Cadmus, one of the least uncertain of the mythological heroes, was of Phœnic extraction, and the legend of Europa, daughter of a king of Tyre, points in the same direction. One of the most characteristic ornaments of Mycena was the scrollwork pattern which is frequently found in Asiatic work. The pattern exhibited is an enlargement from a piece of pottery discovered by Dr. Schliemann near the tomb of Agamemnon. The Ionic capital preserved, in the full developed architecture, this type.

The oldest temple at Athens, of which we have any traces, was no doubt the Erechtheum—not the temple which we now see, but its predecessor,—and we may be quite sure that the original Ionic architecture was purposely continued in the newer structure. In the time of Homer this Pelagic or Ionian family was dominant; but shortly afterwards a great revolution occurred in Greece from the invasion of the Dorians, a race bearing somewhat the same relation to the Pelag as that in our own country the Normanns bore to the Saxons. These became the rulers of the country, and especially of the Peloponnesus, and introduced the Doric architecture, which seems to have been partly based on Egyptian prototypes. A branch of the Dorians had sojourned in Crete as mentioned by Homer, and so would be favourably situated for correspondence with Egypt; indeed, it can hardly be doubted that the Doric column had its origin on the banks of the Nile, and was there executed in stone, but the Dorians combined it with a superstructure which had its motive in wooden construction. We know nothing of the first attempts in this combination. All the early experiments have perished, and we find the union completely full grown, though not yet fully educated in the massive temples of Corinth, Ægina, Selinus, and Paestum. The Dorians threw out colonies to Sicily and the south of Italy called Magna Græcia, and the earlier temples in those countries are almost invariably Doric. There is an Early Doric temple at Assos, in the south of Phrygia, and a Late Doric temple at Delos; but these architectural inroads into the Ionic countries are rare.

The Ionians still held their ground in Asia, and in most of the islands of the Ægean Sea, and were, on the whole, in the ascendant at Athens, or, at least, the two races were blended on fairly equal terms, and there, at any rate, we find the most happy combination of the massive and simple Doric and the more elegant Ionic. The Doric is more refined and the Ionic more forcible than elsewhere. There was also one important Ionic temple in the Peloponnesus, namely, Tegea, but of it nothing is now extant, or, at any rate, known.

A third order, as we all know, was developed, namely, the Corinthian,—so called, I suppose, from its rich and ornate character and so suited to the luxurious Corinthians. Vitruvius, indeed, tells us it was first used in the neighbourhood of Corinth; but, as by the same authority, it was invented by Callimachus, an Athenian architect, and the oldest examples extant seem to be the single column in the interior of the temple at Bassæ, the work of an Athenian architect, and after that the exquisite choragic monument of Lysicrates at Athens, we may fairly doubt the priority of Corinth in its use. It is as true of this order as of the Greek poetry that,—

"Græcorum sunt antiquissima quæque Scripta vel optima."

All subsequent examples are inferior to these earliest, so that the Corinthian did not go through the same process of refinement and perfection as the other two orders; but that, no doubt, was owing to the political and artistic decadence of Greece, for this order, was, as it were, the child of the old age of Greece, and its education ere long had to be entrusted to a stepmother. The Corinthian order was used by the Romans almost to the exclusion of the others, and through them had an immense effect in producing the Medieval styles. Many of the features of Romanesque architecture in France and Italy are scarcely distinguishable from later Classical work, and these merged into the Gothic by steps easily traceable.

The phases which the architecture of Greece went through were exactly such as come by natural growth, but of which at the present day we can have no experience in consequence of our having no true or living style. Exactly as the massive Norman produced the refined, but till forcible, Early Gothic, then the rich Decorated and towering Early Perpendicular, and, lastly, the attenuated Tudor or Flamboyant; so a Greek architecture the severe and simple features of the temple at Corinth were educated into the perfection of the Parthenon and Propylæa, and then became drawn up and refined as in the later examples. When it had reached this state the soil had lost its vigor, and it was very properly supplanted by the Corinthian.

In the diagram I have represented the relative proportion of the entablature to the column in several examples. The scales are so adjusted as to make the column of the same height in each, so that the relative heights of the entablatures show their comparative heaviness.

Judging from the architecture, which alone remains, the temple at Corinth has the most ponderous entablature. Then follows the earlier Parthenon, of which part of the entablature and some drums of the columns remain all into the north wall of the Acropolis of Athens. It is true that the height of the column is conjectured, but judging from the character of what remains, and from the known character of the column, it seems proper to put intermediate between the Corinthian and the Egyptian example which is next to it. After the latter,—taken from the Temple of Jupiter at Hellenus at Ægina,—follows the Thesæum. The Parthenon is slightly less massive than the Thesæum, but it wants nothing in appearance of dignity. The three later examples are inferior in dignity, but it should be mentioned that the temple from Nemea is from a temple which carefully worked in every respect, and is of good period, and it is not unlikely that the richness of the entablature may have been designed expressly on account of its situation in a valley, where a primary consideration would be the total height of the temple, as obtained by an unusual height given to the columns. At the portico of Philip at Delos and the gate of the New Agora at Athens were civil, not religious, structures, and their lightness may very be accounted for on that ground; for we learn from Vitruvius that this was one of the principles acknowledged:—"Aliam enim in forum templis debent habere gravitatem aliam porticibus et ceteris operibus subtilitatem." The approximate dates of the buildings I have mentioned are:—

Corinth	B.C. 650
Earlier Parthenon	" 600
Ægina	" 550
Thesæum	" 497
Parthenon	" 440
Nemea	" 400
Delos	" 350
New Agora, Athens	" 40

There were also important Doric structures at Eleusis and Olympia, but we may omit their consideration in this general résumé, because they were of a less refined character than most of the works mentioned above, and their proportions cannot be satisfactorily quoted, as the height of the column would be to some extent conjectural. Many of the remains in Sicily are of a large and well preserved, but all are comparatively coarse unless it be the fine temple at Segeste, and in Italy there is the noble Temple of Neptune at Paestum, but I am not aware that either of these has been examined with the scrupulous care that is necessary to establish the relations of accurate proportion.

The Ionic architecture followed no doubt a richly analogous career, but from various reasons,—especially that of the Persian wars,—we have not any specimen of nearly so early a date as we have of the Doric. Subsequently to the invasion of the Dorians, as already mentioned, this architecture had never been in vogue in the Peloponnese. Its chief expansion was in Asia Minor and in Attica, but all this country was overrun by the Persians, who made a point of destroying the temples.

The oldest specimen known to us in Greece seems to have been the small Temple of Epitoleum on the Ilissus at Athens, which, unfortunately, does not now exist, but was carefully measured and drawn by Stuart. This, with great probability, he assigned to one of the years immediately following the battle of Salamis, or about B.C. 478. The proportions

of the entablature to the column in this temple contrast very remarkably with those of the Erechtheum, and still more so with the examples for the most part in Ionia. In this temple the diminution of the column is also small, being about one-ninth of the lower diameter instead of something between one-seventh and one-eighth, and its height is only eight and half diameters instead of nine and a half in the case of the Erechtheum, and ten in some of the best of the Ionian specimens. There are not, however, examples enough extant to illustrate sufficiently the gradual development of the Ionic, for the conditions most favourable to this style of building had only a short duration, namely, from about 450 B.C., when the peace with the Persians resulting from the victories of Cimon, the son of Miltiades, secured the practical freedom of the Asiatic Greeks until the wars of Alexander and his successors, which commenced about 340 B.C. When Ionia was again brought under a stable government by the Romans, the Corinthian had become the dominant style. The oldest of the Ionian temples is at Samos, which seems to be of a very early type, and probably is anterior to the subjugation of the country by the Persians, and therefore may be about 500 B.C., but the remains are too scanty to afford sufficient data for criticism. The other principal works are the Temple of Diana at Ephesus, that of Didyme or Branchidæ, at Sardis, the extremely elegant but smaller temple of Minerva at Priene, and the Mausoleum at Halicarnassus. The principal remains of Greek architecture are the temples, and a circumstance which has preserved many of them to us is that they were, after the decay of Paganism, many of them converted into churches. There are also theatres and stadia, and occasionally tombs. The traces of domestic architecture, however, are very scanty. This remark, indeed, does not apply to the later and provincial towns of Pompeii and Herculaneum, which have been handed down to us by Vesuvius. But there is no doubt that in the best days of Greece the temples occupied a somewhat similar position as did our ecclesiastical architecture in the Middle Ages. The domestic structures were not prominent,—

"Nulla decembris
Metata privatis cœcis
Porticus accipiebatur Arcton."*

The palaces of kings were, perhaps, sometimes exceptions, as the recent explorations of Dr. Schliemann at Tyrus seem to show; but they were also citadels. Still the temples were pre-eminent; very great care was taken in the choice of their sites. Vitruvius, who has preserved some of the traditions of the ancients in a curious conglomerate, at the end of his first book, directs that the temples of Jupiter, Juno, and Minerva should be placed in the highest ground in a city. As remarkable instances of this may be cited pre-eminently Athens,—the Temple of Jupiter Panhellenus at Ægina, Segeste and Agrigentum in Sicily, and Sunium; but all, or nearly all, are well placed, and doubtless the situation was carefully considered in the design, and exerted great influence upon it.

It is a great error to suppose, as some have imagined, that all the Greek temples are built upon one model, and, given the number of the columns and their diameter, it would be possible to restore the design of a temple without knowing anything more about it, except, perhaps, the order. On the contrary, we find in each temple variations both of distribution and detail, which entirely disposes of so limited a conception of the duty of a Greek architect.

Let us, however, leave generalities, and examine some examples more particularly; and as fortunately the same city which in the judgment of antiquity received the highest praise for the magnificence of its architecture still retains for us the best-preserved models, we shall do well to confine our attention for this evening to the city of Minerva.

The Acropolis is a detached rock with a fairly flat summit, having a general extension from east to west, very precipitous towards the north, east, and south, but sloping more gradually towards the west, where the ridge again rises, but to a less elevation, in the Areopagus. Although in ancient times, when Athens had its greatest development, the Acropolis was surrounded with buildings on all sides, yet the most populous part was to the north, where also

* "The loggia, built to invite the cool north wind, were small, and needed not to be measured by the ten-foot rod."

the modern town is situated. The rock rises about 300 ft. above the general level of the town. A little way off, on the south side, is a range of hills which on one point rises almost to the level of the Acropolis, namely, the ancient Museum, which is crowned by the monument of Philopappus, a work of Roman times. There is a tolerably deep valley between this hill and the Acropolis, and against it were built many important structures, especially the great Theatre of Bacchus, capable of containing 30,000 spectators; and various temples, of which many traces have been recovered by recent excavations, notably the Temple of Esculapius, with the fountain described by Pausanias. Its architecture was Doric, but not of the very best period. There is also the Odeum, built by Herodes Atticus in later times.

Beyond the Areopagus, and towards the bottom of the slope, on a spur trending away to the north, still having sufficient elevation to offer a splendid site, and standing well above the plain is the exquisite Doric temple of Theseus, of which we do not absolutely know the origin, but Leake is probably right in considering it was built during the pre-eminence of Cimon, the son of Miltiades. Not far off is the gate in the city wall, called Dipylum, and the commencement of the sacred way leading to Eleusis, lined with tombs, many of them of remarkable sculpture. From this point, turning eastwards, we come to a four-column Doric portico, the gate of the New Agora, built about forty years B.C. Its architectural character has already been referred to. Near it is another building of municipal character, and not much earlier in date, the Horologium of Andronicus Cyrrestes, commonly called the Tower of the Winds. It formerly contained a water-clock, and still retains the hour lines of a sun-dial. There is much architectural elegance and simplicity about it, but the sculptures which are carved in relief on the eight faces of the octagon are very rude and inartistic, and show an extraordinary decline from the days of Pheidias. Northward of the Horologium is a work of Roman times, the Stoa of Hadrian, of considerable extent and magnificence of material, but the profiles of the mouldings and the carving of its Corinthian capitals are very inferior. Under the east end of the Acropolis rock is the exquisite little temple or choragic monument of Lysicrates, which used to be called the Lantern of Demosthenes. The illustrations on the wall will give some idea of its extreme refinement (notice the moulding of its base). The date of this earliest known example of the Corinthian order, except the one column of the Temple of Bassæ, is 334 B.C., the same year in which Alexander invaded Persia.

We may pass through the arch of Hadrian,—a work which, at least at Athens, does not invite much observation,—to the very fine remains of the enormous temple of Jupiter Olympius. This temple, though contemplated by Pisistratus, does not seem to have been proceeded with until the time of the successors of Alexander. Antiochus Epiphanes, between the years B.C. 174 and 164, made great progress with the work, having employed a Roman citizen as architect, named Cosuttus. It is, no doubt, this design in the main which we see, but the work was discontinued after his death, and resumed under the influence of Augustus, again to be postponed and finally finished and dedicated by Hadrian. The columns are of fine work, and though much less graceful than those of the monument of Lysicrates, are altogether of a superior character to the neighbouring arch of Hadrian or the Stoa mentioned above. It would therefore seem that although there can be no doubt that Hadrian finished and dedicated the temple, the design was of a much better period. Only fifteen columns remain standing out of the original number of 116 which formed the porticoes and peristyles, and these were only preserved to us by the fact that a small church was built in amongst the columns of the south-eastern angle of the temple. Still, their great height,—about 56 ft.,—gives to these fifteen columns a most impressive effect. The temple was surrounded by an ample peribolus, which was formerly full of statues.

Near the temple of Jupiter Olympius, and on the other side of the Ilissus, was the small temple of Triptolemus, which has already been mentioned.

Having thus completed the round of the existing remains outside the Acropolis, we may ascend by its only access, the Propylæa towards the west, and here was, in the opinion of the

ancients, and which seems thoroughly justified by the existing remains, the finest monument in Athens. A grand flight of marble steps, about seventy in number and 70 ft. wide, led up to a portico of six Doric columns, more than 5 ft. in diameter, contrasted by two smaller Doric porticos on either side. On the right hand approach was a small but exquisite Ionic temple; Victory without wings,—for the Athenians fancied they could secure continued victory by making the goddess wingless,—and on the left a large pedestal supporting a group of statues. Both these smaller and subordinate structures were out of parallel to the Propylæa, and so caught the sun's rays at a different angle, giving great beauty and variety to the scene, and as they were independent of the main design they did not in the least disturb its continuity. The main central portico was divided into three aisles by two ranges of Ionic columns. The ceiling was entirely of marble, and supported by marble beams, more than 20 ft. in length. Having passed through the propylæa the spectator emerged close under the pedestal of the gigantic statue of Minerva Promachus, and passing up a street full of sculptured memorials, and rising rather rapidly all the way, soon came in front of the Parthenon. The access was not in the central axis of the temple, but giving an oblique view, which was far more interesting and picturesque. The combination of symmetry and freedom in Greek architecture is one of its most important characteristics, and most deserving our attention.

No doubt the architecture of the Parthenon was enriched with the grandest accompaniment of sculpture that the world ever saw. We have fortunately sufficient remains of the work of Phedias from the east front to establish this, but it would be quite a mistake to consider the architecture merely as a frame for the sculpture. It has its own qualities, its harmonies of proportion, and its contrasts of light and shade. I shall refer later to the exact proportions which rule in the principal masses; but it is desirable to remark that in smaller features, such as the metopes, there is a remarkable inequality of width, those in the centre of the front are, on the whole, the widest, but in no regular gradation. There is thus a law of liberty, quite consonant with the works of nature, introduced, which enlivens the general effect. A modern builder would be shocked if he were told to make some of the metopes 4 in. wider than others.*

The temple, technically described, is peripteral and octastyle, with pronaos at the east and posticum at the west, each having its own portico of six columns. The interior was divided into two parts, the cells embracing both these parts; and to the east was the naos, or temple proper, containing the colossal gold and ivory statue of Minerva; and to the west was the opisthodomus, which was used as the Public Treasury. Both the naos and the opisthodomus were closed with wide and lofty folding-doors, and there was a communication by means of two small doors between the opisthodomus and the naos. The naos was divided into three aisles by two ranges of columns one over the other, as we see still standing at Pæstum and Ægina. The traces on the pavement show that the lower columns were Doric, and the upper columns were probably Doric also. The opisthodomus was supported by four columns. The alps on which they stood still remain, but there are no traces of the columns. It is, however, presmable that they were of the Ionic order.

In addition to the Parthenon there were several temples and some municipal buildings on the Acropolis; but little remains of these. Nor do the accounts of Pausanias and other ancient writers lead us to suppose there was any great interest in any of them, excepting the Erechtheum, which is, perhaps, both on account of the beauty of its architecture and the interesting intricacy of its plan, the most valuable relic of antiquity. After the Propylæa and the Parthenon it certainly is so. In the Middle Ages it was converted into a church. It afterwards became the Turkish pasha's residence, and, finally, a storehouse, and partly a gunpowder magazine. It has suffered very much, but still enough has been preserved to indicate the beauty of the original, and to be the groundwork of volumes of archaeological discussion. It was a double structure.

* Probably this arose from variations in the sculptor's treatment of the metope subjects.—Ed.

The temple of the goddess Athena Polias, the original Minerva tutelary of Athens, and the fame of the hero Erechtheus, and also combined with it was a compartment sacred to the nymph Pandrosus. The temple (speaking of it as a whole) preserved evidence of the contest of Neptune and Minerva for the protectorate of Attica. The mark attributed to Neptune's trident on the rock was there,—and, indeed, it may still be seen,—and the sacred olive which Minerva produced, and which decided the contest, was preserved in some part of the sanctuary.

It is a curious point in the archaeological discussion having reference to the distribution of the area of the temple that the behaviour of a certain dog throws more light upon it than even the narrative of the traveller Pausanias. The story is told by one Philochorus, who had no doubt been scandalised by the desecration of the sacred spot.

"A dog having entered into the Temple of Minerva Polias rushed into the Pandroseum, and, having mounted upon the altar of Jupiter Hærcæus, which is under the olive tree, lay down." Now, consider the temple itself divided into two parts (for the levels differ by many feet), the eastern and upper part sacred to the hero Erechtheus; the larger and western part, which is approached by the four-column portico of the noblest proportion, to be the Temple of Minerva Polias; and the Pandroseum, to be the space immediately to the west of the temple, we can see at once the manner in which the dog behaved, not having the fear either of Minerva or Jupiter before her eyes. There are still evidences of steps leading down through a doorway in the western wall, and there are evidences of an enclosure of the space westwards of the temple. Here would then be the olive tree and the altar of Jupiter, and the garden and residence of the virgins who attended to the worship of the nymph Pandrosus. This space is bounded on the south by a rather lofty and very rough wall, which seems never to have been cased with finer work, but was probably concealed by the shrubs or creepers of the garden, and very probably helped to support the open work beams of a trellis or pergola. There seem to be traces of some such construction against the west walls of the Erechtheum. The staircase shown in Inwood's plate is quite imaginary.

It should be borne in mind that the Minerva of this temple was more reverently worshipped than the Minerva of the Parthenon. In the great Panathenæic festival every year, and with more extraordinary pomp every fourth year, there was a procession to this statue, and as the new temple which we see, was necessarily limited in size by the original sacred site, it was of the more importance to embellish it with ornament, and this has certainly been done in the most appropriate way. We do not know whether there was any sculpture in the pediments,—it may reasonably be concluded there was not,—but the frieze still shows the attachments of figures. The hand of ornament which carries round the line of the capitals,—themselves the perfection of all Ionic work,—is extremely graceful and tender, and the bases were beautifully carved. But there was also plenty of solid and plain masonry, some of the stones being very massive. However the problem arose, how to give sufficient importance to the south front facing the Parthenon. This was solved by the, perhaps original, conception of the Caryatid portico. The plan of the Erechtheum did not admit of a public entrance at this point,—a small private door for the use of the privileged is there. It is, therefore, rather a loggia than a porch. The pose of the figures themselves is most remarkable, and they appear quite sufficient for the work they have to do. They differ enough amongst themselves to have individuality, whilst the idea given at first sight is that of exact resemblance, excepting that they are contrasted in the pose of the legs upon which they chiefly bear their weight. The folds of the drapery falling with a general appearance of verticality towards the outside of the portico have a columnar effect. All this has been well stated by your President in some remarks on a paper by Mr. Fergusson on the Erechtheum in 1876, which will be found in the "Transactions" of the Royal Institute of British Architects for that year.*

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* We will give the remainder in our next, accompanied by reproductions of a few of Mr. Fergusson's diagrams.

Illustrations.

WESTMINSTER ABBEY.

IN connexion with Mr. Waterhouse's lecture at the Royal Academy last week, reported in another column, we publish a series of measured drawings, various portions of the abbey. The reproduction of Hollar's view of the abbey from the north is a fair example of the English architectural engraving of the period, and corresponds fairly with Newcourt's plan, which frequently accompanies it. It was engraved in 1654, only two years after Hollar's return to England. The central lantern was not erected; on the other hand, the porch of the north transept is still shown. It was removed when the transept was restored, in the early part of the last century.

The other illustrations include one half of choir, section and elevation, measured by Mr. E. Emlyn White; the interior of the south transept, measured and drawn by Mr. J. Atwood Slater, to whose careful and beautiful work we call the more attention because he has not signed his drawing, as the other contributors have. Both these drawings, obtained for their owners the Royal Academy Silver Medal. Mr. H. O. Cresswell contributed a drawing of the screen of the tomb of Henry VII., which obtained a Medal of Honour in the last competition for the Pugin Travel Studentship; Mr. Maclaren contributed drawings of the cloisters, which obtained similar recognition on the same occasion; and Shearman contributes an elevation of Chapter-house doorway.

The building is fully dealt with in Mr. Waterhouse's lecture. It only remains for us to express our best thanks to those who have kindly lent us their drawings, and our appreciation of their merit as specimens of architectural draughtsmanship.

CENTRAL ASSOCIATION OF MASTER BUILDERS.

The annual general meeting of the Central Association of Master Builders of London was held at 27, King-street, Covent-garden, on the 25th ult., Mr. F. J. Dove in the chair.

The Secretary read the balance-sheet, audited and signed, and copies were handed round for inspection. It was resolved "That balance-sheet as audited and read be adopted."

The Secretary next read the report, and the Chairman having addressed the meeting on the several matters referred to therein, motion that the report as read be adopted.

The motion, having been seconded, was carried unanimously.

The Secretary reported that the hallooting had been prepared in accordance with Rules XV. and XVI., and it was resolved:—

"That the officers and committee, as printed on hallooting-list forwarded to members, be elected for ensuing year."

The newly-elected members having taken office, the Chairman, referring to the rates and wages in the London district, mentioned that he had been invited and had attended the meeting of the Industrial Remuneration Conference, and had refrained from speaking, as he did not feel justified in committing his colleagues to opinions without their having been consulted, he could not help saying to those present that he was surprised at the earnestness and intelligence shown by several of the working-delegates, and he had come to the conclusion that this Association would do more by meeting the representatives of the men than it would by opposing the action of the trade unions in Parliament. After some discussion of the subject, in which several members took part, it was resolved:—

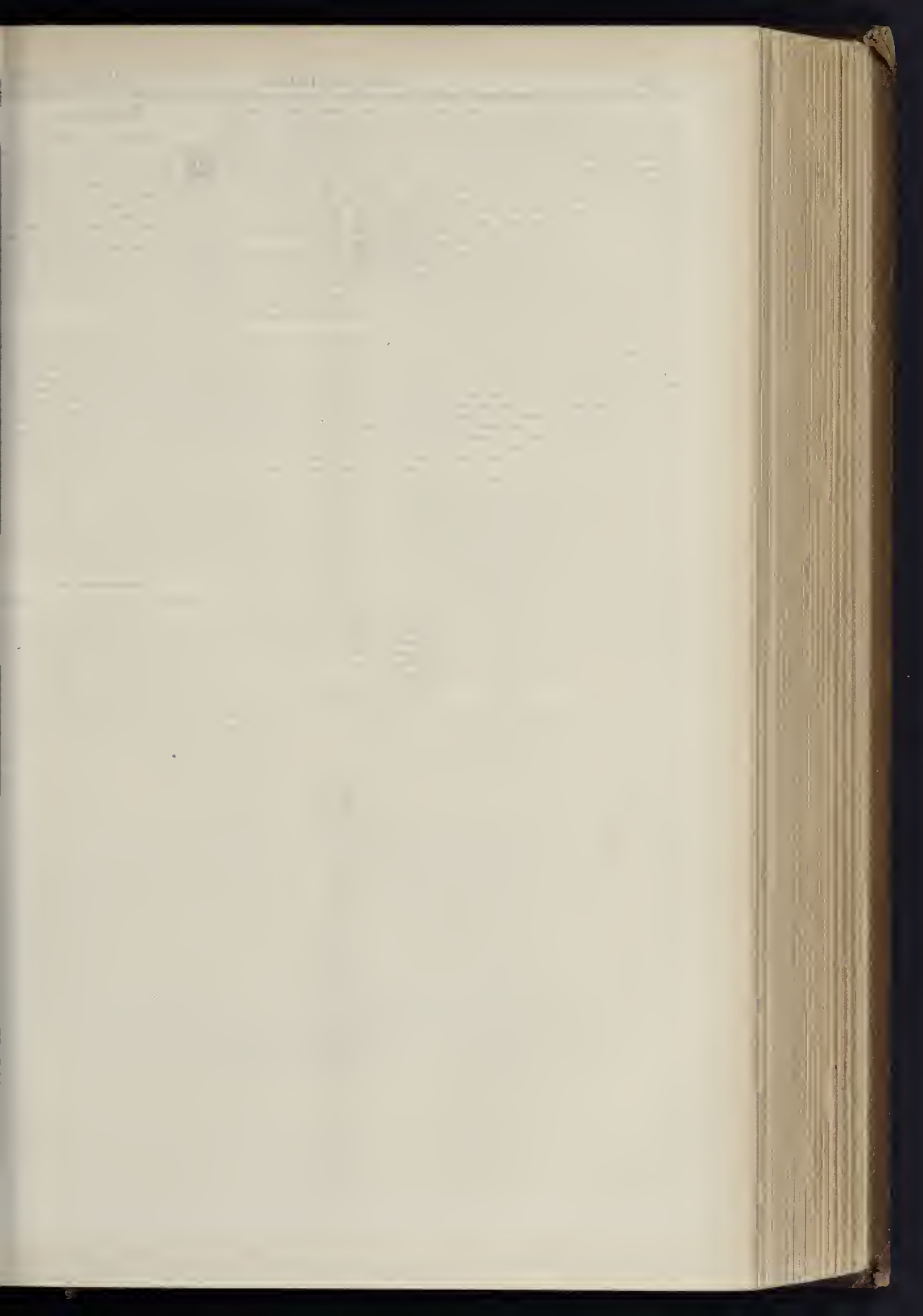
"That if the workmen have any just grievance to complain of the Committee are hereby empowered to meet them without any further authority."

A letter to the *Builder* of February 14, 1885, signed "H. S.," having been read, the subject* spoken to by some of those present it was resolved:—

"That the attention of the Committee be called to the desirability of writing the First Commissioner of Works and Public Buildings requesting that, in accordance with the almost universal practice of architects, when tenders for building works have been received and a decision arrived at, the parties tendering be permitted to see a copy of the same."

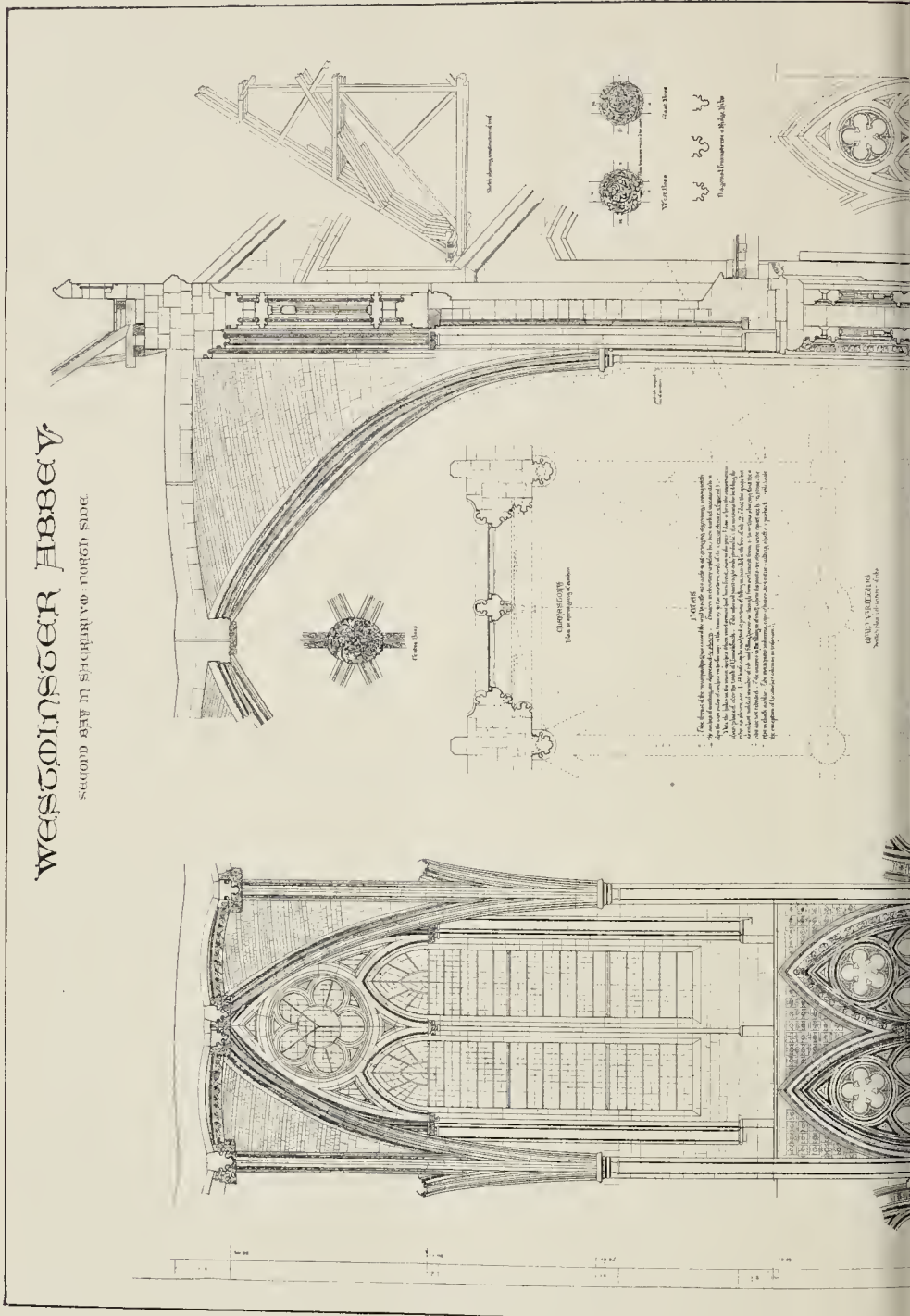
The meeting was concluded by a vote of thanks to the chairman.

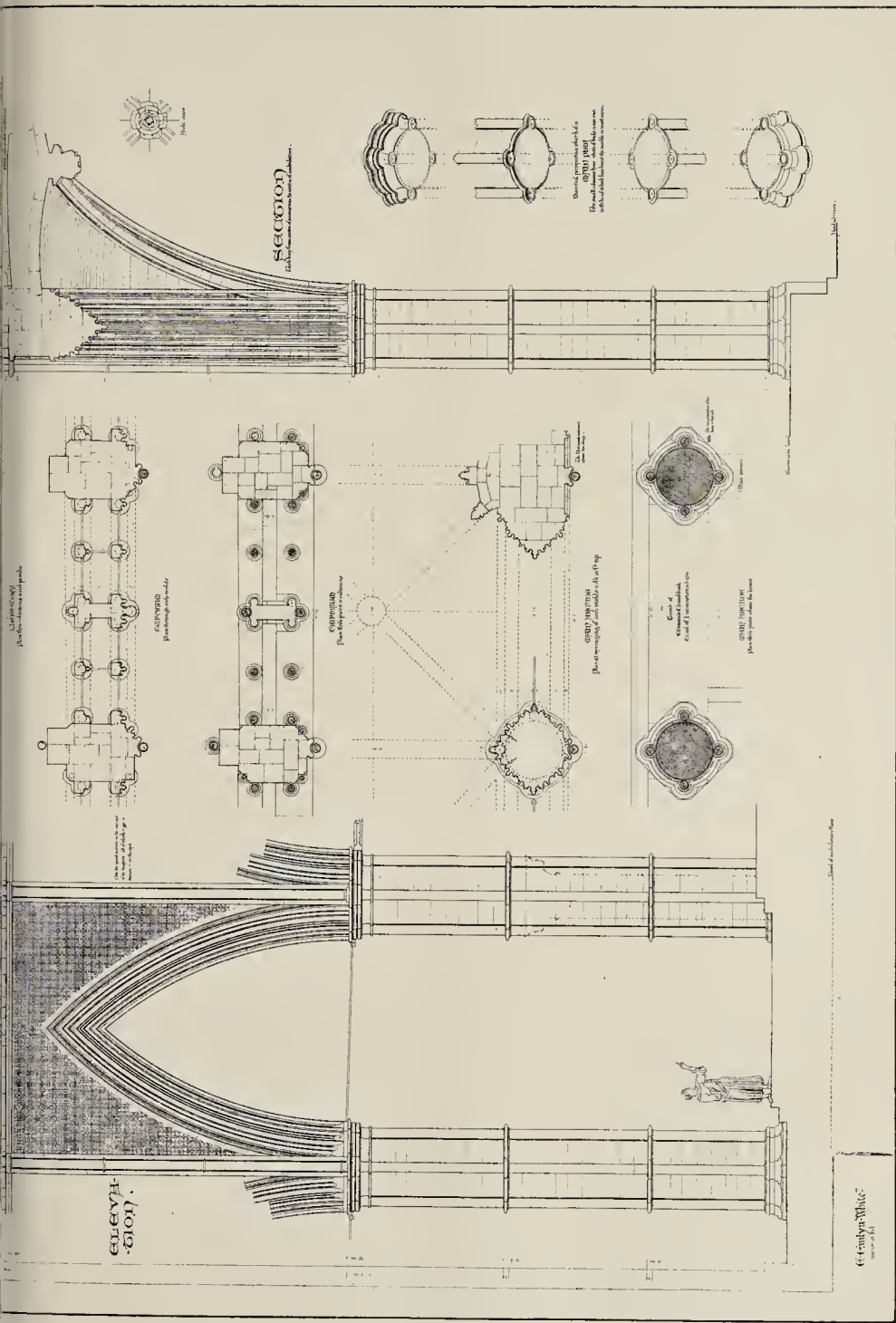
* "Government tenders."



WESTMINSTER ABBEY

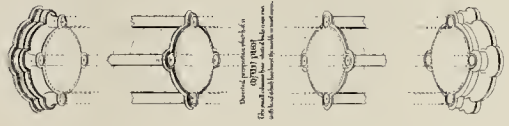
SECOND BAY IN SHIPBURY'S NORTH SIDE.



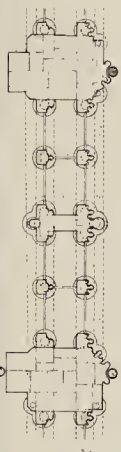


SECTION

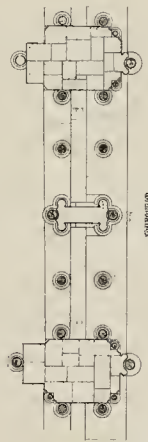
of the column showing the internal structure.



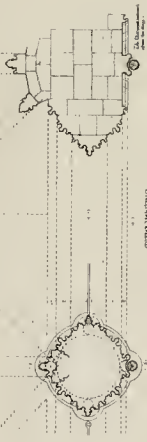
Detail of the capital of the column showing the internal structure.



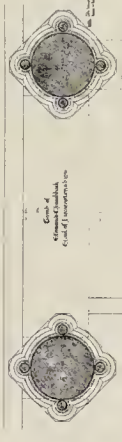
Base of the column



Base of the column



Base of the column

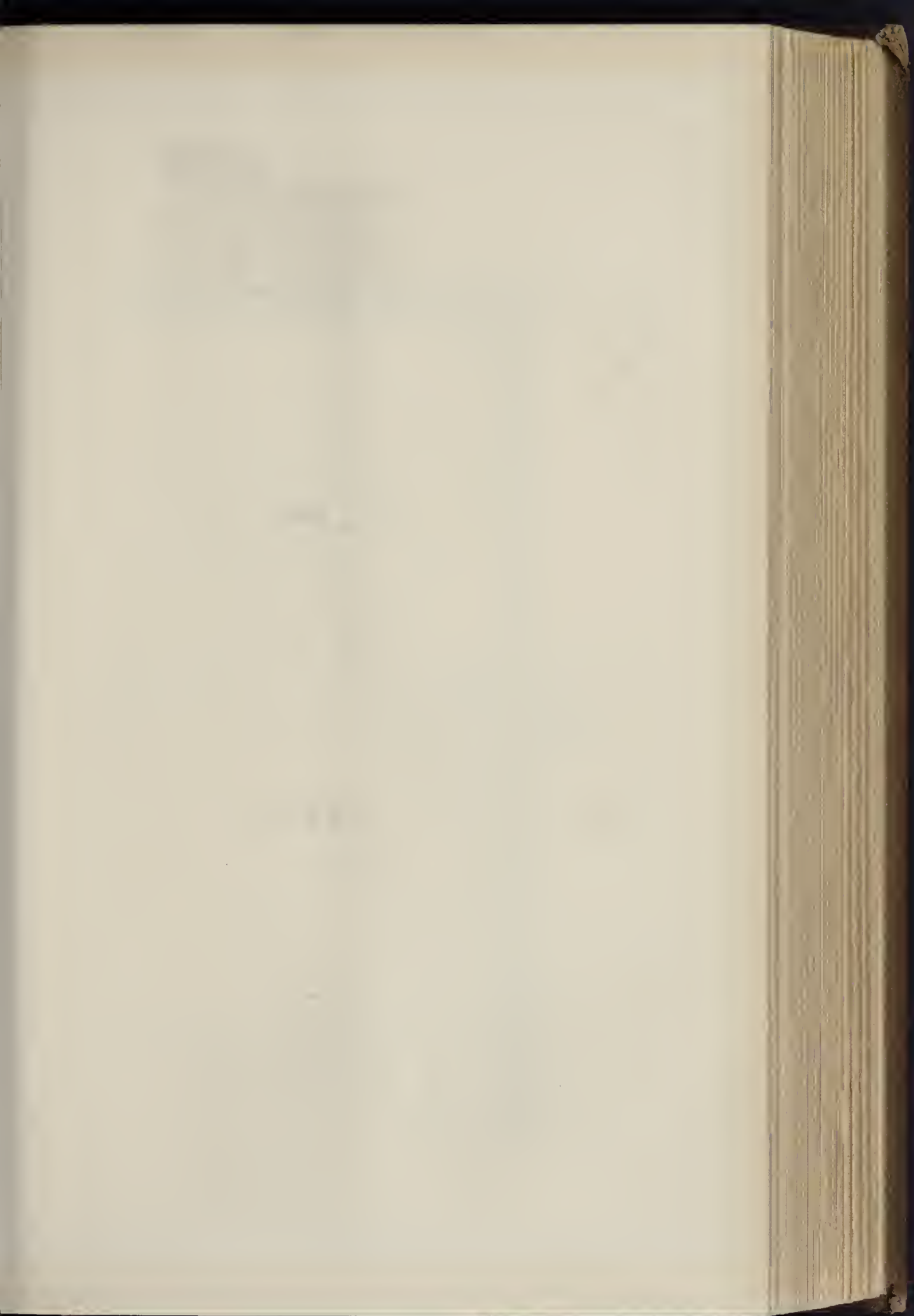


Base of the column

SECTION

of the column showing the internal structure.

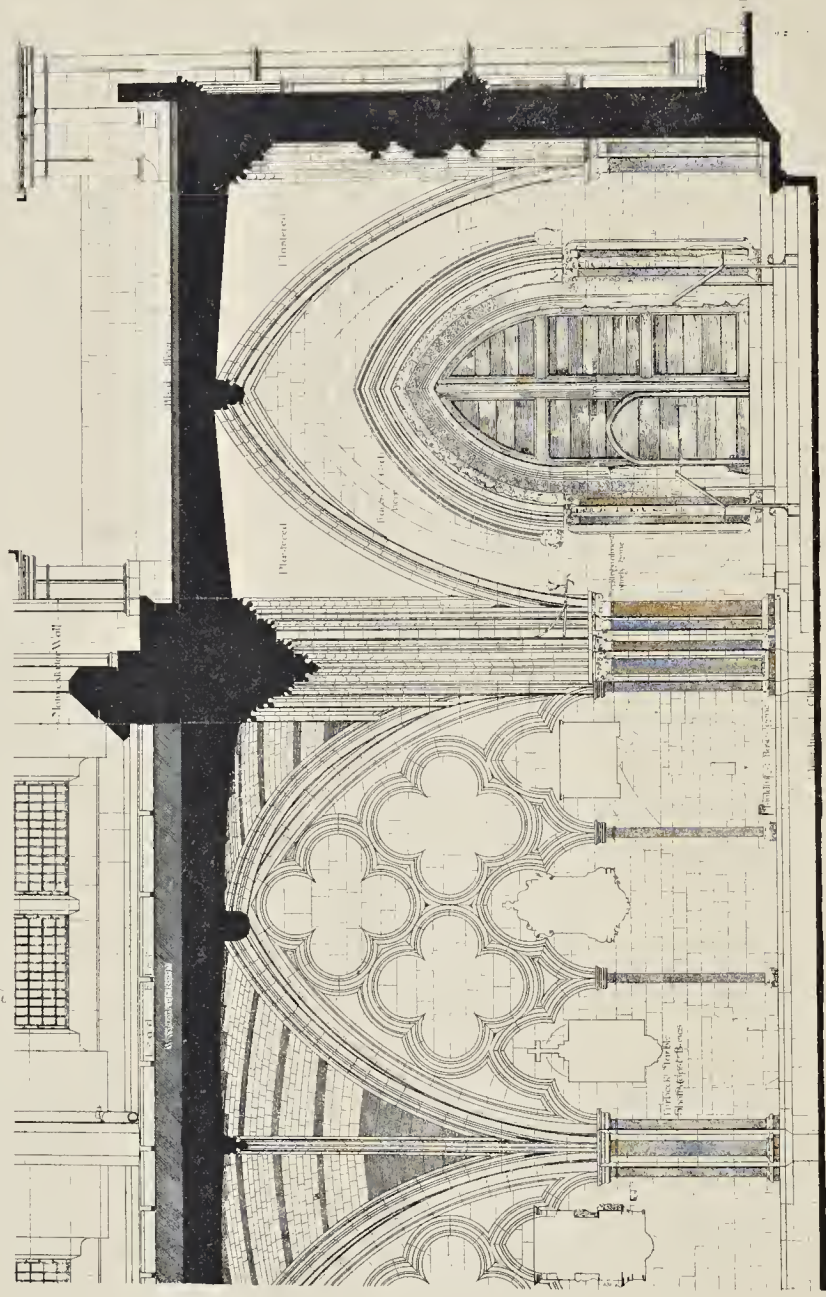
Wentworth & Partners, 11, Queen's Street, London, W.C.



THE BUILDER, MARCH 7, 1885

See D on General Plan.

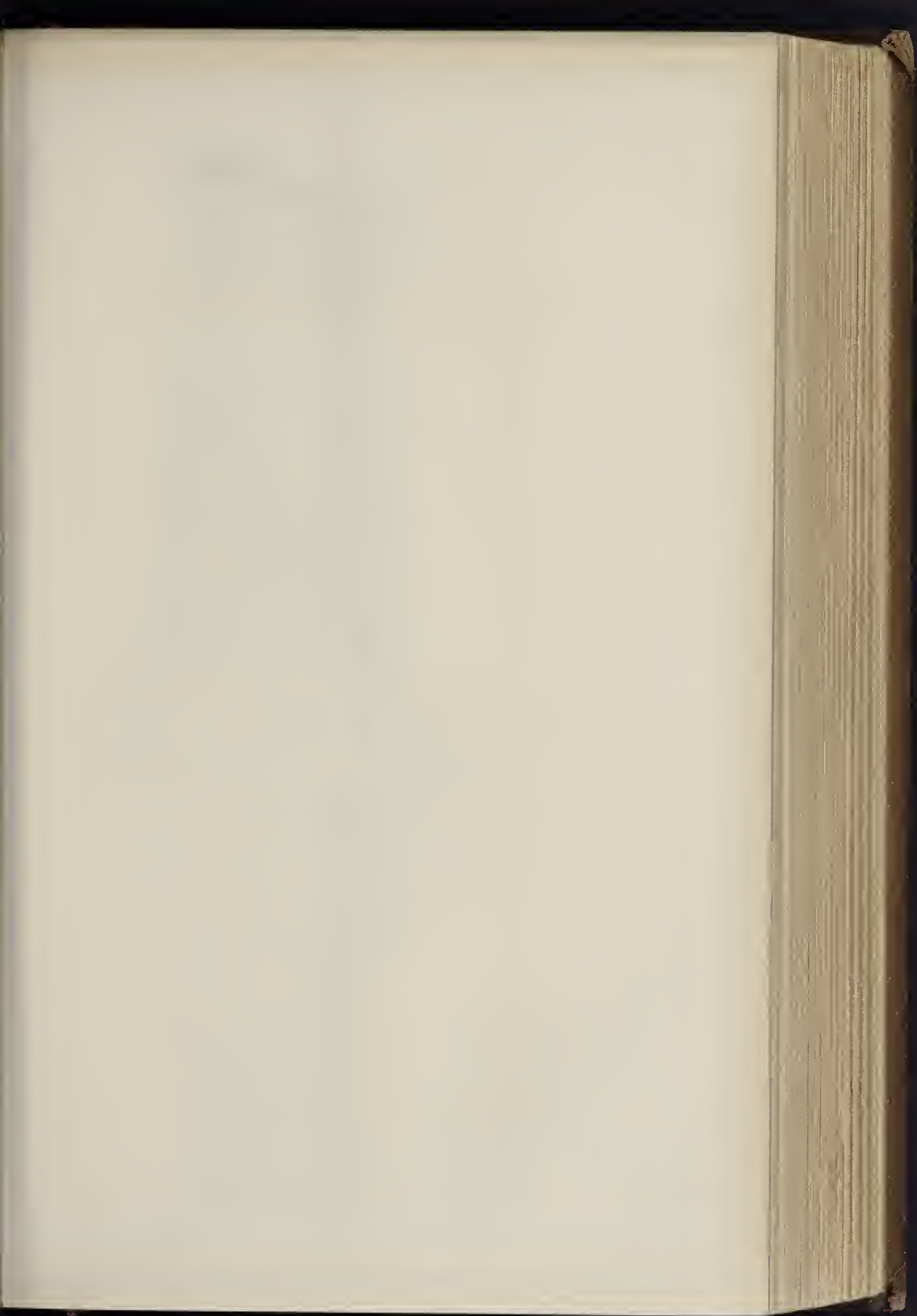
Westminster Abbey Two Eastern Bays: North Walk of Cloisters:



Longitudinal Section looking North

Note:—Shaded portions taken from actual measurements.

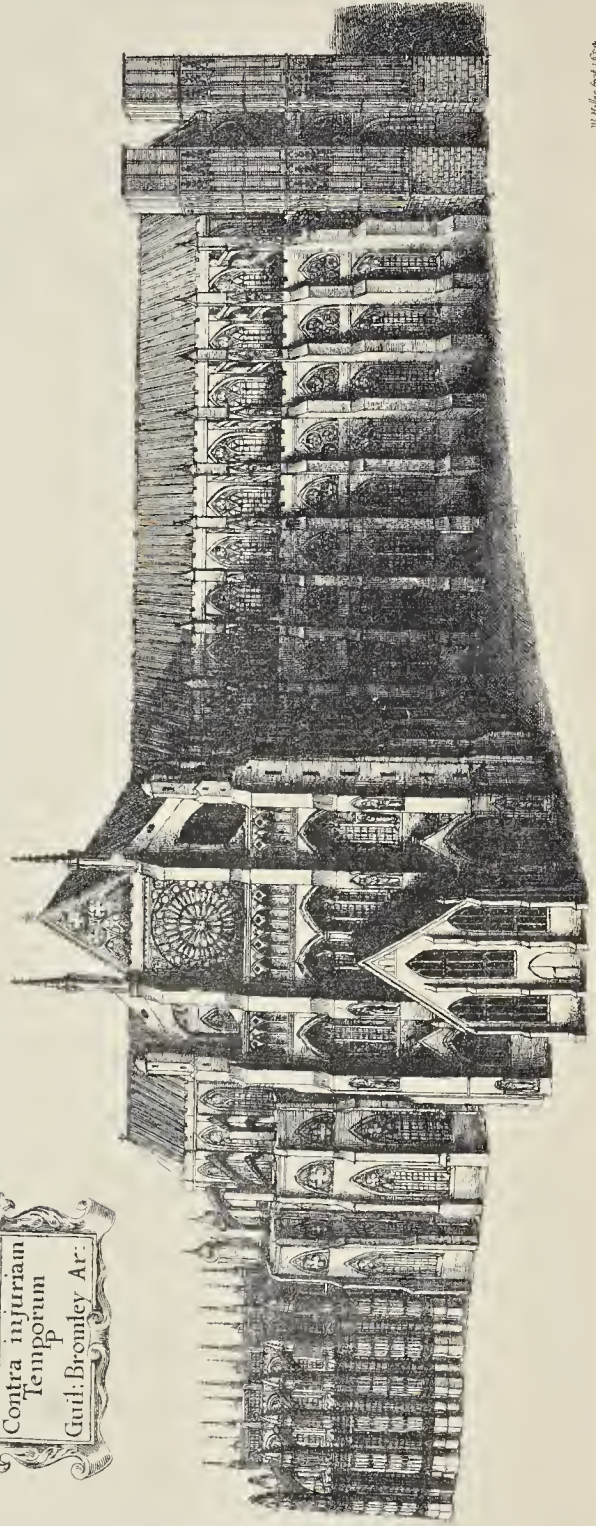
Measured & Drawn by
Mr. Thomas M. Loren.



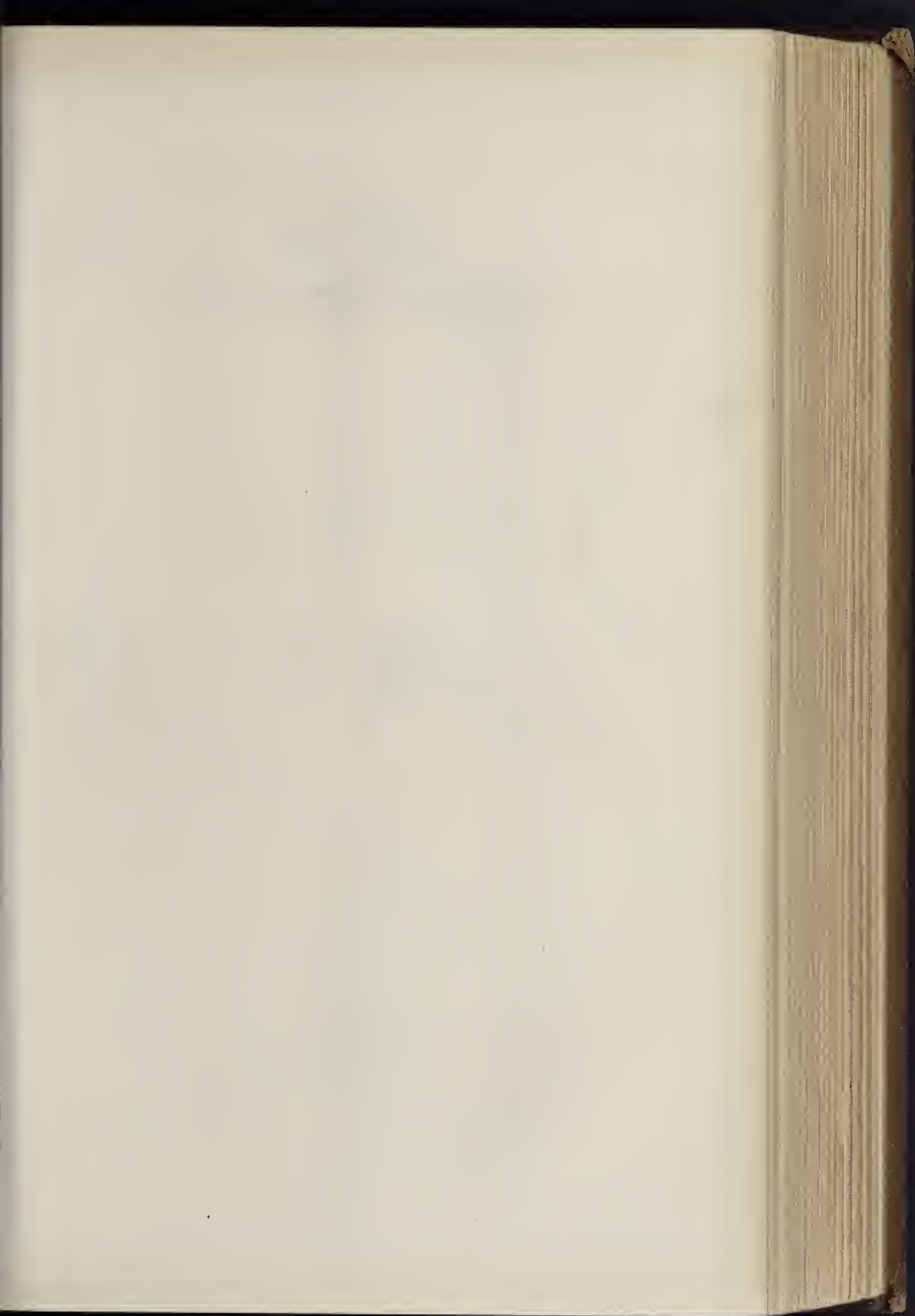
THE BUILDER, MARCH 7, 1885.



Westminster: ecclesia
coniv' factis aquilonalis.



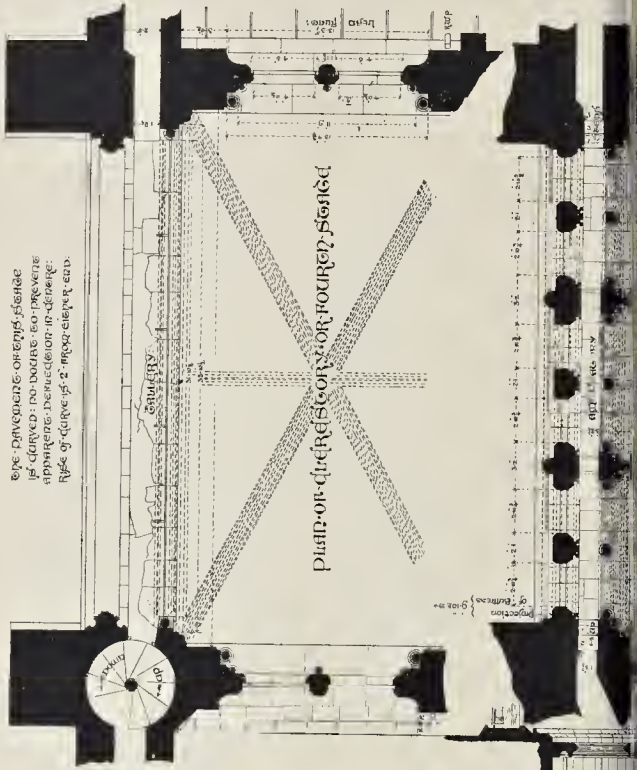
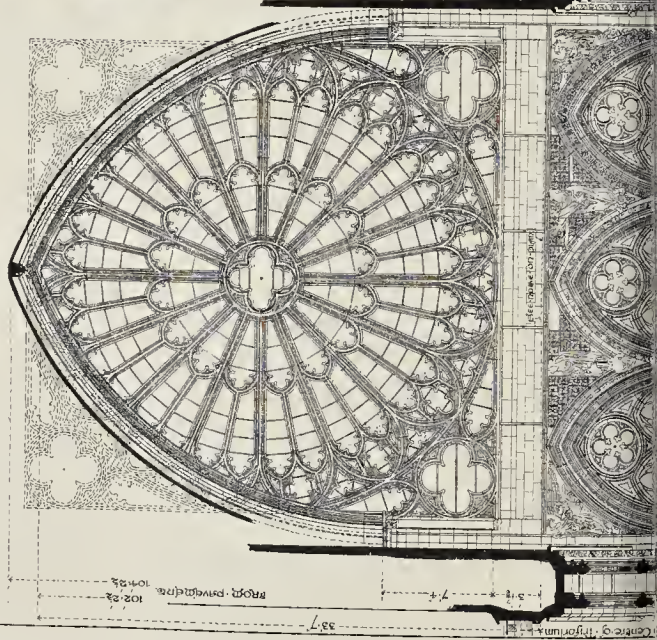
W. H. & S. W. 1884



WESTMINSTER ABBEY SOUTH TRANSEPT

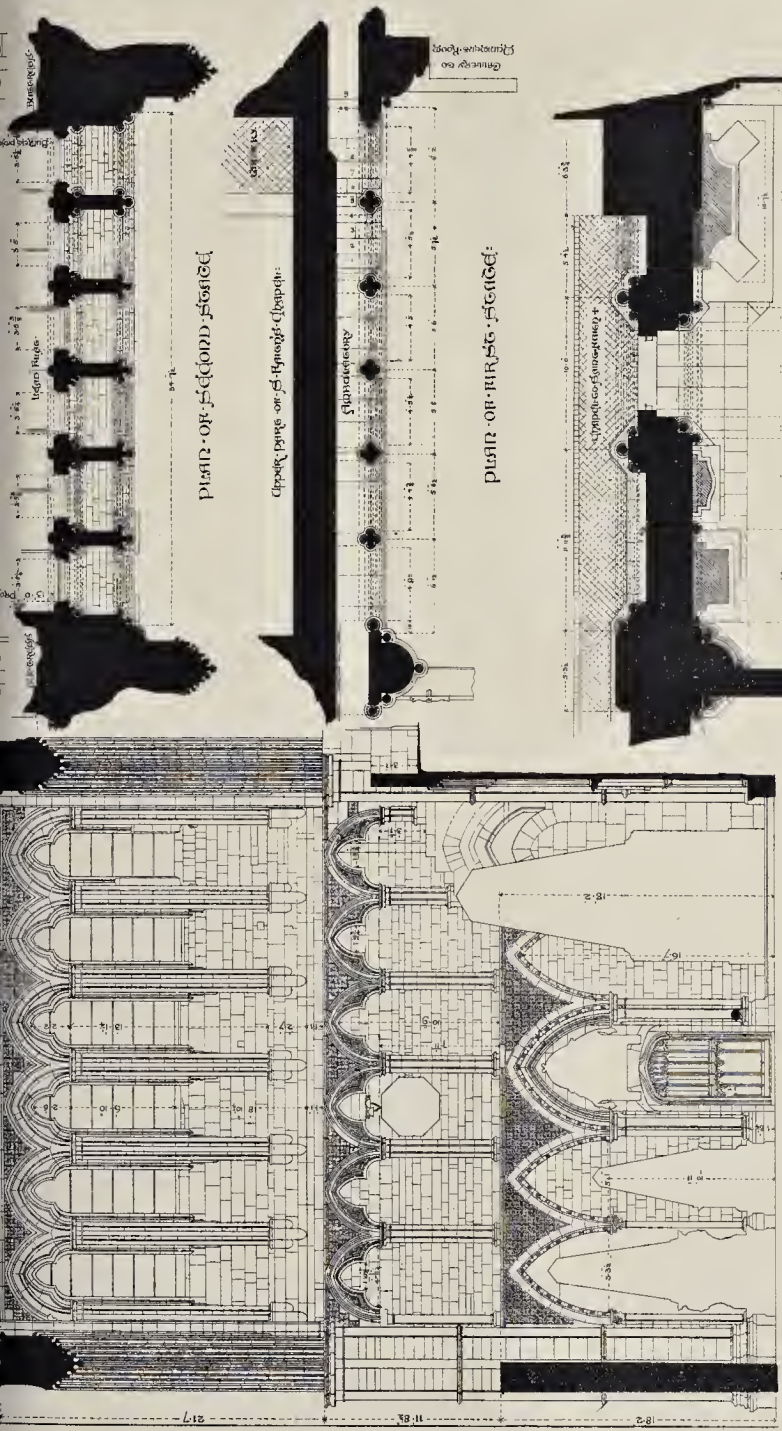
D.B. plan showing the position indicated on drawing of front elevation.

INTERIOR WALLS OF SOUTH AND NORTH TRANSEPTS
SHOWING CONNECTION WITH SIDE WALLS



THE DRAWING OF THE ROSE WINDOW IS DERIVED FROM THE ARCHITECTURAL DRAWING OF THE ROSE WINDOW IN THE DRAWING OF THE ROSE WINDOW IN THE DRAWING OF THE ROSE WINDOW.

PLAN OF THE ROSE WINDOW



ეlevation

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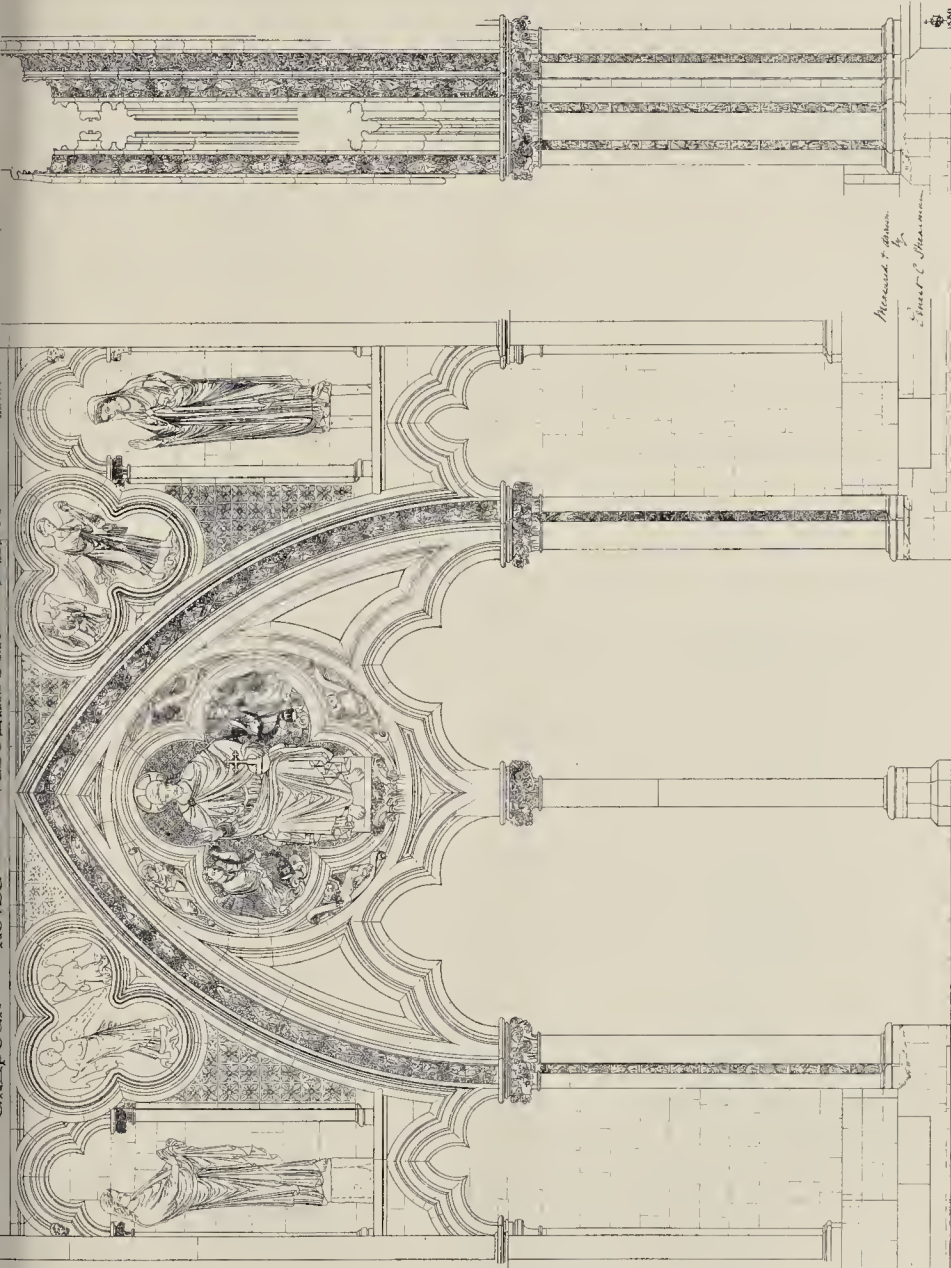
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პირ-ორ-ბოლო-სენი

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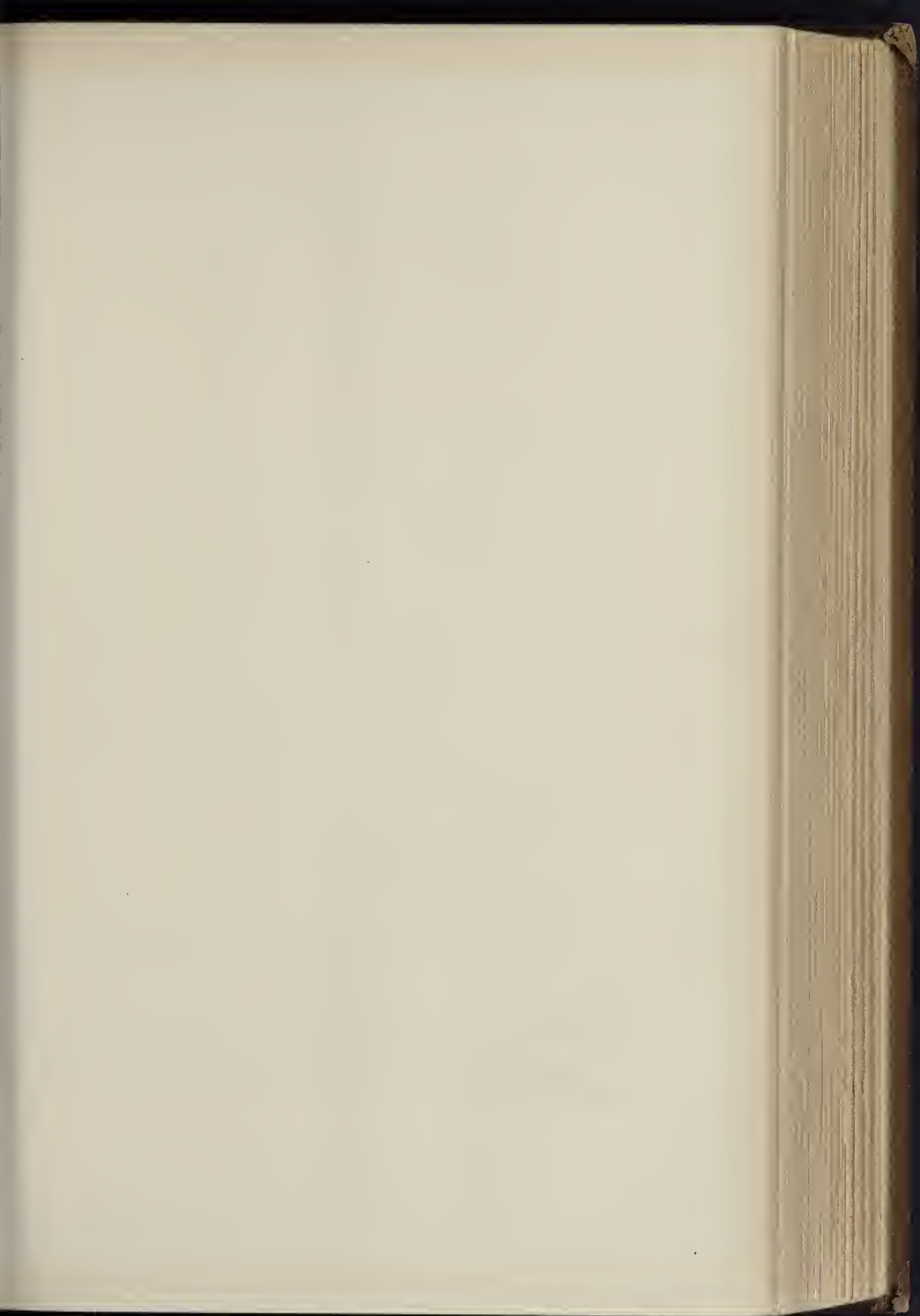
Architectural drawing of a building facade, showing elevation and ground plans.

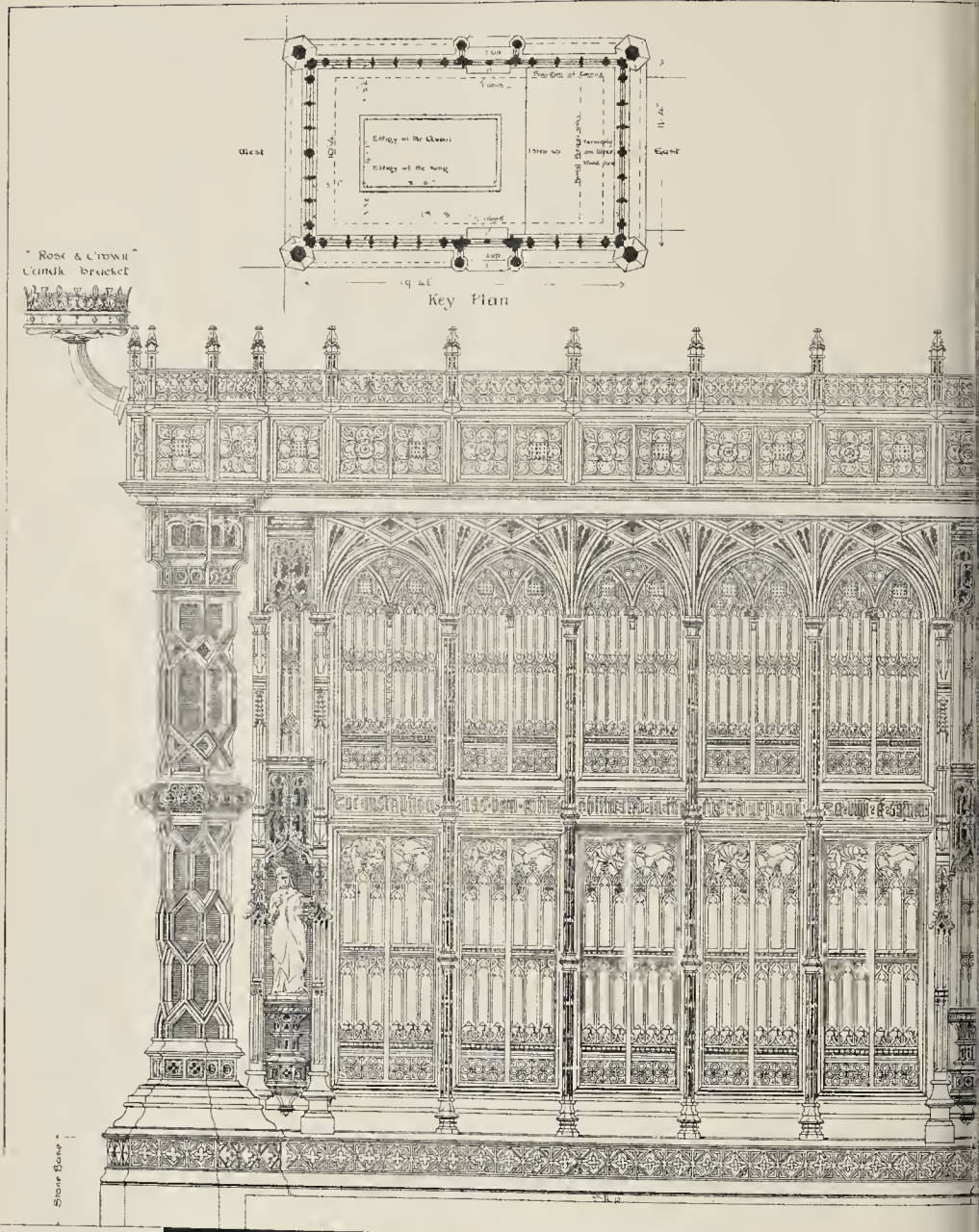


*Measured & drawn
by
E. C. Mansfield*

ELEVATION OF ARCHES DOORWAY

SECTION





"Rose & Crown"
Canopy bracket

Key Plan

Stone Base

Statue missing
St John Baptist

Statue
missing

SC

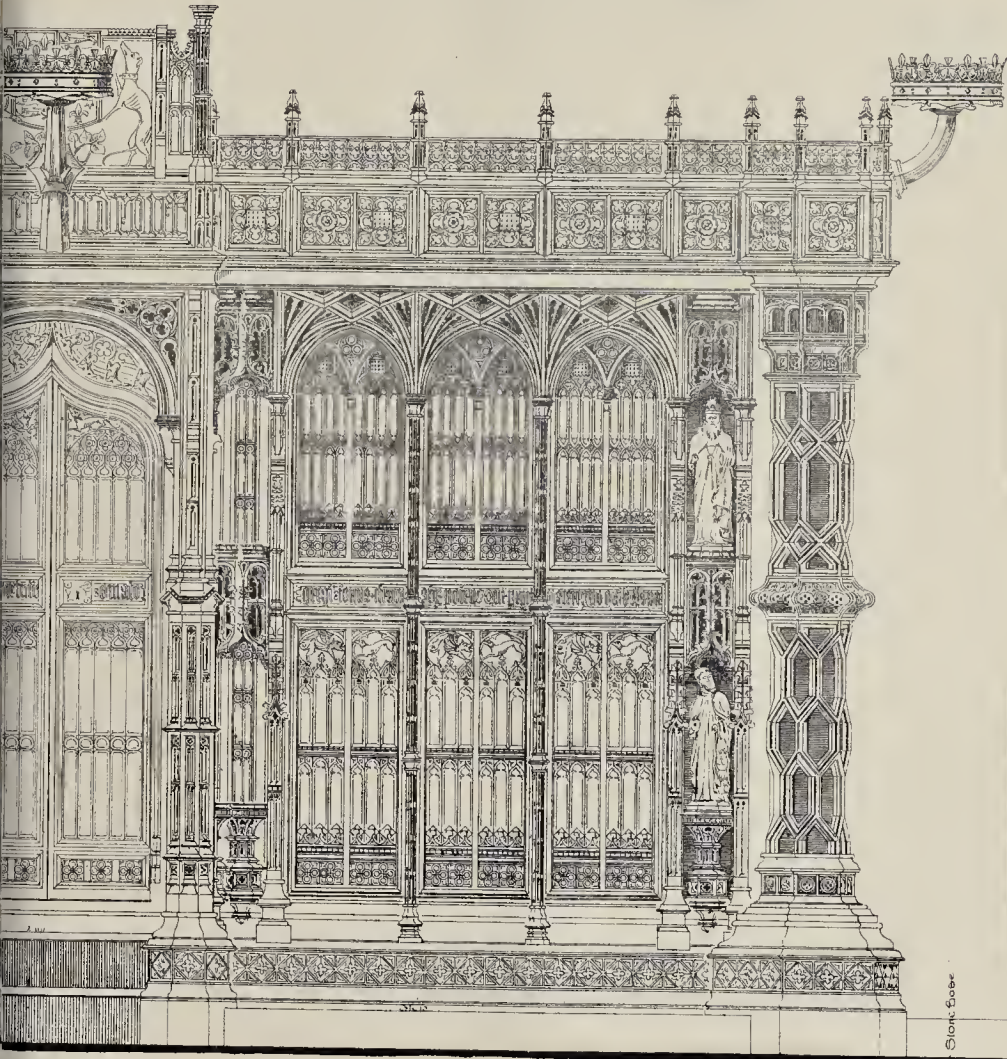
W. Kell Photo Lath & Printer

PUGIN TRAVELLING STUDENTSHIP, 1885.
MEDAL OF MERIT.

SCREEN SURROUND

WEST

Note The Screen has been damaged in places but I have restored the missing parts from similar existing ones where possible. It is executed in Brass painted the colour of Bronze and was originally adorned with 56 Brass Statues gilt of which only 16 are now remaining.



Statues
missing

King Edward Confessor
St Bartholomew

Restoration of Screen

Archibald
1854-1855

8 Castle St. Heiborn, London, E.C.

BY ORDER OF HENRY VII.

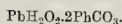
BEY.

FREE LECTURES TO ARTISANS AT
CARPENTERS' HALL.

BLACK, WHITE, AND RED LEAD.

The third lecture of this series* was delivered on the 25th ult. by Professor Church, M.A. The air was occupied by Mr. Alfred Preston, Pastor of the company.

Professor Church commenced by saying that though the lecture bore the title of "Black, White, and Red Lead," there was, strictly speaking, no such substance as black lead. There were three ways in which white lead was manufactured. The first was the Dutch process, consisting in taking metallic lead in the form of a grid and coating it, or placing a coil of wet lead in a crucible or vessel containing vinegar, and surrounded by a quantity of fermenting manure. A large quantity of carbonic acid is thus given off, and was the chief agent in the manufacture of white lead. Two other constituents entered into its composition, the one being the oxygen of the air, and the other being water in the form of vapour. The result of these was to produce an attack on the metallic lead, which was a pure elementary substance, and in the end they got the metallic lead with its shining surface thoroughly corroded, a mass of white lead with lead in the centre. The next process was a much simpler one, but required a great deal of attention. It was invented by a French chemist, and was also practised in England by a chemist named Goussier. In this case carbonic acid gas from any source, such as that resulting from the action of sulphuric acid upon chalk, was passed into a solution of acetate of lead. The acetate contained oxide of lead in excess of the quantity requisite to form it, and when the carbonic acid was passed through it a white powder was deposited in the form of white lead. The third process was invented by two chemists,—Dale and Milner. In this instance, a yellow combination of lead and arsenic was used in the proportion of four parts of the common salt one part, and water sixteen parts. These were ground together for four or five hours. The mixture was then transferred to a leaden vat, and on carbonic acid gas being passed through it to a certain point, they got white lead. There was still another process, and that is produced white lead of an inferior character, he would not deal with it. White lead consisted of two substances, not always present in exactly the same proportions, but very nearly so in all good samples. It was a compound of two proportions of carbonate of lead and one proportion of hydrate of lead. The following was the chemical formula of white lead:—



Sometimes the samples were grey, arising from the iron or core not being separated from the white lead, a small quantity of finely divided iron spoiling the white tone of the mass out of it. Occasionally a sample would appear bluish, caused by one of the oxides of lead being present. Another defect of white lead arose from the presence of too much hydrate of lead. It sometimes contained too much carbonate of lead, and then it would not grind readily. It was desirable that white lead should be thoroughly washed from sngar of lead if it was to be used for the finest work,—and, indeed, it is a better for all work. The lecturer then referred to Venice, Hamburg, and Dutch white lead, demonstrating by experiment how to tell whether the material was adulterated. Nitric acid was a useful agent for detecting adulteration. He had bought several samples, and found that the majority were unadulterated, but in employing house-painters had detected that the paint with which they had been supplied had been adulterated. The advantages of white lead were body and density, drying character, and its economical union with oil containing the particles of paint and surface on which they were spread. This was to be seen in the case of old oil paintings and putty made only of white lead and linseed oil. In the National Portrait Gallery they could notice that the parts of the pictures which had been best preserved were the high lights, in which flake white had been largely used. The preservative effect of flake white formed a lead soap, and a substance which was almost imperishable. The disadvantages of white lead were that

it discoloured and was poisonous. Peroxide of hydrogen would get rid of the tarnish of lead. White lead, again, would dissolve in the acids of the stomach, and in cases of lead poisoning there was a peculiar effect to be observed: at the point where the teeth joined the gums there was a slaty blue line. This arose chiefly from want of care in eating with unwashed hands, and sometimes from the powdered lead being inhaled and swallowed. There were two remedies for lead poisoning; a pleasantly acidulous drink of diluted sulphuric acid turned the white lead into sulphate of lead, which was practically insoluble. The other remedy was iodide of potassium, which should be carefully used. A specially prepared respirator was a most important precaution. A species of white lead which was practically non-poisonous had lately been introduced. It was a sulphate of lead, to which was added a small quantity of zinc white. Red lead was the densest of the three, and often was made by roasting white lead. It was an oxide of lead, and its formula was:—



Red lead when boiled with oil had a great power of drying and preserving wood. It was sometimes adulterated with brick-dust and red oxide of iron. Weak nitric acid dissolved red lead into a clear solution by the addition of a little bit of sugar. If the red lead contained brick-dust or oxide of iron, they would not dissolve. Black-lead was carbon, and was as such an element as oxygen. The carbon existed in three forms,—in diamonds, black-lead, and charcoal or soot. Graphite or plumbago was a better term than black-lead. Graphite had been said to be the only perfect pigment, and would stand a high temperature. Black-lead was adulterated with ground anthracite coal, and with gas carbon from the retorts. Graphite would stand a fire-red heat without burning, while the soot or carbon burned away.

The fourth lecture was delivered by Mr. Thomas Blashill, F.R.I.B.A., on Wednesday evening last. The subject treated of in this lecture was "The Shoring of Buildings." The lecture was very fully illustrated by models and drawings, and the large hall was completely filled by an attentive audience. We defer a report until next week.

PUBLIC WORKS AT BRUSSELS.

THE Communal Council of Brussels has applied to the Belgian Government for authority to spend 55,720*l.* during the current year for the completion of primary schools. There is a school in the Rue Haute, which will cost more than 10,200*l.*; another in the Rue Schaerbeek, 4,000*l.*, and a third, Impasse Canivet, estimated by the architect, M. Samyn, at 20,440*l.* But these are not the only expenses that the town is incurring for the promotion of education. The building of the Royal Athenaeum cost 19,884*l.* in 1853 and 40,000*l.* in 1854. This important structure will be completed during the course of the present year for a further cost of about 20,000*l.* When we consider that Brussels is, after all and comparatively speaking, a small town, this expenditure in the noble cause of education is very creditable. But there are many other calls on the public purse. The tourist and the student of Renaissance and Gothic architecture will rejoice, this year, in the restoration of the Maison du Roi. This celebrated building, formerly used as the seat of local authorities, was built from 1514 to 1527. Here it was that Counts Egmont and Hornes were confined the night before their execution. To prevent a rescue, planks, it is said, were placed, reaching from the balcony to the scaffold, situated in the great square. Thus the building is intimately associated with the independence of the Netherlands and the rebellion against Catholic and Spanish domination. In 1707, this structure, which is also sometimes designated as the Halle au Pain, was most clumsily and injuriously restored. Some years ago the original plans were found, and, in 1873, it was determined to efface the traces of the previous restoration, and reconstruct according to first and superior designs of the sixteenth century. On this work close upon 40,000*l.* have been spent, and during the present year 8,000*l.* more will be required, principally for fixtures, doors, &c. M. Jamar has completed his studies of the galleries and balconies, and the

gallery leading to the office of the Burgomaster is almost finished. In the Gothic hall two large bronze statues will be placed, but the models of the nine other statues, also required, have not yet been approved by the Fine Arts Commission.

Early in the year works for the Provincial Government House of Brussels will be put up for competition. The details concerning these adjudications fill a volume of 625 pages; and, according to the calculations of M. Hans, the principal engineer of the Ponts et Chaussées administration, the total cost is put down at 98,280*l.*, and the caution money required from the contractors, at 4,920*l.* These works relate principally to the enlarging, deepening, &c., of the Brussels and Charleroi Canal. There will be also ten aqueduct siphons, five draw-bridges, ten ordinary bridges, together with pavement, embankments, &c. To explain all these details it has been necessary to draw up sixty-five different plans; and the entire work must be completed in two years, or a penalty of 100 francs for every day's delay will be inflicted. Something also is to be done with respect to the beautifying of Brussels, and the housing of the poor; 44,000*l.* will be devoted to the transformation of the small district of La Vierge Noire,—a quarter which has barely 400 inhabitants. Finally, 24,000*l.* are put down for continuing the improvement and development of the north-east or fashionable Quartier Leopold. Altogether it will be seen that neither political disturbances nor commercial depression have checked the forward movement of the town of Brussels. No important project has been abandoned, and many new proposals are seriously entertained. This is most fortunate, as the number of workmen out of employ is daily increasing, and the distress would be doubly keen if the Government as well as private enterprise failed in providing work.

ARCHITECTURAL SOCIETIES.

Glasgow Institute of Architects.—The annual dinner of the Glasgow Incorporated Institute of Architects took place at St. Enoch's Hotel on the 27th ult. Mr. James Sellars, President, occupied the chair, and Mr. David Thomson, ex-vic-president, was crozier. The Chairman, in proposing the toast of "The Institute," said that the names of such men as the late Alexander Thomson and James Salmon, George Bell, John Baird, and John Burnet, would long be remembered as the fathers of the Institute; and, thanks to the efforts of those men, and of those who came after them, the Institute had long ago entered on a useful career, doing good earnest work in the past, taking part in all matters of public interest connected with the architectural profession, and justifying its claim to a position of influence among similar societies in Glasgow. With regard to architectural education, Mr. Sellars said that a Chair of Architecture at the University was required, in order to secure the status and the proper recognition of architecture as one of the learned professions. Referring to the "Alexander Thomson Travelling Studentship," the funds for which will be available in about two years, Mr. Sellars said that a sum of money was collected by the friends and admirers of Mr. Thomson at his death, and after providing a host of the deceased architect, which is now in the Corporation Galleries, the balance has been invested, and every three years a sum of 60*l.* or 70*l.* will be available and competed for by young architects, the successful candidate being awarded the money, under certain conditions, to help him in his studies. No more fitting tribute, said Mr. Sellars, could be paid to the memory of Alexander Thomson, who was himself an earnest student all through his too short career, and it will be the means of handing down to posterity the name of one of Glasgow's most distinguished architects. Something is also being done for the architectural education of the young men in the profession, and that by the young men themselves. The Glasgow Architectural Association is doing excellent work in this way. Mr. Sellars concluded by referring to the proposed Police Bill for Glasgow and to other matters of local interest.

Birmingham Architectural Association.—The sixth ordinary meeting of this Association was held at Queen's College on Tuesday evening last. Mr. H. H. McConnal was in the chair.

*For reports of the two previous lectures see p. 264.

A paper was read by Mr. W. Doubleday on "Symbolism in Art," which was copiously illustrated by diagrams and sketches. The lecturer expressed his opinion that the age of symbolism had not passed away, and that in modern architectural works the necessity of symbolic representation would frequently occur, more especially in all buildings erected for the worship of the deity. A vote of thanks to the lecturer was proposed by the Chairman, and supported by Messrs. Victor Scruton (hon. sec.), J. Cotton, and F. Cross.

THE FOLK-LORE AND ART OF OLD JAPAN.

This was the subject of an interesting lecture delivered by Capt. Charles Pfoundes, F.R.G.S., at the meeting of the Society for the Encouragement of the Fine Arts, Conduit-street, on Thursday evening, the 26th ult. The chair was occupied by Sir J. Whitaker Ellis, Bart., M.P., and vice-president of the society. The lecturer pointed out that the art of Old Japan, that is, the true art of the cultured natives, derives so much of its art motive, and so many of its ideals, from the folk-lore, the myths, and legends, that we must know something of these before we can properly understand the art, or have any true conception whatever of the meaning, the origin, of the compositions that are so ably depicted in the characteristic Japanese delineations. In the decorative design of wares, even of those fabricated for foreign use, however cheap, we find those well-known groupings that to the native, and also to the well-informed foreigner, recall the most popular poetic ideas, the best known legends, and the numerous plots of the Japanese. Beginning with the native myths, the Japanese story of the Creation, when from Chaos order was evolved; then the successive acts of creation of beasts of the field, birds of the air, fishes of the sea, and semi-divine man, we follow on from legend to legend, throughout the most important epoch of Japanese history. War and love, loyalty and revenge, efforts to improve the condition of the people, to civilise the rude aborigines, all form salient features in the art work of the designers. Besides the pictorial art and book illustration, the calligraphic art takes a high place. In a former lecture before the Society on the System and Meaning of the Art of Old Japan, some of these points were dealt with by the author, and in a still earlier lecture he essayed to elucidate the connexion between the art and the literature, and entered somewhat fully into the calligraphy of the Japanese. It was not necessary, therefore, to again travel over that portion of the subject, but a little explanation might bear repetition, as to the peculiarity of the written character, and why it affected the art so much. As it is not an alphabet or a mere syllabary, but an ideographic character, derived from hieroglyphic forms, it appeals to the eye, beyond its mere phonetic value; and in illustrations of myth legend, or curious rites or custom, a few of these Chinese written characters, as used by the Japanese, throw much light upon the suggestive sketch as to the intention of the artist. The enamel and cloisonné wares called "seven jewels" show the seven colours: pink, coral, amber, mother-of-pearl, emerald, agate, pearl, and crystal; gold and silver are included in the term, as a matter of course, and it is interesting to find these groupings in ancient Indian and Chinese jewelled articles intended for religious uses. Whilst the Japanese have incorporated much from the adjoining continent of China, all this appears as merely engrafted on the indigenous stock; and the scholarly native draws a sharply-defined line between the "foreign" and the "native" myth, legend, and poem. Whether in wood or ivory carving, in bronze casting, in inlaid metal, or other work, the same series of ideas are found repeated and perpetuated; but the Japanese are judicious and expert in the selection of material, and of design to suit the uses and the forms of the articles. Indeed, an extensive knowledge of the daily life, the manners, and the ceremonies of the people of all classes, is absolutely essential for a true understanding of the art of this most interesting people. Unfortunately, in recent years, they have diverged widely from the traditional lines, and are sinking into imitation, not only of foreign wares, but actually are copying foreign imitations of

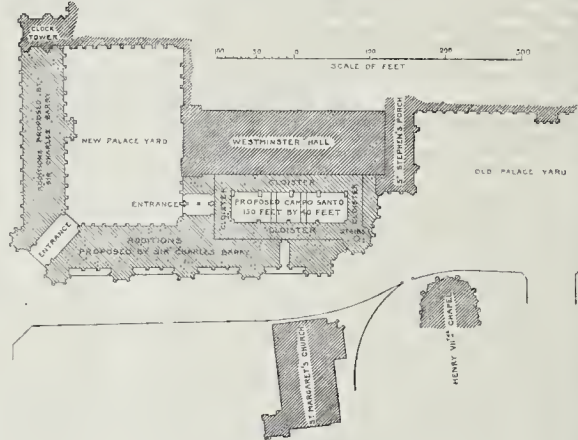
their own older wares, now scattered over the face of the earth, and much of which is to be found, not duly valued or appreciated, anywhere but in Japan. With our modern arbitrary art canon and recent "scientific educational" art machinery, we cannot criticise Japanese work in its detail of execution; but in the sketch, or group depicted on any Japanese article, in the "lozenges" that contain the "blazon" of an ancient clan, much will be found of deep interest. The realistic and servile copying of the beautiful Nature that the Japanese is so happily surrounded by, and which he so thoroughly appreciates, is not the sole forte of the Japanese artist; but to grasp the idealistic art, to adequately enjoy its beauties and depth of meaning, one must undergo a course of training, a long series of studious investigation into classical and native literature, into history, legend, poem, and folk-lore.

amongst them a little more. He was quite sure that many of them would be very pleased to comply for architects could not but feel their indebtedness to such men as were to be found amongst the members of the Institution. He should like to see an eminent architect like Mr. Waterhouse occupying their chair on such an occasion as the present.

WESTMINSTER HALL.

SIR,—The appearance of the beautiful drawing of the late Sir C. Barry's design for completing the new Palace at Westminster in the *Builder* of Jan. 24 shows evidently that the public are interested in the completion of the surroundings of Westminster Hall.

I venture, therefore, to inclose a sketch plan containing an idea for devoting the central space, called "The Hall Court," to the purpose of a "Campo Santo." I wish it to be con-



Suggestion for Devoting the Ground formerly occupied by the Law Courts at Westminster to a Campo Santo.

PROVIDENT INSTITUTION OF BUILDERS' FOREMEN AND CLERKS OF WORKS.

THE annual dinner of the members and friends of this Institution took place at the Holborn Restaurant on Saturday, the 26th ult., the Governor, Mr. George Plucknett, J.P., in the chair, supported by Mr. F. J. Dove, Mr. W. Scrivener, Mr. Hall, Mr. Thomas Stirling, and several other master builders and builders' merchants. The company numbered upwards of 130.

The Chairman, in proposing the toast of the evening, "The Provident Institution of Builders' Foremen and Clerks of Works," asked all who were present to do what they could in support of so excellent an institution. Such support could, perhaps, best be given by making known the objects of the Institution to those for whose advantage it was established, now upwards of forty years ago. The annual income at the disposal of the directors was very limited, but, small as it was, it enabled them to do a great amount of good. There were, he hoped, many builders' foremen who would some day be masters, and he hoped they would not then forget the claims of the Institution, which had two classes of members, viz., ordinary members and honorary members. The first-named class of members subscribed to, and were entitled under certain conditions to participate in, the Provident Fund.

Mr. Bedford, the secretary, in responding, said that among the members of the Institution who had risen to be masters, was the late Mr. William Bangs. Since its establishment, the Institution had expended the sum of 5,539, 15s. in affording relief and granting pensions to infirm and aged members, their widows and orphans. In consequence, Mr. Bedford referred to the great services which had been rendered to the Institution by Mr. Plucknett as Governor during the last sixteen years.

Mr. George Groome, vice-chairman, next proposed "The Governor," Mr. Plucknett briefly replying.

The other toasts included "The Trustees," proposed by Mr. J. Derry, financial secretary, and coupled with the names of Mr. W. Scrivener, and Mr. J. Dove; "The Builders," proposed by Mr. Ross, and responded to by Mr. Hall; "The Officers of the Institution," proposed by Mr. Johnson, and replied to by Mr. Welch, treasurer; and "The Architects and Surveyors," proposed by the Chairman, and responded to by Mr. Thomas Stirling, who suggested that architects should be invited to come

considered an addendum to Mr. Barry's plans, and not in any way conflicting with them.

The grand idea of Sir Gilbert Scott to devote a large portion of Abingdon-street to the object I have in view will probably never be carried out. I therefore submit the scheme with greater confidence, because it can be initiated at once, and at no expense for purchasing the land, &c.

As far as I can gather from your pages, professional opinion is generally opposed to Mr. Pearson's proposal to cover and inclose the space between the flying buttresses as a stand for horses. This would be sacrilege!

The idea I submit does not in any way interfere with Mr. Barry's plan, except that it narrows St. Margaret's-street in order to obtain a more rectangular quadrangle for my suggested Campo Santo. This I propose to be 150 ft. by 40 ft., with a cloister about 20 ft. wide round it. This cloister might be two stories in height, and would provide accommodation for tablets, busts, and statues for the illustrious dead, whose remains would be deposited in the central space, or Campo Santo, for many years to come. Access could be obtained from New Palace Yard and St. Margaret-street, and from Westminster Hall, and a circular staircase would connect the two floors.

J. W. WALTON-WILSON.

* * * Of course, as will be seen, Mr. Walton-Wilson's plan involves setting the line of the new buildings parallel to Westminster Hall, and therefore producing that narrow strait in St. Margaret's-lane which Mr. C. Barry's plan was specially modified to avoid.

The Alexandra Home for Lady Students of Music.—We are informed that the American Elevator Company have been instructed to furnish one of their "Standard Hydraulic Elevators" for passenger service in this building, which is being erected in connexion with the Royal College of Music, as a home for those of the lady students of the college whose homes are out of London.

TREGOLD'S CARPENTRY.

SIR,—I am much obliged to your reviewer for pointing out some typographical errors that have occurred since the new edition of this work; these will all be corrected before any more copies are issued by the publishers.

With regard to the apparent error in "infraction," at page 50, upon which the reviewer has laid so much stress, I beg to say that it is simply the omission of the figure "4" before "s" in printing the equation of the second integration.

Your reviewer suggests that I "might have drawn the line at the calculus"; but in this respect I only followed the example set by previous editors and by Tregold himself, who used the "calculus" in several parts of the work.

Allow me to say that especial attention was paid to the revision of the "Tables of Scantings," every scantling being carefully considered; in some cases it was thought inexpedient to adhere strictly to the results obtained by the rule, but in general those results have been published with some allowance for contingencies.

In the references to other works the "page" has been purposely omitted, as many of them have gone through several editions, and it appeared to me that giving pages would in many cases tend only to mislead and confuse the reader.

E. WYNDHAM TARN.

TAXATION OF SURVEYORS' CHARGES IN COMPENSATION CASES.

SIR,—In the interests of surveyors, and also in those of owners whose property may be required by public bodies or railway companies, we think it right to bring to your notice the facts as to a compensation case in which we have been engaged on behalf of the land-owner, with reference to the unfair and needless manner in which the surveyors' charges have been taxed by Master Francis. In the early part of the year 1881 the Kingston and London Railway Company gave notice to take some twenty acres of land and good dwelling-houses, with large gardens, &c., situated at Wandsworth, and claim was sent in by us amounting to 42,561l. The case was taken to arbitration, and an amount of 34,500l. was awarded as compensation in March, 84, the business having been in hand nearly three years. This case required a great deal more consideration than is usual, in consequence of its dealing with building land, ground-rents, sovereignty, and consequential damage.

The railway company had five surveyors, all of whom gave evidence, and two counsel were employed for the company.

We acted as the claimant's surveyors, and our C. W. Lee was her arbitrator, and gave evidence for the umpire, being supported by Mr. Driver, Mr. Galsworthy, and Mr. Bousfield, who were all called and gave evidence.

The surveyors' charges were as under, viz.:

C. W. Lee (arbitrator) for valuations, reports, plans, and all other services extending over nearly three years, and attending on three days and giving evidence before the umpire, and several disbursements.....	4282
Driver, for valuation and report, and witness in support and giving evidence two days before the umpire.....	201
Galsworthy, ditto, ditto.....	201
Bousfield, ditto, ditto.....	201
Total.....	£886

The bills were taken before Taxing-master Francis taxation, with the following result:—

£. s. d.	
Lee was allowed qualifying fee.....	31 10 0
and two days' attendance.....	6 0 0
Bousfield, ditto.....	31 10 0
and ditto.....	6 0 0
Driver, two days' attendance only.....	37 16 0
(No qualifying fee)	6 0 0
Galsworthy, two days' attendance.....	6 0 0
(No qualifying fee)	6 0 0
Total.....	£88 4 0

There is an utter want of principle shown in the mode of taxation.

Mr. Lee, whose work extended over about three years, is only allowed the same amount as that given Mr. Bousfield, one of the supporting witnesses, and Mr. Driver and Mr. Galsworthy, who were in precisely the same position as Mr. Bousfield, were allowed one-sixth of the amount allotted to that gentleman.

The scale of fees allowed is also entirely inadequate, being less than one-tenth of the amount awarded, Messrs. Driver, Galsworthy, and Bousfield being charged on Ryde's scale, plus 3l. 3s. per m for attendance before the umpire, and Mr. Lee's charge being a moderate one for the amount of work done.

If the bills of claimants' surveyors are to be dealt with in this manner by taxing-masters, it will become necessary for the claimants to add their surveyors' charges to the amount claimed as a separate item of compensation, and these charges will have to be seriously considered by the tribunal sitting in judgment on the case.

LEE BROS. & PAIN.

"NON-ACCEPTANCE OF LOWEST TENDER."

SIR,—Observing some letters on the above subject in your valuable columns, it has struck me to suggest to builders, contractors, and, in fact, to all firms who are constantly giving tenders for doing certain work and for the supply of goods, that they should resolve to refuse to tender when it is stated in the specification "that they [the authority] will not bind themselves to accept the lowest or any tender"; and in order to accomplish this I would suggest the forming of an "Association" or "Defence League," with a large representative committee, to enlist firms willing to be members, and to organise branch leagues, so that every information could be gathered on any such tender in existence, and, if necessary, to bring their grievances before Parliament. With a combined movement of this kind, I am sure it would succeed in stopping such secret practices and favouritism as are known to exist. This is a matter I have often thought about, and I am willing to start an honorary movement of this kind if firms who would be willing to join will communicate with me, and if I find plenty of such support, I will ask you again to assist me by giving publicity to the movement.

WM. ANDREW WILLIAMS.

No. 4, Brighton-terrace, Foberry-road, Brockley.

THE ROYAL ARMS.

SIR,—“M. of M.,” “J. E.,” and other Scotch enthusiasts, are in error on the subject of what they call the national arms of Scotland. What they speak of are the arms of the sovereign,—individual, personal property. If the sovereign of the United Kingdom chooses when in Scotland, from amiable condescension to weak national vanity, to alter the arms as usually borne, he or she can do so: they are dealing with their own; but it is absurd of the Scotch people making claim to such alteration as a right, as though the arms belonged to them. As a matter of common sense, England, being the greater nation, the arms of its sovereign, as derived from Henry II., should take precedence when in combination with those of James VI., as both cannot be first. The arms of Scotland are the St. Andrew's cross; of England, St. George's cross.

P. E. MASEY.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

8,526, Locks for Railway Carriage Doors
W. H. St. Aubin.

The body of the lock-case is cast in one piece, to it is fitted the iron end. The body of the lock has circular bosses at each end working in circular holes, formed partly in the sides and partly in projections from the front. In place of the mainspring generally used, the bolt bears upon one end of a lever and is centred at about the middle of the lock, and the other end of the lever is connected to a spring. The great advantage is the replacing of the spring, which is likely to get out of order, by a device which, answering the same end, is simple and far less likely to get disarranged in working.

145, Fire-grates and Stoves. J. Bate.

The fire-grate is divided by a grating or partition, and the space behind is used for burning cinders or small coal whilst larger coal is consumed in the main portion of the grate. Thus a cheerful fire may easily be maintained. The grating may be replaced with a fire-basket with fine perforations, which answers the same purpose.

408, Spades, Shovels, &c. T. Parkes.

The piece joining the blade to the handle is made wedge-shaped, and is furnished with a double flange on each side. It fits into a wedge-shaped slot on the blade, and the flanges are then riveted to the blade.

164, Sash-fastener. F. Lea.

A curved lever is actuated by a projection over the lever of the ordinary sash-fastener, so as to bring a part of the fastener at right angles across the meeting-rails of the sash, from which position it cannot be moved from without.

2,123, Combination Tool for Gasfitters. G. Plumpton.

This is a modification of the ordinary gas pliers, with the handles widened out so as to receive a solid screwing die as near to the joint as possible. Square lugs on the die fit into corresponding holes in the handles, which again may be utilised upon the removal of the dies for turning an ordinary tap or receiver. If desired, cutting-tools in place of the screwing-tools may be substituted.

4,176, Constructing and Applying Blocks for Building. W. R. Cornell.

This is a method of constructing and applying blocks of concrete, &c., for building and other purposes, and for ventilation. The blocks are applied in forming air spaces or passages in the walls of a building through which foul air may be withdrawn from within the building by the action of the heat from the ordinary fires, and either be discharged into the outer air, or burned in the said fires as may be desired. The walls are built of concrete with a deep depression on one face, and these leave an open passage in the section of the wall which is utilised for the extraction of foul air, &c.

APPLICATIONS FOR LETTERS PATENT.

Feb. 20.—2,312, J. Dutterworth, Hot-water Supply Apparatus.—2,316, R. Wellford and Others, Sanitary and other Pipes.—2,315, J. Bewick, Roofing or other Lath or Wood Cutting Machines.—2,319, T. Normanton, Water-pipes and Flushing Cisterns to prevent bursting by frost.—2,323, G. Oulton, Soldering Irons heated by Gas-jet or Flame.—2,326, J. Smith, Mounting or Attaching Door handles.—2,340, A. Clark, Combined Truck and Ladder.

Feb. 21.—2,360, H. Fletcher, Protracted Set Square.—2,364, P. Hanway, Water-closet Seats or Covers.—2,378, B. Gordon, Flushing Apparatus.

Feb. 23.—2,408, C. Harvey, Ventilating Sashes, Drains, Cesspools, &c.—2,412, J. Tulloch, Sewer-closet Window.—2,424, T. Dykes, Improvements in Grinders.—2,451, M. Bressac, New Industrial Product to be used as Panels and Hangings in Relief.—2,450, G. Messenger and S. Messenger, Ventilators and Chimney Cows.

Feb. 24.—2,488, G. Andrews, Alarm for Street and other Doors.—2,492, F. Humpherson, Water-waste Preventer.—2,507, A. Common, Sealing Doors or Manholes against Escape of Air and Gas.—2,508, A. Common, Water-closet Apparatus or Fittings.

Feb. 25.—2,542, J. Sunderland, Improvements in Hoists.—2,566, J. White, Ventilating Cows.

Feb. 26.—2,617, W. Eglin, Improvements in Seats.—2,626, J. Stevens and C. Major, Spring Hinges for Doors.

PROVISIONAL SPECIFICATIONS ACCEPTED.

16,278, R. Griffin, Back Stop or Bench Knife.—202, A. Bout, Improvements in Stoves.—384, F. Silk, Fastenings for Windows and Casements.—609, E. Tomlinson, Ventilation, &c.—685, S. Von Kosinski, Ventilating, Heating, Drying, and Disinfecting Buildings, &c.—718, J. Hershart, Flat or Piercing Saw Frames.—743, W. Baylis, Construction of Saws.—749, G. Pickett and G. Skinner, Curing Smoky Chimneys.—1,000, J. Tait and Others, Draught and Dust Excluders.—1,102, R. Warwick, Colouring and Permanently Decorating Surfaces of Plastering Work.—1,284, J. Horne, Appliances for Breaking up Solid or Compact Refuse in Sewers and Drains.—1,408, T. Amos, Improvements in Water-closets.—1,589, A. Roberts, Apparatus for Disintegrating Sand and other Materials.—903, T. Palmer, Clamps or Clamping Presses.—1,003, S. Meacock, Indicating the Occupation of Rooms, Closets, &c.—1,173, W. Gillett and H. Moreton, Ventilating Apparatus.—1,601, L. Groth, Improved Water-meter.—1,522, F. Cunliffe, Lavatory Appliance.—1,826, R. Evers, Flushing Cisterns.—1,862, J. Wilesmith, Jun., Securing Door, Cupboard, and other Knobs to their Spindles.—1,926, J. Cooper, Joint for Socket-pipes.—1,923, E. Hollowell and H. Bamforth, Apparatus for Regulating, Controlling, and Diverting the "Draughts" of Fireplaces and Chimneys.—1,957, H. Moorwood and J. Watson, Dog-grates and Fireplaces.—1,983, H. Gresham, Stops or Catchers for Windows, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

6,431, R. Wenner, Improvements in Water-closets.—7,576, H. Thorpe, Electric Bell Indicators.—13,474, H. Lake, Improvements in Bakers' Ovens.—15,450, E. Murray, Room-to-room Communicator.—6,690, F. Hagen, Improved Gully Trap.—6,691, F. Hagen, Improvement in Water-closet Basins.—836, A. Bout, Improvements in Mallets.—837, A. Bout, Manufacture of Tiles and other Articles from Plastic Materials, and in Apparatus for same.

London Sanitary Protection Association.—The report of Council for the year 1884, presented to the general meeting on the 28th of February, states that

"The total number of houses inspected for the first time by the engineers of the London Association during the year 1884 is 424. Of these, two, or '47 per cent., were found to have their drains entirely closed up, and no connexion whatever with the sewer; all the foul matter sent down the sinks and soil-pipes simply soaking into the ground under the basement of the houses. In 75 houses, or about 17½ per cent., the soil-pipes were found to be leaky, allowing sewer-gas, and, in many cases, liquid sewage to escape into the houses. In 56, or 13 per cent., the overflow pipes from the cisterns were led direct into the drains or soil-pipes, allowing sewer-gas to pass up them and contaminate the water in the cisterns, and in many cases to pass freely into the house. In 21, or about 50 per cent., the waste pipes from the baths and sinks were found to be led direct into the drain or soil-pipes, thus allowing the possibility of sewer-gas passing up them, instead of these pipes being led outside the house, and made to discharge over trapped gullies in the open air as they should be."

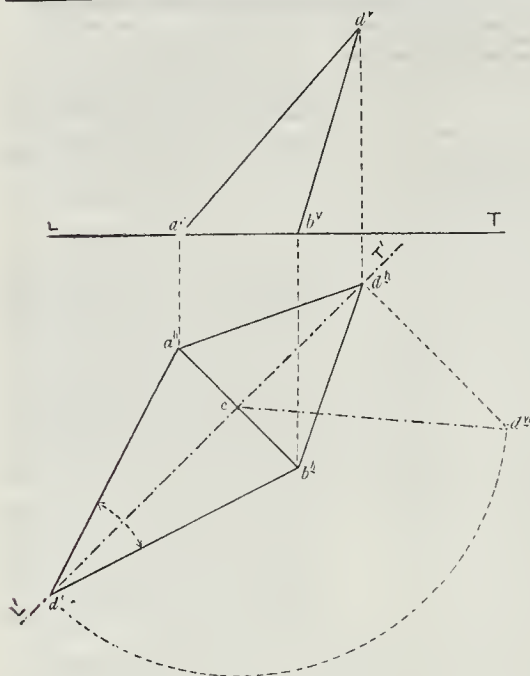


Fig. 25.

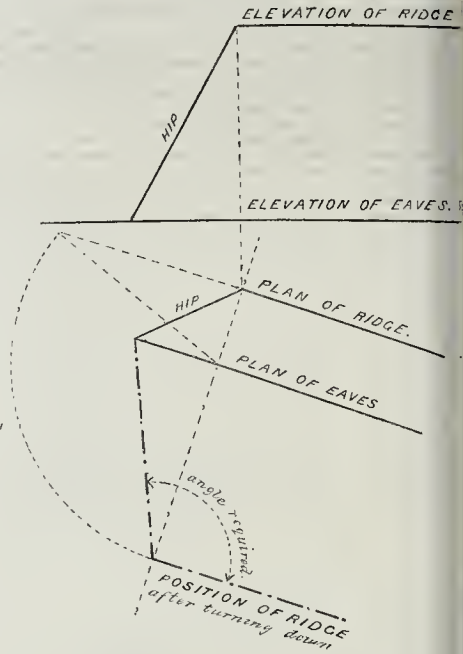


Fig. 26.

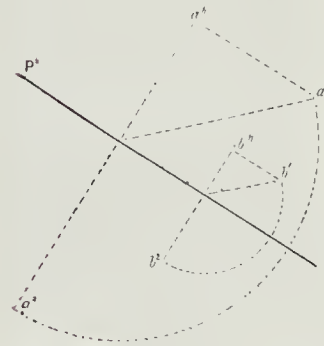


Fig. 28.

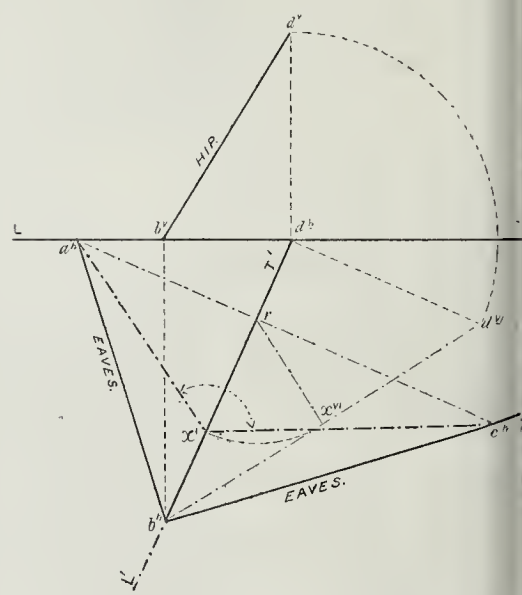


Fig. 27.

The Student's Column.

DESCRIPTIVE GEOMETRY. — V.

WE may wish to know the angle formed by the meeting of two hips or of a hip and a ridge; if we do not, the plumber will, when he makes the apron for that part of the roof. This is found by turning down the surface of the roof round any horizontal line belonging to it such as the eaves.

In our diagram we take as hinge of the rotation the eaves a^h, b^h , the apex d of the roof will move in a plane perpendicular to the eaves; we can consider that plane as an auxiliary elevation and draw thereon d^v and the arc it will describe in rotating round c^h ; the angle of the hips is, therefore, a^h, d^h, b^h . (See fig. 25.)

If it be the angle of the hip and the ridge which is required, the turning down of the roof surface is done as before, only we must remember that the ridge once on the turned-down surface remains parallel to the eaves. (See fig. 26.)

If you order ornamental lead at a great distance from the job, say in Paris where they have selections of highly artistic patterns, either

the architect or the Paris plumber will have to find from the drawings, plan, elevation, and section the exact inner angle formed at the meeting of the two roof surfaces.

In fig. 27 the plan of the eaves is a^h, b^h, c^h , the line $b^h d^h$ is the hip of the roof. If we intersect the roof by a plane perpendicular to the hip, the angle formed by the intersections of that plane with the roof on each side will be the angle required. The horizontal trace a^h, c^h of that auxiliary plane will be perpendicular to the plan of the hip, and if we make an auxiliary elevation on the vertical plane which contains the hip, we shall have the vertical trace a^v, c^v of our auxiliary plane perpendicular to the hip, the point a^v will be the apex of the angle required:

we have only to turn it down round a^h, c^h , hinge of rotation, and a^h, a^v, c^h is the angle formed by the roof surfaces at this hip.

We may have to draw on a roof a given figure; it may be some pattern produced with different coloured tiles, it may be the opening of a skylight. We shall study the most difficult case that in which the eaves are not parallel to the main elevation; this would happen for the side of an octagonal roof, for instance.

The method used consists in turning down the surface of the roof on the plan, the eaves serving as hinge of the rotation. Then you draw on the turned-down surface the figure you wish to represent and rotate back the whole of the surface comprising the figure drawn thereon to

ner position. The two following diagrams make the operation clear.
 The fig. 25 a plane P is given by its horizontal trace P^a and a point a thereon, of which plane a^b is given and its height equal to a^c is known. If we turn down the plane and its trace P^a, a will come to a^d; suppose mark on the turned-down plane a point b^e in you rotate the plane back to its former position, the plan of b will be b^d and its height be b^e b^f.
 In the fig. 29 we merely apply the preceding method of finding one point to the four angles

priced at 1s. 8d. per foot super; the 2-in. sashes and frames, double hung, at 2s. 2d.
 The prices of American pine joinery are given, and will be found useful, for the best of this kind of work is good, and is found to stand well; there is also a list of Swedish joinery.
 The cast-iron columns and girders are priced at a much lower scale than is usually given by price-books, the minimum of 8s. being given for town castings. This is really a low price; we think wrought-iron chimney hars at 30s. per cwt. very high, and the rolled joists are

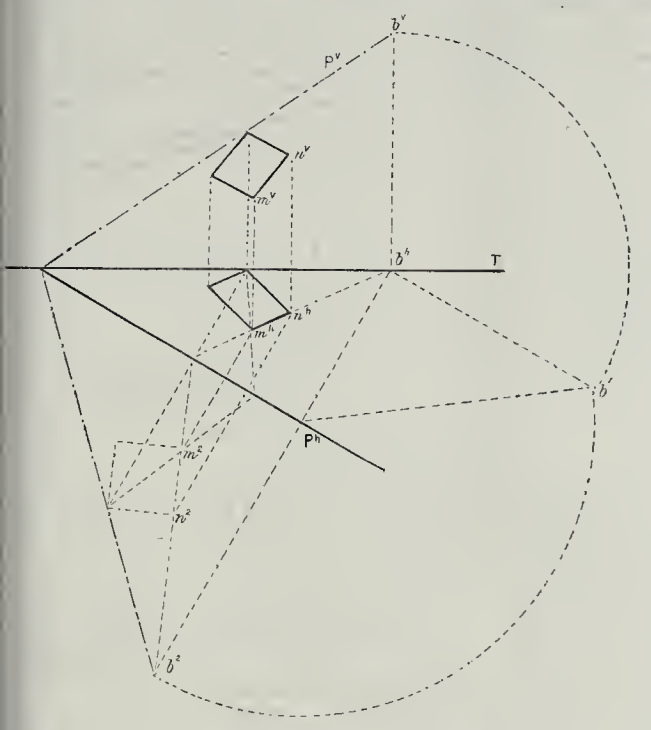


Fig. 29.

square of which m-n is the side. Again, the wrought-iron welded gas or steam pipes are put at the gross prices given by the makers in their lists; we think this is high, even to include labour and profit.
 There is such an enormous number of prices contained in the work that it is impossible to do more than select a few as we have done. They are formed, it seems to us, on one basis, and, as we have already said, they are intended for the very best work and material and a fair profit added, so they must be used with thought, and the nature of the work being priced must be taken into consideration when they are used.
 There is an interesting chapter on sanitary work and drainage that will be found very useful to those who are not well experienced in these matters.
 The regulations and fees for hoards and scaffolds within the City of London form a useful addition, and also some notes as to rules necessary for the use of those desiring to obtain the sanction of the Metropolitan Board of Works to the erection of furnace chimney-shafts; additional law decisions are given, the list of patents granted is added to, and the book altogether is a very useful and complete one, containing, as it does, outside its enormous list of prices, a vast amount of useful memoranda and information for all those concerned in building operations.

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Books.

Builder's Price Book for 1885. Originally compiled by WILLIAM LAXTON. Sixty-third edition. London: Kelly & Co., and Simpkin, Marshall, & Co. 1885.
 HIS old-established work, which addresses itself to the builder and contractor, rather than to the architect, is in bulk every year. We notice many additions to the last edition. The prices are on a very high scale, and are intended for the very best labour and materials. It is useful to see a list of prices that is added for ordinary contract work. For instance, the drain-pipes are priced at the gross on lists. The price of brickwork is now at 13l. 17s. 6d. per rod, inclusive of profit, this is too high for ordinary contract work; 2-in. four-panel square-framed doors are

square of which m-n is the side. Again, the wrought-iron welded gas or steam pipes are put at the gross prices given by the makers in their lists; we think this is high, even to include labour and profit.
 There is such an enormous number of prices contained in the work that it is impossible to do more than select a few as we have done. They are formed, it seems to us, on one basis, and, as we have already said, they are intended for the very best work and material and a fair profit added, so they must be used with thought, and the nature of the work being priced must be taken into consideration when they are used.
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The Sixth Annual Building Trades Exhibition at the Agricultural Hall, Islington, will be opened on Monday, the 16th inst., and will remain open for a fortnight, closing on the 28th.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

FEBRUARY 23.

By MULLEN, BOCKER, & CO.
 Baywater—63, Portobello-road, freehold stabling 4730
 Hyde Park—The lease of 44, Porchester-terrace, 6 years 130

By WAGSTAFF & WARMAN.
 Lea Bridge-road—6 Essex Villas 65 years, ground-rent 12l. 206

FEBRUARY 24.

By BROAD, PATCHARD, & WILTSHIRE.
 Child's Hill, Hendon—"The Castle Hotel," freehold 3,600

By G. & H. WHITE.
 Lambeth—Improved ground-rent of 35l. a year, term 27 years 387
 Nos. 46, 47, and 48, Lower Marsh, term 26½ years, no ground-rent 2,070
 No. 9, William-street, 26½ years, no ground-rent Improved ground-rent of 67l. 17s. 9d. a year, 29 years 310
 Newington—155 and 156, Great Dover-street, 16 years, ground-rent 6l. 16s. 646
 Montague-square—Improved ground-rents of 50l. a year, 22 years 436

By ALFRED RICHARDS.
 Commercial-road, E.—54, Anthony-street, 16 years, ground-rent 2l. 11s. 180

By DEBENHAM, TAWSON, FARMER, & BRIDGEWATER.
 Notting-hill—ground-rent of 105l. a year, reversion in 67 years 3,440
 Ground-rent of 24l. a year, reversion in 60 years... 550
 Ground-rent of 25l. a year, reversion in 67 years... 620
 Islington—22, St. James's-street, 40 years, ground-rent 5l. 370

By A. WALTON.
 Peckham—3 and 4, King's-road, 60 years, ground-rent, 10l. 540

By FLEURBAEY & SON.
 Commercial-road, E.—Nos. 45 and 47, freehold..... 1,950

By REYNOLDS & EASON.
 Hackney—2, 3, and 4, Heolop-place, 9 years, ground-rent 6l. 9s. 145

By G. G. FLINT.
 Commercial-road, E.—2 to 19, Havering-street, freehold 6,096
 Nos. 422 to 434 even, freehold 7,530

FEBRUARY 25.

By DAVID J. CHATELLE.
 Pentonville—37, Claremont-square, 27 years, ground-rent 8l. 8s. 680

By S. HERBICK.
 Lewisham—7, Church-terrace, freehold 180
 No. 33, Thurston-road, 76 years, ground-rent 2l. 10s. 216
 Islington—56, Hemingford-road, 63 years, ground-rent 10l. 390
 No. 71, Rhodes-street, 66 years, ground-rent 6l. 7s. 250
 No. 72, Albion-grove West, 64 years, ground-rent 7l. 300
 No. 48, Albion-grove West, 63 years, ground-rent 7l. 300

By R. TINNEY & SON.
 Kingsland—134, Tottenham-road, 36 years, ground-rent 4l. 266

By E. ROBINSON & HINE.
 Wandsworth Common—"Heath Villa" and "May Villa," freehold 1,216

By PHILLIPS & DYER.
 Holloway—17 and 19, Eden-grove, 11 years, ground-rent 15l. 210
 Islington—33, Cloudeley-square, 16 years, ground-rent 7l. 266
 Camden Town—52, St. Paul's-crescent, 65 years, ground-rent 6l. 360
 No. 20, Cantelowers-road, 65 years, ground-rent 10l. 600

By G. G. FLINT.
 Stepney—436 to 450 even, Commercial-road, freehold 7,355
 No. 27 to 40, Bower-street, freehold 4,750
 No. 1 to 8, Bower-street, freehold 3,130
 No. 452, Commercial-road, freehold 1,980

FEBRUARY 26.

By ERWIN SMITZ & CO.
 Haverstock Hill—5, Queen's-crescent, freehold..... 650

By MESSRS. FLOOD.
 Paddington—20 and 26, Lanthill-road, 79 years, ground-rent 17l. 1,125
 No. 96, Shirland-road, 96 years, ground-rent 10l. 500

By NEWSON & HARDING.
 Canonbury—29 and 22, Marquis-road, 62 years, ground-rent 29s. 1,280
 Dalston—102, Graham-road, 78 years, ground-rent 6l. 440

By C. C. & T. MOORE.
 Leyton, Church-road—"Cheam Lodge," freehold Clapham Common—95, term 14½ years, ground-rent 8l. 2s. 6d. 526
 260

By PROTBOR & MORRIS.
 Shadwell, Sage-street—1 and 2, Settle's Cottages, freehold 750
 Leytonstone, Queen's-road—"Farnley Villa," freehold 616

By E. STIMSON.
 St. Luke's—155, 157, and 159, Old-street, 12½ years, ground-rent 121l. 620
 King's Cross—38, River-street, 57 years, ground-rent 34s. 325
 Loughborough Junction—21, Wingmore-road, 60 years, ground-rent 5l. 290
 No. 93, Poplar Walk-road, 81 years, ground-rent 3l. 10s. 276
 Wandsworth Common—5 and 6, Spring-terrace, 92 years, ground-rent 6l. 10s. 265

By FAREBROTHERS, ELLIS, CLARK, & CO.
 City—12, Harp-lane, freehold area, 670 feet 2,610
 No. 3, Love-lane, freehold area, 2,070 feet 6,800
 Nos. 5, 6, and 8, Botolph-alley, freehold 3,470
 Blackfriars-road—175, 176, and 177, freehold 3,540
 Nos. 10, 12, 14, and 16, Stamford-street, freehold 6,600
 No. 16, Stamford-street, and 25, Bennett-street, freehold 2,560
 No. 6, Bennett-street, freehold 1,230

Blackfriars-road—Freehold timber-yard, in rear of Stamford-street.....	£2,400
Nos. 1 and 2, Bennett-street; 1, 2, and 3, Bennett-court; and 1a to 5a, Bennett-court, freehold.....	1,610
No. 42, Stamford-street, freehold.....	210
Lambeth—88 to 93, even, Lambeth Walk, freehold.....	5,043
Nos. 3 and 5, Mill-street, freehold.....	780
Old Kent-road—23 and 25, Charles Cottages, 54 years, ground-rent 10s.....	315
FEBRUARY 27.	
By BAKER & SONS.	
Hanwell—A plot of land, 4a, 3r. Op., freehold.....	2,000
Battersea—18 and 20, Orbell-street, 92 years, ground-rent 6s.....	50
By A. WATSON.	
Starch Green—1, Bylet-road, 90 years, ground-rent 8s.....	520
By HARRIS, VEEGRAY, & FRANKSON.	
Lewisham, Morley-road—"Albion House," 81 years, ground-rent 2s.....	1,250
"Grassmere," 7½ years, ground-rent 13s. 12s. 6d. Nos. 15 to 19 and 21, Landowne-road, freehold.....	620
Nos. 3 and 4, York Villas, 74 years, ground-rent 7s.....	1,605
	690

MEETINGS.

SATURDAY, MARCH 7.

Association of Public Sanitary Inspectors.—Dr. J. W. Tripe on "Disinfectants and their Sanitary Uses." 6 p.m.

Clerks of Works' Association.—Visit to new buildings in Brook-street, Grosvenor-square. 3 p.m.

Edinburgh Architectural Association.—Visit to Corstorphine Church and neighbourhood.

MONDAY, MARCH 9.

Surveyors' Institution.—Adjourned discussion on "Less-should Enrichment." 8 p.m.

London Institution.—Mr. H. M. Statham on "Architectural Character and Expression." 5 p.m.

Society of Arts (Garden Lectures).—Mr. J. Hungerford Pollen on "Carving and Furniture." I. (Types and Fashions of the Wood-carvers' Art.) 8 p.m.

Inventors' Institute. 8 p.m.

Leeds and Yorkshire Architectural Society.—Paper by Mr. T. G. Jackson, of Oxford.

Edinburgh Architectural Association.—Mr. W. W. Maclean on "The Painter."

Society of Antiquaries of Scotland.—Five communications. 3 p.m.

TUESDAY, MARCH 10.

Anthropological Institute.—Rear-Admiral F. S. Tremlett on "The Sculptured Dolmens of the Morbihan." 8 p.m.

St. Paul's Ecclesiological Society.—Mr. Charles Browne on the "Ecclesiology of the Roman Catacombs." 7.30 p.m.

Institution of Civil Engineers.—Discussion of Mr. Froudeley's paper on "Locomotive Engines." 8 p.m.

WEDNESDAY, MARCH 11.

Architects' Benevolent Society.—Annual Meeting. 5 p.m.

British Museum.—Mr. W. St. C. Boscawen on "Assyrian and Babylonian Antiquities, III.—(The Palace, its Architecture and Ornament.) 2.30 p.m.

Carpenters' Hall, London Wall (Free Lectures to Artisans).—Professor A. B. W. Kennedy on "A Piece of Steel." 8 p.m.

Civil and Mechanical Engineers' Society.—Mr. C. S. Herthon on "Steel Guns." 7.30 p.m.

Manchester Society of Architects.—General Meeting. 3 p.m.

THURSDAY, MARCH 12.

Society for the Encouragement of the Fine Arts.—Mr. C. M. Campbell, M.D., on "Physiology in Art." 8 p.m.

Society of Arts (Applied Chemistry and Physics Section).—Mr. W. K. Burton on "Recent Improvements in Photographic Development." 8 p.m.

Society of Telegraph-Engineers and Electricians.—(1) Sir David Salomon on "Constant Electro-Motive Force in an Electric Light Circuit." (2) Mr. Andrew Jamieson on "Electrical Definitions, Nomenclature, and Notation." 8 p.m.

Parke Museum of Hygiene.—Mr. A. Wynter Blyth, M.R.C.S., on "Household Poisons." 8 p.m.

Society of Antiquaries.—8 p.m.

FRIDAY, MARCH 13.

Institution of Civil Engineers (Students' Meeting).—Mr. William Kidid on "The Blasting and Removal of Rock under Water." 7.30 p.m.

University College.—Professor C. T. Newton, C.B., on "Greek Inscriptions." V. 4 p.m.

British Museum.—Prof. J. F. Hodgkiss on "Medieval English Remains." IV. (Armour.) 2 p.m.

Royal Institution.—Sir Frederick A. Abel on "Accidental Explosions caused by Non-explosive Liquids." 9 p.m.

SATURDAY, MARCH 14.

Architectural Association.—Visit to the Hampstead Hospital and Messrs. Reed's Bottling Stores, Gospel Oak. Assemble at Hospital at 3 p.m.

Miscellaneous.

Presentation to Mr. E. R. Robson.—An interesting ceremony took place at the London School Board offices on Saturday last, in the presentation by the members of his staff of a token and address to Mr. Edward Robert Robson, late Architect and Surveyor to the Board, on the occasion of his retirement from that position. Mr. Lewis Wall was unanimously voted to the chair, and was ably supported by Mr. T. J. Bailey, the Architect, Mr. Andrew Young, the Surveyor, and other heads of the Department. The token consisted of a silver casket in the form of a Greek temple, supported by twelve pillars, the address, in the shape of a book, being placed in the top. It is of sterling silver, weighs 85 ounces, and was manufactured by Messrs. J. G. & E. Meyer, of Northampton-square, Clerkenwell.

Scottish Memorial to Archbishop Tait.—The Scottish Auxiliary Committee charged with the erection of the memorial to the late Archbishop Tait have concluded their labours, and the ceremony of handing over the monument to the custody of the Edinburgh University authorities took place on Friday, the 27th ult. The memorial consists of a colossal bust placed in a mural monument, 16 ft. high, which is built into the eastern facade of the Medical School Buildings,—this site having been chosen as that of the house formerly existing in Park-place in which the late Archbishop was born. The monument is designed in the Italian Renaissance of the "Cinque Cento" period, in harmony with the University Buildings, and consists of a pedestal about 5 ft. high, divided into three compartments, in the central one of which is the inscription. On the pedestal rest two columns of polished grey granite, with moulded bases and sculptured capitals in bronze. These support a full entablature, with sculptured panels in the frieze, displaying in the centre the mitre, crozier, and pastoral staff, and in the sides the Christian monogram, I.H.S., and the crest and motto of the Archbishop's family. The entablature is surmounted by a segmental pediment, in the tympanum of which is a bronze panel, in the relief, displaying two cherubs supporting an Italian shield bearing the arms of the See of Canterbury impaled with those of the Tait family. The bust, which stands upon a moulded plinth over the pedestal, and is set within a semicircular panelled niche, between the columns already described, has been executed in bronze by Signor M. Ragzi, London. The monument has been designed and executed under the direction of Dr. R. Rowand Anderson, architect, Edinburgh.

"The Buckingham Theatre."—A Committee of the Metropolitan Board of Works has had under consideration the question of the safety of the building known as the Buckingham Theatre, No. 153, Buckingham Palace-road. The "theatre" is about 107 ft. long, by an average width of 21 ft., and occupies the upper floor of a building, the ground-floor of which is used as a stable. The floor of the "theatre" is of wood, and the joists are not cailed. The approach is in Buckingham Palace-road, by two doorways, each 3 ft. wide, leading to an entrance vestibule, out of which is a staircase, 4 ft. 5 in. wide. The treads and risers of the staircase are of slate, 1½ in. thick, and the staircase is enclosed by wooden partitions. The total superficial area of the theatre is about 2,240 square feet. There are no fixed seats, but there is probably room for an audience of about 300 persons. The place was licensed for music in October last by the Justices of Middlesex, but it has not received the Lord Chamberlain's licence for the performance of stage plays. The Committee, after an examination of the drawings made by the Superintending Architect of the Board, and a full consideration of the circumstances of the case, reported that the building is totally unsuitable for use as a place of public entertainment, and it was resolved that the Justices of Middlesex and the Lord Chamberlain be informed accordingly.

The Sunday Opening of Museums, &c.—The Duke of Westminster and the Committee of the Sunday Society have issued invitations to a National Conference with authorities and officers of museums, art galleries, and libraries which have been open in the United Kingdom on Sundays. The Conference has been called specially for the purpose of directing the attention of Parliament to the results which have attended the Sunday opening of museums, art galleries, and libraries in the United Kingdom, and it is expected that representatives will be present from each of these institutions. The Conference will be held in St. James's Hall, on Wednesday, March 25th.

Building Progress in Sydney.—According to the Immigration Agent for New South Wales, there is little or no cessation of building operations in the Australian metropolises, where, during the past year, 521 buildings, including large warehouses, were completed, besides additions to 198 old premises,—numbers about equal to those of 1883. But the list for 1884 includes a larger number of extensive warehouses. "Any visitor must be struck by the large number of fine new structures, as well as by the number in course of erection. The work of construction has been considerably promoted by capital sent from England for investment."

Brighton Recreation and Health Society.

We have received the second annual report of this useful society, though its usefulness is apparently hampered by want of adequate support. One of the questions which has engaged the attention of the society has been the proposal to establish a public abattoir in the town. The society having collected a good deal of evidence bearing upon the subject, this was embodied in a circular, and copies were sent to every member of the Town Council. The circular was followed by a special appeal to that body, to take up the matter, and, as a result of this, the Sub-Committee has been appointed by the Council to report upon the whole question. The evidence obtained on the various points shows that, where established, the public abattoirs are a great gain to the locality, on the grounds of health, humanity, and public utility. Further attention has been given to the condition of some of the poorer districts of Brighton, and the society has again been represented in connexion with the sanitary cases before the Borough Magistrates. The increased power given to the Corporation officials by some of the sanitary clauses of the Brighton Improvement Bill will, the report says, lessen the need for the work of the society in connexion with the insanitary condition of the courts and slums.

Female School of Art.—The Duchess of Westminster presided at the annual distribution of prizes to students of the Female School of Art, Queen-square, Bloomsbury, on Monday last, the ceremony being held in the Prince's Hall, Piccadilly. The report showed that during the past year 208 students received instruction in various branches of art. Fourteen national awards were gained. Towards the fund for the extension of the school house the sum of 1,480 had already been received, and the adjoining house was now the property of the school. Some structural repairs and alterations had still to be made, and it was proposed to erect a building for class-rooms in the rear of the school. To enable them to meet these additional expenses, amounting to about 4,000, and to pay off the balance of the debt incurred for the purchase of the house (1,500), the committee appealed to the public for liberal subscriptions. Sir Philip Caultley-Owen moved.

"This is the opinion of this meeting it is of the highest importance that early possession of the new premises should be obtained, and for this purpose it is essential that the debt incurred to complete the purchase should be paid, and a further sum of 24,000 raised. In order to effect these worthy objects, the proposal to hold a grand bazaar is approved, and increased donations are solicited."

This was seconded by Mr. George Godwin, and passed unanimously, as also were the succeeding resolutions.

The Vital Statistics of the Peabody Buildings.—The vital statistics of the resident population of the Peabody Buildings afford trustworthy evidence of satisfactory sanitary condition. The birth-rate was equal to 44 per 1,000, and exceeded by 10·9 the rate for the whole of London. This high birth-rate indicates an age constitution of the population which should give a low death-rate. The recorded death-rate, after correction for the deaths of residents recorded in hospital, was 19·1, and was 1·2 below the general London rate. Infant mortality, measured by the proportion of infants under one year to births, was 138·7 per 1,000, and 13·7 below the mean rate in London. These figures are somewhat more favourable than those recorded in recent years. It is necessary, however, to point out that mortality statistics of improved or model dwellings are of somewhat doubtful value for comparative purposes. The inhabitants of such dwellings consist for the most part of a "selected" population, selected indirectly as being healthy, steady, thrifty, and respectable.

Incandescent Electric Lamps.—Messrs. Woodhouse & Rawson have just introduced what appears to be a marked improvement in incandescent lamps. One great trouble hitherto with such lamps has been with the platinum loops, which, being more or less fragile, have been very liable to be strained or broken when the lamps are being attached to or detached from the holder. The improvement to which we are referring consists in the provision of a "vitrite" holder, by the use of which there is no strain at all on the platinum connection. "Vitrite" is described as a vitreous material perfectly hard and incapable of fusion, except at very high temperatures. The new vitrite holder is adaptable to existing installations.

"Jamaica Coffee-House."—This celebrated coffee-house, in St. Michael's-alley, Cornhill, demolished. It was for many years headquarters of those who represented the big interest. The old lockers still remain, and were used by the City magnates of a past age. A new building is about to be erected on the site, from the designs of Mr. Banister Fletcher, the accepted contract being 7,173*l*. Record of the past will be kept by painted scenes, representing scenes which have taken place within the walls of the building, and the old City merchants.

Carving and Furniture.—Subject of the next course of Cantor Lectures at the Society of Arts will be "Carving and Furniture," by Mr. J. Hungerford Pollen. The course will consist of four lectures, to be held on March 9, 16, 23, and 30. Lecture I. will deal with the types and fashions of the carvers' art. Lecture II. will be devoted to the Renaissance; while the subject of Lecture III. and IV. will be the Age of Louis XIV., and that of their successors.

Hydraulic Door-Spring.—Messrs. Add Smith & Stevens, of Leicester-square, held at the Royal Institution Conversazione, on Friday evening, February 27, by request, a new hydraulic door spring, which attracted considerable amount of attention.

Mayorship, Hendon Local Board.—We had there were upwards of a hundred applicants for this appointment. The applicants were referred to a committee to report to the Board. We have not yet been advised of the result.

Hydrographic Surveying.—At the last meeting of the Institution of Civil Engineers of Ireland, Dublin, the paper read was by Mr. James Dillon, member and past vice-president, "On the patent hydrographic surveying and sounding apparatus used for the preparation of plans, sections, soundings, and charts of sea, canal, lake, estuary, and river beds; also for determining the rate of silting-up of same when necessary; and for the use of the mariner when navigating shallow waters."

Hydraulic Lifts.—The directors of the Employers' Liability Assurance Corporation, 84, King William-street, E.C., have instructed Messrs. R. Waygood & Co. to fix for them a direct-acting lift worked from the London Hydraulic Power Company's mains.

The Electric Railway at the Alexandra Palace.—The work of making the electric railway from Wood Green Station to the Alexandra Palace, which will be completed before the 30th of March inst., has been commenced, the contractors being Messrs. Wilkinson Bros., of Finsbury Park.

The New Buildings at St. Pancras Workhouse.—On the invitation of the St. Pancras Guardians, the Lord Mayor has consented to open the new buildings on the 13th inst. Mr. H. H. Bridgman is the architect of the buildings.

The Burns Memorial.—The bust of Robert Burns, which has already been placed in Westminster Abbey, will be formally unveiled on Saturday afternoon at four o'clock, when the Dean will be present.

Tenders for the erection of an infirmary at East Dulwich-grove, Champion Hill, S.E., for the Guardians of St. Saviour's Union, Messrs. Henry Jarvis & Son, architects, 23, Trinity-square, Southwark, S.E. Quantities supplied by Messrs. Franklin & Andrews:—

W. Down, Walworth	286,874 0 0
J. Longley, Crawley	86,963 0 0
B. Nightingale, Albert Embankment	86,429 0 0
Colls & Sons, Chamberwell	86,164 0 0
G. Shaw, Westminster	83,880 0 0
W. J. Adcock, Dover	83,169 0 0
Hall, Messrs., Clement's Inn	81,000 0 0
Brass & Son, St. Luke's	80,777 0 0
Peto, Bros., Fimlico	79,967 0 0
W. Shepherd, Hermandsey	79,834 0 0
J. T. Chappell, Fimlico	75,223 0 0
Wells, Aldershot	75,000 0 0
Smith & Son, South Norwood	78,966 0 0
Lawrence & Sons, City-road	78,964 0 0
Mowlem & Hart, Millbank	78,850 0 0
Howell & Son, Lambeth	78,660 0 0
Rider & Son, Union-street	78,000 0 0
J. & J. Greenwood, Arthur-street	77,850 0 0
W. & F. Croaker, Southwark	76,970 0 0
M. Gentry, Stratford	76,750 0 0
Kirk & Randall, Woolwich	74,571 0 0
G. Wall, Chelsea	73,585 0 0

[Architects' estimate, £80,000.]
* Accepted.

For roads, sewers, manholes, and ventilators at Ipswich, upon the Wharfedale-road Estate of the National Liberal Land Company Limited, Mr. George Looley, surveyor, 26, Charing Cross, S.W.:

A. C. Trow, Ipswich	2,937 15 0
W. Nicholls, Wood Green	8 0 0
J. C. Truman, Hackney	8 0 0
J. B. & F. Bennett, Ipswich	825 0 0
T. Adams, Moorgate-street	8 9 0
W. Carter, Ankerly	798 0 0
S. Clapham, Rotherhithe (accepted)	715 0 0

For curb and channels for new roads on the Kant and Essex Land Company's West Gravesend Estate. Mr. George R. Cobham, surveyor, Gravesend:

A. C. Rayner, Gravesend (Cornish granite)	£511 17 6
W. H. Archer, Gravesend (Cornish granite)	500 12 6
W. C. Middleton, Gravesend (Cornish granite)	495 0 0
Adams, London (Newry granite)	438 15 0
Wheeler & Hindle, London (Norwegian granite)	438 15 0
W. & J. R. Freeman, London (Cornish granite)	427 10 0
Curzon, London (patent silicate)	371 5 0
W. C. Middleton, Gravesend (Cornish granite and rag)	337 10 0
W. H. Bonsted & Son, Maidstone (Kentish rag)	337 10 0

Accepted for curb only.

For the erection of a house in Mersea-road, Colchester. Mr. G. H. Page, architect, Colchester:

Harden	£250 0 0
Melster	248 0 0
Gladwell	188 0 0
Sansom	190 0 0
Ambrose	185 0 0
Hitt (accepted)	177 0 0

For the erection of Infectious Diseases Hospital at Wellingborough for the Local Board of Health. Quantities by the architect, Mr. E. Sharman:

G. Henson	£2,884 17 0
E. Brown	2,733 13 0
Harrison & Hockley	2,733 0 0
K. Marriott	2,883 0 0
J. Underwood	2,649 0 0

For heating apparatus at the New Wandsworth Workhouse. Mr. Thomas W. Aldwinckle, architect, 2, East India-avenue, E.C.:

Benham & Sons	£785 0 0
Bacon	763 0 0
Grundy	689 0 0
Thames Bank Iron Company	616 0 0
Berry	595 0 0

For the erection of proposed Baptist Chapel, Fernao Park-road, N. Mr. J. Wallace Chapman, architect:—

In Terra Coita	In Bulb Stone
Nightingale	£2,189 0 0
Lewis	5,030 0 0
Dove Bros.	4,715 0 0
Palkner	4,597 0 0
Tarrant & Son	4,567 0 0
Nye	4,523 0 0
Staines & Son	4,464 0 0
Wm. Oldrey	4,408 0 0
Taylor & Grist	4,374 0 0

For alterations and repairs to the Robin Hood Tavern, Holborn, W.C., for Messrs. Deakin & Crimman. Mr. Arthur W. Saville, architect, 99, Strand, W.C. Quantities supplied:—

D. Rice	£763 0 0
Bright & Co.	650 0 0
J. Beale	650 0 0
Spencer & Co.	625 0 0
Royal	580 0 0
Freshwater	578 0 0
Beardsfield & Son	569 0 0
B. Cook (accepted)	535 0 0

For the erection of houses at Surbiton for Mr. Arthur Shepherd. Messrs. Alexander & Gibson, architects, 9, Great St. James-street, Bedford-row:

F. & J. Adkins, Surbiton	£2,065 0 0
Bishop, Putney	1,669 0 0
Turtle & Appleton, Wandsworth	1,625 0 0
Sass & Son	1,540 0 0
Gregory & Bence, Hampstead	1,595 0 0
Judd, Kingston (accepted)	1,663 0 0
F. Smith, Wandsworth	1,320 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Architectural design of the Young Memorial, Wisbech	Rev. D. D. Jones The Committee	Not stated do.	March 13th March 18th	ii. ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Paving	Whitechapel B. of Wks Hendon Local Board	Official do.	March 9th do.	ii. xxi.
Excavating, Kerbing, Flints, Slag, &c.	Wilkesden Local Board	O. Claude Hobson	March 10th	ii.
Curbing Works	do.	do.	do.	ii.
Drainage	do.	do.	do.	ii.
Building School	Thames Ditton Sch. Bd.	R. J. Lovell	do.	xxii.
Works	West Ham Local Bnd.	Lewis Angell	do.	ii.
Enlarging Town-hall	do.	do.	do.	ii.
and Art Museum and National	Com. of Public Works in Ireland	Official	March 12th	ii.
Drinking, &c., for Water Supply	Fulham Board of Wks.	George Crow	March 14th	ii.
of Pumping Engine-House	Elbow Vale Steel, &c., Co.	Official	do.	ii.
Works	Clevedon Local Board	do.	do.	xxii.
of New Station, &c., Brockley Rise	Sowerby Bridge Ld. Bd.	do.	do.	xxi.
Works	J. B. and S. C. Ry. Co. Vestry of St. George	do.	March 16th	xxi.
Materials	Kingston Southwark Highway Bd.	T. H. B. Heslop	March 17th	xxi.
Paving, &c.	Cor. of St. Helen's	G. J. C. Broom	March 18th	ii.
Gasworks	Fulham Board of Wks.	Official	do.	xxi.
Office, Folkestone	Com. of H. M. Works	Official	do.	ii.
Works	Fulham Union	do.	March 19th	ii.
of Dust, &c., and General Cartage Wks.	Finchley Local Board	G. W. Bremell	March 23rd	xxii.
of Two Salom's Ovens	Managers Met. Asylum Guildford U. S. A.	A. & E. Harston	do.	xxi.
Building Reservoir	Edwin Wood & Son	W. Sugdon	March 24th	xxii.
of Farm Buildings, &c.	West Ham Local Board	Lewis Angell	do.	ii.
of Sewers	The Committee	Waller, Son, & Wood	March 25th	ii.
of Part-Rebuilding St. Mark's	Tonbridge Union	H. H. & E. Cronk	March 27th	ii.
Ch. Bevil	Maryport Harbour	Trustees	March 31th	xxii.
of Pauper Lunatic Asylum	The Committee	H. U. McKie	do.	xxii.
Works	West Riding Pauper Lunatic Asyl. Menston	J. Vickers Edwards	April	xxi.
and Additions to Corset Factory	Handsworth Local Bnd.	E. Keaworthy	April 17th	ii.
at Harborough	R. & W. H. Symington & Co.	do.	Not stated	xxii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Inspector and Surveyor	Merthyr Tydfil Ld. Bd.	35 <i>l</i> .	March 18th	xviii.
Master	West London Sch. of Art	12 <i>l</i> .	Not stated	xviii.

TENDERS.

For the erection of fire houses in Tibble's-alley, Beckham, for Mr. Henry Combe. Mr. A. T. Waterfield, architect; Mr. C. I. Cadney, surveyor:—

Reading	£2,500 0 0
Edme & Son	2,480 0 0
Trickett	2,421 0 0
Steel Bros.	2,412 0 0
Wm. Oldrey	2,355 0 0
W. Johnson	2,072 0 0

Building down and re-building No. 97, Mortimer-avenue, W. Mr. W. J. Miller, architect:—

Edme & Son	£2,075 0 0
Trickett	2,051 0 0
Wm. Oldrey	1,950 0 0
Edme & Son	1,943 0 0

For new house, Artillery Field Estate, Woodbridge-road, Guildford, for Mr. James Edie, Messrs. Peak, Lunn, & Peak, architects, Guildford:—

Martin, Wells, & Co., Aldershot	£771 15 0
Garnett, Guildford	673 0 0
Downes & Hill, Guildford	633 0 0
Stradwick, Guildford	628 0 0
T. E. Downes, Guildford	600 0 0
Buttrill, Reading	608 0 0
G. & R. Smith, Guildford	593 0 0
Lunn, Guildford	581 0 0
Ellis, Guildford (accepted)	525 0 0
Charrington & Peto, Guildford (with drawn)	445 0 0

For re-building the Lion and Crown public-house, North-street, Guildford, for Mr. William Smith Bramley, Messrs. Peak, Lunn, & Peak, architects, Quantities supplied:—

Garnett, Guildford	£1,250 0 0
Pink, Milford	1,200 0 0
Kingdale, Oxford	1,180 0 0
Martin, Wells, & Co., Aldershot	1,170 0 0
Bottrill, Reading	1,130 0 0
Nye, Guildford	1,089 0 0
Stradwick, Guildford	1,087 0 0
Mitchell Bros., Shafted (accepted)	1,025 0 0

For alterations and additions to the Watford Water Works, for the Watford Local Board of Health. Mr. E. Easton, engineer:—

Judge & Eames	£715 10 0
J. W. Turner	592 0 0
Andrew & Son	515 0 0
G. & J. Waterman	500 0 0
Halse & Brooks	497 14 6
Noble, Horse Shoe Wharf, Upper Thames-street (accepted)	463 0 0

For constructing roads and sewers on the Waterloo Estate, High-road, Kilburn. Messrs. Ventom, Bull, & Cooper, surveyors, 85, Old Jewry, E.C. 1:—

S. Barnett	£3,591 0 0
Kearly	2,779 0 0
Nowell & Robson	2,723 0 0
Rogers & Dickens	2,687 0 0
Moston	2,654 0 0
Beadle Bros.	2,500 0 0
Rebble	2,450 0 0
Plazey	2,446 0 0
Adams	2,427 0 0
Bath & Blackmore	2,300 0 0
C. Killingback	2,250 0 0
Nichols	2,241 0 0
W. Neave & Son	2,224 0 0
G. Felton, Kilburn (accepted)	2,097 0 0

For extension of concrete sea-wall and promenade (802 yards), Bray, co. Wicklow. Engineer, Mr. P. F. Comber, C.E., 37, College Green, Dublin. Quantities taken by the engineer:—

John Best, Leth	£20,589 0 0
Brand & Son, Glasgow	17,733 0 0
W. C. Gault, Ballymena	17,337 0 0
W. J. Deherly, Dublin	16,335 0 0
Robert McAlpine, Glasgow	12,159 0 0
Robt Simpson, Dublin	12,015 0 0
B. Brady, Bray	9,721 0 0

The tender of Mr. McAlpine (who is the contractor for the first section of the work now in progress) was accepted.]

For general repairs to the Cock and Magpie public-house, King street, Hammersmith, for Messrs. Fuller, Smith, & Turner, Chiswick, Mr. George More, surveyor:—

Lamble	£164 0 0
Nye	162 0 0
S. Hunt	157 0 0
Page	154 15 6

For building new house, High-street, Acton, W., for the West Middlesex Permanent Building Society. Mr. Edward Monson, jnr., architect:—

Julian & Co.	£1,196 0 0
S. Hunt	1,139 0 0
Fenny & Co.	1,095 0 0
Nye	1,049 0 0
Wilkinson Bros.	1,027 0 0
Mason	1,024 0 0
Hooper	987 8 9
Beach	947 0 0
Leyford	947 0 0
Roles	903 0 0

For the erection of two shops and houses, Brixton-ris, for Mr. H. D. Mellish, Mr. R. C. Gieed, architect. Quantities by Léon A. Francis:—

Amuel & Amos	£3,440 0 0
G. M. Green	3,364 0 0
Cooper	3,306 0 0
Smart	3,303 0 0
Beal	3,293 0 0
Green	3,259 0 0
Acke Bros.	3,253 0 0
Moyle & Son	3,250 0 0
Smith	3,187 0 0
Parker	3,138 0 0
Bangs—(Too late)	

For making and fixing sundry joiners' work and fittings at the New Schools, Lower New-road, for the Guardians of the Poor of Lambeth Parish:—

Atkinson	£258 0 0
Gainsford	229 0 0
Miller	197 0 0
Wood, Harris, & Co., Rural Works, Clapham-road	193 0 0
J. Wood	189 0 0
A. Daniels	188 0 0
J. Higgs	188 0 0
Burch (accepted)	167 0 0
Deacon	160 0 0

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"Mitre Cut" (we never set on information on important matters of that kind without name and address of writer)—B. & Sons.—E. E. W. & B. (Bank)—W. & R.—J. W.—E. F. H.—A. & Co. (no responsible use to the—L. Paris—Smith (no name or address given)—G. & A.—W. G. S.—G. A. H. (the comparison can hardly be made; the same work could not be carried in both materials. The cost of frame as material would be the lowest; the cost of working would be the highest, but really a goodly profit is hardly possible in granite)—J. A. C.—J. A.—P. (last week)—under G. H. (weekly)—C. J. T. (if you will send the MS. we will look at it).

All statements of facts (letters, notices, &c.), must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving public notices, &c., of our own volition.

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We cannot undertake to return rejected communications. Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

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The Builder.

Vol. XLVIII. No. 2197.

SATURDAY, MARCH 14, 1883.

ILLUSTRATIONS.

Proposed House at Wargrave-on-Thames.—Mr. W. H. Atkin Berry, Architect.....	376
Sketches of Old Houses at Boppard and Cochen, by Mr. W. J. N. Millard.....	377
Westminster Abbey.—Illustrations in connection with Mr. Waterhouse's Lecture at the Royal Academy:—	
Details of South Transept, measured and drawn by Mr. J. Atwood Slater.....	380
Inner Vestibule of Chapter-house, measured and drawn by Mr. E. C. Shearman.....	381
Section and Details of Two Eastern Bays, North Walk of Cloisters, measured and drawn by Mr. T. McLaren.....	384-385
Details of Tomb of Henry VII., measured and drawn by Mr. H. O. Creswell.....	388
Ashburnham House, Westminster: Plans, Sections, and Details of House and Staircase, measured and drawn by Mr. H. Sirr.....	389, 392, 393

CONTENTS.

Sewage Treatment by Intermittent Filtration.....	365	The Tomb of Henry VII.....	395	The Stone used at Westminster Abbey.....	398
Building Stones.....	366	Ashburnham House.....	395	The Royal Arms.....	398
Notes.....	366	On Staircases.....	395	"Non-acceptance of Lowest Tender".....	398
The Shering of Buildings (with Plans).....	367	Architects' Benevolent Society: Annual Meeting.....	397	Taxation of Surveyors' Charges in Compensation Cases.....	398
On Greek Architecture (with Diagrams).....	371	The Late Mr. M. E. Hadfield.....	397	Local Borough Surveyor.....	398
Westminster Abbey.....	373	Architectural Societies.....	398	The Student's Column: Descriptive Geometry.—VI.....	399
Abingdon Corn Exchange and Cattle Market Competition.....	374	A Party-Wall Question.....	398	Recent Sales of Property.....	399
Design for a House at Wargrave-on-Thames.....	395	Liability for Paving and Drainage Apportionments: Hull and Another, v. Edwards.....	398	Meetings.....	400
Old Houses, Boppard and Cochen.....	395			Miscellaneous.....	400

Sewage Treatment by Intermittent Filtration.



R. DENTON has taken advantage of an opportune moment for publishing a second edition of his work on "Intermittent Filtration,"* for the appearance of the Royal Commissioners' Report on Metropolitan Sewage Discharge has been the signal for re-opening the discussion on that much-debated subject, on which, if on anything, it may be truly affirmed *quot homines tot sententia*. Not that too much consideration can be given to so important a matter, on the effective treatment of which, as in the case of our own metropolis, the health of millions of human beings may depend; but very many of those who have joined in the debates on this question have apparently been unable to apprehend the distinction between a scheme of sewerage and the processes for the disposal of the sewage; hence acrimonious contentions as to the actual merits and expenses attending sewerage schemes in different localities, notably the Lower Thames Valley scheme, have been carried on under a confusion of ideas. Sewerage schemes must necessarily be governed by various existing physical conditions; sewage disposal is possible, and can be effected independently of those conditions. The former is an engineering question, confined to the best method of conveying and delivering the sewage at the lowest possible cost. The latter is complicated with the additional difficulty of satisfying social and sanitary requirements in which efficiency can only be secured at a seemingly disproportionate cost. It is comparatively easy to carry away from the metropolis its vast volume of sewage, but the difficulty commences when it is once clear of its boundaries, in determining how and where it is to be disposed of. From the recorded opinion of the Royal Commissioners, Mr. Denton's plan meets with their favourable appreciation, primarily on the ground that it makes filtration through porous ground the *principal*, instead of an incidental, process of sewage treatment; and after enumerating the objections which have been urged against his system, and the replies furnished by Mr. Denton, they express their own views in the following words:—

1. That the process has great scientific merit, and offers valuable practical advantages

for the disposal of sewage in situations where broad irrigation is impracticable, and where land suitable for filtration can be obtained.

2. That, however, it appears desirable where the area of land is considerably reduced, the sewage should be previously treated by some efficient process for removing the sludge.

3. That an arrangement of this kind would be applicable to the metropolis.

Intermittent filtration is explained by Mr. Denton to be "not crowding sewage continuously on porous land in the careless manner often adopted to get rid of sewage, but its concentration at regulated intervals on as few acres of land as will absorb and cleanse it without preventing the production of vegetation. It is by this means that the assimilative powers of growing plants are brought to bear on the fertilising elements of the sewage at the same time that the percolation of the sewage through the soil brings it in contact with the atmospheric air pervading the soil, and renders it harmless by oxidation."

In this it is distinguished from what is termed broad or surface irrigation, which consists rather in the distribution of sewage over as many acres as it will wet without supersaturation, having in view a maximum plant growth.

Three objections to the process of intermittent filtration were urged by the Rivers Pollution Commissioners, who, in consequence, hesitated to recommend its adoption. They were:—

1. That soils became after a time so loaded with sewage that their powers of absorption and percolation cease.

2. That the concentration of sewage for filtration on a small area is attended with greater nuisance than other modes of treatment.

3. That the cost of preparing the land is so great as to preclude its adoption.

Those objections have been replied to satisfactorily by Mr. Denton, who shows how, in practice, at Merthyr Tydfil and other places, the operations had been modified by the lessons learned in land under-drainage. Originally, Dr. Frankland, by whom the idea of intermittent filtration was first conceived, was of opinion that one acre of suitable soil, drained 6 ft. deep, would suffice to cleanse the sewage of 3,300 persons; but Mr. Denton subsequently reduced this proportion to 1,100 persons, and less, per acre, and instead of covering the whole surface of the land so utilised with sewage, he distributed it by furrows, so that the sewage might reach the roots of the plants growing on the ridges laterally through the soil, without touching their edible parts. He further pointed out that the area of land

necessarily differs with the various descriptions of soil, the extent of surface required depending on the capability of the upper soil to absorb, and of the subsoil to infiltrate the liquid, as well as on the depth to which the land may be thoroughly drained in order to provide the necessary bulk of filtering material. Mr. Denton claims for his process the advantages of:—

1. That when adopted separately it will, by minimising the quantity of land required, ensure the purification of sewage at the least cost to the ratepayer; and

2. When systematically adopted in combination with surface irrigation, it may be made the means of removing the greatest drawbacks experienced by the sewage farmer, and thus afford a tangible benefit to agriculture.

In illustration of his claim, Mr. Denton details the operation carried out by his firm in a dozen cases, varying in size and character, and with populations ranging from 50,000 to 3,000. It is not possible in the limits of a short article to enter into the particulars of the various instances cited, but the accounts given of the expenditure and revenue connected therewith fully bear out his contention that his system effects the object sought at the least cost to the ratepayers.

In Merthyr Tydfil the return obtained from 336 acres over and above the expenditure was 452l. 9s. 7d.

In Abingdon the whole of the farm was let for 4l. 10s. per acre.

In Forfar, after charging 4 per cent. on 4,000l., the purchase-money of the land, as well as on 1,500l., the expense of the engineering works, there was a net profit of 1l. 13s. 8d. per acre.

In Great Malvern the district accounts for last year show that there was a balance in favour of the farm of 162l. 15s. 1d., which was carried to the credit of the district rate.

On the other hand, at Watford, in Hertfordshire, there has not been the same financial success, owing, it is stated, not to any fault in the system, but to the careless mode in which it was carried out, checking the aeration due to the under-drains, and to the sewage itself having been applied without the required intermittency.

The cardinal points to be observed in the process are explained to be:—

1. The preparation and formation of the land which is intended to receive the sewage, with precision. Irregular surfaces and steep slopes are to be avoided even more carefully than clay soils.

2. Intermittency of application and regulation of quantity, the former being positively essential to secure a continued good effluent.

3. The under-drainage of the filtration areas

* Sewage Disposal: Ten Years' Experience (now fourteen years) in Works of Intermittent Downward Filtration. By J. Bailey-Denton. 1865. Second Edition, with Additions. London: E. & F. N. Spon, 125, Strand.

ould be laid out as carefully as practical science will suggest, so as to ensure drawing the liquid sewage down from the surface only through the prepared ground.

With a view to prove its financial soundness, a table is given showing the comparative expenses of land treatment and chemical precipitation, in the cases of Abingdon and Hallowstead on the one hand, and Aylesbury and Hertford on the other, from which it appears that in the last two towns the annual charge on the ratepayers is 1s. 7d. and 2s. 1½d. per head, while in the two others it is only 1s. 0½d. and 5d. per head of the population.

The chapter treating of experiences and results of sewage farming contains several facts which are not commonly known, especially that of the actual market value as compared with the chemist's value of sewage,—the former, owing to attendant drawbacks in the present mode of application, is less than ½d. per ton. Even with such a diminished value, Mr. Denton observes, the country has a valuable property, which it is its duty to preserve. "In England alone, exclusive of the metropolis, there are 13 towns which have a population above 100,000, 19 towns between 100,000 and 50,000, 178 towns between 50,000 and 10,000, and 549 towns between 10,000 and 2,000, and if only half of these towns with an aggregate population of 5,000,000 ultimately determine to utilise their liquid refuse by application to land, the annual quantity at disposal will be 305,000,000 tons, the value of which, at ½d. per ton, would amount to upwards of 300,000l. a year." How is it, then, that at the present time there are various sewage farms to be hired at rents less in amount than would be given for the same land without sewage? Mr. Denton's answer is, that it is entirely due to the adoption of the hap-hazard method of distributing the sewage, instead of a regulated flow of the exact quantity, neither more nor less than is absolutely required for the particular crop sought to be raised.

So far, then, the process of intermittent downward filtration seems to afford a practical solution of the disposal of sewage as far as combining efficiency with economy. Why, then, it will naturally be asked, is there any hesitation to recommend its adoption in the case of the metropolis? The Royal Commissioners evidently think well of it, though they have pronounced rather in favour of a combination of chemical with land treatment,—that is, of precipitation supplemented by application to land,—as the plan which offers the most feasible means of solving the difficulty. In support of their view they cite the recommendation of the Rivers Pollution Commissioners, of Dr. Letheby, and even of Mr. Denton himself, their own opinions being:—

1. That it would get rid of the chief objection to chemical treatment only, as the effluent, being thoroughly purified, would no longer be injurious to fish, while the land treatment of the already clarified liquid would, if properly designed and conducted, reduce to a minimum, if not do away with, any danger of contamination to subsoil waters.

2. That, though it would add considerably to the expense in the purchase and working of the land, and in the necessity for pumping at the outlets, a fair return of crops might be expected, and part of the expense be thereby reimbursed.

In the discussions which ensued at Captain Douglas Galton's recent lecture at the Society of Arts on the Royal Commission's Report, the opinions of the principal speakers on the subject were not in favour of any particular treatment of the sewage, but tended rather to the view that the best and cheapest plan in the end was to carry the sewage of the metropolis to the sea and bury it out of sight altogether. Such a conclusion, however, seems scarcely conducive to our claims to be considered either as a scientific or a practical nation.

Institution of Civil Engineers of Ireland.—At a general meeting of the members of this Institution, held in the Museum-buildings, Trinity College, Dublin, on the 4th inst., Mr. H. A. Ivatt, member, read a paper on "Breakdown Tackle for Railway Work."

NOTES.

T seems to be now generally believed that the Railway Rates Bills will be withdrawn. The supporters of the measures are both annoyed and astonished at the extent of the opposition; and it has been asserted by a railway magnate that "people have been stirring up traders and taking advantage of their ignorance to oppose the Bills." This is not very complimentary to Sir B. Samuelson, Mr. Agnew, M.P., Mr. F. M. Eden, and the host of practical men who have closely studied the question and explained it to the poor ignorant public; and we cannot but incline to the belief that the charge of taking advantage of the ignorance of the public has been laid at the wrong door; and the unanimity pervading all the meetings held to consider the subject proves unmistakably that the counsels of these gentlemen are appreciated and accepted by those to whom they are addressed. Lord Henniker's motion in the House of Lords last Monday evening for a copy of certain judgments of the Railway Commissioners led to an interesting discussion of the subject, and Earl Granville, who is a very extensive producer and trader, said that it must be obvious to every one that the railways were necessary to the producers, and the producers to the railways; and that whatever mode they might adopt for arriving at the end, that end would be one common to both interests, and that they should not be treated as antagonistic one to another. Much was said as to "terminals," "preferential rates," and other points dealt with in our article of last week upon this question, and the subject occupied nearly the whole of the sitting.

MR. FIRTH asked the Home Secretary on Tuesday last "whether he was aware that, under the working of the Metropolis Valuation Act, 1869, there had thus been an increase of nearly eight millions sterling of assessed annual value upon which the water companies were able to charge London consumers, and thus enormously increase their income without any increase of supply; and whether, as this year a further assessment of the metropolis was taking place, he would take steps to prevent the continuance of the system under which, in default of immediate legislation, the London water companies would this year be able to increase their income by 100,000l. a year, and the capital value of their property by more than 2,000,000l. sterling, at the expense of Londoners, and without in any way improving or increasing the water supply." Sir William Harcourt replied that, although it was true that water rates were founded in law on the net annual value, it was quite certain that a rise in the assessment was extremely likely to lead in the future, as in the past, to a rising in the estimate of the net annual value; and that he thought the continual increase in the charge for water, without any proportionate increase in the supply, a great injustice to the people of London. It certainly looks like it, to people who do not hold shares in water companies.

ON the same day, Mr. Dixon-Hartland put a practical question in the House of Commons as to the great inconvenience caused by the present postage-stamps being all of one colour. Mr. Shaw-Lefevre replied that he had given consideration to the matter, and that it was being considered by a Departmental Committee. The inconvenience, though seemingly a small matter, is a real one, and should be remedied.

THE Westminster Hall Committee resumed its sittings on the 9th, Mr. Shaw-Lefevre in the chair, and Mr. William Morris was called and examined by Mr. Dick Peddie, and gave evidence to the effect that he did not believe anything was necessary for the protection of the exposed wall, but that if anything were done it should be merely for protection. It was one of the views of the society which he represented that all additions to ancient buildings should be conspicuously modern. This is news to us. If the repeated declarations of the Society for the Protection of Ancient

Buildings mean anything, their view has always been that no additions at all should be made to ancient buildings. It is to be regretted that so much of mere doctrinaire views should be mixed up with and confuse the questions at issue in such cases. We observe that a timber and canvas representation of Mr. Pearson's design has been put up between the buttresses, the lower and the higher or double-storied cloister. It harmonises well enough with the buttresses, but that is not the question, or not the main question. The authorities have not ventured to put up a representation of the proposed mean building at right angles to Westminster Hall.

AT the meeting of the Chelsea Vestry on the 6th, the question of the competition for the new Vestry-hall came up; fifty-two sets of designs had been received, and it was recommended that Mr. H. A. Hunt be appointed professional assessor, with a fee of 100 guineas. To the question of a member, whether Mr. Hunt was an architect and surveyor, the Chairman replied that he "could not say." An amendment was proposed that the matter be referred back to the committee, and another member supported this on the ground that Mr. Hunt did not practise as an architect, and his name was not on any list of architects. The amendment was lost. We have every belief that Mr. Hunt would be an impartial judge and an entirely able one as far as the practical side of the question is concerned; but that is not everything, and we doubt if the appointment will satisfy the competing architects. It is not what has been contemplated by those architects who have resolved not to compete except when a professional assessor is called in. They look for the appointment of an architect of high standing, not of a surveyor.

A CIRCULAR letter from Captain Douglas Galton, on behalf of the Council of the Parkes Museum, notifies the fact that the results of the recent Mansion House meeting have enabled the Council, after discharging their liabilities, to secure a continuance of the lease, and to provide accommodation for the valuable addition which the Council of the International Health Exhibition have made to the Library. The chief remaining immediate wants of the museum are a curator to take charge and to explain to visitors the uses of the various exhibits, and the provision of a printed catalogue of the contents of the museum and library. The Council are desirous to provide the additional income necessary for these purposes, by extending the number of members or annual subscribers. We hope that many who understand the value of the objects for which the museum exists will rally round it and strengthen the hands of the Council to carry out their wishes for the future. The annual member's subscription is one guinea; life membership, ten guineas.

FOR some weeks past correspondents have favoured us with letters as to the right of persons, who have tendered for works, against the employer in relation to the acceptance or rejection of such tenders. There is no doubt about the law. In Roscoe's "Digest of Building Cases" it is thus stated, at p. 48,—“A person who invites, by writing or word-of-mouth, tenders for work, or for the purchase of anything, does not, by so doing, impliedly promise to accept the lowest or the highest offer, or to accept any one of such tenders. The notice to persons willing to tender is a mere proclamation that he who issues the notice is willing to receive and consider offers.” The authority for this statement is the case of Spencer v. Harding, Law Reports, 5 Common Pleas, p. 561, decided in 1870. The judgment in the case was delivered by the late Mr. Justice Willes, one of the most eminent of English judges, and has never been overruled. Unless, therefore, there is any language in the advertisement for tenders which can be construed as an undertaking to accept the lowest tender, the offer of the person who makes it can be rejected. Nor is this contrary to common sense; for it may well be that a tender may

be so low as to be obviously incompatible with sound work, or may be made by a person undesirable to be employed, and it would be absurd for an employer to be bound to accept his offer.

AS some of our readers are aware, a Bill has been introduced by the Chancellor of the Exchequer to make further provision for enabling Deans and Chapters to repair their cathedral churches. This is to be done by the establishment of a fabric fund of such annual amount as may be approved by an Order in Council. This fund will be a first charge on the revenues of the Dean and Chapter. The Bill also gives the Ecclesiastical Commissioners a kind of control over the expenditure of the funds; also enables the property of the Dean and Chapter to be at their option transferred to the Ecclesiastical Commissioners, who would then pay them a fixed annual income. As a matter of fact, this Bill does not make any serious alteration in the law, for Deans and Chapters are bound to repair the fabric of the cathedral churches which belong to them. It is, indeed, a kind of supplement to the Act of 1840, which organised the duties of Deans and Chapters in regard to canopies, and so forth, and it makes the state of the law in regard to repairs clearer, and causes the care of the cathedral church to be the first duty of a Dean and Chapter. The proviso by which a Dean and Chapter may hand over their property to the Ecclesiastical Commissioners is rather a step towards disestablishment, because it points to a way by which the fabrics of our cathedrals may be preserved as national property without the intervention of a State clergy.

THE statement, attributed to the South Staffordshire Coal Owners' Association, that "1884 offers the first instance of a decrease in the national output of coal," is incorrect. The output of 1878 was less, not only than that of 1877, but also of that of 1876. The figures were:—1876, 133·3 millions; 1877, 134·6 millions; 1878, 132·6 millions, of tons. The output in 1879 was 600,000 tons less than that of 1877. There is no doubt that a diminution of 3·7 millions of tons in 1884 as compared with 1883, if it be verified, is serious enough; but it is better not to exaggerate. It is now twenty years since the late Professor Jevons, in a work on "the coal question," startled the world by a calculation founded on the rate at which the output of coal had annually increased during the decade for which statistics were available. The output of 1854 was 64·6 millions; that of 1864, 92·8 millions of tons; and Mr. Jevons estimated that by 1871 it would amount to nearly 118 millions of tons. It reached 117·35 millions; and this accord between forecast and fact, coupled with the inefficient report on the subject made by the Royal Commission "on matters relating to coal in the United Kingdom," had no doubt much share in causing the rise of price from 9·8 shillings per ton in 1871 to 20·9 shillings per ton in 1873; a rise which, however, was accompanied by a rise in quantity won from 117·35 to 127 millions of tons. That definite relations exist between output, demand, and price, is indisputable. But there is much reason to conclude that price is the resultant, and not the cause, of proportionate demand.

IT is gratifying to note that not only was the vote of 70,000l. for the purchase of the Duke of Marlborough's Raffiello agreed to in the House of Commons last week by a large majority, but that it was agreed to, although after a long conversation (rather than debate), with more of enthusiasm and more generally expressed faith in the real value of a good picture than we generally meet with in art debates in the House. There were the usual eccentricities,—there was the member who "had had the advantage of seeing the Louvre," and who for some freak of logic connected with that memorable visit, wanted the French to have the picture; there was the member who wanted it hung in the tea-room, that honourable members might estimate its value,—and so on; but in the main there seemed to be a

general conviction that a great Raffiello was a precious possession; and considering that there can never be any more of them than there are now, the price is not exorbitant. There are, as was suggested, private collectors who would have given more than that to possess the work,—

"Bequeathing it, as a rich legacy,
Unto their offspring."

THE ruins of a Temple of Juno have been recently laid bare at Civita Lavinia, not far from Rome. Fragments of sculpture have been discovered which formed part of a square block of marble. The fine character of the work leads to the supposition that if not actually Greek, they were executed under Greek influence. There have also been found the head of a goddess and six torsos of warriors clad in armour, also a head of Jupiter in very good preservation. The excavations are still in progress.

THE Rector of St. Bartholomew the Great, Smithfield, appeals for help towards purchasing the premises adjoining and covering the ambulatory and sanctuary, which are offered for 6,500l., with a refusal till April 3. The rector and churchwardens have no funds for such a purpose, and if the money cannot be raised, the site will pass into the hands of the speculative builder, and the sanctuary will remain, as it is now, with a factory over it supported by iron columns standing within the altar-rails. St. Bartholomew's, as every one knows, is one of the most interesting fragments of ancient architecture in London; and we hope that money will be raised for the purpose of removing the permanent disfigurement and danger to which it will otherwise be subjected.

THE Hellenic Society held a meeting at No. 22, Alhemarle-street on Thursday afternoon, Professor C. T. Newton in the chair, when Professor Ramsay read a paper on pottery discoveries on the Ionian coast. The finds in pottery in this part of Asia Minor have been very few and far between, and the work is all archaic. Professor Ramsay inclines to think that the disappearance of any remains of pottery at an early stage may have been owing to the predominating influence of Attic art, and that terra-cotta statues took their place. Among the few objects that have been found, however, were some ornamented fragments of great interest, as showing unusual forms of decoration, and a complete vessel discovered by Mr. Ramsay, and believed by him to be Phocæan. This has a very unusual shape, and is decorated by horizontal cylindrical rings of various colours on the lower part, and a kind of trellis ornament above, with "metope" spaces between, on which faces with long hair are painted, the hair curled round at the extremities in a sort of conventional ornament. The prominent features of the ordinary fragments of pottery found on the Ionian coast, as at Myrina, are bands of red painted on the natural buff-colour of the clay. In the discussion it was suggested that much more light might be thrown upon our knowledge of ancient lines of commerce by the study of even the ruder remains of pottery, which passed from land to land in ships, and even the material substance of which was a record of their locality.*

THE death of Mr. Louis Haghe deprives us of one of our most versatile and accomplished architectural draughtsmen. Mr. Haghe was educated as an architect, but forsook the practice of his profession for the more congenial work of illustrating old buildings, devoting himself principally to those of his native country, Belgium. His views of the town-halls of Bruges, Courtrai, Ypres, are well known, and were rendered popular by being reproduced in lithography. Mr. Haghe was for several years in partnership with the elder William Day, and, as the art director of the

* The meetings of the Hellenic Society would probably be better attended if each meeting were called by a card announcing the agenda. People do not bear in mind monthly meetings always, especially when they have no notice of what is to be done.

firm of Day & Son, did much towards improving the taste of the public. David Roberts's "Holy Land," Sir M. Digby Wyatt's "Treasures of Industrial Art," and other important works, were among a number issued by this firm. Mr. Haghe was a man of genial disposition, and retained his facility of hand almost to the eve of his life, and it was only last year that he resigned his position as President of the Water Colour Society.

BUILDING STONES.*

WHATEVER opinion we may hold on the vexed question of architectural evolution, whether we accept or not the theories of Professor Semper which have lately been brought to our notice, I imagine there would be but little difference of opinion among us as to the fact that the earliest habitations of men constructed *ad hoc* were made of wood. Where naturally-formed caves existed, affording shelter from the elements, and a secure retreat from wild animals and still wilder men, these would doubtless be resorted to as dwellings; but where such habitations did not exist there can be little doubt that the material which was most easily manipulated would be used for the construction of huts, in preference to that which required more laborious efforts to adapt it to the purpose. In some countries a timber architecture survives to the present day, as in Japan, and in other parts of the world, but as a rule, as men advanced in intelligence and skill, they could not fail to contrast the ephemeral and destructible nature of their timber dwellings with the solid and lasting properties of the various rocks and stones which nature has so lavishly provided in nearly all parts of the globe. It is a trite remark that the architecture of a country or district is largely influenced by the nature of the building materials found ready to hand in the immediate neighbourhood, and in those parts of the world where stone is not abundant a brick or terra-cotta style has been evolved. But where stone existed we may be quite sure that as soon as men settled down into communities and began to abandon nomadic existence, they would speedily devise means to utilise so lasting a material for purposes of shelter and defence. The probability is that, having before their eyes many examples of naturally-formed caves, men would first of all increase the number of such dwellings by boring into the rock, and every one knows that rock-cut chambers, whether they be called temples or tombs, are among the earliest specimens of architecture which have been discovered. There is, however, no necessity to assume that rock-cut buildings must have been anterior to those erected of blocks of stone. We know what an effect the weather and time have upon rocks, so that large blocks are perpetually being split off, and these accumulate in enormous quantities in any billy district. Thus stone may have been used for building purposes long before any means of quarrying it existed, and the character of the earliest stone erections which are known to us points to this having been the case. As far as can be judged from the few remains which have come down to us, the method of the primitive stone builders was the same everywhere, their work being characterised by great size and great simplicity. The difficulty of cutting stone into blocks of a portable and manageable size was far greater than that of moving the largest and heaviest blocks, because the primitive builders had an ample quantity of manual labour at their command, but very few cutting-tools, and those of a rude character; and this seems to me quite sufficient to account for the colossal nature of such ruins as those of Mycæne, Tiryns, &c. No doubt, a considerable amount of artistic skill is shown in the carving of some of these Cyclopean masonry, but it must be borne in mind that implements for carving could be made much more easily than tools for dividing huge masses of very hard stone. The durability of the early stone buildings depended partly upon the climate and partly upon the nature of the stone, and this was a matter of accident, for the most valuable characteristic of any building-stone would be its proximity to the place where it was to be used, and no selection of one kind of stone

* A paper by Mr. John Slater, B.A., read at the meeting of the Architectural Association on the 6th inst.

before another would be attempted. But, as civilisation advanced, and various cities began to vie with one another in the elaboration of their buildings, the stone of certain localities became widely known, and, with the spread of luxury and the desire for excessive ornamentation which characterised the age of the Roman emperors, the rarest and most costly marbles and other kinds of stone were obtained at vast expense from the furthest limits of the known world. The suitability of a stone to resist the climatic conditions to which it would be exposed was, probably, never thought of in early times, and it is an extremely fortunate thing for us moderns that in so many instances the early efforts of the stone-worker's craft were embodied in a material which has proved itself almost impervious to the attacks of time. The liability to decay when exposed to the weather is the most important point for consideration in selecting building stones, and, as this depends upon the nature of the stone itself, we ought to know what this is before deciding upon any building-stone that we propose to use. It would be manifestly utterly impossible in the course of a short paper to attempt to classify or describe the numerous kinds of building stone that are now in use in this country, and I shall confine myself to a few practical remarks upon the three kinds which are chiefly used for buildings, viz., granite, sandstones, and limestones. There is a word that used, I think, to be more frequently used than it is nowadays, and that is "freestone," which is quite without signification as to the real qualities of a stone, as it simply means a stone that can be worked, and includes both limestones and sandstones; in fact, it is one of those delightfully vague pieces of nomenclature which are rather plentiful in all the branches of practical architecture.

In the first place, it is very desirable that we should have a clear idea of the difference that exists between the two great classes into which rocks are divided by geologists. These are the stratified or sedimentary rocks, and the unstratified or metamorphic, the former having been produced by aqueous agency, the latter by igneous. Now, I dare say nearly every one here has watched the sands of a seashore after the tide has receded, and has noticed the number of little runnels which drain off the pools that have been left in hollows of the sand by the tide. These tiny streams gradually wear out channels for themselves in the yielding sand, and you may notice how the small particles of sand are gradually deposited some distance from the point whence they were rubbed off. Or, to take another instance, it sometimes happens during a heavy rain storm that the street gullies get stopped up, and you may see how all the fine particles of granite, earth, and what not have been washed away from the centre of the roadway, and are deposited on both sides of the stopped-up gully. Now, it is precisely these simple operations of water magnified a thousand fold that have originated nearly all the building stones which we now use. Ages and ages ago aqueous action was busy eroding various parts of the crust of the earth and carrying off the eroded particles and depositing them at the bottom of some sea or lake, the heavier particles being, of course, deposited sooner than the lighter ones, the particles consisting of sand, gravel, mud, clay, and so on; and in process of time layers upon layers would accumulate, vast changes would take place, and these same particles, according to the pressure to which they were subjected and to various chemical changes that they underwent, would become,—the sand, a sandstone; the gravel, a conglomerate; and the mud or clay, shale or slate. But the layers, or laminae, would still be distinctly visible under the altered circumstances, and these layers enable us to tell what the natural bed of the stone is, and these rocks thus formed by the ordinary sedimentary agency of water are called sedimentary or stratified rocks. But when we examine lava or any matter ejected from a volcano we see no such laminae in it. The materials have all been fused together into one mass, and in many cases rocks thus formed have burst through other stratified rocks. These rocks are, therefore, called metamorphic, or unstratified rocks, and are produced by igneous agency.

1. Of the igneous rocks granite claims our attention first, partly because of its hardness and durability, but chiefly because of its antiquity as a worked builder's stone. The columns, obelisks, sarcophagi, and other monumental remains which have been found in such

numbers in Upper Egypt, owe their preservation partly to the dryness of the climate, but mainly to the fact that they are worked in the hardest granite, the inscriptions on which, being so accurately cut and sharply defined, have enabled us to reconstruct faithfully all the features of a civilisation which dates from the earliest antiquity. This Egyptian granite was quarried chiefly in the neighbourhood of Syene, the modern Assuan, and it must have been worked on a very extensive scale when we consider the numerous specimens that exist not only partly hidden under the sands of the desert, but also in almost all the principal cities of the South of Europe, Rome possessing no less than twelve Egyptian obelisks. The most remarkable of these are monoliths, such as the column supporting the statue of St. Theodore at Venice, the obelisk of Luxor in Paris, and Cleopatra's Needle on the Embankment; but there is a great probability that many of the columns which now form part of the churches in many Italian cities were quarried, carved, and polished in Egypt, because we know how fond the enterprising Mediaeval republics were of carrying off the art treasures of the East to adorn their own cities. Granite is a stone of extreme hardness, so that it is impossible to work it into small and intricate mouldings, and, therefore, in those countries where it is plentifully distributed, and forms the staple building stone, the architecture will always be of a somewhat severe and massive type. I dare say many of you have travelled in Brittany, a most interesting and easily accessible district for a short foreign tour, and although you will not find the charming lightness and the play of artistic fancy that are so fascinating in the churches of Normandy and on the banks of the Loire, yet to my mind there is a quiet grandeur and breadth of effect in the simple massive character of the Breton architecture that are most impressive. And when you get a city like Aberdeen or St. Petersburg, almost entirely built of granite, the effect is undeniably grand.

Granite is one of the oldest of rocks geologically, and is of igneous origin, consisting in the main of quartz, felspar, and mica, with minute quantities of numerous other foreign ingredients, which, according to their nature and the proportions in which they occur, cause endless varieties of texture, colour, &c. Granite is not extensively distributed in England, the principal quarries being in Devon and Cornwall, and at Mount Sorrel, in Leicestershire. The latter granite is practically a syenite; that is, the mica is replaced by hornblende, and it has a very pleasant, warm, rosy tint.* The Cornwall granites vary very much in their composition. Scotland is rich in granites, the red of Peterhead and the grey of Aberdeen being the best known, and the pink granite of the Isle of Mull is now being largely worked. When chemically analysed, the preponderating constituents of granite are found to be silica and alumina, and when we come to examine the causes of decay in stone, we shall see that this is the main cause of its durability. As a rule, no signs of lamination are visible, and consequently it is not so important in the case of granite as with other stones that it should be laid on its natural bed; but wherever distinct signs of lamination are seen, then it should always be laid on its bed. But I shall have to recur to this point further on. You have probably all remarked in any very old specimens of granite, that it has somewhat of rough weather-worn appearance, and this shows that, hard and impervious as it is, certain constituents of its composition are decomposed by the action of the weather: these are the felspar crystals to which the red granite owes much of its beautiful appearance, and, therefore, if granite is required for an extremely exposed situation, the grey will probably be found the most useful. You may distinguish the felspar crystals in granite by their laminated glassy appearance, and by the fact that they can be scratched with a knife, while the quartz crystals resist this. The specific gravity of granite is 2.66, and the weight of a cubic yard is as nearly as possible two tons.

2. Building stones of the Sandstone Group, which is widely distributed over the United Kingdom, are of aqueous origin, mechanically formed, of varying geological age, from the old Red Sandstone of the Devonian system, to the Kentish rag, which lies at the base of the Cretaceous system. Sandstone is chiefly com-

* It is this stone that is used so extensively in the manufacture of artificial stone by the Victoria Stone Company.

posed of grains of quartz united by various kinds of cementitious material, either siliceous, ferruginous, or calcareous, and it is mainly upon the nature of this cementing substance that the suitability of the stone for building purposes depends. Occasionally immense pressure under heat has been the only consolidating cause. Some varieties are extremely hard and close-grained, and some are very coarse; sometimes the stone occurs in thick beds, sometimes in thin, and sometimes it is so mixed up with pebbles as to be unfit for architectural work. The colours of the sandstones are also very varied, ranging from red through brown and yellow up to almost pure white, the chief colouring agent being iron. From the composition of sandstone it is less liable to be affected by the weather than limestone, but still great care in selecting a sandstone is required, as the evil results of using inferior qualities are sadly apparent in Chester, Carlisle, and Durham. I can only mention a few of the principal sandstone quarries in England, but I must strongly caution you on one point,—that is, if you want to be particular about a stone, never rely only on the name of a quarry, as the quality of stone varies very much in the same quarry, and it by no means follows that because a certain quarry was producing an excellent building stone two years ago it is doing the same now. A personal investigation at the quarry is always desirable. In Yorkshire, the Bramley Fall stone, which is a fine-grained combination of quartz and felspar, joined by an argillio-siliceous cement, is good and durable.

The stone from Aislaly, which is used in Whithy Abbey, proved very durable, and this building was noticed as a good instance of preservation of sandstone by the Commission which sat in 1839, for the purpose of deciding upon the best kind of stone for the new Houses of Parliament. Elland Edge, Park Spring, and Gatherley Moor, used for the Doncaster Town-hall, are also well-known Yorkshire quarries. In many of the Yorkshire quarries in the neighbourhood of the coalfields the stone lies in a series of comparatively thin beds, from which are taken the well-known York flags. In Northumberland are the Heddon and Kenton quarries, the stone from which much resembles the Bramley Fall; in Lancashire, the Longridge Fell, much used in North Lancashire and for Preston Town-hall; in Derby, the Darley Dale; and in Durham, the Stenton Quarries, the stone of which was used in the round keep of Barurd Castle, may be mentioned as having supplied excellent stone for buildings in their respective localities. Manley, in Cheshire, is supplying the red stone with which Chester Cathedral has been partly restored, and Pocklington, in the same county, supplies a stone of very similar quality. Hollington, used in Trentham Hall and Crumpwood, in Staffordshire; Grinshill, in Shropshire, yielding extremely large blocks; Hadley, in Worcestershire; and Calverley, in Sussex, all supply a fine grained sandstone of first-rate quality. Some of the Kentish rag stone, which is a calcareous sandstone, quarried in Maidstone and the neighbourhood, is, if carefully selected, excellent for building purposes, and it compares very favourably with other kinds of stone in price. At Craigleith, near Edinburgh, is a quarry of beautiful light-coloured fine-grained sandstone, to which that city owes its striking appearance, and which has also been largely exported.

The chemical composition of sandstones varies considerably, but they generally contain over 90 per cent. of silica. The weight of a cubic foot averages about 140 lb.

3. We now come to the Calcareous Group of building stones, or limestones, which, like sandstones, are of aqueous origin, but formed organically or chemically, instead of mechanically. Whereas sandstone is composed mainly of the sedimentary deposits of inorganic matter, limestone is largely, and in some cases almost exclusively, formed of the stratified organic remains of living creatures of low organisation, such as starfish, coral animals, and molluscs. Limestones range from the carboniferous to the lower tertiary geological age, and may be classed for building purposes as crystalline, magnesian, and oolitic. The crystalline limestone generally exists in the form of marble, and as such is used for ornamental purposes mainly in this country, so that it scarcely comes under the category of building stones. It is, however, widely distributed over England, and is found in numerous varieties of tints, so that for decorative purposes it can be used with admirable effect as a contrast to other kinds of stone.

The Derbyshire, Devonshire, Perbeck, and Irish marbles are now becoming more extensively used for ornamental work; but it should never be forgotten, however tempting it may be to adorn the façades of modern buildings with beautiful variegated marble columns, that the constitution of the material is such that it will not stand if exposed to a smoky atmosphere.

The magnesian limestones or dolomites are amongst the best building stones in this country. As a rule they are slightly crystalline, composed in the main of carbonate of lime and carbonate of magnesia with a little silica. At Mansfield, however, the red magnesian limestone has so large a proportion of silica,—nearly 50 per cent.—that it is difficult to decide whether to call it a sandstone or a limestone, and you must always bear in mind that *ceteris paribus* the silica in a stone determines largely its durability.

These magnesian limestones acquired a greatly increased reputation through the report of the Commissioners in 1839, who recommended that the stone from Bolsover Moor should be used for the new Houses of Parliament. This stone, or one very similar, was used in the construction of the choir of Southwell Minster in the twelfth century, and it is still in good preservation. The stone of Roche Abbey, near Bawtry, has proved very durable, and in the main the magnesian limestones have always stood well in country districts, although at Doncaster and York the reverse is the case. But the present Houses of Parliament, which were built out of Bolsover Moor, but of Anston stone, are a striking instance of failure, and I shall endeavour to show later on why these stones are not suitable for London. The colour is generally a yellowish brown or red.*

THE SHORING OF BUILDINGS.

This was the subject of the fourth of the "Free Lectures on Matters connected with Building," delivered under the auspices of the "Carpenters' Company." The lecture was given by Mr. Thomas Blasbill on the 4th inst. After speaking of some of the various ways in which structures become insecure and require temporary support during repair, Mr. Blasbill continued:—

Next to a knowledge of the ways in which structures become insecure is the question of the methods of making them temporarily safe. Shoring of some kind must generally be employed, and it is important to employ the right kind in the right way.

In the great majority of cases it is not necessary to carry any material portion of the weight of any wall or building. Still less is it required to lift it or to force any inclined wall back into the upright. These last are operations of a very peculiar and exceptional kind. We generally want to stop the present mischief by providing some firm and sufficient resistance to any continued tendency towards falling over. The following headings will cover all these cases:—

1. The flying shore, which carries no weight, but is generally a trussed beam, placed horizontally between two buildings in order to prevent one or both of them leaning over the vacant space between them.
 2. The raking shore. An inclined prop also used to keep a wall from falling outwards, but which will carry some dead weight if applied carefully for that purpose.
 3. The strut, or dead shore, used only for carrying weight, and generally placed under eaves or floors.
 4. The needle, a short beam supported at the ends by struts and used to carry a short length of walling.
 5. Framed systems of shoring and centring used under arches to carry the dead weight of heavy structures during the rebuilding of them.
 6. Shoring used in combination with some mechanical power for forcing walls back into an upright position.
- In using any of these contrivances we cannot be too much impressed with the necessity for proceeding gently, so as to avoid all jarring or shock to the building. Shoring is not an affair of sledge-bammers, but should be quietly put in place and made tight up to its work with wedges, so as not to injure the structure. It could also be fixed so that it can at any time be eased, and finally removed without any damage to the building.

The remainder of the paper, with some notes of the session, in our next.

violent shock; and, lastly, it should be so arranged that it will be well out of the way of any work that has to be done while it is in its place.

A flying shore (see diagram) is the best contrivance for preserving the position of a wall that is simply in danger of falling over. The assistance that such a wall requires is usually extremely slight. A horizontal beam is fixed across a street or across vacant ground, each end being carried on a short piece of wood that goes through a plank which is fixed upright against the wall. The beam is braced against these two pieces, and has straining pieces secured to it, to form abutments for the braces, which are stopped on the wall-pieces by cleats. The beam is tightened up at one end by wedges. We shall see how all these parts are used in relation to the raking shore.

Flying shores can be made of ordinary timber up to a span of between 30 ft. and 35 ft., for longer spans timber of extra length must be used, or the beam must be scarfed. In such cases, great care is necessary to stiffen the beam and to wedge it tight, but flying shores can be supported and stiffened by connecting them to others above or below them, or at a few feet distance, or by taking upright posts up from the ground. When the shore has to be removed, the wedges can be loosened, and the upper braces taken away for a few days if it is desirable to test whether the building has been made secure by the works that have been done to it for that purpose.

A flying-shore placed across a street is usually put to support one house against an opposite house that is supposed to be firm. But when deep excavations are being made in the street the houses on both sides may be supposed to require support from each other, and this is the case when one house in a row has been taken down and the houses left on each side of the gap require mutual support. It is usually supposed that the flying shore should be made stronger,—perhaps twice as strong,—when both houses incline to fall as when only one of them is inclining. But, if each house is exerting a thrust equal to one ton against the shore, the one will simply counteract the other, and the strain upon the beam will be the same as if one house only was pressing with the force of a ton against another house that was standing firm.

In considering the raking shore, we will go back to the illustration which Professor Kerr gave us of the relation between the beam and the truss. If we have a beam that is fully loaded in the centre we may draw two lines from the point where it is loaded to the two points of support, and if we remove the two upper gusset-shaped pieces outside these lines, the beam will still carry its load. If we remove the remaining substance of the beam, except these two lines strong enough, we have two rafters in compression and a tie in tension, and these will carry the load. If we provide two good abutments and remove the tie, the rafters alone will carry the load. We will now go a further and final step and remove one of the rafters,—that which remains is a raking shore. In order that it should support even the smallest load, it is necessary that, in addition to the abutment at the base, it should have some sufficient resistance at the top to supply the place of the opposite rafter. If there is no such resistance, the load will bring the shore down, describing a curve struck from the foot of the shore. There must first be something to shore from; and, secondly, something to shore to. What such a shore will carry when properly arranged may be accurately calculated according to its degree of inclination. It will carry most weight when it slopes least.

As a matter of practice, the raking-shore is not generally used to carry heavy weights, but to afford such moderate support to a wall or building as may resist its tendency to incline out of the upright. Heavy weights are carried by dead shores and needles. The first thing is to get a solid foundation to start from. If the ground is soft or loose it may be rammed; if very bad, a floor of planks or stout timbers may be laid down. If vaults or areas exist close to the outer face of the wall, you plant your shore beyond them, or go down to the bottom of them, or use any solid wall you may find between them. When a wide excavation for a sewer is being made in a street, the houses may be shored from whole timbers laid across the street, as well as by flying shores from

house to house. It is generally sufficient to take up a part of the paving and lay the sole piece on the ground below it with the necessary inclination towards the building.

It used to be the practice to merely plant as many single shores or props as seemed necessary in the ground, to insert the upper ends for a few inches in the parts of the wall that seemed to need them, and to wedge them tight into these holes. The present practice is to observe the part of a wall that needs a shore (or if the whole wall be inclining, to fix on several places a few feet apart), and there to put up shores, as I shall describe.

I have said that you must have something to shore to. Such defective walls as we constantly see are not fit to have a prop put to them in any careless way. For, if the wall is settling and continues to do so,—ever so little,—after a raking shore is put, the shore, having no firm resistance at the top to supply the place of the opposite rafter, will be brought down by the weight and will push in the wall. The more the shore slopes out of upright the greater is the danger of this accident. I have seen it happen to one of the unbraced 9 in. walls that I have described, which fell inwards upon the chamber floor and the store floor it.

When a flying-shore is made to incline so that its foot comes down on a lower building the danger of injury to the lower building is very considerable.

The safest place for fixing a raking-shore in front of a building is against the end of a party-wall, where most old buildings are insufficiently bonded. There the party-wall gives the necessary resistance, and the same may be said of other cross and return walls. If the part to be supported is between such return walls the points of support must be fixed near to the under side of the floors, which will offer sufficient resistance.

The mode now adopted for applying the shore to the wall is to provide a long plank called a wall-piece fixed upright against that part of the wall which needs support. Pieces of wood, called pins or joggles, are passed through the plank and made to project 4 in. into the wall, a half brick being removed at each place where the head of a shore is to come in order to admit the joggle. The wall-piece must be carefully fitted to the face of a wall that has strings or other horizontal projections, by packing or otherwise.

It is usually necessary to put more than one shore from the same sole-piece, so that as many as three or four may be made to support the joggles at different heights of the wall-piece. The outer ones may be fixed as "riders" carried on short pieces of timber. Thus, instead of propping a wall at irregular points by several shores having independent foundations, and acting independently against the wall, we have one strongly-framed compound shore, which may be repeated at intervals in the length of the wall as may be required.

As to the manner of fixing the shore, having been cut to fit in its place, is set on the sole-piece, and the top, which has been cut with a couple of horns to clip the head of the joggle, is brought up to it. It is dangerous to drive up the foot of the shore with a big hammer, as that would certainly give severe shocks to the building, and probably make the shore too tight. It requires to be just brought well up to its place, and no more: with this object a crowbar is put into a notch cut in the beel of the shore, and it is then gently levered up until it is felt to be tight. It can then be secured by iron dogs, so that, should the shore become slack, or be subjected to any shock, it may remain fixed at both top and bottom.

In fixing a rider the short piece of timber to form the foot is first set on the sole-piece so as to lie against the back of the shore; the rider is next made to rest on a pair of oak wedges, and is gently brought up so as to clip the joggle by driving the wedges. The feet of the shores are fastened together by hoop iron, which is wrapped round them and well nailed; if necessary the foot of the outer shore might be cut with a very short tenon and dropped into a mortise in the sole-piece. It is the common practice to connect the rider and the shore by nailing stout boards in one or more places across each side of them, which are continued to the wall-piece, the whole system thus becoming a strong piece of framing in a triangular form. Solid timber might be used instead of the boards, but these are easily fixed and are sufficient for ordinary cases. The cleat that is put above the joggle should

be very securely fixed, and may be let into the wall-piece if much strain is expected. It is usually nailed and, practically, has very little to do.

As to the dimensions of timber used in shoring there is a common practice of using deals, which, from their thinness, bend aside as soon as any weight comes upon them. When half-timbers are used there is less strength from the same cause. The square stuff from 5 in. by 5 in. to 9 in. by 9 in., is the best material for shoring, particularly as there is much chance of accident from a side blow or from the pressure of wind.

Fir is the best timber to use on account of its straightness of grain, cheapness, and lightness when being moved.

The way in which raking shores may be employed to carry dead weight is shown in the operation of removing a column from the arcade of a church. The shores, two or four in number, and perhaps used together with struts and needles, are placed opposite to each other, so that the indirect action of each of them against the part supported may be counterbalanced. In Viollet-le-Duc's "Dictionary of French Architecture" some examples of this are given.

The action of raking shores is a question which those acquainted with mathematics may study with advantage. The whole question of shoring and underpinning has recently been dealt with in a book published by Batsford, High Holborn, price 4s. 6d. It was written by the late Cecil Haden Stock, an earnest student in architecture, who managed to do this very useful piece of work at an unusually early age.

The various ways in which the dead shore or strut is useful need not be catalogued. As a temporary support for girders during the rebuilding of a wall, or during the replacing of a column, it is in common use. I have seen such struts fixed by simply driving them into their place with a sledge-hammer, which very seriously shakes a building. They should be wedged up at the bottom, driving the wedges very gently, and stopping as soon as the strut is made tight. The timber should be solid and sound. One sometimes sees three or four deals lashed together, and made to do duty as a strut. It should be better known that the strength of a column or strut depends very materially on its thickness or diameter, and that three deals, however firmly you may fix them together, are very far short of the stiffness of a post of solid timber of the same dimensions. The utmost care must be taken to see that the strut is set on a solid foundation. A soft subsoil, old vaults, or cesspools must be searched for, and a good sill of timber used to start from.

We now come back to our old friend the beam, pure and simple. The "needle" is a short beam loaded at the centre, and usually carried at each end by a strut. It should be of good, sound, and solid timber, and if it is over necessary to use a combination of deals, they should not be laid flat upon each other (as is often done), but placed edgewise, bearing in mind that a 9 in. by 3 in. deal so placed is three times as strong as the same deal laid on its side. Wrought-iron rolled joists are now very often used as needles, for they only require a hole of 4 in. in width, instead of 10 in. or a foot.

The illustration shows the common operation of putting in or replacing a bressummer. You first strut up the floors, not trusting to the bottom floor without examination. Put some timbers in the window openings, and support any balconies or projecting parts. Raking shores are then put to steady the upper part of the house, and the needles are passed through holes under the solid parts of the walling. If any of the struts cannot be fixed sufficiently near to the front the needles must be made longer, and stiffened by strong raking pieces from the foot of the struts. The bressummer is then passed into its place, bedded, and the brickwork over it made good in cement.

It is often necessary to make a large opening in a front or cross wall, high up or in a position where struts cannot be easily fixed. Then a number of square frames may be made, best of iron, consisting at top and bottom of short needles joined by uprights at the ends. These are put through the walls in the place of ordinary needles, the bottom pieces resting on the brickwork, the tops pinned up tight to the wall above. The brickwork along the wall is then cut away of depth sufficient to admit the girder, and after it is made right the frames may be removed and the wall below may be cut away to form the opening. In the same way

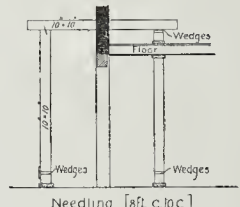
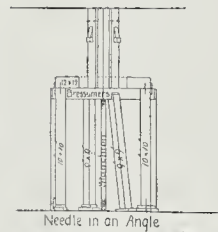
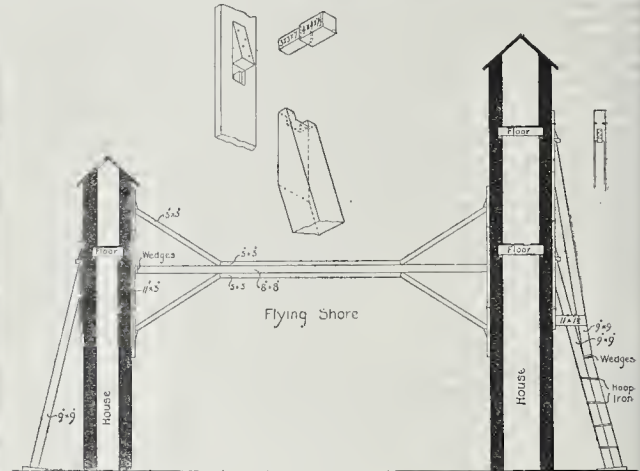
an arch may be turned over an intended opening by making the temporary frames of height sufficient to suit the rise of the arch. There is a good illustration of this plan in the *Builder* for 1859.

In order to place or to change the column at the angle of a building, a needle is put through the corner diagonally with other needles and raking shores, of which two should stand close to the corner. When a raking strut is put under a bressummer, catching it with a bird's-mouth, remember that there is the same danger and need of good resistance at the top, as in the case of a raking shore, and that the more nearly upright the strut is the safer and stronger it will be.

Whether the formation of an extra basement beneath a building shall be a dangerous or a safe operation depends chiefly on the way in

trench close behind them, another trench being made between the shores and the wall for the purpose of underpinning. In that condition of insecurity the wall was left with the rotten work cut out and several courses of underpinning left still undone from Saturday to Monday.

You may be surprised to hear that no accident happened,—more surprised, perhaps, that I tell this story,—for, if it proves anything, it proves that such work will stand. I am sometimes met by a man whom I have warned for doing something of this kind with the triumphant announcement that nothing has happened. One can only reply that it ought to have happened, and this leads me to make the following observation. There are many things done in dealing with old buildings which may or may not be dangerous,—one can only judge by the



which the shoring is arranged and maintained during the work of underpinning. The most obvious course is to secure the walls of all adjoining buildings by flying shores and by raking shores planted on the old level of the ground, deferring the excavation until the underpinning is completed. This is executed in intervals along the face of each wall and needling all parts that require it. The mass of earth that has afterwards to be excavated is thus made to support the shoring and the timbering of the shafts until the adjoining buildings are made secure.

One of my illustrations shows a curious specimen of shoring, of which a record happens to have been kept. A party-wall, the lower part of which was split and ruinous, had to be underpinned, and raking shores were applied to it. These stood upon soft "made" ground, with a

result. The thing is an experiment. What shall we say of it? I say it is risky. Let me offer that most useful word for your careful consideration. I do not find it in the dictionary, yet I can count over twenty words in the column where it ought to be that will never be of the least use to any of us as long as we live!

It is never worth while, for the sake of a saving in trouble, or even in cost, to run risks that are plainly to be seen. All prudent constructors go a great deal further than that. From a sense of risks that are not obvious, or that may only arise at a distant time, we usually make all kinds of beams strong enough to carry three or four times the greatest weight they are expected to bear. Columns are made of ten times the strength that might seem to be necessary. Provision is thus made for contingencies, and yet accidents sometimes happen in spite of this caution.

ON GREEK ARCHITECTURE.*

The heaviest works of shoring that we have dealt with are connected with failures in the walls and piers of our old churches and cathedrals. I have found the towers of ordinary village churches, with walls 5 ft. thick, threaten to fall to pieces, because the inside or core of the walls was made up of dry, loose materials at would run out of the cracks like sand out of a bag. Raking shores, and good wall-pieces were to be put against them simply to keep the outer casing of stone steady while the cracks were cut out and some solid stonework introduced bit by bit. In the case of large central vaults the openings between the four great arches are filled with strong framed shores, and raking shores are put at the angles, until piers and arches are rebuilt. The shoring of the tower of Grosmont Church, Moomouthshire, carried out under Mr. J. P. Seddon, and very good example, is illustrated by my drawings and a photograph which he has lent me for this lecture. This tower, sighted, above the arches, about 800 tons, the weight of a cathedral tower will be ten times as much as this. Thirty-five years ago I saw with interest the enormous shoring that carried the tower of Hereford Cathedral while its piers were rebuilt. In such a case a deep and solid bed of concrete is first laid under and around the tower, the defective parts have to be surrounded with a jacketing of masonry to keep the outer casing of stonework together, and prevent the bursting out of the crushed rubble work in the core. Strong frames of the largest timbers are built up, carrying the centres of the great arches. All the walls of arches near the tower are shored up, and great part of the shoring must be made to move, bit by bit, as the stonework is renewed. The largest amount of shoring ever used has always seemed to be insufficient. I exhibit a photograph of the shoring put by Sir Gilbert Scott under one of the tower arches of St. Alban's Abbey, not to carry it, but only to form a moderate amount of support.

The operation of restoring a wall to the upright is not often undertaken. We have here a drawing of that used 155 years since in forcing back the transept wall of Beverley Minster 4 ft. A very interesting operation of the same kind was carried out at St. Alban's Abbey 60 years since, where strong frames of timber were fixed in the nave to receive the wall as it was forced into its place by machinery placed inside the building. If any one has occasion to undertake any of these grand operations, he can be no difficulty in his ascertaining, by inquiry, full information as to what has been done before. References will be found in a book on shoring that I have named.

I will venture to add to this lecture a few observations on shoring done in other materials than wood. If you walk round Westminster Abbey or look at the newly-exposed side of Westminster Hall you will see in the great flying buttresses specimens of shoring in stone, such as was done hundreds of years ago, on the grandest scale and in infinite variety. Between the western towers of Lincoln Cathedral there is a flying shore in stone of 14 ft. span, and only 11 in. deep. It forms a flat arch, the rise of which is barely 15 in. The tower of Salisbury Cathedral has on every side of it double raking shores built up behind the outer architecture of the lower parts of the church. At Salisbury and Wells Cathedrals, and at some other churches, very curious arches, acting as flying shores, were added to prevent the piers of the tower arches from yielding under their load. In the deep cuttings of the Metropolitan Railway lines flying shores of cast-iron have been very extensively used. All these are well worth our study, even if we only have to prop the front of a common bonse, and such study ought to sweeten our work. I own that I should feel more hesitation than I do in addressing you on this subject if I thought that every error and omission I may make could lead to permanent mischief. But I comfort myself with the belief that every one who may be hearing what I say will take all opportunities of studying the subject in actual execution, and thus correcting his wrong impressions by an appeal to that great foundation of valuable knowledge,—the experience of practical work.

Proposed International Exhibition in Edinburgh.—A committee has been formed in Edinburgh with the object of holding an international exhibition in that city in 1886.

We have now glanced at the principal buildings which remain to us at Athens. We should not, however, have an adequate idea of their effect without an allusion to the exquisite colours which nature has infused upon the marble of which they are built, of which, however, the surface is itself, except where the sea air has caught it, is as perfect as the day when it was finished. There is a small proportion of iron in the constituents of the marble, invisible when fresh, but which in time produces the most mellow tones of ochre and of amber imaginable.

But this is not the colour which the ancients saw and admired. No doubt much polychromy was used, but within due limits. How far it was allowed to appear on the works in marble is very difficult to determine. In some of the Greek works which were executed in common stone, and, I believe, then always coated with a very fine stucco, as at Ægina, the colour was probably applied pretty freely, and considerable remains have been so found. But not only our natural feeling would be outraged if marble were so spoiled and obscured by the paint-brush, but there is this absolute fact. In all the principal buildings, and nowhere more so than in the Erechtheum, the joints are made as fine as possible. There could be no object in doing this if they were to be obscured by paint. Moreover, in the columns the drums are, with the slightest exception possible, made of equal stones, so that the joints range on the same level. This, again, would not have been done had they been hidden, for it is no easy matter to select serviceable stones on Pentelicus. That the columns and general architecture were in some way toned so as to subdue the raw new white is most probable, and that some colour of greater force was introduced in the soffits and shady portions is also likely. How these limits could have been secured is very difficult to imagine, but we may, at any rate, feel sure that it was done in exquisite good taste and harmoniously.

The genius of Gothic architecture aims principally at subdivision and a flowing harmony throughout, connecting the members at the top of a design with the base. The Greek aims more at contrast, providing a sufficient mass for the support, and cutting it sharply off by the entablature; in fact, the one is arcuate in its principle, the other is truncate. The brilliant sunshine of Greece must have had much to do with the actual proportions and details employed. The powerful reflections from the pavement served to supply an adequate half light for the columns and even the sculptured ornaments of the internal porticoes of the pronaos and posticum. Again, the cast shadows of the columns upon the colles, or that which fell upon the columns themselves from the architrave or the broad shafts of the Doric capital, produce an effect which we can little understand from copies executed here under the influence of our paler sunshine. The echians of the Doric capital may seem in our copies ineffective, but it is not so under a brilliant sun, when every square inch of the surface has a delicate gradation arising from the light and shadow playing upon the subtle curvature of its profile. If, under any circumstances it should be required to be reproduced in this country, some carefully-studied modifications of the original form would be required. The way in which the shadow of the cornice is broken upon the channels of the triglyphs and the metopes, if sculptured, gives a subdued richness which is more lovely than superfluous ornament. The marvellous accuracy of the workmanship is another reason for the excellence of the effect. The gradations of shadow are not haphazard, but can be followed in the mind as to cause and effect. When the sun glances upon the columns carved with shallow flutes, each of them towards the shade side deepens in intensity until we come to the part fully in shade.

Much depends also upon the profiles of the mouldings. In these we not only feel the refinement of the artists who designed them, but also their scientific knowledge of form. There are no jerky curves, as we find in Roman and most modern work; but, for instance, in ogee curves, the line passes from the sharpest curvature of one part through infinite gradations to absolute straightness at the point of

* Continuation of a lecture by Mr. F. C. Penrose, M.A., delivered to the students of the Royal Academy on the 27th ult. See p. 334, ante.

contrast, and then recovers its contrasted curvature by degrees. Compare the Roman method of two arcs of uniform curvature meeting against one another in opposite ways.

In these curves the technical skill of the workman went parallel with the discoveries of the geometer. At the time of the greatest development of the architecture, the mathematicians had begun to investigate the sections of the cone; or, indeed, it might be that the artists were using them practically, whilst the geometers were speculating on their properties, we find continued examples of curves of parabolic and hyperbolic section, and occasionally, but not so frequently, elliptic. There seem to have been other geometrical curves, ovoids, and conchoids used in the outlines of vases; but in architecture the conic sections seem to have been used exclusively, and they are sufficient for all its wants. The hyperbolic especially has the advantage of variety and gradation. This curve can be selected so as to have within the space of a few inches the sharpest possible curvature and practical straightness, or any desired gradation. Consequently it became very suitable for the echians, and for the delicate hollows of the upper cornice. The shafts of the columns have also a hyperbolic outline, simple in the Doric, but in the Ionic composed of three contrasting curves, the long delicately-curved shaft, of which the convexity or entasis is not intended to be apparent. Growing out of this is a more divided but shorter curvature outwards under the necking of the cap, and a spreading curve also like a tree-root, where the shaft springs from its base. In modern work this refinement is often omitted, to the great inferiority of effect. In Greek work of the best period, the circle is rarely used in profiling the mouldings. I know of but one instance of a continuous moulding, namely, the cymatium on the pediments of the Parthenon. In that case its absence of gradation was, I think, specially aimed at so as to produce a quiet effect above the varied sculpture which adorned the pediments.

Occasionally, indeed, the torus mouldings of the bases of Ionic and Corinthian columns are circular curves, but elliptical shapes are more common. You will see on a diagram (Fig. 1) the difference between the ordinary Roman base moulding and the Greek; the example here is taken from the Choragic monument of Lysicrates. On the same paper are two cymas or ogee mouldings,—one a Greek example with the gradation of curvature referred to above, and the other a Roman character, which is formed of two circular arcs.



Fig. 1.

The Ionic volute is of sufficient importance to have suggested many methods of drawing it. Vitruvius, in a passage somewhat difficult to interpret, shows that in his day it was produced by a system of centres and circular arcs, and much ingenuity has been expended upon the contrivances. The volutes of the Erechtheum and other good Greek examples will not adapt themselves to these jerky expedients. I have a diagram of a volute drawn by continuous motion on the principle of the equiangular spiral, a curve which cuts the radius always at the same angle. This, however, although the curvature is faultless, does not fit the Greek example. I was led to try another method from the observation that there is usually a hollow in the centre of the eye of the volutes into which could have been fitted some kind of instrument suited for the purpose. This hollow was doubt-

less afterwards filled up with a suitable plain or sculptured boss. The great convenience of such a contrivance would be that the workman having always the generating instrument at hand could at any time verify his work. The small instrument referred to takes the shape of a spiral having equidistant convolutions after the first turn, and, therefore, not itself the volute. It is called the spiral of Archimedes, because its geometrical properties were investigated by him. It so nearly resembles another spiral called the involute of the circle that it may in practice be used instead, and this spiral is generated by unwinding a string from a cylinder. Carry this one step further and unwind a string from the spiral of Archimedes or the involute spiral and we obtain a curve which has all the characteristics of the Ionic volute.

I have tested the volute generated by the little instrument referred to, and the approximation with the Greek examples is most remarkable. To obtain any other line of the convolutions of the fillets of the volute nothing is necessary but to turn the instrument a little about its centre and tighten it again.

One of the great secrets of the perfection in Greek architecture arises from the harmony of proportion which exists not only in the main elements, but also among the subordinate details. That this was so was felt by all attentive observers,—but the rule by which these harmonies were produced for a long time eluded research, and sometimes encouraged unprofitable speculation.

The secret was revealed to Mr. Watkiss Lloyd some years ago, after a careful study of the Parthenon and all the monuments of the best Greek time, of which there were measurements which could be depended upon. It was published by him as an appendix to Professor Cockerell's beautiful work on Bassæ and Ægina. There are some diagrams which illustrate his main points (Figs. 2 to 6). The coincidences

low numbers, and must form part of a scale of harmonics belonging to the particular building. The favourite relations are those wherein there is a difference of unity between the numerator and denominator, such as $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots, \frac{9}{10}$;

dimension on the horizontal line on the top of the scale, incline the rule, which is held from the left-hand lower corner, so as to touch it, and its edge will point out all the permitted relationships, amongst which there would be considerable choice (Fig. 15).

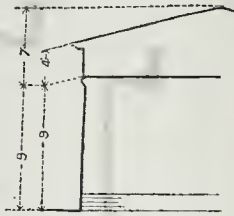


Fig. 5.

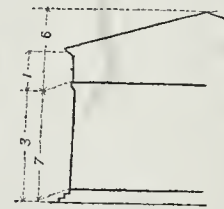


Fig. 6.

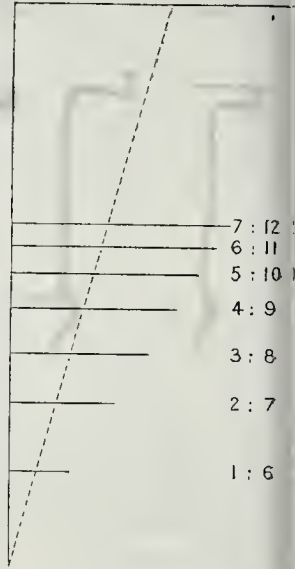
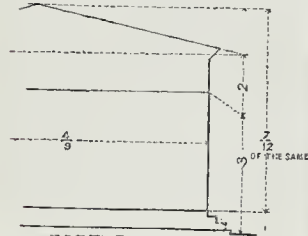


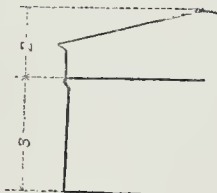
Fig. 15.

- 7 : 12
- 6 : 11
- 5 : 10
- 4 : 9
- 3 : 8
- 2 : 7
- 1 : 6



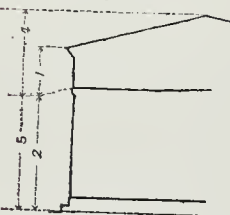
PARTHENON.

Fig. 2.



PROPYLÆA E.

Fig. 3.



THESEVS.

Fig. 4.

between the actual measurements and the theoretical deductions are so close that, especially in the Parthenon, a divergence of one part in 400 would be in most cases rejected. Moreover, as you will see, the relations must be between

and, of course, sometimes equality, as in diameters of columns. In addition to this there is the sequence peculiar to the building which, in the Parthenon, is a system of ratios, having a difference of 5 between the numerator and denominator, namely, $\frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{6}{5}, \frac{7}{5}, \frac{8}{5}, \frac{9}{5}$.

The length and breadth of the general plan is the first consideration.

In the Parthenon on the top step this is $\frac{2}{3}$. In the Theseum on the bottom step the same proportion.

Then we look to other members naturally correlative, as verticals and horizontals, solids and voids, breadth and height, and find them proportionate:—

Height of column..... : breadth of front :: 4 : 9
 Height of front from top step to apex..... : breadth of front :: 7 : 12

The height of the column (as vertical member) to joint height of steps, entablature, and pediment is found to be thus in different temples:—

Parthenon	9 : 10
Sanium	7 : 8
Bassæ	6 : 7
Rhampusæ	5 : 6
Theseum	4 : 5

There is also almost always a simple relation between the height of the column and the entablature taken together with the steps, as shown on several of the diagrams. Figs. 7 to 14 show the proportionate heights of a number of entablatures to the height of the columns, the latter being supposed to be all reduced to the same apparent height.

The space occupied by three columns and their two intercolumniations was frequently proportionate to the height of the columns,—in the Parthenon it is exactly equal.

The list may be carried very much further, and even amongst the smaller details; as an instance, in the Parthenon, of one of these, the thickness of the horizontal cornice (fronte) is to the total frize as $\frac{1}{3}$.

The effect of a law of this kind is by no means to take away the initiative of the architect, but it had the effect of steadying, as it were, and giving unity to the design. It can be applied with very great ease, and is applicable *mutatis mutandis* to a design in Renaissance, or even Gothic architecture. The main dimensions have first to be approximately chosen, according to the requirements of the case. Then the length and breadth, &c., adjusted so as to have aliquot parts, and in this there is considerable room for choice. Then, when the diagram peculiar to the building has been settled, a diagram may be prepared with lengths proportionate to the different ratios. If the question be to find a term having one of the permitted affinities to a given dimension, set off that given

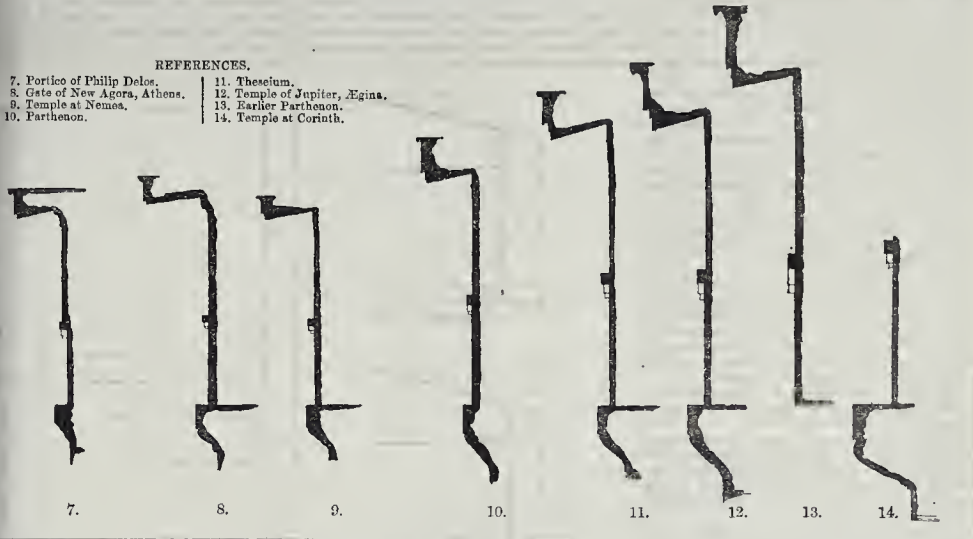
But however carefully proportioned and accurately worked, this Greek architecture would not have been so perfect as it is had not certain optical adjustments been added, which show that the architects were men of extreme refinement. They had noticed that straight-sided columns appeared hollow in the middle, and therefore applied a delicate swelling; and, to counteract this, So delicate is the effect that the departure from the straight line in the Parthenon does not exceed $\frac{1}{100}$ of the column height. Then it was noticed that if the columns were erected absolutely perpendicular they would appear to lean outwards, and they gave to the axes of the columns, and also to the faces of the superstructure, a delicate pyramidal inclination. The axes of the columns are made in the Parthenon to incline from the perpendicular $\frac{1}{100}$ of the whole height. The effect of this is to give a sense of repose and solidity to the whole structure, and it imparts a certain amount of richness also. But this was not all. In a design of whatever kind one part acts upon another, and the apparent direction of any line may be deflected by the neighbourhood of oblique lines. As an instance I point to a diagram where two straight-sided columns are made one to look hollow and the other to look bulged in the middle by the contrasting curves drawn near them. In the same way the included lines of a pediment when we look at it near the angles (especially of a flat pediment, where the angle does not exceed about 14°), the horizontal cornice at each of these points appears deflected, and as the eye passes from one angle to the other there is a very considerable result of apparent deflection. To remedy this the Greek architects gave a considerable amount of convexity to the horizontal lines, which was also shared by the stylobate, because generally the columns were made of equal height. This optical correction at first was made to the fronts only, where the cause operated, and we find it so confined at Paestum, but afterwards generally it was applied to the flanks also.

The amount in the Parthenon is a rise in the centre of the front of about 3 in., and on the flanks of about 4 in. It is also found at Athens in the Theseum and the Temple of Jupiter Olympian, and in the Propylæa, but with this variation, that in the Propylæa, where the step is cut by the ascending roadway, it is found in the entablature only. It is also found in many other temples in other parts of Greece.

These adjustments which I have pointed out

REFERENCES.

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|---------------------------------|-------------------------------|
| 7. Portico of Philip Delos. | 11. Theseum. |
| 8. Grotto of New Agora, Athens. | 12. Temple of Jupiter, Egina. |
| 9. Temple at Nemea. | 13. Earlier Parthenon. |
| 10. Parthenon. | 14. Temple at Corinth. |



all evidences of careful thought bestowed on the architecture, and are worthy of our attention; for many circumstances will continually arise which may call for adaptations more or less analogous. The harmony which results from their application cannot be questioned.

Let us, in conclusion, for a moment consider the lessons may chiefly be learned from Greek architecture. Last Friday you heard from one well qualified to insist upon it, that one of the earliest points for the student to aim at was refinement. It is impossible to study Greek architecture deeply without advantage in this respect. I suppose no one will question that our earliest master in this quality was the late Professor Cookerell. Another point of great moment which Mr. Bodley called your attention was the economy of ornament. The Greeks never littered their works all about with foliage or sculpture, but reserved it as nature does for important positions, introducing broad masses of plain work for repose. A work executed with the Greek feeling, and with the smallest possible addition from the sculptor's or carver's hand, is always noble. The contrary condition when carving is largely applied without the masses being properly cared for never produces more than a momentary approval. The Erechtemion shows us that the spirit of Greek architecture admits of the greatest variety that can legitimately be desired. No true Gothic building has more. Its different levels, its side porches placed just where the internal plan demanded them, and several other features testify to perfect liberty of general arrangement. But not the less was the architect careful to use the severest symmetry in balancing those effects which judgment demanded. It was not assigned, as so many modern buildings are, for the purpose of looking picturesque, but of being true to the requirements of its plan. No doubt, in the architecture which we received on the eighteenth century the convenience of the plans often suffered from an idea of rigid uniformity, which the study of Greek architecture has shown to be a mistaken one. Let us work while there is time that the twentieth century may not receive from us a system of architecture running, as it were, to riot and disorder from a much more objectionable and usually mistaken misinterpretation of the Gothic.

Queensbury.—A window in memory of the late Mr. W. Foster, of Queensbury, and Hornby Castle, has just been erected in Queensbury Church, from the design of Mr. Thomas Camm, and executed by Messrs. R. W. Wingfield & Co., Birmingham. It illustrates the under-mentioned subjects:—"Abraham, at the command of God, leaving Mesopotamia for the promised Land," the "Offering of Isaac," and "Abraham receiving the Blessing of Melchizedek."

WESTMINSTER ABBEY.*

Of the exterior as it was originally, it is difficult now to form a correct idea. It was found to be in a perilous state of decay in the commencement of last century by Wren, who began the rearing of it throughout with Oxfordshire oolite of a somewhat pinkish tint. At the same time, as I have before remarked, he pared down the mouldings of the parts which he left, so as to render it now almost impossible to recognise their original form, while by exposing a fresh surface this process has given the finger of decay a second bold upon the stone worse than the first.

The details also when renewed were strangely altered. This work was continued by his successors; so that there is very little indeed of the exterior which can be said to be the untouched work of its original builders (that, of course, with such a climate as London has acquired would be simply impossible in the lapse of more than six centuries), but in reality there is little that we can point to as a faithful reproduction of the old work in its old manner, except it be Sir G. G. Scott's work, and that now going on.

Keepe, in 1683, bears his testimony to the ruinous condition of the church. He says,—“On the south side you rather behold the skeleton of a church than any great comeliness in her appearance, being so shrivelled and parched by the continual blasts of the northern winds to which she stands exposed, as also the continual smooks of the sea-coal, which are of a corroding and fretting quality, which have added more furrows to her declining years, that little of her former beauty now remains.”

The pinnacles of the buttresses seem to me to have been tampered with, the crumbling five over the north porch being now by far the most attractive of the series. It is but natural that such features as pinnacles and parapets should be the first to succumb to the corroding influences of smoke and weather, and so we find that in Richard II.'s time the parapets appear to have been renewed with the embattled variety then in vogue. Blom, during his reign as abbey architect, replaced a considerable length of it on the south side of the nave and south transept with a straight-coped variety, pierced with continuous quatrefoils, for which he appears to have had no precedent in the abbey.

The student will not fail to notice the different treatment of the buttresses of the nave on the north and south sides, arising from the necessity on the south side of spanning the cloisters (north walk), and so throwing the weight and energy of the vaulting over and beyond them.

On the south side you will see the two upper flying arches are continued beyond the lofty

* Continuation of a lecture by Mr. Waterhouse, A.R.A., delivered to the students of the Royal Academy on the 4th inst. See p. 351, ante.

pinnacle which rises from the wall of the aisle to an outer range of buttresses south of the cloisters. Externally, the windows of the triforium (on the same plane as those of the aisle below), with the parapet above, shut out the view of the lower part of the clearstory windows, and display, with the haphazard way in which the flying buttresses abut against this wall, a want of system which, as Sir Gilbert says, is not of a piece with the studious exactness of other points of the design, and seems to suggest some alteration during the progress of the works. Could this have been connected with an early intention to vault the triforium, which had to be abandoned as the work proceeded? The height of the triforium gives to the transepts externally what some would call a high-shouldered look, detracting from their elegance, but which, I venture to think, gives them great interest and dignity; in fact, I think few things can exceed the beauty of the outline of the north transept externally.

The most striking and beautiful feature externally has been, and is still, the triple portal at the end of the north transept,—a feature common enough in France; but in England, like the chevet, almost unique. In the time of Richard II. this portal had become much decayed, but was then cased in from the weather by another structure filled with windows, and of sufficient magnificence to be styled “Solomon's Porch.” You see it in Hollar's view.

In 1723 Dart writes of the original stately portico “that is now lately beautified, the time-eaten sculpture and masonry pared away, the Gothic order justly preserved, and the whole adorned by a magnificent window designed by the ingenious Mr. Dickinson, Surveyor of the Buildings.” Pity that the ingenious Mr. Dickinson did not leave the form at any rate of the original rose window. To his ingenuity is probably due the ogee form given to the central canopy of the porch.

It has been reserved for Sir Gilbert Scott to restore this northern portal to something resembling its original form and splendour. Sufficient remnants of the old work were discovered to enable him with his keen eye to decipher much of their original contour, and though some of the sculpture may be on the side of too great a delicacy, it is undoubtedly a very noble work. The light-coloured shafts are of Bath stone and temporary. They are to give way to statue shafts of Chilmark as Mr. Brindley completes them.

All that is visible externally of the central tower is due to Sir Christopher Wren, and is of Portland. It was his intention to crown it with a spire, the design for which is still, I am informed, to be seen in the Denery, and a model of which is in the triforium. It appears, however, he was soon convinced of the futility of proceeding with the work by the piers below showing signs of refusing to carry more than they do at present, and all they were doubtless

designed to do. If, as is possible, Reims and Amiens were the models on which Westminster was designed, we cannot be surprised at the central piers being prepared for nothing weightier than a central *fleche*.

I was prepared to speak to you of some of the more interesting of the tombs, and some of the furniture of the abbey, but I find time will fall me if I attempt it to-night. I will therefore only call your attention to the thirteenth-century pavement, and on the way thither, in passing round the chevet, notice the over-arching chantry of Henry V., which spans the ambulatory at its centre, and throws into impressive gloom the point at which one quits it to ascend the broad flight of steps leading into the chapel of Henry VII. The chapel itself, the burial-place of nearly every English sovereign from Henry VII. to George II., may be considered the finest Perpendicular building in England, called by Leland "the miracle of the world." It was to be the king's chantry as well as his tomb, and almost a second abbey was needed for the monks who were to sing in their stalls, "as long as the world shall endure."

Seventy-three statues, whose natural simplicity and grandeur of character and drapery were greatly admired by Flaxman, surround the walls. Some of the best of them were retained from the ancient Lady-chapel, the rest sculptured expressly for the new work. From the east windows the figure of the royal founder looks down upon the whole.

The glory of the chapel is its roof, the fan-tracery of which is a marvel of constructive ingenuity, and has not been excelled by any other example either in England or abroad.—In fact, this mode of construction was almost confined to our island. This roof has of late been in a somewhat precarious state owing to the extreme lightness of the arches on which it all depends, and it is a satisfaction to know that it is to be at once secured by tie-rods.*

The entrance to the chapel of St. John the Evangelist is through the shrine of St. Erasmus which has a lovely little doorway of the age of Richard II., which leaves little to be wished for either in form, light and shade, or colour. The tabernacle work over this doorway is also exceedingly delicate and beautiful, and of the same date.

Within the chapel of St. John the Evangelist is a fine bit of conventional carving in what remains of the old wall arching under the commonplace Perpendicular arch which covers the Vaughan tomb. Two bays off is a naturalistic treatment of the spandrel. It is interesting and instructive to compare the two.

On those of you who have visited Italy probably nothing which came down intact from Medieval times has made a deeper impression than the splendid mosaic pavements of the class called *Opus Alexandrinum*, composed of slabs of porphyry and serpentine, surrounded by mosaics of these two now precious marbles, and palomino, arranged geometrically and divided by bands of cipollino or other greyish-white marble. In fact, many a noble church that has lost every other trace of its original art, in the degrading changes which it has undergone during the last two or three centuries, has still its pavement of *Opus Alexandrinum* in a nearly perfect state.

The porphyry, of a deep purple red, was brought by the ancients from Egypt for their columns. These were sawn up by the Medieval mosaicist into slices for his work. The serpentine, of a deep green, is of the same formation geologically as porphyry, and was found in nodules in the mountains of Laconia. The palomino is a white marble, in colour like chalk, but extremely hard. It is found near Assisi and in Sicily. These three marbles, from their hardness, formed an almost imperishable pavement; from their colours a brilliant contrast; in fact, they serve to give emphasis to each other; while the cipollino, white with greenish grey stripes, forms an admirable setting for their more decided tones, so that nothing can be imagined more brilliant, and, at the same time, more refined than this work, which was always worked in geometric patterns of the severest type.

Little wonder that Abbot Ware, when in Rome, was attracted by its beauties, and decided to have a specimen at Westminster, in front of

* Mr. Scott has kindly lent me two of his father's drawings illustrating this groining.

the altar. He appears to have brought over two artists, Odericus to do the pavement, and the before-mentioned Petrus for the glass mosaic of the shrine. He must have brought home with him also the porphyry, the serpentine, and the palomino.

The Westminster work, however, presents some peculiarities not found in any Italian example. In the first place, there was no cipollino forthcoming, and so recourse was had to Purbeck, which was a not altogether satisfactory substitute, being a trifle too sombre in colour, and liable to decay in our damp climate. Then there was an inscription in brass letters imbedded in the Purbeck, and as the workmen were without large slabs of porphyry and serpentine, the eyes of the larger circles were composed themselves of mosaic, and in some parts glass mosaic took the place of marble. This pavement has suffered from later restorations and repairs.

In Edward I.'s time there was another importation of tessere for the pavement of the Confessor's chapel, which was laid, in all probability, by English workmen. The ground of Purbeck occupies the greater portion of the surface, the sinkings for the mosaic, which has now unhappily in great measure gone, being formed of a pattern composed of circles and scrolls intertwined.

I may here mention that I was so fortunate some years ago as to discover some rough blocks of porphyry in the area of a house in Belgravia, very near the abbey. These were given me by the owner, and I used them in the pavement of the vestibule of the Manchester Town Hall.

I regret not being able to read my remarks about the tabernacle and the coronation chair, because Mr. Scott has kindly lent me Mr. Stacey Marks's very exact and interesting copy of one of the subjects on that remarkable altar-piece of the fourteenth century, and a facsimile of a portion of the beautiful gliding on gesso at the back of the chair.

The rovestry is a curious and little visited apartment opening out of the south transept, from which it was separated by three doors,—one of which was covered with human skins, traditionally of the Danes, but more probably with those of wretches who had committed sacrilege, and who were thus exposed as a deterrent to other would-be deprecators. The groining of the rovestry is curious and interesting, being very irregular from the peculiar plan of the room, wedged in, as it is, among the great buttresses of the abbey. It contains also the low bridge which the sleepy monks had to traverse to get from their dormitory to the church, to the floor of which they descended by a winding staircase which formerly existed in the corner of the transept. You will see the door and beginning of stairs in your print of the south transept.

Another door, covered with human skins both within and without, was discovered by Scott in the narrow space south of the entrance to the Chapter-house, marking it, he thinks, as the entrance to the Pyx Chapel, used as the treasury of Edward I., from whence a round 100,000*l.* was abstracted in his reign. One word as to the old glass. There is no contemporary glass left, I believe, except the three splendid clearestory windows over the apex, the west window of the south aisle, and a bit of grisaille in the triforium taken out of a window in the Chapel of St. Nicholas.

Scott tells us that in his restoration of the Chapter-house the only parts conjectured were the parapet, pinnacles, the gables of the buttresses, and the roof. There is a curious point in connexion with the west window of the Chapter-house. Before the restoration this window was entirely walled up with fragments of the ruined vaulting shafts. When Sir Gilbert removed them the sill was revealed with seatings for four mullions instead of three, as in the other windows, and Scott gives a very good reason for this, that the window being so short would have looked out of proportion had the mullions been so far apart; and so, in his design for the restoration, he shows a window slightly different from the rest, of five vertical divisions, the circle in its head being necessarily larger, and having eight foils instead of six. What was my surprise, therefore, to find that in execution the window was made precisely like the rest, so far as its tracery was concerned, and in Scott's "Recollections" I find the reason. All the windows have ancient iron ties at their springings of round iron, flattened where they pass through the mullions. In the west, or

shortened window, the tie was discovered, though the tracery was lost, and this tie was flattened like the rest, for three mullions, not four. It was clear, moreover, from fragments of tracery found, that the window had been renewed by Abbot Byrcheston, circa 1345, when he rebuilt the bays of the cloisters, opposite the Chapter-house entrance. It is probable, therefore, that he thought five lights more beautiful than four, and so made his window, though he left the iron tie; while Scott, though agreeing with him, went back in his restoration to the original setting out. This is an illustration of the different spirit which actuated the architects of the fourteenth and nineteenth centuries: both to be commended in their way. Byrcheston tried to improve upon the work of Waro a century before. Scott's critical eye is not allowed to guide his judgment, when he discovers the intention of the original builder of the glorious Chapter-house, with reverent hand he replaced the work as he had reason to believe the builder left it.

In this spirit I trust we shall approach Westminster Abbey, reserving the exercise of our imaginations, our creative faculties, for new buildings; be content at Westminster to keep the structure in thorough repair, but precisely as its builders bequeathed it to us, and so hand down to our children unimpaired the most beautiful and most interesting national monument of which England is ever likely to boast.

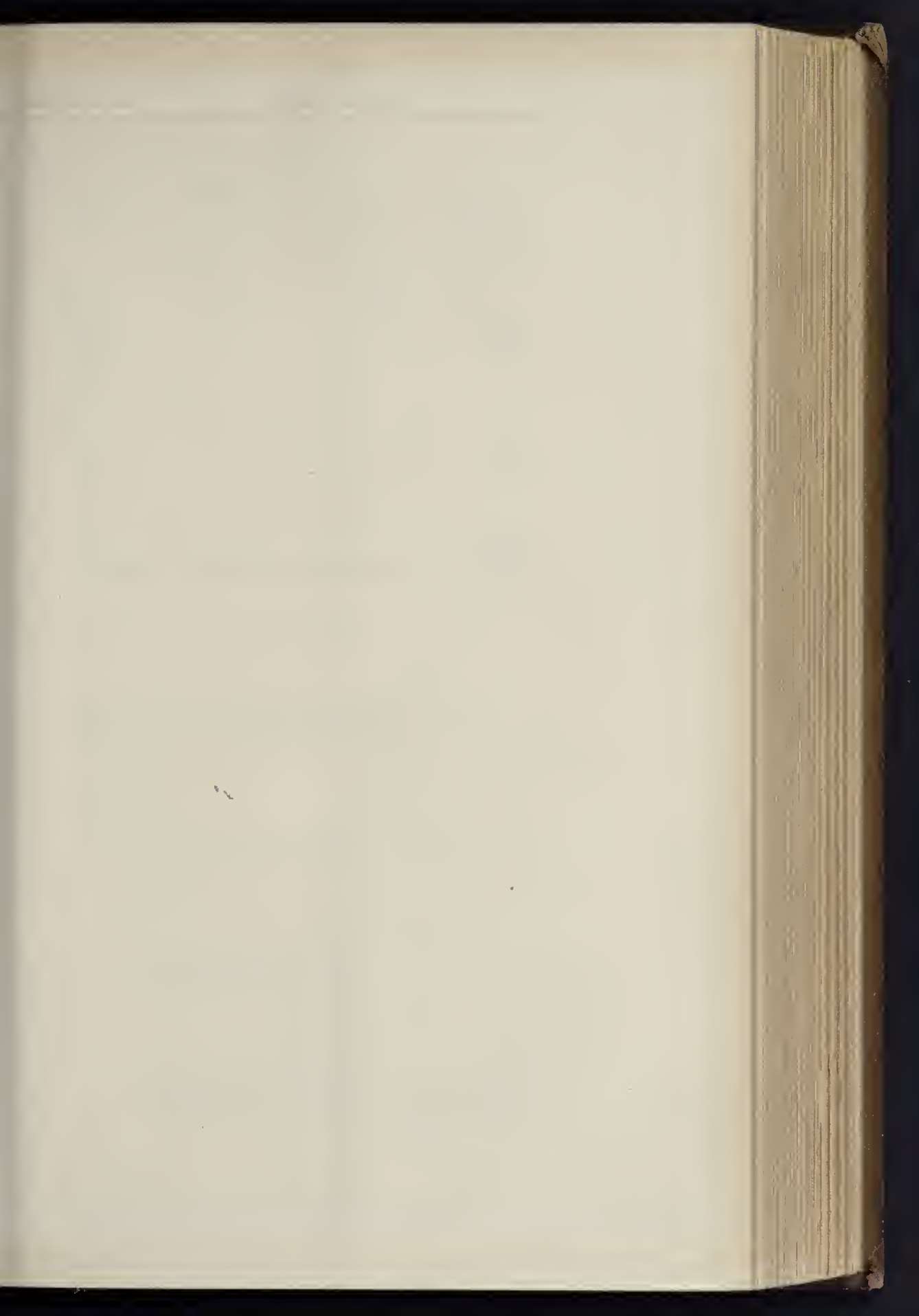
One word more to the students of architecture here. You will observe that though, through the kindness of my friends, I have been able to show a great number of illustrations, many of them of a very high order, of detached portions of the abbey, I have not produced any large plan of the church, nor complete sections through it showing the roof and the flying buttresses. The only plans I know of are those in Scott's "Gleanings," from which the small plan in your hands is taken, and the one in Neale's beautiful work on the abbey, the views in which work, however, are of a pictorial character, which fail in giving accurately either the proportions of the architecture or its details. Is it not to be regretted that we have no comprehensive, accurately-measured drawings of this splendid building to refer to?

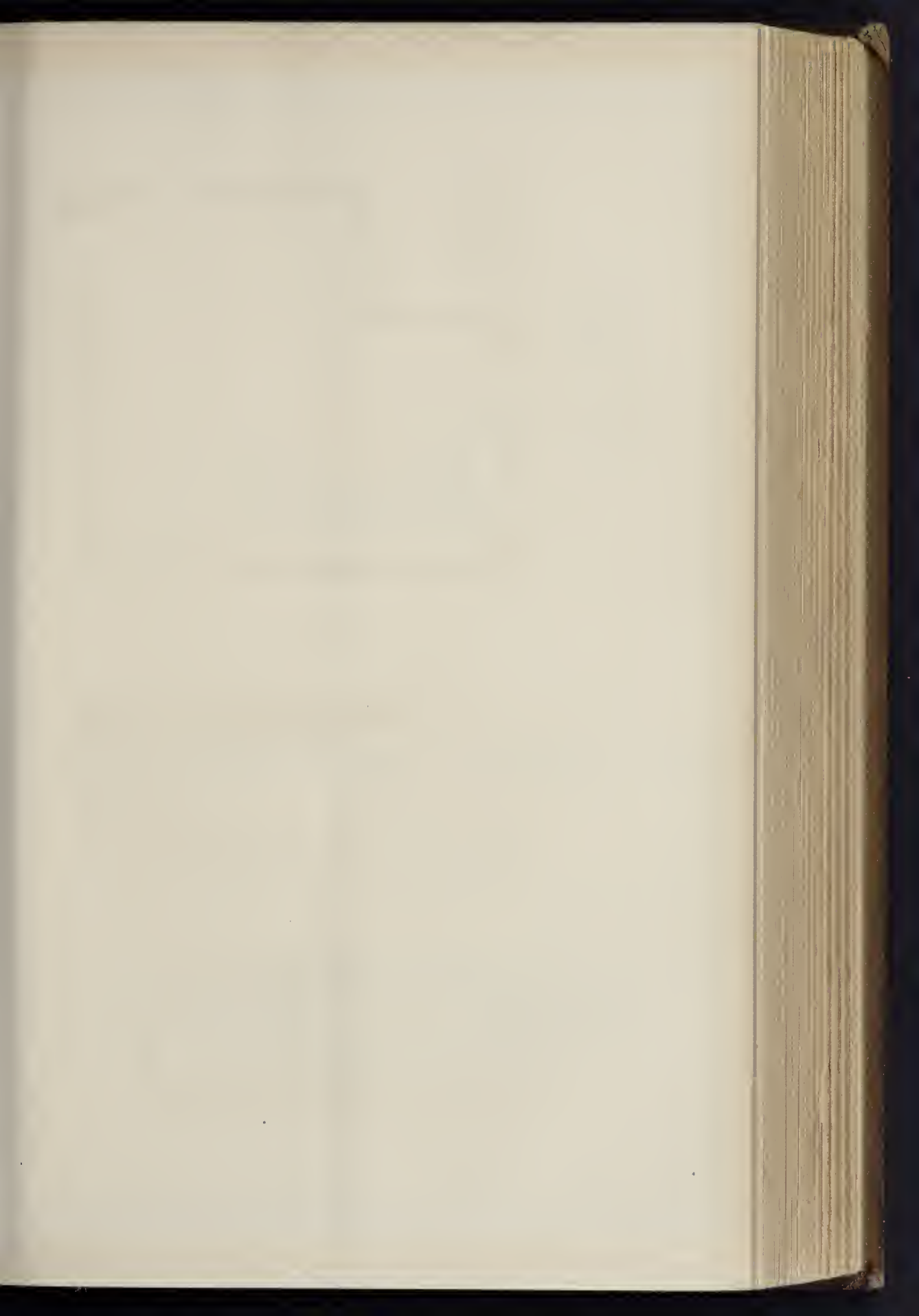
You know the admirable result of Mr. Neale's labours at St. Alban's. He was himself an Academy student, owing his entrance here as probationer to a measured drawing of a bay of that church, and it was due to the encouragement he received here that he produced his magnificent work, for which he obtained 300*l.* subscribers, and which gained him the Pugin Studentship of the Institute of Architects.

Coming back to our Abbey of Westminster, it is evident that the Royal Academy students of the past must have the credit of having produced the best delineations of detached portions. Now, why should not the present students follow Mr. Neale's illustrious example and have the high honour of giving to the world the first complete set of measured drawings of the abbey? Believe me, the task, if divided among you, would not be superhuman. No work could be more delightful, none more improving to those who undertake it, and none of greater advantage to the profession to which we all have the honour to belong.

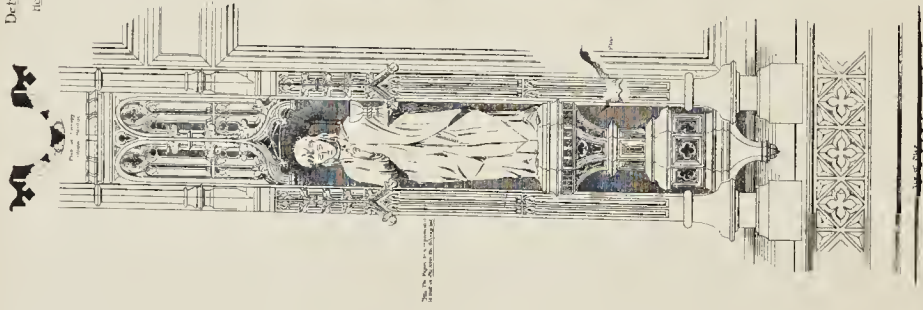
Abingdon Corn Exchange and Cattle Market Competition.—The Corporation, assisted by Professor Hayter Lewis, of London, have selected the design "Bonh Fida," by Mr. C. Bell, of New Broad street, London, out of nine designs submitted, the design bearing the motto "No Fac Nisi Bene Facias," of Mr. J. G. T. West, of Abingdon, being placed second, "Commodatis" by Mr. Quilter, taking the third place, and "Z," by Mr. Cobb, the fourth. A correspondent says:—"It is simply a case of the old tale over again, of requiring more than could possibly be had for the money, if well done. The Corporation generously reward the second, third, and fourth men with premiums of 5*l.*, 3*l.*, and 2*l.* respectively."

Herbert House, Belgravia.—Messrs. Banner Bros. & Co., of Billiter-square, have been commissioned to entirely overhaul the sanitary arrangements of Herbert House, Belgravia, the town residence of Lady Herbert de Lea, and substitute the "Banner System" throughout. The work is being carried out under the superintendence of Mr. A. E. Hubert, C.E., Messrs. Banner's engineer.

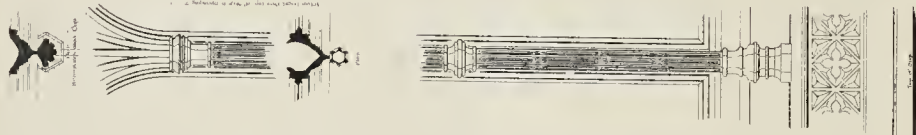




Details of Screen
Half Real Size

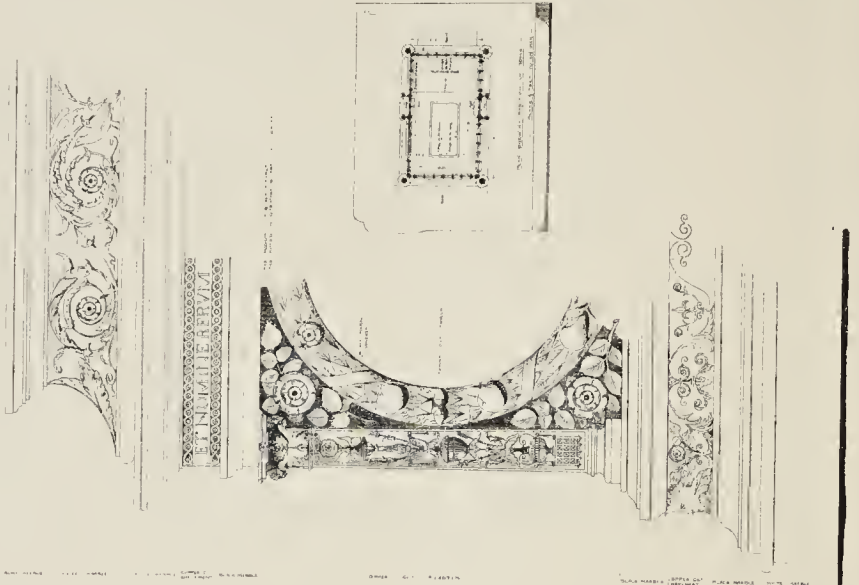


From the Screen at St. Dunstons

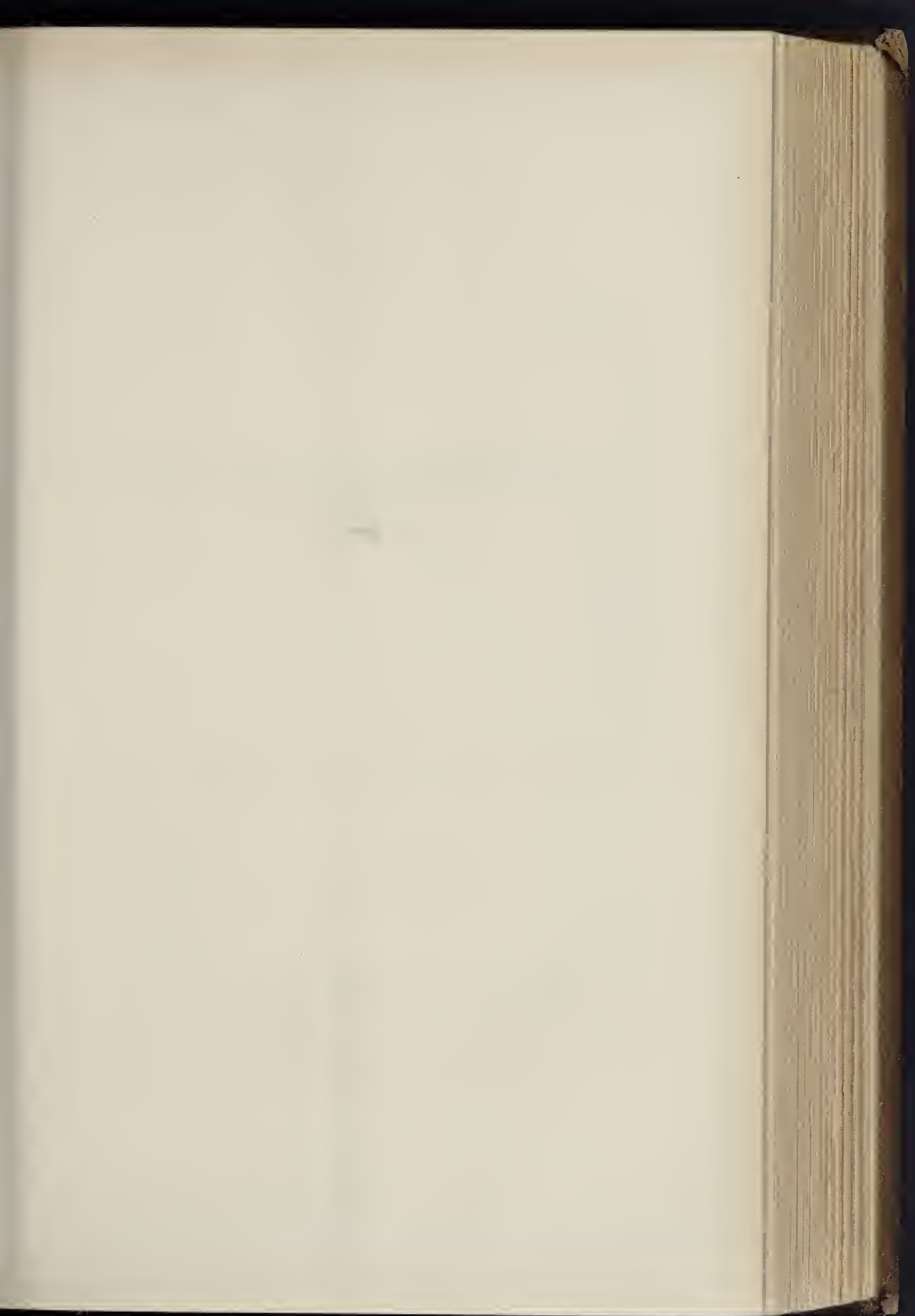


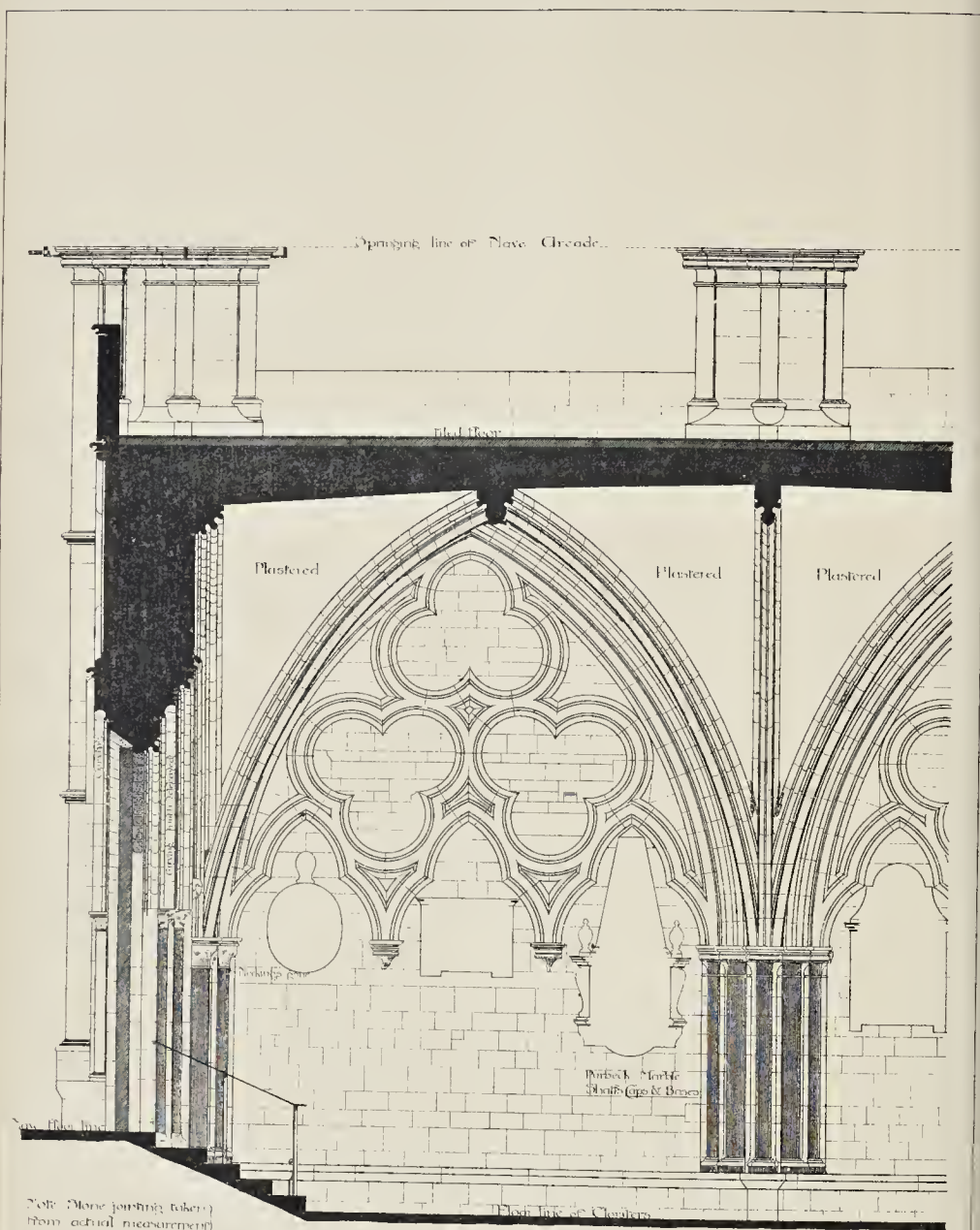
From the Screen at St. Dunstons

DETAIL OF TOMB
Half Real Size



MEASURED AND DRAWN BY MR. H. P. CRESWELL.





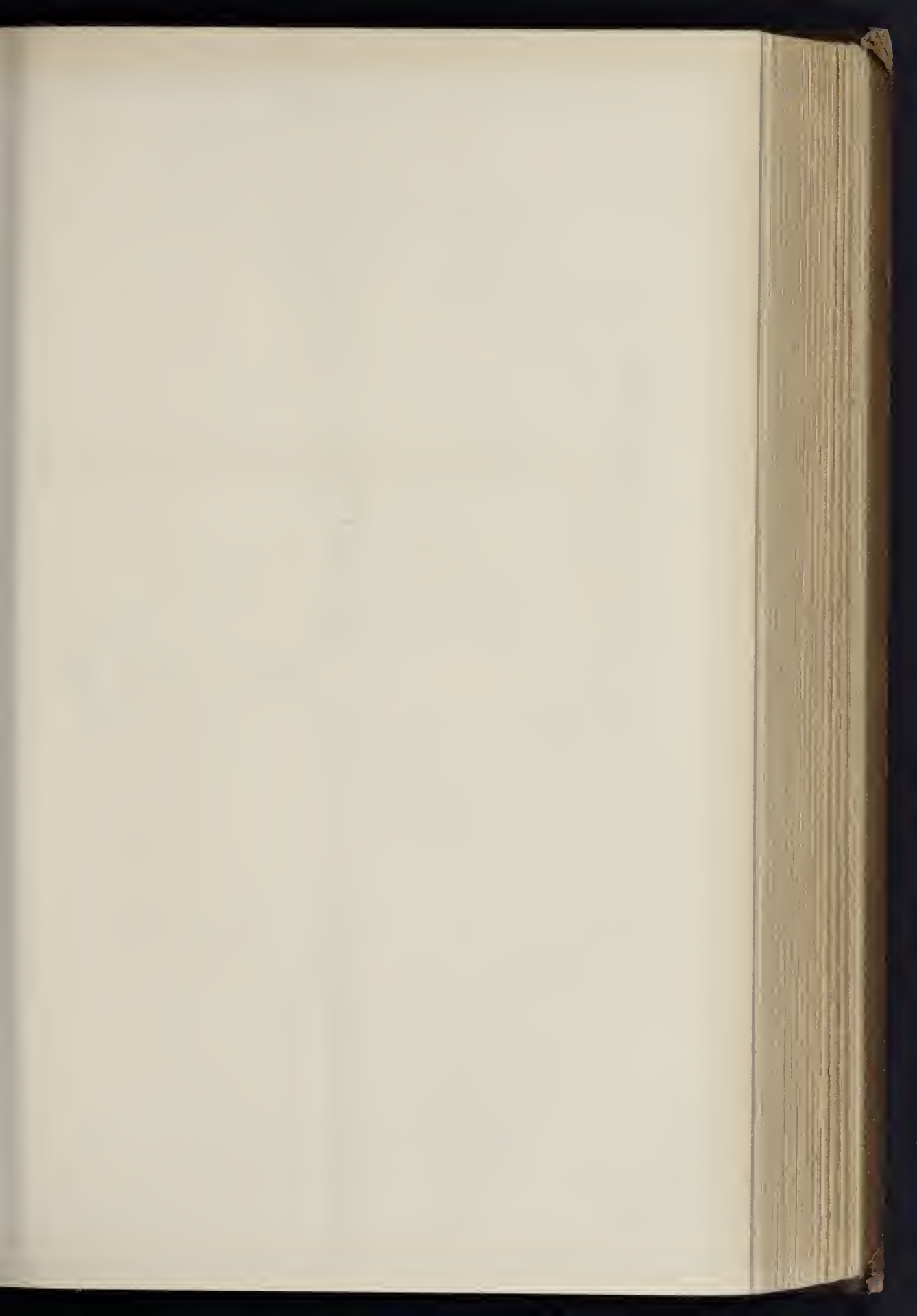
Transverse Section looking East

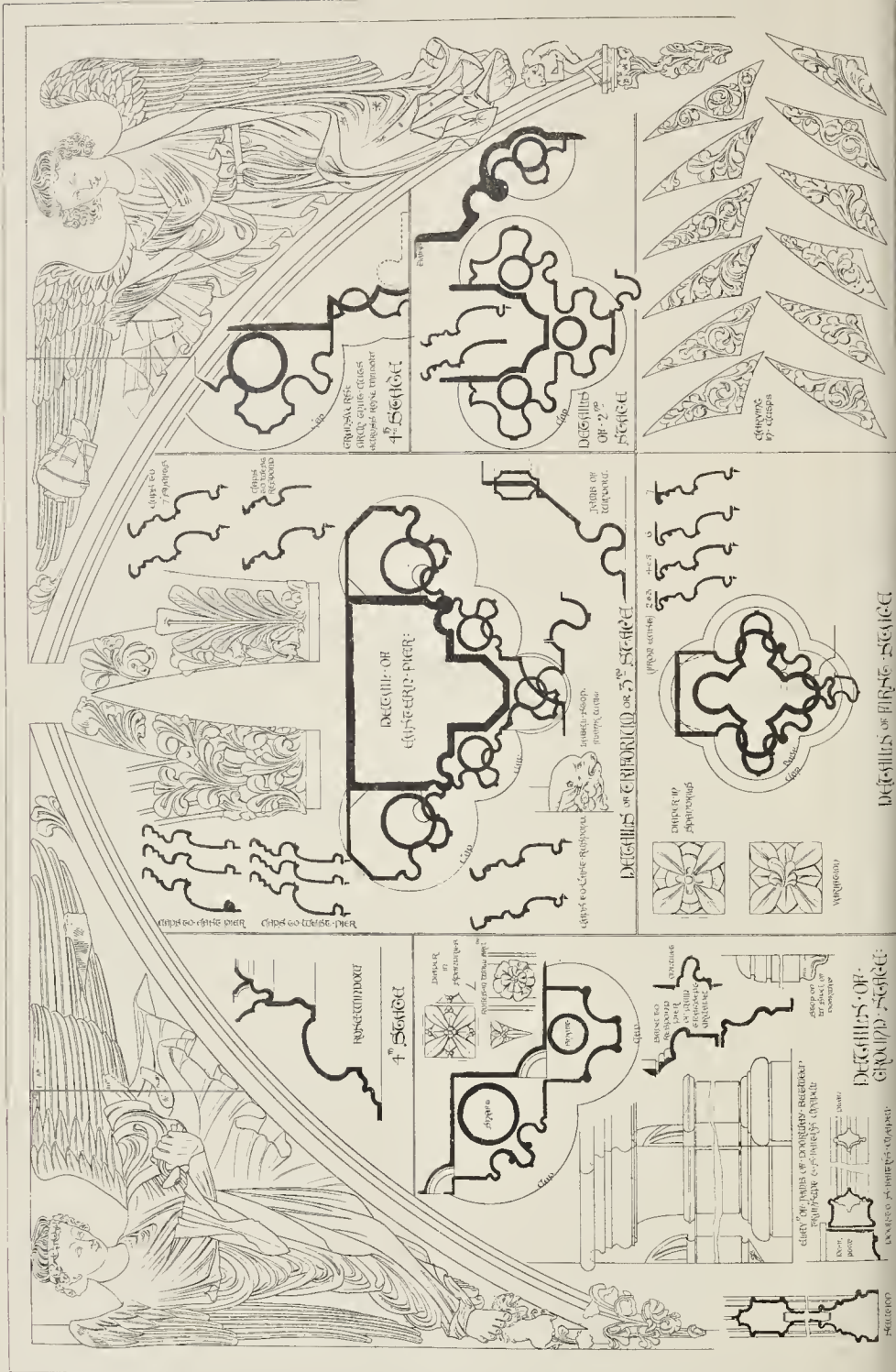
MEASURED AND DRAWN BY MR. THOMAS MCLAREN.

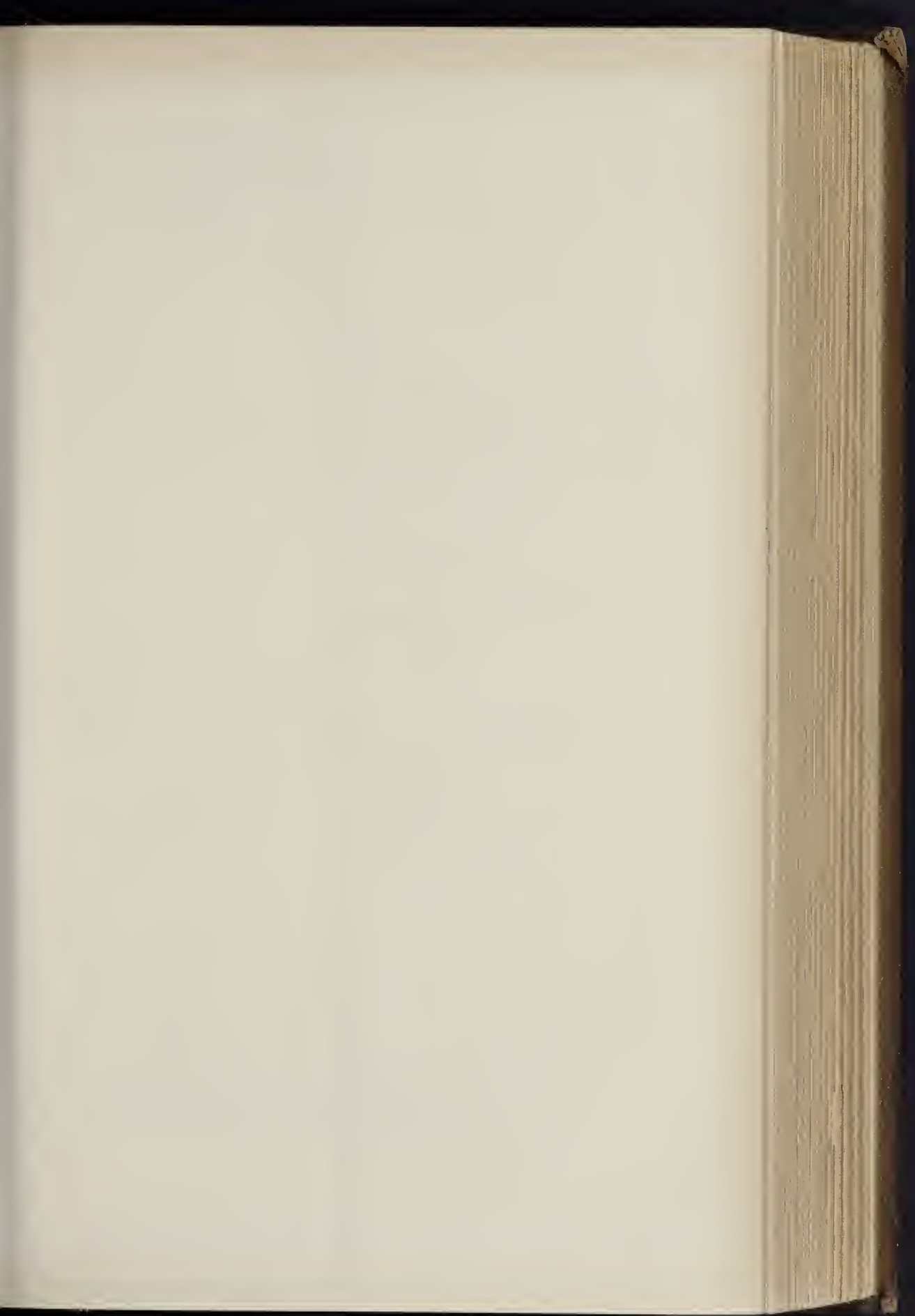
PUGIN TRAVELLING STUDENTSHIP, 1885, MEDAL OF MERIT.

F. Kelly Photo Litho & Engraver, 8, Castle St., Holborn, London, E.C.

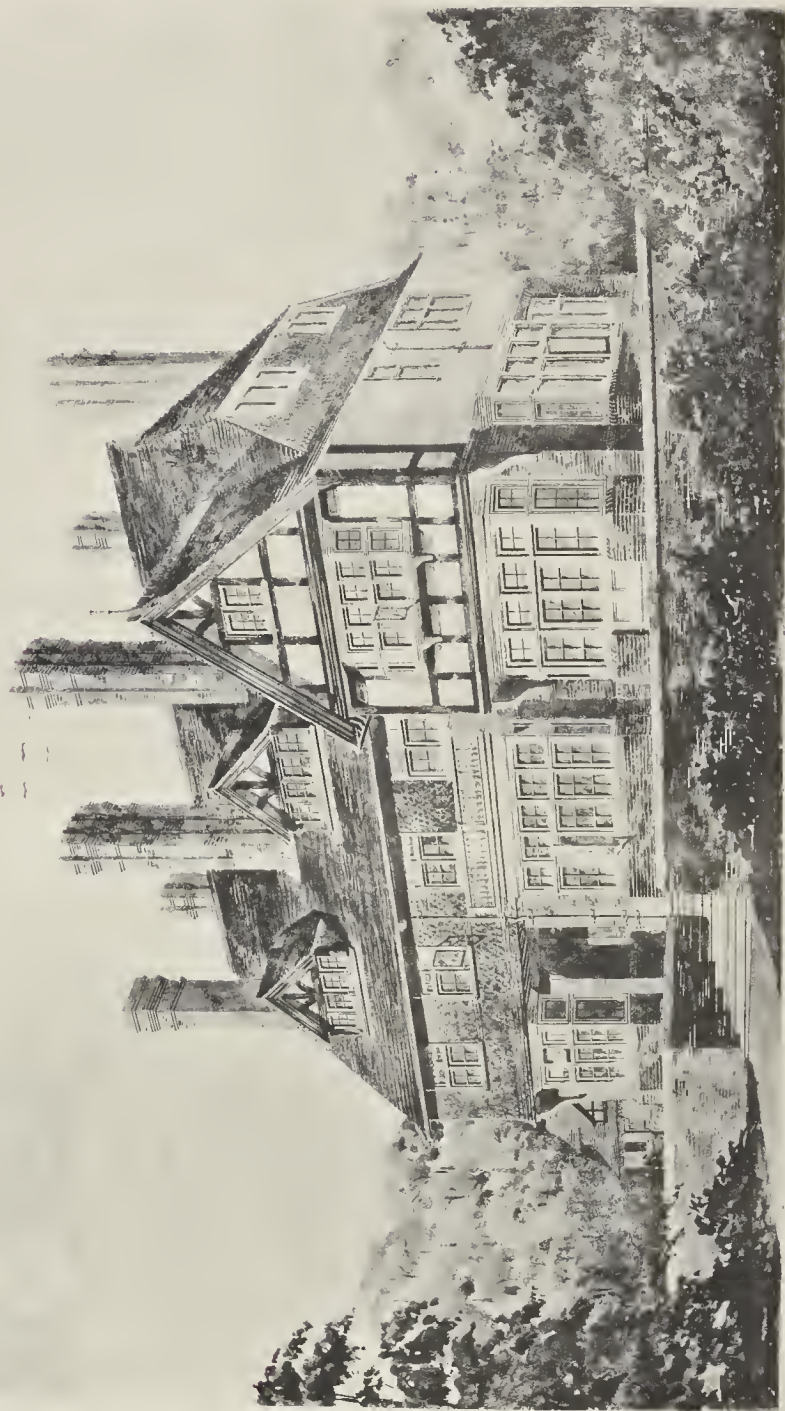
WESTMINSTER ABBEY, TWO EASTERN BAYS: NORTH WALK OF CLOISTERS.







THE BUILDER, MARCH 14, 1885.

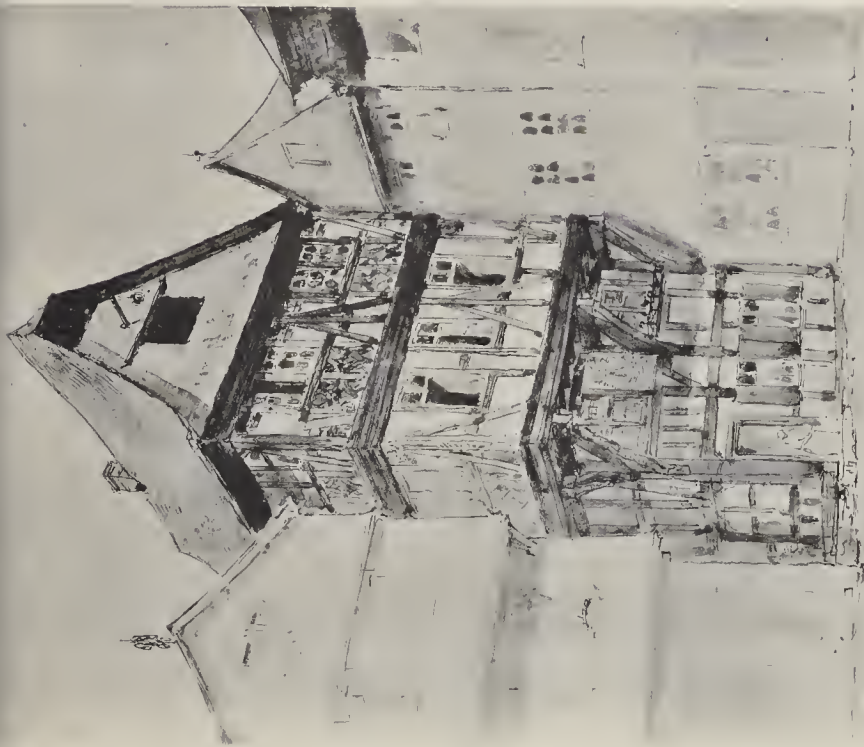


Photocopy, Hatcher & Sons Limited, London.

PROPOSED HOUSE.—WARGRAVE-ON-THAMES.

MR. W. H. ATEN BERRY, A.R.I.B.A., ARCHITECT.

Reproduced by 'Photocopy' from the Architect's Drawing.



*Old House in
Market Place
Boppard, Rhine*

Photograph, Water & Son

OLD HOUSE, BOPPARD.



*Old House of
Cochen on Rhine*

OLD HOUSE, COCHEN.

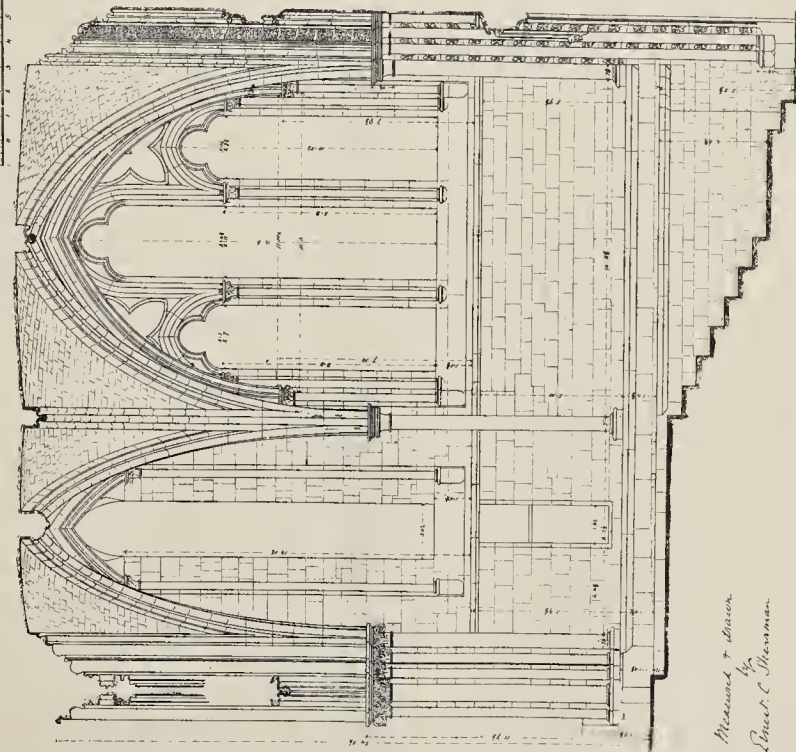
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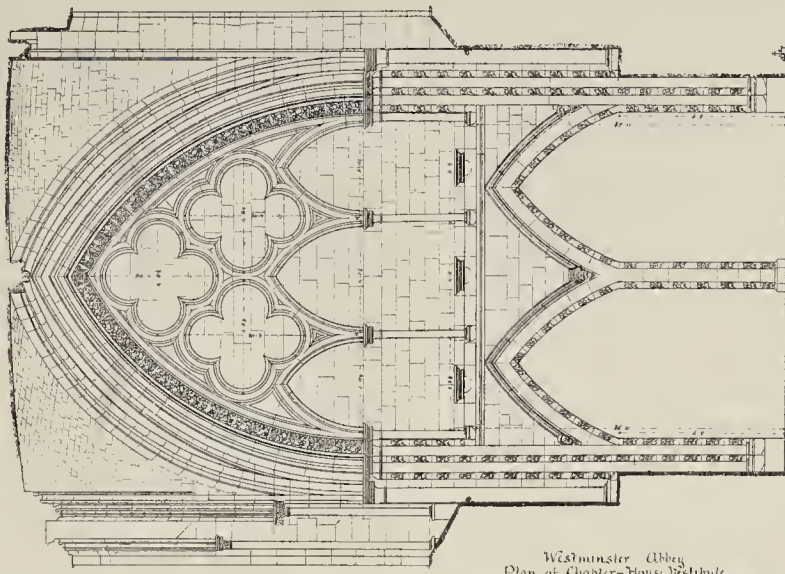
WESMINSTER ABBEY
INNER VESIBULE
CHAPTER HOUSE

SCALE OF FEET



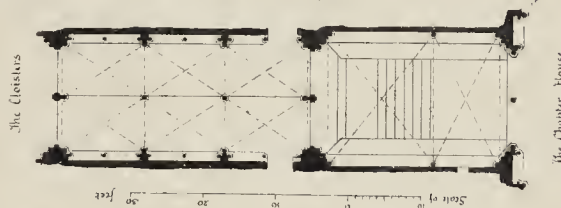
LONGITUDINAL SECTION LOOKING SOUTH

Measured & drawn
By
Domet C. Mannan



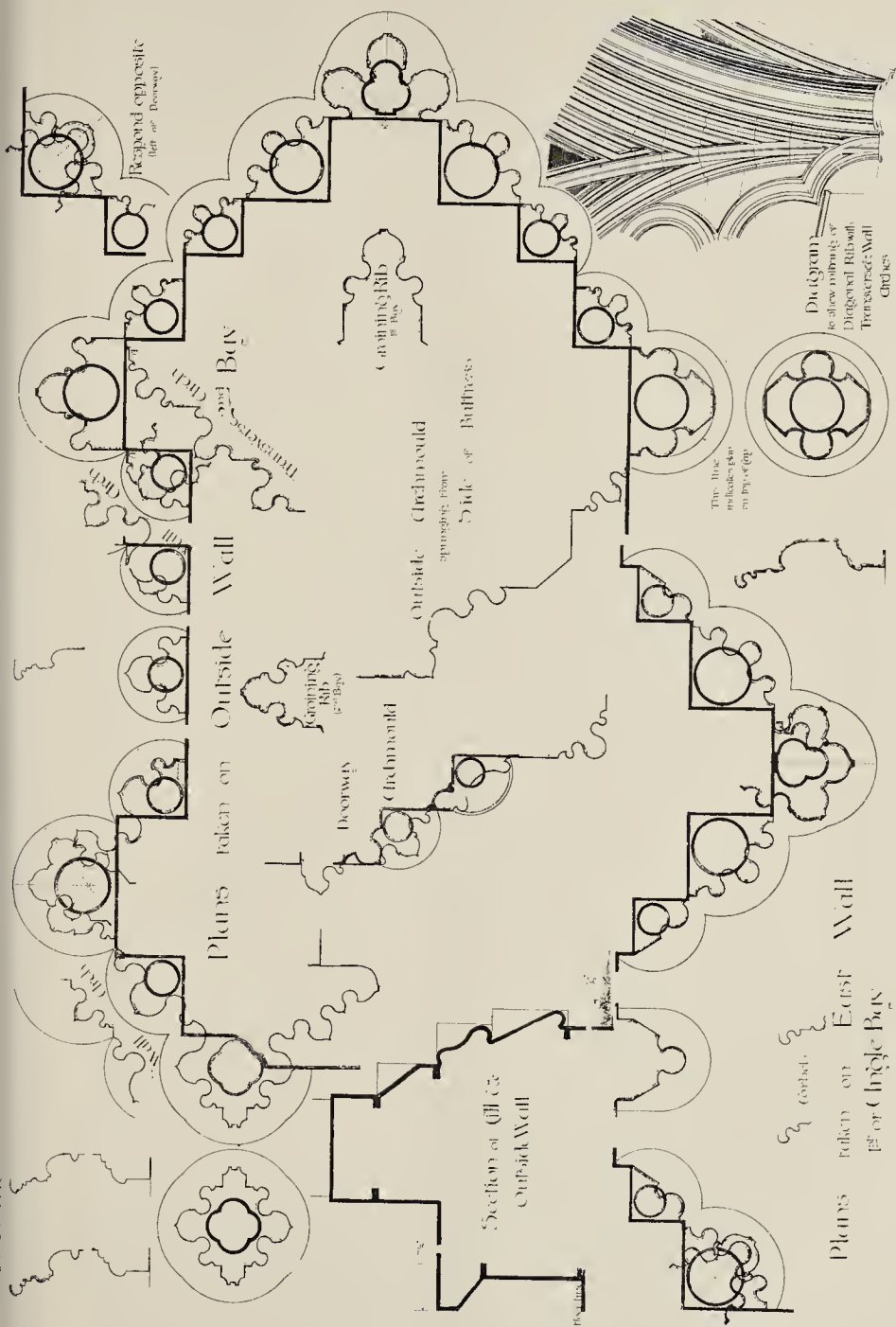
GRAND REVERSE SECTION LOOKING WEST

Westminster Abbey
Plan of Chapter-House Vestibule.



The Chapter House

The Chapter House



MEASURED AND DRAWN BY MR. THOMAS McLAREN.

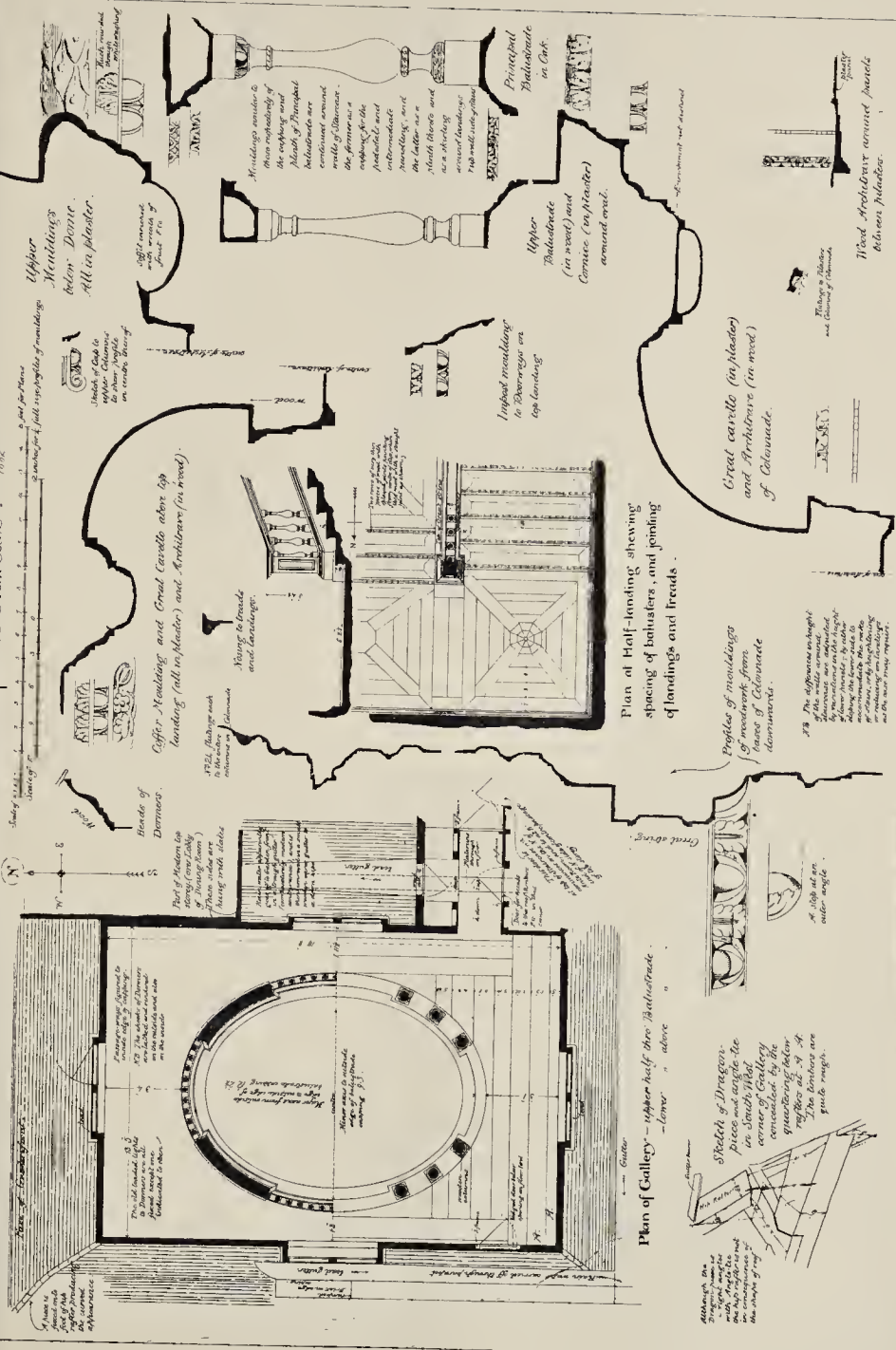
Published by the Architectural Library, 1885, Medal of Merit.

WESTMINSTER ABBEY, TWO EASTERN BAYS: NORTH WALK OF CLOISTERS

PUGIN TRAVELLING STUDENTSHIP, 1885, MEDAL OF MERIT.

Ashburnham House, Westminster. Details of The Staircase.

1922



MEASURED AND DRAWN BY MR. HARRY SIRR

ASHBURNHAM HOUSE, WESTMINSTER.

Sketch of Dragon's Piece - see also the corner of Gallery - surrounded by the quartering below - see at 2. A. A. - see rough.

The difference in height of the walls around by the cornice on the top of the balustrade is due to the cornice being of a different height than the wall.

Great cavetto (in plaster) and Architrave (in wood) of Colonnade.

Wood Architrave around panels below balustrade.

Upper Mantelcase below Doors. All in plaster.

Handings similar to the upper half of the balustrade of the balustrade are continued around the cornice in a coping for the balustrade and the latter are placed above and around the balustrade as a coping around the balustrade. Top wall into plaster.

Principal Balustrade in Oak.

Upper Balustrade (in wood) and Cornice (in plaster) around oval.

Impetal moulding in stone on top landing.

Plan of Half-landing showing spacing of balusters, and joining of landings and treads.

Profile of mouldings of woodwork from base of Colonnade downwards.

Plan of Gallery - upper half the Balustrade - lower " above.

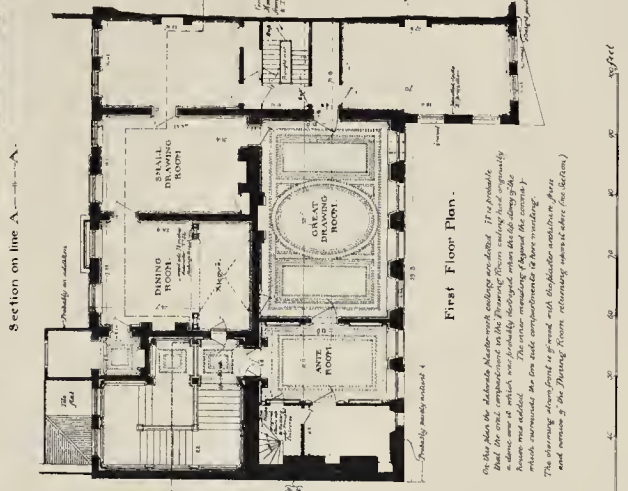
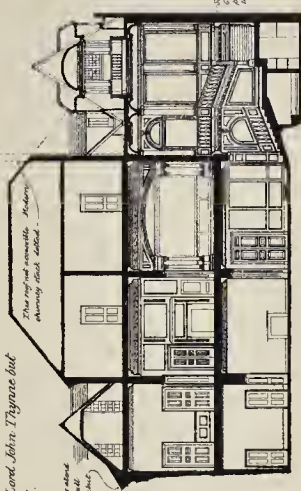
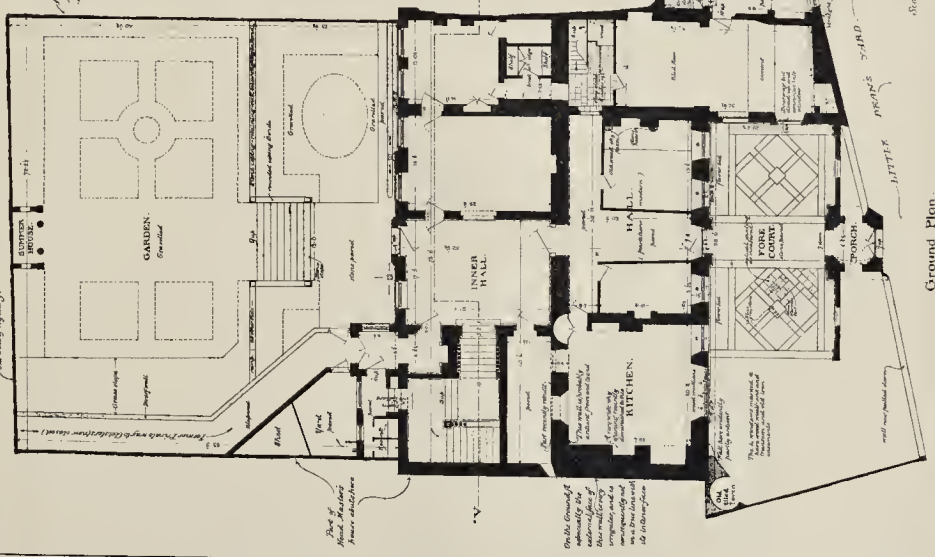
Although the dragon's piece is not a perfect circle, the circumference of the circle of 17 ft.

G. F. Meill, Photo-Litho, Care of St. Dunstons, London, E.C.

Ashburnham House : Westminster .

Formerly the Residence of The Earl of Arundel, John Thynne but now converted into Westminster School.

SOUTH CLOSETTA WALK



After visits to the house in 1881 and 1882, the architect proposed a plan which, although differing slightly from the original, was approved in 1883. The house is undergoing alterations, but no notice is taken on these plans of any alterations effected since June 1882. Plans have been added in garden on Ground Plan. All floor use of wood except where otherwise expressed, in plans in writing. On the plan a single line shows wood panelled and a double line shows wood panelled and a second line shows wood panelled where shavings were used.

The house is evidently built upon the site of the old Manorial Buildings and some of the old walls have been apparently utilised. It is impossible to discover to what extent as there is so much paneling, but such walls as appear to be ancient are noted on the Ground Plan. "Hearth" walls have probably been walls raised upon them above the Ground story.

On the plan the kitchen is probably a later addition. It is possible that the small compartment on the right side of the kitchen was at which was probably destroyed when the old wing of the house was added. The iron mantelpiece against the chimney is a later addition. The site of the chimney is shown and remains in the Dining Room extending upwards to the roof.

MEASURED AND DRAWN BY MR. HARRY SIRR

ASHBURNHAM HOUSE, WESTMINSTER.

C. F. Red, Plasterer & Painter, 4, Castle St. Ballinacorney, London E.C.

Illustrations.

IGN FOR A HOUSE AT WARGRAVE. ON-THAMES.

THE illustration shows the Terrace-Front overlooking Wargrave and the river. The site being high and exposed, and materials proposed, hollow walls are provided, the upper portions being faced with her-tiling and rough-cast. The half-erling, roofs, details of windows, &c., are especially contrived to meet the circumstances of the exposed situation. The design by Mr. W. H. Atkin Berry, A.R.I.B.A., of Dover-street, W.C., and the illustration is production by photo-print from his drawing, which was in the Royal Academy Exhibition of year.

D HOUSES, BOPARD AND COCHEN.

These picturesque examples of German half-erling houses, are reproduced by Messrs. Perlow's "photo-print" process, from original or-colour sketches by Mr. W. J. N. Millard.

THE TOMB OF HENRY VII.

Among the Westminster Abbey illustrations presented with Mr. Waterhouse's lecture, we last week Mr. Cresswell's drawings of Henry VII.'s Tomb, and this week some details, in reference to which Mr. Cresswell sends following remarks:—

The screen and tomb of Henry VII., generally attributed to Torregiano, were completed in 1519, years after the king's death, and may be taken as an exact point,—at which the Gothic style was superseded by the Classic revival; a screen enclosing the chantry being a most important example of Late Gothic, whilst the tomb itself displays the most refined Classicism. It is not the fact that the style is so recent, I should think it very doubtful whether Torregiano was in any way responsible for the design of the screen, even if he was concerned in its erection, inasmuch as we find evidence made to it in the will of Henry VII., directing that the tomb should be surrounded 'a closure of copper and gylte, after the fashion that we have begone.' This would tend to point to the fact that the design, at all times, was fairly settled before the king's death.

The screen was adorned externally with six brass statues, gilt, of saints, of which six remain, and is also profusely decorated with the badges of the two rival Houses of York and Lancaster, so auspiciously united in the marriage of the King with Elizabeth of York; and finally there formerly stood, at the east end, a tall altar, dedicated to "Our Saviour Jesus Christ," above which the rood beam still remains, though the panelled canopy, of which there are evidences, and the cross itself, have since disappeared.

In the matter of construction the hexagonal screen at the four angles play a very important part, as, according to the late William Burgess, they carry iron beams concealed in the cove of cornice, upon which the upper portion of screen depends for support, additional strength being imparted by the wide transoms—way up, whilst the stability of the whole is materially assisted by the two projecting piers. The continuous inscription which is round on the transoms just mentioned is a beautiful example of Late Gothic character, and the initials in Latin hexamer lines the various names of the deceased monarch.

In the tomb itself, which is of black and red marble, with copper gilt enrichments, are fine effigies of the king and queen, also upper gilt, the hands together in the attitude of prayer, with supporting angels at each corner, *bas-reliefs* on the sides,—three to the north and three to the south,—the royal arms, and supporters, being at each end.

There is an interesting story told to the effect that Torregiano was anxious to obtain the sanction of Benvenuto Cellini in the execution of his work, and wrote making him liberal proposals, and holding out the prospect of future employment. Cellini, who was then at the court of Francis I., seems to have entertained proposals favourably at first, until he learned that Torregiano had carried his quarrel with Michelangelo so far as to have struck this great

man, an act of sacrilege in Cellini's eyes which nothing could palliate; he then at once declined all further communication."

References to the other drawings from Westminster Abbey will be found in Mr. Waterhouse's Academy lecture, the conclusion of which we give this week.

ASHBURNHAM HOUSE.

THESE measured drawings of Ashburnham House, by Mr. Harry Sirm, formed a portion of the illustrations to Mr. G. Aitchison's Royal Academy lecture on "Staircases," and are here published with the same object of illustrating the lecture, which is reported elsewhere. We may add that a view of the staircase, from a drawing by Mr. Brewer, will be found in the *Builder* for January 14, 1882.

ON STAIRCASES.

THE first of two lectures on this subject was delivered on the 2nd instant to the students of the Royal Academy, by Mr. G. Aitchison, A.R.A., who said that the history of stairs and staircases might be interesting from an antiquarian and ethnological point of view, but here it was the practical question of how they could be made better and more beautiful than heretofore. The steps found in the rocks probably suggested to some pre-historic genius an easy means of conquering steepness. That steps were known at an early time was shown in the rock-cut temples of Egypt. The chronology of Egypt professed to begin 3,500 years before our era; the kingdom of the Pharaohs dated from 1830 to 1312 B.C., and it was to the latter period that the rock-cut tombs with steps and the staircases in the Palace of Rameses belonged. The Chaldean temples, too, were supposed to have had grand flights of steps. The early chronologies were somewhat vague, some giving the date of 1635 B.C., other 1571, and even 1312 B.C., as the date of the birth of Moses; when steps were first mentioned in the Bible it was after the flight from Egypt. Whether Jacob's Ladder was a flight of steps, or a ladder, he would leave the learned to decide. Solomon's birth was said to have been somewhere about 1000 B.C., and they read that when the Queen of Sheba had seen the house which he had built, "and his ascent by which he went up into the House of the Lord, there was no more spirit in her." Then, as now, the employer, and not the architect, got the credit! Persia was probably the country where flights of magnificent steps were principally to be seen, evidently used to give dignity and impressiveness to the buildings. Those in front of the great walled plateau of Persepolis were 34 ft. high. The Palaces of Darius and Xerxes had very fine staircases, which preceded but a little those to the Propylæa on the Acropolis, which must have been the most magnificent in the world. The vestibule at the top of these stairs was splendid and unique amongst Greek buildings; that is to say, amongst the most perfect architecture the world had seen, and which deserved some mention beyond the immediate purpose of the lecture. It was the building at the very acme of Athenian taste, and was looked on as the personification of Athenian supremacy. It was considered the gem of Athens, and united at once the most perfect simplicity, the greatest subtlety of composition, and the greatest originality of any Greek building that had come down to us. Placed on the crag platform of the Acropolis, it was the main feature of Athens, its stairs conferred imperial beauty on it, and gave dignity to the columns of its portico. Mr. Penrose had shown conclusively that the flanks had no pediment. Within the central portico and at right angles to it was a double row of Ionic columns, flanking the carriage-way. We have reason to wonder that such noble works should have been built in so short a time. Plutarch, writings 500 years afterwards, says "even now they have the freshness of modern buildings, and a bloom is diffused over them, as if they were animated with a spirit of perpetual youth and unfading elegance." By referring to Vitruvius they would find the way in which steps should be made. At the Propylæa and in other Greek temples there was a chase out on the bottom of the riser, and another on the back of the tread; the chase looking as if it were out

to catch the rain-water, when the rain ran down the riser, it was apparently caught by this channel. Mr. Penrose found there was no exit to these, so that after rain the channels were full of water. There were some curious points about these channels, some being worked on the riser, and some on both the tread and riser. His hearers might doubtless think that this would be more interesting to the mason than to the architect: still these matters were not so trivial, particularly as the material used was costly marble, and the superfluous marble left, which the chases marked, was to protect the face and edges. They might say that they could not be roused to enthusiasm about steps, but he would try to persuade them that much might be learned from such humble accessories. Was it not possible that these sinkings were found to give accent to the stages, and were eventually used for aesthetic purposes? The beauty of stairs depended on good proportion and the realisation of proper effect; the hand of a master could be traced in the smallest detail of a building. If the mouldings of a building were coarse and ill-proportioned it could be seen that the architect was a savage, although he might be a clever one. In the case of steps, when the treads were too narrow, the whole flight rose up before one like a wall, while, if the risers were too low, the lines which were the beauty of the steps were lost. When he first thought of this lecture he believed he had merely to go to the Institute or the British Museum Library to get full details of every flight of steps or grand staircase he had seen; but it was almost like digging for diamonds on Salisbury Plain! One example that had struck him as being most important, the *scalinata*, was not to be found, nor were there any details of those two grand staircases,—the one at the National Gallery and the other at the Royal Academy, when both were housed in Trafalgar-square. Nor was a plan of the staircase of Santa Maria in Ara Coeli to be found. If the competitors for the silver medal could be set to work on the great buildings of England, and if their drawings could be published or preserved and bound, what an important gallery of English architecture the Academy would possess! External staircases presented infinite possibilities of display, as one was not hampered by want of space or the fear of spoiling the interior arrangements of the building. The *scalinata*, or grand flight of steps, at Santa Trinità dei Monti in Rome, was certainly superb. It consisted of one grand straight flight with three landings, divided into three by square pedestals, the central portion being about three-fifths of the whole width, and above circular flights, the whole being crowned by the two-towered church of Santa Trinità dei Monti. Sir John Soane had evidently taken from this his suggestion for a Scala Regia, published in his work. Another splendid staircase in Rome was that leading to the Church of Santa Maria in Ara Coeli, built in 1348. However inferior in position this staircase might be, it to some extent suggested the magnificence of that to the Propylæa. Though the staircase at the Ara Coeli was not nearly so magnificent as the *scalinata*, it was, perhaps, more striking on account of its perfect simplicity. The art in the other was only too apparent, while the highest art was to conceal it. Every architect who looked at a perfect Doric temple must wish that he had lived before the Greeks, feeling sure that he would have done it in the same way. It looked so simple that it would seem as if he could have fallen on no other form than sublimity. In the same way, on first seeing the inside of the Pantheon one was almost angry with the nameless architect who had lighted the vast dome by a single eye, before one had the chance of doing so. He wished to impress on his audience the advantage of the infinite pains which must be taken, and of the self-denial to be exercised, if they hoped to produce the highest work which should live. Perhaps the most historic open-air staircase was that of the Giants at Venice. This *Scala dei Giganti*, with its two colossal statues of Mars and Neptune, was not the place of execution of the Doge Marino Falieri, as it was not then built. This staircase was a little over 13 ft. wide, and consisted of twenty-eight marble steps, with landings in the middle and at the top. In Mediæval times a large proportion of the staircases was in the open air, built on to or corbelled out from the wall, like that of the Bargello at Florence. There was

a very fine flight of the same sort at the Courts of Justice in Barcelona. This was a wide flight, like that of the Bargello, and at the top where it entered the arcade which surrounded the courtyard, the angle column on which the two arches would rest was suppressed, and there was nothing but a boss. Viollet-le-Duc gave a representation of an outside staircase leading to the ramparts at Carcassonne, which was of interest. The lecturer drew attention to several examples, of which drawings were displayed on the wall. One was an open-air staircase, with a pretty open-work Gothic balustrade, probably from Nuremberg. Another was a view of the Ripetta at Rome, showing a series of three steps and a landing,—a double curve on plan. These had been swept away by the foundations of a new bridge. The President had kindly lent him a sketch of the summer palpit at Jerusalem, and on the wall was a drawing of the celebrated staircase in the cathedral at Burgos, lent by Mr. O'Connor, which had so great a charm for painters. It was an inside staircase, with many of the features of an outside one. In Canterbury Cathedral would be found a noble flight of steps leading from the transept to the choir, which would have been effective if it had not led to dead wall. And here should be named Sir Charles Barry's magnificent stairs in Westminster Hall, stretching nearly across it. Nearly every considerable church or cathedral, both at home and abroad, has, or has had, a more or less imposing flight of steps. The fine open-air staircases of England were mostly to be found in the gardens and terraces of the Tudor and Elizabethan age. Sir Charles Barry was very successful with this form of garden and terrace staircase. In Italy there were numerous specimens of stairs in gardens and terraces. Before going further he would like to draw attention to the splendid flight of stairs by Wilkins to the portico of University College, London. This was well worth studying, and any who were looking forward to doing grand public buildings should spend some time in measuring it, and seeing how the grand effects were produced. To get these effects required commanding genius in arranging steps and staircases so that the proportion which would make them look well, and yet would not prevent their convenient use. This was done by making the risers shallow and the treads wide. Breadth was also of the first importance. Splendid specimens of staircases in gardens and terraces were to be found about Rome and its environs, and J. Gwilt was of opinion that the stairs at Versailles showed magnificence and artistic skill. Any one could now consult books on the subject, but there were so many points that even the best views would not give, that it was rash to speak of effects until they had judged of them with their own eyes. He would like, however, to refer to the beautiful garden and architectural effects of the Villa d'Este, near Tivoli. There was one rule which should not be lost sight of in outdoor steps,—that of giving each tread a slight fall to the nosing, so that the rain-water might run off. He never walked on the grand pier at Brighton without thinking what a fine street could be made from the square to the heights above, finishing with a grand flight of steps, and crowned with a some cathedral, town-hall, or museum. He was afraid that Londoners would have to wait for the crowning of their "Mons. Sacre;" Primrose Hill, with a grand flight of steps and a pulpit for addressing the people, before they could hope to rival the Propylæa at Athens or Santa Trinita dei Monti at Rome.

Mr. Aitchison's second lecture was delivered on Friday, the 6th inst. Mr. Aitchison said that staircases might be divided into the following classes; first, the corkscrew, lantern, winding or newel staircase, sometimes called a ryse; second, the straight staircase between two walls; third, those which went round two, three, or four sides of a rectilinear figure; fourth, a central ascent with two branches, &c.; fifth, the circular, semicircular, or oval well staircase; and, sixth, the compound staircase, with straight flights in conjunction with curves, &c. Properly speaking, the word "staircase" implied its own use, namely that of a case, hut, as was well known, a long flight of stairs out of doors would be called a staircase. Staircases were important features in buildings, as they presented opportunities for all that the architect, sculptor, and painter could do in the way of adornment, and

also for the effects due to light. Lighting from the whole ceiling, vault, or dome was the best, and there was a gravity and uniformity about this mode which caused it to surpass all others. The next best plan was a lantern, hut, if this were adopted, the vertical windows must be ample. Windows on the stairs or landings were dazzling to the eye, but a fine method of lighting was by recesses lighted from the top and partly from the sides, and screened from sight. Winding stairs were used throughout the Middle Ages, and captivated the leaders of the Renaissance. M. Viollet-le-Duc gave some examples of corkscrew stairs, and notably one from Mayence Cathedral. The celebrated screw staircase at the Louvre was another fine example. Mr. Aitchison then described the central staircase at Chambord, and also that in the courtyard of the Castle of Blois. A Greek, in the age of Pericles, would have considered this staircase barbaric, but its depth of shadow and relief conferred holdness and originality upon it. Inside, the newel had a moulded skirting, and was divided above into panels by slender shafts, the panels enriched with delicate arabesque. The staircase at Chambord, since the floors of the great hall had been removed, had a most surprising and astounding effect. One seemed to be in a lofty cathedral, with a piece of tabernacle work rising up through the roof. Though this staircase was not so rich as that at Blois, it was still very effective, and its fame even reached the ears of Palladio, who mentioned it in his book, though he thought it was a well staircase, and had four staircases rising one above another, instead of its being a newel staircase, with two stairways like those by Mr. Bodley at the School Board Office. Another celebrated circular staircase was the Scala Minelli, at Venice. In the leaning tower at Pisa the winding staircase went spirally up between the inner and outer walls, and, though devoid of ornament, was very striking. The great drawback of these newel staircases was the want of vista, and the truly royal staircase was the straight one. Of these he would mention that of Bernini at the Vatican, which had been managed with the most perfect art. The great objection to a columned staircase was the raking of the vault, which looked unsafe and unpleasant. Sir John Soane was aware of this fact, and in his royal staircase he got his vaults springing from a horizontal line by keeping the stairs within the stylobate. He must not omit to mention the Scala Santa, or holy staircase, of St. John Lateran, said to be the stairs of Pontius Pilate's house. It consisted of twenty-eight marble steps cased with wood, and a two-story building was erected to take this staircase, with four other staircases to meet the wants of the faithful. The Norman staircase leading to the school at Canterbury was a type of a common form used in the Middle Ages. It consisted of four large Norman columns, each with a square abacus; a wall about two-thirds of the height of the columns ran up on the rake, and was capped with a plain projecting coping. The shafts diminished in height as they went up the slope, so that their capitals were level, and the whole was covered with a pent-house roof.* He was very much struck with this when he first saw it, and his admiration had not diminished with time; indeed, it was one of the most effective small out-door staircases he had ever seen. The Normans were great architects and sculptors, and it seemed a pity that so much of their sculpture had been restored by those ingenious persons who should carve comic pipe-heads and umbrella-handles. In the third class he would mention Sir Charles Barry's staircases at the Reform Club and Bridgewater House, going round three sides of a square between walls. Mr. Ewan Christian wished him to remark that in every house a staircase between walls should be built, as it was the only fireproof staircase, and would save life in case of fire. Mr. Aitchison then drew attention to some drawings of the celebrated staircase by Inigo Jones at Ashburnham House, and of which Sir John Soane thought so highly that he had drawings of it specially made for his Academy lectures. From the inner hall, a low, plainly-panelled room, about 17 ft. by 23 ft., the visitor passed up a flight of ten steps in the middle of the west wall, and was landed in the

staircase-hall, where three more steps took him to the foot of the grand staircase. He found himself in an elegant hall, about 20 ft. high, 27 ft. 7 in. long, and 14 ft. wide, with two windows at his back. The walls on the first floor level were ornamented with Ionic pilasters. At the top of the stairs was a recess of about 15 ft. by 7 ft. 6 in., the lines of the hall being supported by two engaged columns and an isolated one in the middle, its pedestal forming that of the balustrade. The hall had a cove cornice, and in the centre of the ceiling was an oval lantern, domed at the top, supported by twelve Ionic colonnettes, grouped together in threes, and with balustrades between the groups. The grand staircase had but seventeen steps, one flight of nine, then a square landing, and then another flight of eight landing in the line of the columns forming the front to the recess. The landing in this recess, about 7 ft. 6 in. square, gave access to the dining-room and ante-room. The first flight was 5 ft. 8 in. wide; the second about 7 ft.; the risers being 5 in. high, and the treads 14 in. wide. It was difficult, even with the drawings, to convey the full effect of the art and ingenuity displayed. The low plain inner hall acted as a foil to the elegance and proportion of the staircase-hall. The 12 ft. 6 in. of height to the first floor, gained by three steps, was half cut off insensibly by the steps from the inner hall, and the three to the staircase floor. He doubted if anything so original as the lantern existed. It was constructed in common hipped roof, tiled, and with four dormers, and no one looking at its external homeliness would guess at the elegance within. The drawings of it were lent by Mr. Harry Sims. There used to be elegant staircases in some of the old City houses, but these had been swept away to make room for modern tasteless rubbish, built on the leasehold system. He hoped that some day the Academy would acknowledge the claims of architecture, and would extend its liberality to endowing a Professor of Construction, and thus remove the present reproach that the schools turned out draughtsmen and scene-painters, but not architects. The Palazzo Braschi at Rome contained a celebrated staircase going round three sides of a parallelogram with a well in the middle. The stairs were about 10 ft. wide, and the hall was lighted by three windows on one side, by windows in the cove, and a small skylight in the top. One point which had never been conquered in this kind of staircase was the distortion of the arches, but still there was one was a striking example. There was a similar one at Naples. The architectural details were poor, but the corridor had their windows facing the street, and when he saw it, on coming from London, struck him as a fine and original work. One of the finest staircases he knew was that of Christ Church, Oxford. A straight flight led to the hall, a few steps taking one to the Cathedral Close, another flight going to a small quadrangle, and then came the kitchen. The staircases were without number; this was a central flight with branches to the right and left. One of the finest in London was that of Station House, where the flights went round three sides of a magnificent hall with columns and corridors. The twin flights, however, had a parasitic look, like vines on an elm, and this was peculiar, as the general fault of such staircases was that all view of the ceiling above was obscured, so that it was sacrificed to the very moment when it should be most prominent. When magnificence and not economy of space had to be considered, these spiral flights should be enclosed between walls with double rows of columns and corridors. The bridge staircase was to be seen to perfection in the Comédie Française at Paris; and here the lecturer exhibited a drawing of the staircase at the Paris Grand Opera, designed by M. Charles Garnier, adding that the whole of this magnificent building afforded an example of revived Classic, sweetly proportioned, and yet distinctly French. Of the oval and circular staircases, a well-known example was that of the Palazzo Barbarini, with a riser of 4 in., and a tread of 11 ft. 7 in. There was also a circular staircase in the building of the Belyeders at the Vatican, the well being formed of eight single columns to each story.—Tuscan on the lower, and then Doric, Ionic, Corinthian, and Composite. Sir William Chambers had a similar

* A view of this staircase, from a drawing by Mr. G. H. M. Addison, will be found in the *Builder* for March 4, 1882.

Some of them are enabled to reproduce among photolithographic illustrations.

cular banging staircase in one of the wings of Somerset House, facing the Strand, is well worth looking at, and showed us a beautiful plan might produce a bad effect. The worst feature in it was the landing in the middle, making an ugly break in the spiral lines. Probably one of the most extraordinary compound staircases in existence is that designed by Michelangelo for the Vatican Library. It went from the hall to an upper library, and consisted of a central flight on the bevel with fifteen risers, and with staircase on either side. The steps curved inward like a bent bow with hobs at each end, and we could hardly understand for what purpose these hobs had been made, except for appearance. It was an extremely effective staircase, and quite different from anything I had seen in any part of the world. Another very splendid compound staircase was that of Buckingham Palace, by John Nash. From the hall a flight of eight steps led to a landing lit by a screened side window; nineteen steps led to the next landing, well lighted from above, and then four steps and a landing and one-two more steps between walls, adorned with columns, led in one line to the gallery. Had the exigencies of the building permitted, it would have been better to have had a landing to the gallery-door, lighted from the side like that in the Royal Academy. The balustrade was very handsome, being of gilt ironwork. At the second landing from the bottom two curved twin flights led to a landing lit by a dome over the entrance to the staircase; the part was domed over with a flat dome and impost. The central dome was of ground glass with slight bars of metal, the centre part being in the shape of a star. This beautiful staircase was very worth notice; when a man had been very much struck with it, and had admired it again the other day. He would like also to call attention to the staircase of the Royal Academy. The soffits of the upper stairs were moulded, and had a good effect, and they intensified the lines of the lower stairs. The stairs, which were 8 ft. above, swelled out as we got to the landing, and were 10 ft. at the bottom, and came down well between the coupled columns. The flight between the large Devonian marble columns had the light from above. In the case of the grand staircase at Versailles a visitor came up a straight flight in front, with twin staircases right and left. The first flight was square, with the angles cut off. The staircases were about 10 ft. wide; the first floor had Ionic pilasters all round the cage. He did not omit to mention Wilkins's staircase at Finsbury-square, when the National Gallery Royal Academy were under one roof. Illustrations of this might be seen in Leed's "Public Buildings of London." The entrance was by a central hall lit by windows at the end; the side walls were kept low, with Corinthian columns between them, and a balustrade between; and the stairs to the National Gallery and the Royal Academy were opposite the centre and in two twin flights, so that when you turned round on reaching the first floor you could see the persons ascending on the other side. It had a magnificent effect, and it was much to be regretted that it had been pulled down and other iron-plate staircases put up in their place merely to save a little room. This might be all very well in the case of private mansions, but a scandal in the matter of public buildings. The National Gallery had many splendid points about it, and a great deal of that which was explained of it was forced upon Wilkins against his will. He was, amongst other things, compelled to force back the angles so that one end did not interfere with the view of St. Martin's Church. Mr. Aitchison added that he had a good many photographs of more or less ornate staircases, exhibited on the wall, but was impossible to name all the fine staircases of the world. Had he done so the lecture would have been a mere catalogue. He had been compelled to omit all mention of fine staircases at Genoa, where the whole end-floor of some of the palaces seem devoted to their display. Then there were the odd ones in some of the London balls, and one of F. P. Cockerell, one at the Royal Society Painters in Water-Colours, and one which the architect sketched out, and which he (the lecturer) finished, in South Andley-street. He had been unable to speak of the fine Elizabethan staircases, and many of those designed by Inigo Jones. In conclusion, he would urge that in most every tolerably-sized house, where the

principal rooms were on the first floor, greater attention should be devoted to the staircase than had been paid within the last twenty years. The magnificent examples shown on the walls would not, be hoped, be without some effect on the works his bearers might hereafter execute.

ARCHITECTS' BENEVOLENT SOCIETY.
ANNUAL MEETING.

THE thirty-fifth annual general meeting of the subscribers and donors to this Institution was held on Wednesday afternoon last in the meeting-room of the Royal Institute of British Architects, Conduit-street, Professor T. Hayter Lewis, Member of Council, in the chair. Amongst the gentlemen present were Messrs. T. M. Rickman, F.S.A., Geo. Scamell, E. N. Clifton, Lewis Solomon, B. Edmund Ferrey, and Hugh McLachlan.

The Hon. Sec. (Mr. William H. White, Secretary R.I.B.A.), read the minutes of the last annual meeting, which were confirmed. He next read the annual report, from which we extract the following passages:—

"During the year 1884 your Council have distributed the sum of 521*l.* among thirty-four persons,—an increase upon the preceding year (1883), when the sum of 479*l.* was given away in grants to twenty-eight persons. In 1884 the sum of 332*l.* was received in subscriptions from 227 persons, being about 27*l.* less than in 1883. The donations have reached the sum of 156*l.*, including a legacy of 100*l.* left, free of duty, by the late Mr. Edwin Nash, the senior member of your Council, who was first elected a member in 1876, and who since then has almost invariably assisted in the business of the Society. His death, which occurred in May last, was referred to in sympathetic terms by the President of the Royal Institute of British Architects at the opening meeting of the session,—one of Mr. Nash's claims to professional gratitude being, according to Mr. Christian, that he had devised 'a legacy of 100*l.* to the insufficient funds of the Architects' Benevolent Society.'"

The death, at a comparatively early age, of another of the oldest contributors to our funds, viz., that of Mr. John Whitehead, took place in January last. Elected President of this Society on the death of Mr. Thomas Henry Wyatt, Mr. Whitehead diligently directed its affairs, with advantage and success, during four years, and his place will be difficult to fill. Your Council, however, have decided to recommend that, in future, the President for the time being of the Royal Institute of British Architects should be requested to become also the President of the Architects' Benevolent Society, and in the present instance, Mr. Ewan Christian has kindly consented to act if such recommendation be approved by the general body of contributors to the Society.

Your Council have also to announce, and with deep regret, that the retirement of Mr. George Mair, our esteemed and excellent Honorary Treasurer, has been rendered necessary by the state of his health, which, during some months, has prevented him from fulfilling the duties of the office to his own satisfaction. Mr. Mair has, therefore, mentioned his desire to be relieved from the Treasury, but, at the same time, has expressed a wish to be allowed to continue his connexion with the Society as a member of your Council. And here, perhaps, it may be appropriate to record that he was one of the first life-members, and served on your first Council. In fact, from 1850 to 1872, a period of twenty-three years, he was eighteen years a member of Council, succeeding the late Sir William Pitt in 1873 as Honorary Treasurer,—an office he has held for twelve years, during which the annual statement of receipts and expenditure has undergone great changes. That statement in 1872 showed a capital of about 1,700*l.* It is now more than 6,000*l.*, and our annual dividends are 200*l.*, as against 73*l.* in 1872. The gifts to applicants then amounted to 190*l.*; they are now more than 500*l.* The expenses of working in 1872 amounted to 73*l.*; they average now less than 20*l.* Though much of this steady increase and improvement is undoubtedly due to the impetus given by the late Mr. Wyatt,—who, during his Presidency, worked unremittingly for the Society,—a great deal of gratitude for long service rendered has been worthily earned, and is thoroughly deserved, by the genial Honorary Treasurer who gives up that office to-day, and your Council commend the fact to the notice of all the contributors."

The Council conclude their report by pointing out that the amount received in annual subscriptions is "totally inadequate to the many valid claims made upon the society's funds, and quite unworthy of the members of such a profession as that of architecture." They add that at the present time there are more than 1,000 professional members of the Institute within the United Kingdom alone, and of these only about 176 contributed to the funds of the Society during the past year. On the other

hand, gratification is expressed in the report at the help afforded by the Architectural Association and some of the provincial architectural societies (notably those of Leicester, Liverpool, and Newcastle), and by Mr. John Holden, President of the Manchester Society.

The balance-sheet (the correctness of which was certified by the auditors, Messrs. John Hobb and B. Edmund Ferrey) showed a total income for the year (including 54*l.* 12*s.* 10*d.* brought forward from last year) of 587*l.* 13*s.* 6*d.* The total expenditure was 533*l.* 2*s.*, leaving a balance of 54*l.* 11*s.* 6*d.* to be carried forward to next account.

On the motion of the Chairman, the report and balance-sheet were unanimously adopted, and Mr. Ewan Christian, President of the R.I.B.A., was requested to act as President of the Society.

Messrs. Geo. J. J. Mair, J. Macvicar Anderson, J. H. Good, John Hebb, R. St. Aubyn Roumieu, Thomas Cundy, and J. Goldie Turner were elected members of Council in succession to Messrs. Edwin Nash (deceased), Ewan Christian (elected President), T. Hayter Lewis (elected Hon. Treasurer), Joseph Peacock, Frederick W. Porter, T. M. Rickman, and James Williams (who retired by rotation). The old members of Council who retain office are Messrs. T. G. Jackson, E. C. Robins, A. Waterhouse, E. N. Clifton, Cole A. Adams, William Emerson, and Lewis Solomon, and Professor T. Roger Smith.

Prof. T. Hayter Lewis was elected Honorary Treasurer, and Messrs. Geo. Scamell and Hugh McLachlan were elected auditors. Mr. William H. White was re-elected as Honorary Secretary, and thanks were voted to him for his services and to the Institute for the use of its rooms and for much valuable assistance in carrying on the work of the Society. On the motion of the Chairman, a special vote of thanks was passed to Mr. Mair for his past services to the Society, coupled with the expression of a hope that the Council might for long have the benefit of his experience in carrying on so useful and necessary a work as that in which the Society is engaged.

THE LATE MR. M. E. HADFIELD.

WE announce with much regret the death of Mr. Matthew Ellison Hadfield, senior partner in the well-known firm of M. E. Hadfield & Son, architects, of Sheffield, which occurred on Monday last. Mr. Hadfield, who was seventy-two years of age, had been in failing health for the past three years.

By his death Sheffield loses a well-known figure, one who linked memories of the past with the movements of the present. He was born at Lees Hall, Glossop, on Sept. 8, 1812, being the eldest son of the late Mr. Joseph Hadfield, who married a sister of the late Mr. Michael Ellison, agent of the Duke of Norfolk, in which office he was succeeded by his son, Mr. M. J. Ellison. After receiving his education at Woolton Grove Academy, near Liverpool, he was placed with his uncle in the Duke of Norfolk's estate office. Mr. Ellison, however, discovering that his nephew had a decided talent for architecture, persuaded his father to article him to Messrs. Woodhead & Hurst, of Doncaster. The indentures were signed in 1831, and continued in force for three years, when Mr. Hadfield went to London, and entered the office of the late Mr. P. F. Robinson. In 1836 he entered into practice on his own account. In 1838 he joined in partnership the late Mr. John Gray Weightman. In 1850 the firm took into partnership Mr. George Goldie, and its style then became "Weightman, Hadfield, & Goldie." About the year 1858 Mr. Weightman retired, Mr. Goldie following in 1860, and in 1864 Mr. Charles Hadfield joined his father, and the firm has since been known as "M. E. Hadfield & Son." Mr. Hadfield has carried out many important works, several of which have been illustrated in our pages. We understand that a memoir of him will be read at the next meeting of the Royal Institute of British Architects.

The Common-place in Architecture.—

This was the subject of an able paper read before the Leeds and Yorkshire Architectural Society on Monday evening by Mr. T. G. Jackson, M.A., F.S.A., which we intend to publish, but pressure on our space compels us to hold it over until next week.

ARCHITECTURAL SOCIETIES.

Liverpool Architectural Society.—The fourth ordinary meeting of this society for the current session was held at the rooms, No. 9, Cook-street, on the evening of Wednesday, the 4th inst., Mr. Thomas Mercer, Vice-President, in the chair. There was a fair attendance of members. It was announced that the Council had decided to award the prize for the best series of sketches executed during the recess by a member of the Sketching Club to Mr. Walter H. Brierley. Mr. Mercer then read the paper for the evening, by the late W. Pettit Griffith, F.S.A., entitled "The Rigid versus the Subtle Styles of Architecture," the proceedings closing with the usual votes of thanks.

Edinburgh Architectural Association.—The members of this Association on Saturday last paid a visit to Corstorphine Church and neighbourhood. The party, conducted by the President of the Association (Mr. G. Washington Browne), went first to Old Saughton House, which was inspected with much interest. On the way to the parish church, the site of the old castle of Corstorphine was pointed out. The old stone-built pigeon-house, which belonged to the manor of Corstorphine, and which contains about 1,000 pigeon-holes, was also visited. On reaching the church, the party gathered at the entrance, where Mr. Browne gave a short historical account of the earlier churches which existed before the present collegiate church. The old parish church was taken down in 1646, and a new aisle built, which now forms the south aisle and transept of the church. The north aisle and transept were added in 1826. Inside the church the chief points of interest are the old sedilia and piscina in the south wall of the chancel now the vestibule of the parish church,—and the three tombs of the Forresters,—two in the north wall of the chancel and one in the south transept.

A PARTY-WALL QUESTION.

At the Westminster Police-court last week, Mr. J. Charlton Humphreys, iron building manufacturer, of Albert-gate, was summoned before Mr. Partridge for neglect of an order to erect a party-wall between Humphreys' Hall, used as a "Japanese Village," and the Albert-gate Mansions, which face the Kensington-road, Knightsbridge. A month ago the order was made by Mr. Partridge on the evidence of Mr. A. Williams, the Assistant District Surveyor, that the buildings were separate and not divided by external or party walls of required material or thickness. Mr. Williams now stated that there had been no effort to comply with the order, which was made in the interest of the public.

In cross-examination by Mr. Humphreys, who conducted his own case, Mr. Williams admitted that there was no structural danger in the building, and that the unlet residential flats above were divided and isolated by a fireproof floor.

Mr. Humphreys, in addressing the Court, said that the Japanese exhibition was likely to go on for a long time, and he could not interrupt its success by doing the work. He had spent over 50,000*l.* on the buildings, and at present he could not obey the order of the Court.

Mr. Partridge, the magistrate, said the direction of the Court must be obeyed. The defendant was liable to a penalty of 20*l.* a day, and on this occasion he would be fined 10*l.* and costs. The authorities, too, could exercise the right of doing the required work.

LIABILITY FOR PAVING AND DRAINAGE APPORTIONMENTS.

HILL AND ANOTHER v. EDWARDS.

This case, which came up in the Queen's Bench Division a few days ago, was a dispute between landlord and tenant as to liability for certain work done under the Metropolis Local Management Acts, 1855 and 1862.

It appeared that by lease, dated the 16th day of February, 1877, between W. Love, deceased, and the defendant, land at Highbury was demised to the defendant for twenty-one years from Lady Day, 1877 (determinable at the end of the seventh or fourteenth year), at a yearly rent of 114*l.*, payable quarterly without deduction. The defendant was to pay property-tax, and the lease covenanted that he would pay "the title or rent-charge in lieu of tithes land-tax (if any), sewers rates, main-drainage rates, and all other taxes, rates, impositions, and outgoings, whatsoever then or thereafter to be charged or imposed on or in respect of the said premises or any part thereof (except the landlord's property-tax)." In December, 1882, the Local Board, under the provisions of the Metropolis Local Management Acts, 1855 and 1862, gave notice to the owners or occupiers of the premises requiring them to sewer, level, pave, &c., the portion of the roads upon which

the demised premises abutted and adjoined, and in default the local authority did the work themselves, and apportioned the sum chargeable upon the owners in respect thereof at 10*l.* 6*s.* 6*d.*, which sum the plaintiffs, as the representatives of Love, the lessor, paid, and sought to recover it from the defendant, the lessee.

The case was tried before Mr. Justice Mathew without a jury on the 30th of January, 1885, when it was argued for the plaintiffs that the defendant bound himself by his covenant to repay them the amount so apportioned, as being an "imposition," charged on and in respect of the demised premises. Several cases were cited in support of this contention.

Mr. Lamley Smith, Q.C., submitted that the word "imposition" must be construed to mean charges *quatenus generis* with "sewers rates, main drainage rates, and all other taxes, rates, &c., charged or imposed in respect of the premises," and would not have been meant to include that which is made by the statute, or charged upon the owner in respect of the permanent improvement of the property, and relied upon the case of *Tidswell v. Whitworth* (Law Rep. 2*c.*, p. 326).

Mr. Justice Mathew held that he conceived *Tidswell v. Whitworth* to be good law, and the same had been followed in other cases, and gave judgment for the defendant.

THE STONE USED AT WESTMINSTER ABBEY.

SIR,—I observe from your report [*Builder*, March 7th, p. 331], of the paper read at the Academy that Chilmark stone has been selected by Mr. Pearson, the architect. But what is known of this oolitic limestone that proves it will be more durable than those that have previously failed at the abbey or in its neighbourhood? It was examined by the chemists to the Royal Commission of 1837, Professors Wheatstone and Daniell, and rejected. Mr. Hull, the well-known geologist and chemist, has not a word to say in its favour in his book, "Building and Ornamental Stones," though he speaks of others from the same geological formation as quite unreliable in smoky towns. But though there is little special information, it is well known that oolites and other limestones decay with more or less rapidity in London. Dr. McCormack, who analysed a piece of oolite from the ancient part of Lambeth Palace, found muriatic acid some inches below the surface, and to that extent the stone had perished. The Caen stone of the east front of Buckingham Palace fell to pieces before the workmen were left. A nice little fortune of 60,000*l.* has been invested by the Government to provide for the repairs of the limestone of the palace opposite the abbey. Lambeth Palace has been twice restored in forty years. All this is not surprising when it is considered that these limestones contain 90 per cent. of carbonate of lime, which cannot long exist in the presence of the abundant acids and ammonia of the London air. What is surprising is that, in spite of past unfavourable experience, limestone should be used at all for our great public buildings. Would it not be much better to spend some of the money that these restorations cost upon the extra expense of using the best sandstones? Twenty years' experience in the populous towns of the northern and midland counties justifies my saying that they are the only stones the natural qualities of which render them suitable. The limestones, though equally available in these towns, are not used for building, but only for the manufacture of limes, and for fluxing iron ores. The carboniferous limestone of the Nelson Column, in Trafalgar-square, is in perfect condition after about forty years' exposure. As the abbey is a national building, Mr. Pearson, I do not doubt, will excuse my raising this question.

Woodside, Wimbledon.

H. TRAVIS.

THE ROYAL ARMS.

SIR,—I cannot allow Mr. Massey's letter [p. 359, ante] to pass unchallenged. He asserts that the arms borne by our sovereigns are their own, and not those of the nation. I turn to Parker's "Glossary of Terms used in British Heraldry," and find the following:—"Arms of Dominion, or those borne by sovereign princes; not the arms of their families, but those of the states over which they reign, such as any family or dynasty, but the insignia pertaining to the regal office."

Unless Mr. Massey can quote some better authority to prove his statement about the crosses of St. George and St. Andrew being the national arms of England and Scotland respectively, he is quashed by Parker. He also asserts that the royal arms were derived

from Henry II. Again, I turn to the Glossary and there read:—"The earliest English sovereign, whose armorial insignia we have contemporary authority, is Richard Coeur-de-Lion." Will Mr. M. kindly give his authority?

With regard to "Scotch enthusiasts" (although I am not of that nation), permit me to observe that the precedence claimed for "The rusty rampant in gold" was on account of its representing the older sovereignty of the two. No doubt some of our friends worth of the Tweed will have something to say to this captious critic who treadeth ruthlessly on their traditions, and in their hands, leave him.

In conclusion, might I ask Mr. Massey upon what grounds he included me as a Scotchman? It has never been my task to criticise such a short letter so full of glaring errors, and so delectably asserted.

J. B.

"NON-ACCEPTANCE OF LOWEST TENDER."

SIR,—The suggestion made by Mr. Andrew Williams (Brookley) [*Builder*, p. 359, ante], as to me a good one, and he will do well to suggest would it not be the proper step for him to ask the Committee of the National Association of Master Builders of Great Britain, and also the Central Association of Master Builders, London, to combine in the movement, and then, no doubt, there will be no difficulty in getting the support of those who are tendering outside the builders and contractors.

It appears to me that advertising for tenders was before long only a farce, as I note again in your issue of Saturday last several lowest tenders had not been accepted, especially the East Dulwich firm. In all cases of this kind, the contractor tender being rejected is sure to militate against his and create a detriment to the contractor's ability and stability of carrying out the works.

BONA FIDES.

TAXATION OF SURVEYORS' CHARGES IN COMPENSATION CASES.

SIR,—Messrs. Lee Bros. & Pain are doing good service to the profession in calling attention to the taxation of fees [*Builder*, p. 354, ante]; but they are not quite correct in saying there is no system as for many years (as long as I can remember) the principle has been that only the fees be allowed for the qualifying of two surveyors, no matter how important the claim or how many surveyors are called. Nor is this limitation affected (serious as it may appear) by the number of surveyors who are called on the other side.

Companies purchasing know well the unfair advantage they have, and I have found are sometimes willing to use it. One makes a point of informing one's clients that in refusing any offer it is necessary to remember that they will have to deduct from the sum given in the verdict sufficient to pay for two surveyors, and, therefore, if the company offer the value *minus* these fees, one, of course, advises settlement, and thus the *company gains*.

I may mention when I was recently settling a case at 8,800*l.*, in which I could not obtain anything like satisfactory terms, until when ready for trial, was met (as I fully expected I should be), when I called in four surveyors, who were of opinion that I should not obtain the fees of more than two I went to trial.

I think you, sir, are doing much good by giving publicity to this subject. It not merely relates to compensation cases, but to light and air and cases of a litigious character. In all such cases the fees allowed to surveyors by the Taxing-Masters are insufficient to pay for their services, and therefore there is a manifest injustice to the successful litigant.

BANISTER FLETCHER.

LOUTH BOROUGH SURVEYOR.

SIR,—In your last issue, re the appointment of surveyor for the Borough of Louth, you ask, "What is the meaning of this?" I shall be glad to answer this question as shortly as I can.

The late surveyor, who had 75*l.* per annum, was paid extra for all new work, resumed his office, and was to have charge of the streets, and of which I am chairman, recommended that the salary should be 80*l.* a year, but the inspector nuisances sent a circular to each member of the Corporation, tendering for the appointment at 53*l.* per annum, in addition to his pay as inspector, thereby making, as he said, "a great saving to the town, and acquired some fame as a carver for his work in the Exhibition of 1851, but now called himself civil engineer, surveyor, architect, &c." The Corporation, evidently afraid of the ratepayers, fell into the trap and accepted this bait, and he has since evening been appointed surveyor by fourteen ratepayers. It was some time a protest against the appointment, which the mayor ruled "out of order." One of the candidates had formerly been employed as a stonemason on the repairs of the pavement and I may add, the wages of the foreman are 60*l.* a year.

JAMES FOWLER,

Alderman, and J.P. for Louth, Louth, March 10th, 1885.

The Student's Column.

DESCRIPTIVE GEOMETRY.—VI.

We have in the preceding problems repeatedly made auxiliary elevations; but we have not yet tried to change one of the plan and make thereon an auxiliary plan, an operation we must do if we are to solve problems by changing the plane of projection. To make an auxiliary plan in a different plane than that of the elevation is really not more difficult than to make an auxiliary elevation; but it is so to us because we are accustomed to our plans as drawn on horizontal paper. Fig. 30 illustrates exactly what we do



Fig. 30.

we make an auxiliary plan; and the student will see thereby that the new plan m^h is at the same distance from the horizontal line as m^v was from L T.

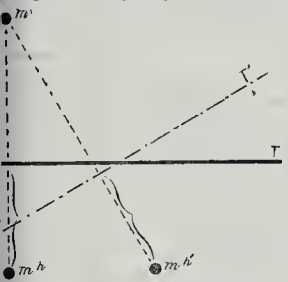


Fig. 31.

on the operation on the point m indicated in the preceding sketch. If the student can

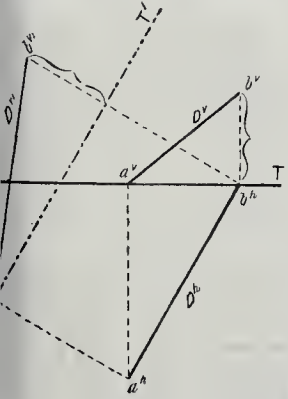


Fig. 32.

fully realise the meaning of this drawing he will make at once great progress in descriptive

geometry; nothing is more difficult than our science if our minds remain in a fog, and we see only lines on a flat piece of paper; nothing is easier when once we are able to image forth in our mind the operations in space we are drawing conventionally by means of plans and elevations. This exercise of the power of imagination is one of the main benefits to be derived from this study.

In the fig. 32 we have made a new elevation D^v of the line D.

In the fig. 33 we have made a new plan D^h of the line D.

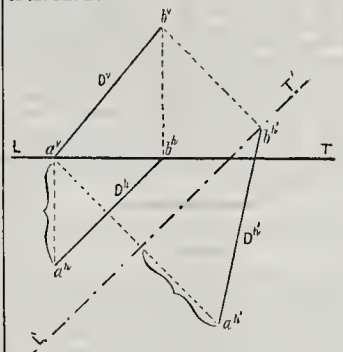


Fig. 33.

We advise the student to make perspective sketches representing the preceding operations. To assist himself in realising these operations he should consider in fig. 32 that his drawing lies flat on the table, whereas in fig. 33 it is hung up on a wall; nor should he forget that, although we have up to this time always placed our figures above the plan and in front of the elevation, yet they may occupy any position in space; they may be below the plan or behind the elevation, or both combined. In fig. 34 we have a perspective sketch representing the plan and the elevation planes: we

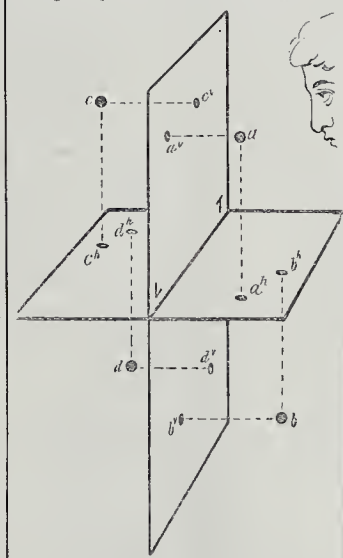


Fig. 34.

see thereby that for a point a its plan a^h will be below L T and its elevation above L T. The point b will have both its elevation and its plan below L T, the point c , both its elevation and its plan above L T, and for the point d we have the plan above L T, whereas the elevation is below L T. We have shown all these positions in the fig. 35 as they appear after the elevation has been turned down on the plan as we are always supposed to have done in our drawings. In short, the student must consider that he has always before him two sheets of paper, one standing upright the other laid flat on the table,

and that they are hinged on L T. He is then supposed to have done all his drawings as represented in fig. 34, and, when completed, to have

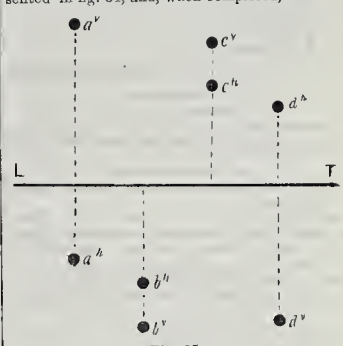


Fig. 35.

folded them down afterwards for convenience sake. Such is the convention on which geometrical drawing is based.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MARCH 2.	
By TOWERS, WILLIAMSON, & ELLIS.	
Kew Gardens—4, 5, and 6, Lonsdale-terrace, and 1, 2, and 3, Lonsdale-mews, 23 years' ground-rent, 26l. (subject to mortgage)	£4,030
J. Jacob & Sons.	
Canonbury—22, Petherton-street, 65 years, ground-rent 8l. 9s.	1,300
By BEAL, SON, & CHABERTS.	
Camden Town—42 and 44, Werrington-street, 64 years, ground-rent 17l.	1,040
By WEATHERALL & GREEN.	
Willisden—1 and 2, Doncaster-place, freehold	790
Willisden lane—Two plots of freehold land	165
Villiers-road—"The Lindens," freehold	555
MARCH 3.	
By DRENNHAM, TITSON, PALMER, & BRIDGEWATER.	
Yorkshire—An annuity of 500l. a year, secured on a life aged 33 years, and the lease of a mining estate, term 21 years	2,900
By HONN, SON, & EVERFIELD.	
Kilburn—23, Friary-road, 24 years, ground-rent 12l.	1,000
By YENSTON, BULL, & COOPER.	
Brighton—9 and 11, Palmera-avenue, freehold	3,075
68, 79, and 72, Goldstone-villas-road, freehold	2,275
MARCH 4.	
By BLAKE, HADDOCK, & CARPENTER.	
Croydon, Wellesley-road—The freehold residence, "Lansdowne House"	1,400
No. 8, Park-street, and stabling, 69 years, ground-rent 8l.	1,320
South Croydon, Mansfield-road—Two plots of freehold land	2,400
By HARMAN & MATTHEWS.	
Bothal-green, St. Andrew's-street, 30.—Leasehold ground-rents of 86l. 10s.	1,350
Hyde Park—6, Marlborough-gate Stables, 69 years, ground-rent 3l.	1,025
Millwell—333 and 335, Westferry-road, 35 years, ground-rent 10l.	520
Canning Town—2 to 6 even, Alice-street, and 1 to 17 odd, Sidney-street, 72 years, ground-rent, 39l. 17s. 6d.	1,430
MARCH 5.	
By COLEMAN & LEWIS.	
Stoke Newington—33 and 35, Laver's-road, 90 years, ground-rent 12l.	615
By ILMAN, SHARP, & HARRINGTON.	
Lewisham—16, 17, and 19, Jerrard-street, 78 years, ground-rent 7l. 7s.	655
By W. & F. HOUGHTON.	
Friern Barnet—The lease of "Beaufont," term 17 years, including fixtures	150
By FAREBROTHAM, ELLIS, CHAM, & CO.	
Lambeth—136, Lambeth-road, freehold	1,080
49, Paradise-street, and a plot of land	700
Camberwell—110 and 120, Camberwell-rd., freehold	2,680
Lambeth, Saville-place—ground-rent of 30l. a year, reversion in 75 years	750
Windmill-street—ground-rent of 60l. a year, reversion in 75 years	1,285
Lower Norwood—ground-rent of 40l. a year, reversion in 45 years	970
Ground-rent of 25l. a year, reversion in 60 years	620
Wandsworth—2, Church-row, 6 years, ground-rent 25l.	100
Lambeth—33, 35, and 37, Wickham-street; and 69 to 67 odd, Catherine-street, 2 years, ground-rent 18l. 11s.	65
Improved ground-rents of 32l. 4s. a year; and Nos. 15 and 16, Ward-street, 23 years, ground-rent, 16l. 4s.	500
MARCH 6.	
By MURRELL & SCORELL.	
New Bond-street—An improved rental of 300l. a year, 7 years	1,375
Brook-street—An improved rental of 86l. a year, 6 years	335
Wandsworth-road—431 and 433, and a ground-rent of 4l. 10s. a year, 40 years, ground-rent 16l.	710
By SHARP & CO.	
Kentish Town—8 and 10, Lismore-road, 80 years, ground-rent 13l. 2s. 6d.	610
Acton—5 and 7, Arthur-terrace, 82 years, ground-rent 10l.	1,053

By FURBER, PAICE, & FURBER.

Oxford-street-73 and 72, Mortimer-street, 21 years, ground-rent 65s.	£1,100
Harley-street-42a, Weymouth-mews, 19 years, ground-rent 20s.	750
Tottenham-court-road.—The lease of 12, Howland-street, term 30 years	400
The reversion to the eleventh share of an estate valued at 15,090s., life aged 55 years	410

MEETINGS.

SATURDAY, MARCH 14.
Architectural Association.—Visit to the Hampstead Hospital and Messrs. Read's Bottling Stores, Gospel Oak. Assemble at Hospital at 3 p.m.

MONDAY, MARCH 16.
Royal Institute of British Architects.—Business Meeting of Members. 8 p.m.
Building Trades' Exhibition at Agricultural Hall.—Opening day.
Society of Arts (Cantor Lectures).—Mr. J. Hangerford Polton on "Carving and Furniture." II. The Renaissance. 8 p.m.
Architectural Section of the Philosophical Society of Glasgow.—Mr. W. P. Buchanan on "The Past and Present Conditions of Plumber-Work from their Sanitary Aspect."

TUESDAY, MARCH 17.
Birmingham Architectural Association.—Annual Dinner. **Institution of Civil Engineers.**—Discussion on Mr. Stroudley's paper on "The Construction of Locomotive Engines." 8 p.m.

WEDNESDAY, MARCH 18.
Society of Arts.—Mr. J. W. Willis-Bund on "The Rivers Pollution Bill." 8 p.m.
Carpenters' Hall, London (Free Lectures to Artisans).—Professor Bonney, F.R.S., on "Elm." 8 p.m.
British Archaeological Association.—Mr. Alfred C. Fryer will read some "Notes on Ancient Glass." 8 p.m.
British Museum.—Mr. W. St. C. Bosworth on "Assyrian and Babylonian Antiquities." IV.—(The Deluge Legend). 2.30 p.m.
Builders' Foremen and Clerks of Works' Institute.—Ordinary Meeting. 8.30 p.m.
Royal Meteorological Society.—Sixth Annual Exhibition of Instruments. 7 p.m.

TUESDAY, MARCH 19.
Institution of Civil Engineers (Special Meeting).—Sir Charles A. Hartley on "Inland Navigation." 8 p.m.
Royal Meteorological Society.—Exhibition of Instruments continued.
Society of Antiquaries.—8.30 p.m.
York Architectural Association.—Mr. R. A. Parkin on "Building Construction." 7.30 p.m.
Durand Institute of Architecture.—Mr. Geo. S. Aitken on "Ecclesiastical Architecture." 7.45 p.m.

FRIDAY, MARCH 20.
Architectural Association.—Mr. F. C. Penrose, M.A., on "Proportion in Architecture, especially as exemplified in the Works of the Greeks." 7.30 p.m.
University College.—Professor C. A. Newton, C.B., on "Greek Inscriptions." VI. 4 p.m.
British Museum.—Prof. J. F. Hodgetts on "Medieval English Remains." V. (Civil Dress). 2 p.m.
Institution of Mechanical Engineers.—Adjourned discussion on Mr. George Richards's paper on "Wood-cutting Machinery." 7.30 p.m.

SATURDAY, MARCH 21.
Edinburgh Architectural Association.—Visit to Caroline Park and Granton Castle.

Miscellaneous.

Fire in Glasgow Cathedral.—A fire, which was fortunately checked before much damage had been done, occurred in Glasgow Cathedral on Sunday morning. About ten o'clock, Mr. Henderson, the caretaker, was getting the building in readiness for the holding of morning service, when he noticed that the choir was rapidly filling with smoke. On making a search to ascertain the cause he found that the roof of the triforium was on fire at a point above the north aisle of the choir, immediately to the east of the transept. The flames had got hold of the woodwork and were making their way through the wooden covering of the roof. The hydraulic machinery and blowers used for working the cathedral organ and blowers used for the triforium, aid, fortunately, a tap was recently fitted to the main to allow of water being drawn off. Mr. Henderson at once set about extinguishing the fire with buckets of water taken from this source. It is estimated that it will cost about £50 to repair the damage done to the roof. It is stated that the cause of the outbreak was the overheating of a flue connected with the apparatus for warming the building.

Proposed New Vestry Hall for Fulham.—At a meeting of the Fulham Vestry on the 3rd inst., the Rev. F. H. Fisher in the chair, the Building Committee recommended that a sum not exceeding £20,000 be expended in the erection of a new hall, and that the churchwardens and overseers be requested and empowered to take the necessary steps for borrowing the money. Considerable discussion ensued, several members objecting to the expenditure of so large a sum of money. Ultimately the recommendation of the Committee was adopted. It was also resolved to advertise for plans.

The Architectural Association.—At the ordinary meeting of this Association, held on the 6th inst., Mr. Cole A. Adams, President, in the chair, eight gentlemen were nominated for membership. Mr. H. D. Appleton, hon. sec., announced that the next Saturday afternoon visit would be made this Saturday, the 14th, to the Hampstead Workhouse Infirmary extension (Mr. Charles Bell, architect) and to Messrs. Read Bros.' new beer-holding stores at Kensish Town (Mr. Theodore K. Green, architect). Illustrations of both these buildings have recently appeared in our pages. A plan and description of the infirmary extension (which has a circular ward) will be found in the *Builder* for February 2, 1884; and view and description of the premises at Kensish Town appeared in our number for February 7, this year. On the motion of Mr. Appleton votes of thanks were accorded by acclamation to Mr. Waterhouse, A.R.A., for kindly meeting the members of the Association and conducting them over the new St. Paul's School, at Kensington; to Mr. L. W. Leeds, for explaining the warming and ventilating arrangements of the same building; and to Messrs. George & Peto, architects, and Messrs. Peto Bros., contractors, for permitting the members to visit some new houses in Collingham-gardens, as mentioned in our last. The Librarian (Mr. R. E. Cox) announced that Mr. J. L. Pearson, R.A., had presented a copy of his Report on Westminster Hall, and that Mrs. Mockett, sister of the late R. C. Page, had presented a series of forty-nine mounted drawings (made by him when the holder of the Pugin Scholarship). On the motion of Mr. Cox a vote of thanks was given to the donors, and the Chairman announced that Mr. Peto's drawings would be on exhibition at the next meeting of the Association. Mr. John Slater then read a paper on "Building Stones," the first part of which will be found on another page.

British Archaeological Association.—At the meeting on Wednesday, the 4th inst., Mr. Thomas Morgan, F.S.A., in the chair, Mr. Irvine sent a large collection of drawings of antiquarian objects recently exhibited at Peterborough, and found either in the city or in the locality. Mr. Romilly Allen described a hitherto unedited stone at Colsterworth Church, near Grantham. It has been part of a shaft of a Saxon cross, and is covered with interlaced patterns. The Rev. Prebendary Scarth described a carved stone pedestal of which a drawing by Mr. Thompson Watkin was produced. It was found in a Roman hypocaust at Chester, and it is carved with some curious and very unusual patterns, one of the ornaments being very similar to the fleur-de-lis of Mediaeval times. Mr. G. R. Wright exhibited a leaden bulla of Pope Gregory XI., found at Spitzerley, Norfolk, in the ruined wall of a conventual building, some notes of the history of the latter, prepared by Mr. Proctor Burroughs, being read. Mr. A. Cope described an early cross at Dunblane, carved on a massive monolith, probably of earlier date than the cross. The concluding portion of the Rev. G. F. Browne's paper on the cross in Leeds Church was then read. The proceedings were brought to a close by a paper on the old signs of the shops in Peter-noster-row, by Mr. Syer Cuning, F.S.A. Scott, read by Mr. Loftus Brock, F.S.A. The rise and progress of many bookselling-houses was traced, and references given to books published and tokens issued.

National Art Training Schools.—The students of the National Art Training Schools held their annual *soirée* in the galleries of the South Kensington Museum on Wednesday evening last. There was a large gathering of past and present students and their friends, who passed a pleasant evening in the congenial atmosphere of the place. The large lecture-theatre, during the distribution of the prizes, was only accessible to prize-winners, and a few favoured friends, but was, nevertheless, well filled, and the applause which greeted each name was general and generous. Two several concerts were given by the Art Students' Choir to crowded audiences, in the lecture-theatre, and an instrumental concert by the students and their friends in the Sheepshanks Gallery, and in the intervals Mr. Clifford Harrison gave some clever and much appreciated recitations. Notwithstanding these attractions, the picture galleries were always filled with interested visitors, and the land which performed at intervals in the Italian Court attracted considerable numbers.

The Tenders for the Champion Infirmary.—We published the list of tenders for this building in our last (p. 363). A meeting of the St. Saviour's Board of Guardians, on the 5th inst., exception was taken by some of the members to the passing over the lowest tender, between which and the next-acceptance there was a difference of nearly 3,000. Mr. Hilton (after vainly endeavouring to obtain a resolution rescinding the tender) at the previous meeting according to the terms of Messrs. Kirk & Randall, on the ground that it was not in conformity with the terms of an advertisement at the time it was opened, notified that the sureties offered by Messrs. Kirk & Randall should not be accepted. The Rev. S. Wallace said he was going to vote against the sureties, because he thought the action of the Board on the previous week was *ultra vires*. Mr. Henley moved that the names should be referred to a committee to inquire into the position of the proposed sureties. Mr. H. seconded this proposition, which was agreed to it being understood that the committee would report to the next meeting of the Board. The clerk read a letter from Mr. Wall, in which the writer said he could not understand why the tender was not accepted. He desired to know the grounds on which the Board based their decision. After some discussion, it was determined to acknowledge the letter only.

The Mersey Tunnel.—Alleged Land Subsidence at Birkenhead.—The *Liverpool Post* reports that for some time past several subsidences have taken place in Hamilton street, Birkenhead, at the end nearest to Haymarket, in consequence of the excavations going on underneath the thoroughfare in connection with the Mersey Tunnel. The result has been that the gas and water-pipes have become there once broken, and the walls of some of the buildings on each side of the street have been cracked in an alarming manner. Early on Sunday morning another subsidence occurred, which was termed another subsidence of any.

TENDERS.

For the erection of the new law courts, offices, the engine station, residences, and firemen's cottages for the Corporation of Nottingham. Messrs. Veitch & H. architects. Quantities by Messrs. Howden, Berriell & Barnes, Nottingham.—

	Main Building.	Cottages.	To
	£.	£.	£.
Peto Bros., London	69,578	6,989	76,567
Loxley, Wolverhampton	57,575	5,985	63,560
Foster & Dickes, Rugby	64,000	5,500	69,500
E. Hind, Nottingham	64,969	4,730	69,699
Farell & Son, Rugby	62,823	6,043	68,866
Hobson & Son, Nottingham	63,141	5,542	68,683
Bott & Wright, Nottingham	62,525	5,475	68,000
Moulson & Son, Bradford	61,900	5,100	67,000
Horsman & Co., Wolverhampton	69,850	6,650	76,500
Simmons & Son, London	61,870	6,200	68,070
Kirk & Randall, Wo lwich	61,175	5,200	66,375
Bell & Sons, Nottingham	69,888	6,104	75,992
Messrs. Nottingham	69,900	6,440	76,340
Warburton, Manchester	69,868	6,524	76,392
Holdsworth, Bradford	60,250	4,950	65,200
Adeock, Dover	69,800	6,130	75,930
Walker & Slater, Darlington	64,750	5,200	69,950
Westley & Mauls, Nottingham	59,150	4,747	63,897
Vickers, Nottingham	68,782	4,950	73,732
Fish & Sons, Nottingham	65,567	5,052	70,619
Gabbatt, Liverpool (accepted)	57,200	4,500	61,700

For Finchley main drainage works. Contract No. 1.	Total.
Mr. Geo. W. Brunell, engineer	£33,812 0 0
Newns	2,833 0 0
Nowell & Hobson	30,533 0 0
Mowlem & Co.	30,339 0 0
Bottoms Bros.	29,809 0 0
Pearson & Son	27,990 0 0
Kellett & Bentley	27,350 0 0
Mears	26,807 0 0
Pell	26,668 0 0
Godfrey	26,167 0 0
Pizey	25,776 0 0
Mears	25,300 0 0
Beadle Bros.	24,978 0 0
Dicks & Co.	23,840 0 0
Cooke & Co.	22,788 0 0
Kilback	22,327 0 0
Everset (accepted)	20,950 0 0
Hill & Co.	19,301 0 0
Hill & Co. (revised tender)	21,301 0 0

For the erection of a dwelling-house in Winchester place, also five houses in Tibble's-alley, Peckham, for Mr. Henry Gamba. Quantities by Mr. C. L. Cadsey, 5, Moorgate-street.—

	Tibble's Alley.	Winchester Place.	Total.
C. W. Reading	£3,261 0 0	£2,650 0 0	£5,911 0 0
E. C. Howell & Sons	1,966 0 0	514 0 0	2,480 0 0
Steel Bros.	1,893 12 0	519 1 0	2,412 13 0
F. F. Trencock	1,910 10 0	501 10 0	2,412 0 0
Holloway Bros.	1,837 0 0	585 0 0	2,422 0 0
Wm. Oldrey	1,789 0 0	466 0 0	2,255 0 0
W. Johnson	1,646 0 0	428 0 0	2,074 0 0

* Too late. † Accepted subject to reductions.

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Table with columns: Nature of Work, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page. Includes entries for Kingston Highway Bd., Fulham Board of Works, Brighton Town Council, etc.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page. Includes entries for Mat. Gold Coast Colony, Gatwick Local Board, etc.

Table of construction and renovation contracts, including entries for temporary timber foot-bridge, demolition of existing old bridge, and various building projects.

Table of public appointments and contracts, including entries for the erection of four cottages, accepted for range of shop and show-rooms, and various other projects.

Table of contracts for the enlargement of schools, Tottenham-road, Kingstand, for the London School Board. Includes names like J. Goodman, G. S. Pritchard, etc.

Table of additions and alterations to the Suffolk County Lunatic Asylum, Melton. Includes names like Messrs. Giles & Gough, architect.

Table of contracts for the erection of six blocks of artisans' dwellings in Seward-street, Goswell-road. Includes names like Mr. M. N. Inman, architect.

Table of contracts for the erection of buildings on the Winchester Estate, Old Broad-street, E.C. Includes names like Mr. F. T. Pilkington, architect.

Table of contracts for the extension of the male division of the City of London Lunatic Asylum at Stone, Kent. Includes names like Mr. Horace Jones, architect.

Table of alterations to the Boys' National School, Waltham-stow. Includes name Mr. W. A. Longmore, architect.

Table of contracts for masonry and ironwork in connection with the Hereford Cattle Markets Improvements. Includes name Mr. John Parker, surveyor.

Table of contracts for ironwork, including entries for Griffin Foundry Co., Birmingham, and other ironwork projects.

For new schools, Spring Park-road, Shirley, near Croxson, Mr. R. W. Price, architect and surveyor, Buckingham street, Strand—
 Patman & Pothringham £2,971 0 0
 Jarret 2,440 0 0
 Ward 2,224 0 0
 Taylor 2,275 0 0
 Page 2,050 0 0
 Smith & Sons 1,997 0 0
 Brass (accepted) 1,957 0 0

For alterations to house and shop, 96, Westgate-street, Gloucester, for the Co-operative Society. Messrs. Medland & Son, architects—
 W. Jones £330 0 0
 R. Teague 600 0 0
 A. King 613 0 0
 Meveuth & Son 407 0 0
 W. Fram 477 0 0
 Dolman & Co 466 10 0
 E. Clatterbuck 450 0 0
 J. C. Leat 317 0 0

For foundations and sub-basement, Eastcheap. Messrs. E. & E. B. Ellis, architects—
 Higgs & Hill £2,157 0 0
 Ashby & Horner 1,890 0 0
 W. Shurman 1,989 0 0
 J. & J. Greenwood 1,973 0 0
 Colls & Son 1,538 0 0
 J. Woodward 1,483 0 0
 Ashby Bros. 1,793 0 0
 J. & J. Chappell 1,746 0 0
 B. E. Nightingale 1,570 0 0

For villa residence, St. Ethelbert Estate, Hereford, for Mr. F. Hathaway, Mr. W. W. Robinson, architect, Hereford—
 Foster, Abergavenny £1,085 0 0
 Powell, Hereford 1,022 0 0
 Cullis, Hereford 850 0 0
 Bevan & Hooges, Hereford 996 10 0
 Rowberry Hereford 873 10 0
 Hiles, Hereford 818 16 0
 Davies, Hereford 812 0 0
 Bowers & Co., Hereford 810 0 0
 Symonds, Hereford 765 0 0
 Pritchard, Hereford 761 12 6
 Ford, Hereford 739 0 0
 Colley, Hereford (accepted) 675 0 0

For enlarging business premises, building new show-room, kitchen, &c., No. 45, Warwick street, Leamington, for Messrs. Hunt & Hawken, drapers. Mr. F. Foster, architect, Leamington—
 J. Athins £510 0 0
 F. W. Lee 433 0 0
 J. Fell 398 10 0
 R. Bow (accepted) 397 15 0

For new shop-front, show-room, &c., to No. 40, Parade, Leamington, Mr. F. Foster, architect, Leamington—
 R. Bowen £338 0 0
 F. W. Lee 323 0 0
 J. Fell (accepted) 310 0 0

For shop extension and building new show-room, &c., to No. 6, Bath street, Leamington, for Mr. S. Fielder, draper. Mr. F. Foster, architect, Leamington—
 R. Bowen £368 0 0
 F. Friend 348 8 0
 F. W. Lee 318 0 0
 J. Fell (accepted) 315 0 0

For new warehouse premises in White Horse-street, Board Lane, Leeds, for Messrs. Goodall, Backhouse, & Co. Mr. Thomas Winn, architect, Victoria Buildings, Park Lane, Leeds. Quantities by the architect—
 Mr. John Hall Thorp's tender accepted for all the works, with the following sub-contractors—
 Bricklayers and Masons—Thompson Bros., Leeds.
 Joiner and Carpenter.—John Hall Thorp, Leeds.
 Concrete Work.—John Hall Thorp, Leeds.
 Painter and Glazier.—J. Fox, Leeds.
 Slater.—J. Seaman, Leeds.
 Plasterer.—J. P. Mountain, Leeds.
 Ironfounder.—J. & J. Horsfield, Dewsbury.
 [Total amount, £8,849 15s.]

For pulling down and rebuilding No. 10, Duke street, for the Worshipful the Butchers' Company. Mr. Alexander Peables, architect—
 B. E. Nightingale (accepted upon a schedule).

For the erection of new bakery on the Berrywood Priory Estate, Acton, for Mr. H. W. Nevill. Mr. W. T. Farthing, architect—
 J. Woodward (accepted at a schedule of prices).

Fittings, &c., at Lower Norwood Schools.—In reference to the list of tenders for this work published in our last issue (p. 384), Messrs. Arthur M. Dawson & Co., of Chapel-road, Lower Norwood, wish to state that the tender lowest on the list was not theirs.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

T. R. R.—J. C. W.—R. C. C.—G. H.—W. E. N.—P. G.—"Honesty" (we cannot express an opinion on such a vague and indefinite statement of a case).—H. D. & Co. (your letter is unavoidably postponed again, but not forgotten).—A. F.—H. H. L.—W.—J. E.—W. E.—W. W. (correspondents who wish letters to appear in our columns must address themselves to the *Builder* solely. See "standing orders" below. Letters obviously duplicated for running round to various journals are regarded as circulars, and will not be printed).—V. W. (ditto).

All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

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.

Letters or communications (beyond mere news items) which have been duplicated for other journals, are NOT RECEIVED. 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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SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY evenings.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent-garden, W.C., free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

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"THE BUILDER" is supplied free from the office to residents in any part of the United Kingdom at the rate of 12s. per annum, PAYABLE. To countries within the Postal Union, 26s. per annum. Remittances payable to DOUGLAS FOOTE & CO., Publishers, No. 46, Catherine-street, W.C.

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The Builder.

Vol. XLVIII. No. 216

SATURDAY, MARCH 21, 1885.

ILLUSTRATIONS.

Completion of New Palace at Westminster, as designed by the late Sir Charles Barry, R.A.: View of the South Side of New Palace Yard and Westminster Hall	414-415
Design for a Municipal Mansion, by Mr. A. B. Mitchell: Stone Medallion, 1885	413-410
Newbury District Hospital.—Mr. H. G. Turner, Architect	422
Front-Door Gable of "Collyers," near Petersfield, Hants.—Messrs. Bateman & Keates, Architects	423
Carving and East Window, Melrose Abbey.—From Drawings by Mr. T. McLaren	426, 427

CONTENTS.

Report of the Royal Commission on Metropolitan Sewage Discharge	423	Newbury District Hospital	419	From The rods in Spires	425
Compliance of Architecture	405	Design for a Municipal Mansion: Stone Medallion (with Plan)	412	Examination of Surveyors' Charges in Compensation Cases	437
Building Trades' Exhibit on at Islington	410	Sketches, Melrose	413	The Sewage Disposal Question	433
Westminster Hall Restoration Committee	411	"Collyers," Hampshire (with Plan)	429	The Student's Column: Descriptive Geometry.—VII.	425
Lectures to Artisans at Carpenters' Hall	412	The Sanitary Uses of Disinfectants	430	Recent Patents	423
C. Barry's Design for Completing Westminster Palace	412	The Westminster Hall Committee	429	Recent Sales of Property	422
		The Decoration of St. Paul's Cathedral	421	Meetings	422
				Miscellaneous	423

Report of the Royal Commission on Metropolitan Sewage Discharge.



AGREEABLY to the intimation made in a brief notice in the *Builder* of the Report of the Royal Commission shortly after its publication at the close of last year, we proceed to lay before our

readers a summary of its contents, dwelling more particularly on some of the interesting facts elicited in evidence, which, until clearly established by more recent and special observations, have not been generally apprehended.

The Report certainly justifies the interest with which it has been awaited, while the quantity and quality of the evidence collected together testifies to the laborious and careful manner in which the inquiry has been conducted. Commencing with a most complete history of a question which has been in agitation more or less for forty years, the Report proceeds with an exhaustive explanation of the circumstances which led to the adoption of the system now existing, and closes with suggestions of a possible solution of the problem which has hitherto baffled the ingenuity of any of the cleverest minds in England. That the problem still remains unsolved indicates an extreme difficulty with which the question is surrounded, the principal cause of that difficulty being undoubtedly the unavoidable necessity of remedying rather than removing existing local defects, and the impossibility of dealing with it on an entirely new basis. Were it practicable to sweep away all the unfortunate arrangements of our forefathers, and to commence *de novo*, the problem could be worked out with comparative ease; but, as the Commissioners observe, so drastic a proceeding would involve not only an enormous expense, it would necessitate so much interference, and give rise to so many inconveniences, that it could create an opposition which it would be impossible to overcome.

The attention of the Commissioners was directed to three distinct subjects of inquiry,—

1. The system under which sewage is discharged into the Thames by the Metropolitan Board of Works.
2. Whether any evil effects arise therefrom; and
3. In that case, what measures can be applied for remedying or preventing the same?

Dealing primarily with the first two of the subjects, the First Report, which was issued at the beginning of last year, is confined to the conclusions resulting from the evidence taken

on these two points. As the Metropolitan Board of Works considered the inquiry almost equivalent to putting them on their trial, that body applied for permission to appear by counsel, and as such a privilege could only be granted alike to all the parties interested, the Commission to all intents and purposes constituted a Court before which the most eminent counsel exercised their talents in pleading for their respective clients. But may it not be asked here, Is such a method of conducting an inquiry absolutely indispensable? Is it not possible for a Parliamentary Commission to be so constituted that its members should be capable of taking evidence and forming a judgment thereon without all the tedious accompaniments of cross-examination, and, in many cases, the futile attempts to confuse a witness and lead him to contradict himself on points of detail, which, after all, affect but little the main issues? It is impossible for an outsider to read the evidence in the present instance without perceiving that many questions were put to the various witnesses, not so much for the purpose of eliciting information as for trying to invalidate previous statements, though such had been made by experts thoroughly conversant with the subject on which they had been examined. A style of cross-examination adopted towards witnesses of the "Winkle" type is scarcely suitable to be used towards professional men of acknowledged ability and experience like Mr. Baldwin Latham, and it is surely matter for regret that counsel should be allowed to occupy the time of the Commission in endeavouring to prove that the "recorded observations" of such an authority are "absolutely worthless," and "as not worth the paper they are written upon from beginning to end." That it was sheer waste of time is clear by the Commissioners' decision that though there might be apparent anomalies in the recorded observations of Mr. Latham, arising from accidental causes, "there is no doubt of their good faith, and, as a whole, of their hearing evidence of trustworthiness, and as representing what they professed to represent."

Part I. of the Report commences with an historical notice in regard to the drainage of London of all the measures proposed or adopted from the beginning of the sixteenth century to the present date. Never before has a record of this subject been presented in so complete and readable a shape, and its perusal serves to show under what great difficulties and amidst what conflicts of opinion the existing drainage system had to be decided upon. The needs of our metropolis, moreover, had thirty years ago become so urgent that the Metropolitan Board of Works were compelled to undertake some scheme without further delay,

and though its weak points have since become apparent, the Commissioners have recorded their opinion that, under the pressure of the attendant circumstances, the Board were justified in adopting Sir J. Bazalgette's design; and further, that whatever differences of opinion there may be as to particular parts of that design, there is no question as to the excellence of the construction of the individual works.

The total cost of the Main Drainage works, according to the Board's Report, amounts to 4,600,000*l.*, while the cost of the "further relief works and extension of the reservoirs" is estimated at 1,650,000*l.* more, raising the total expenditure to 6,250,000*l.* as against the original estimate of Messrs. Bidder, Hawksley, and Bazalgette of 2,300,000*l.*, and of the Referees' alternative scheme of 5,437,000*l.*

Before, however, the present scheme was finally adopted, it was submitted to the consideration of a committee of Referees, who, while agreeing on the main principle,—that of interception from a higher level, and pumping from such levels as were too low for a gravitating discharge, yet differed as to the details in which those principles should be carried out. The most important modification of the Referees was as to the discharge of the sewage, in removing the outfalls to a point much lower down the river, where it would be rapidly and certainly mixed with large volumes of water and be finally carried into the sea. That plan necessarily involved a large amount of work, and a proportionately increased expenditure, as noted above. Their Report was severely criticised by the advisers of the Metropolitan Board, who strongly objected to the scheme of the Referees, and ultimately rejected it under pressure from the principal Vestries and District Boards, and, as it has proved, under the mistaken conviction that the ratepayers would be unduly burdened by its costliness. As events have turned out, however, the wisdom of this objection has not been justified, for the very evils which the Referees predicted, and which their recommendations sought to avoid, have come to pass, while the cost for remedying them will, even if the estimates are not exceeded, surpass that of the Referees by nearly a million sterling! It is little wonder, then, that the controversy is not yet closed, and that it has been scarcely yet divested of the "acrimonious and personal tone" which it had assumed in its early stage.

The weak points of the present system are represented to be (1) the necessity for a large provision of storm-outlets, and (2) the discharge of the sewage in its natural crude state. On the first point, notwithstanding the statements of the Board's advisers to the contrary, the Commissioners justly arrive at the conclusion

that it is impossible to lose sight of the important fact that an expenditure is now going on of the large sum of 1,500,000. for additional "relief sewers" with storm overflows discharging within the metropolis; and that "the discharges of sewage from the storm overflows are frequent and considerable, and that they are occasionally of very offensive character."

On the second point the Commissioners observe that it was always understood that deodorisation would be resorted to, and that it is owing to the failure to carry it out that the Board of Works is now blamed. How far the evil is remediable is discussed in their second Report.

The next subject of interest treated is the distribution of the sewage in the river by the various motions of the water. Its importance is evident from the fact that no less a volume than 19,000 cubic feet per minute is discharged into the river at the two outfalls of Barking and Crossness, and, of course, the interest of the question lies in what becomes of that large volume of sewage after it enters the river, and in what manner it may be distributed about by the various hydraulic currents it encounters there. Herein lies the crucial point of determining the best position for the outlets, and round this, as may be supposed, the battle of the contending parties has most fiercely waged. As, however, a settlement of the question does not depend on any theory, but can be arrived at only by a series of experiments and observations of actual facts, there is, seemingly, not much room for divergence of opinion; nevertheless those very observations, specially carried out for the Committee by Mr. Latham, were sought to be branded as "worthless." So far from being unreliable, the Commissioners declare that they clearly demonstrated the extent and range of the tidal oscillations,—the maximum range recorded at spring tides being 18 miles and the minimum at neap tides 7 miles, the mean of the whole being about 12½ miles. Floats started from the northern outfall at varying stages of the tide ascended, with subsequent flowing tides, to distances of between 7 and 22 miles, clearly proving that, at whatever time of tide the sewage is discharged, some of it may, under certain conditions, be carried up the tidal oscillation alone into the heart of the metropolis, and even further.

There is, however, another force in operation termed "the mixing action," that is, the gradual commingling of the fresh with the salt water, which very materially influences the distribution of the sewage in the river. The proof of this action, and at the same time the means of its quantitative determination, are, it is said, furnished by the amount of *chlorine* in the water, so that the relative quantity of sea water, land water, and sewage can be determined in a given sample of river water, and this discovery has led to the detection of sewage having been carried with the "mixed water" as high up even as Chiswick. But the most startling result indicated by the chlorine test is that the proportion of the sewer liquid contained in the river in the neighbourhood of the outfalls approaches in dry seasons to one-sixth of the volume of the river! The Metropolitan Board, however, assert that a wide distribution of the sewage is favourable to its more rapid oxidation and purification, and that, therefore, in time the discharged fluid is deprived of its offensive properties. This may be admitted, but manifestly the value of the assertion is limited by the time which must elapse before the nuisance ceases.

In regard, then, to the evils resulting from the existing systems of discharge, while declaring that there has been no evidence to lead them to believe that any substantial nuisance attributable to the metropolitan sewage is complained of below Gravesend or above Greenhithe, yet the Commissioners say that it is impossible not to be satisfied of its real existence, and that the effects of the sewage discharge are more or less apparent at all times; that from a considerable distance above to fifteen miles below the outfalls fish have disappeared from the river; and that though there is no evidence of any evil results to the navigation of the Thames by deposits from

the sewage discharge, yet that this discharge adds largely to the quantity of *debris* in the river.

Besides receiving the evidence of others, the Commissioners took the evidence of their own senses by personal inspection of the river, during the summers of 1883 and 1884. The evils which existed in 1883, when there was an abundance of land water diluting the sewage, were found to be greatly intensified during the exceptionally dry season last year. The proportion of sewage liquid in the river near the outfall, which in 1883 amounted to nearly 12 per cent., reached last year 17 per cent. at high, and 28 per cent. at low water. Even within the metropolis it was found at high-water as large as 6 per cent. The sea-water also penetrated as high as Chiswick, that is, 50 to 60 miles from the mouth of the river, and then with a reduced inflow of land water the sewage remained a much longer time in the river before being carried out to sea, so that with the constantly accumulating discharges it culminated in virtually rendering the Thames, between the months of June and September, a huge cesspool, which, in the words of one of the Commissioners, was "a disgrace to the metropolis and to civilisation." It was time, indeed, to declare that "the public interest requires that a remedy should be applied with the least possible delay."

Valuable and interesting as is all the information contained in the first Report of the Commission, yet the attention of the public is more particularly concerned in the views and decisions on the third point of their inquiry, the measures to be applied for remedying or preventing the evils resulting from the present system,—in other words, the disposal of the sewage. It is almost with a feeling of disappointment that we read, that after taking the evidence of twenty-seven witnesses, and themselves personally inspecting the various processes actually practised in various towns, the Commissioners feel themselves "compelled to express their regret at the obscurity in which, after so many years' study and discussion, and after the large experience that has been gained, the subject of sewage treatment appears to be still involved," and that they, therefore, "conceive that their duty will be best performed by stating the various plans that have been proposed or suggested as possible remedies for the existing evils, adding such remarks as seem to be useful in forming a judgment upon them." There is an uncertain ring in this declaration which seems to convey an impression that the Commissioners themselves are not perfectly satisfied as to the successful issue or the finality of the measures they suggest. In so far that it brings all the various proposals under one view, and discusses their respective merits, the Report is valuable in enabling the public to judge of those merits; but there is an absence of the authoritative conviction, which alone can command entire confidence in the skill of the physicians called in to consult over a desperate malady. Perhaps the public must rest satisfied with the completeness of the diagnosis, and trust that the remedies which have been suggested rather than prescribed will work the desired cure.

Before examining the various proposals which have been made for the treatment of the metropolitan sewage, the Commissioners discuss two points which have a very important bearing on the question:—

1. The separation of the sewage from the rainfall; and
2. The prospect of profit by the utilisation of the sewage.

As has already been observed, the impossibility of carrying out the first in the case of the metropolis owing to the necessity it would involve of remodelling the whole of the house drainage at an enormous expense, constitutes the main difficulty to be encountered in designing an effective sewerage scheme; but there is no reason why the "separate system" should not be carried out in all extensions of the metropolitan area. The preponderance of the evidence is conclusive on this point. For though it is quite true that surface drainage, both from town and agricultural areas, must

contain more or less impurity, still by its separation from the actual sewage it allows of the latter being more easily and economically dealt with in its concentrated form.

The second point has given rise to a great deal of discussion, but the logic of facts has led to the almost universal conclusion that, as far as actual experience goes, the positive manurial value of town sewage is so small as not to be worth the cost of carriage, even for moderate distances. Except in very occasional cases, as for instance that of Edinburgh, which, according to Sir R. Rawlinson, could not be applied to the Thames, the application of sewage to land has not been attended with the profits anticipated. Mr. Latham particularly quotes the case of the Croydon farm, where as much as 12,000, have been lost in some years, notwithstanding its favourable position for the disposal of the produce raised.

The only plan hitherto attended with any really successful results is that practised by Mr. Bailey Denton, whose book on the treatment of sewage by "intermittent filtration" was lately reviewed in the *Builder*.

As regards chemical treatment, with the exception of the Aylesbury farm, regarding which, as the Commissioners observe, there is something very unintelligible in the value claimed for the precipitate, the conclusion arrived at is that it is not probable that any marketable manure can be obtained by it, the only possibility being that the precipitated matters might be made to yield some little return in diminution of the cost, and even that is problematical.

On the whole, considering the fact that sewage does contain elements of value, and that the aggregate quantity of the metropolitan sewage is so large, the Commissioners are of opinion that the possibility of realising some of that value should be borne in mind in devising plans for its disposal, and that, as far as is yet known, its application to land seems the probable mode by which this can be done, but that proceedings to free the Thames from pollution must be undertaken irrespective of the question of cost or returns.

While inclining to that belief, the Commissioners proceed to discuss six possible remedies which have been suggested for the evils of the present system of discharge:—

1. The principle known as "Broad Irrigation."
2. Filtration through porous land.
3. Clarification and consequent partial purification.
4. Precipitation and subsequent application to land.
5. Removal of the outfalls farther down the river.
6. Removal to the actual sea coast on the north side.

On the first head the conclusions arrived at are, that although applicable and possibly satisfactory, as well as profitable in the case of small towns, it would be impracticable in the case of the metropolis, owing to the vast area of land required, viz., 40,000 acres, at the lowest computation.

The second remedy the Commissioners think might, with some modification, be applicable, inasmuch as the process seems to be more efficient and certainly more economical in the item of land.

As regards precipitation processes, they would certainly effect an improvement on the existing state of things, but they are insufficient of themselves to purify the river. The annual cost would be at least 200,000, equal to 1s. per head of the population; but its great advantage consists in the ability to bring it into immediate operation, and, when desired, to discontinue it at a comparatively small loss.

A combination of precipitation with filtration through properly-prepared land the Commissioners believe to offer the most feasible, though somewhat expensive, means of solving the problem, for thereby the objection to simply chemical treatment will be obviated by removal of the cause of injury to fish and of danger of contamination of the adjacent subsoil.

As regards the fifth remedy, the Commis-

ioners conceive themselves warranted by the evidence in stating that it would be advisable to remove the outfalls to a point lower down the river than that named by Sir J. Bazalgette, and where facilities are asserted to exist or clarification; but they pronounce emphatically against the admission of sewage in its crude state into any part of the estuary of the Thames from the Nore upwards, though, if properly clarified, it might be discharged below Hole Haven without risk of serious nuisance.

On the sixth remedy, as proposed in the scheme projected by Messrs. Maclean and Stillman in 1849, and condemned by the Referees, to whose notice it was submitted in 1857, and as contained in a similar proposal by The Metropolitan Sewage and Essex Reclamation Company, though supported by Mr. Latham, the Commissioners pronounce a decided negative. A *résumé* of the conclusions and recommendations of the Commission may be stated shortly thus:—

That it is unnecessary and unjustifiable to discharge crude sewage into any part of the Thames, but that processes of precipitation or deposition may be conveniently applied at the outfalls, and the liquid resultant may, as a preliminary and temporary measure, be suffered to escape into the river between high water and half ebb of each tide, the orifices being not less than 6 ft. below low water of lowest equinoctial spring-tides; but for a permanent measure that liquid should be further purified by intermittent filtration through sand, of which, it is believed, sufficient may be found near the outfalls, and if not, then the sewer liquid should be carried down to at least as low as Hole Haven.

These recommendations were criticised by Captain Galton in his recent lecture before the Society of Arts as dealing insufficiently with the fact of the ever-varying strength of the sewage liquid, and with the increasing volume which will have to be dealt with, estimated at 3,000,000 cubic feet in twenty years; also that if the final result of the deodorisation and filtration is to return only a portion of the effluent pumped to the river at a present cost of 4,500,000*l.*, which will have to be increased no distant date to 6,000,000*l.*, additional to the 1,500,000*l.* now in course of expenditure, might be simpler and cheaper to adopt the use of a modified deodorisation suggested by the Referees, *i.e.*, dilution of the sewage combined with its flow through many miles of long tidal channels at a cost of 2½ millions sterling.

Inasmuch as the principal difficulty of dealing with the London sewage arises from the concentration of so exceptionally vast a mass at various points on the river, it seems to suggest the advisability of not attempting to deal with the whole of that mass in any one particular mode, or by any single process. Is there any real impediment to dealing with it in detail, and so availing ourselves of more than one of the several processes, which, although not strictly and commercially successful, have nevertheless practically mitigated the difficulties of sewage disposal? It is acknowledged on all sides that the nuisance must be got rid of at any cost, and as quickly as possible. Would it not, then, be practicable to commence with deodorising and precipitating processes of say one portion of the present volume, carry off another portion on the plan of the Referees, and convey a third right away to the coast, as recommended by Mr. Latham, to be there utilised by private enterprise? By thus dispersing the volume the difficulty of dealing with the accumulated quantity at one point is removed, and the probability of obtaining some value for the annual residuum in diminution of the annual outlay rendered more possible and feasible. In the principle of dividing an enemy's forces, and beating them in detail, may not the metropolitan difficulty of sewage disposal be thus overcome?

Though the suggestions of the Commission are scarcely to be said to amount to a definite solution of the problem set before them, yet the public are much indebted to them for their very able, exhaustive, and interesting report.

NOTES.

T seems that the railway rates question is once more to be referred to a Royal Commission. Mr. Chamberlain stated in the House on the 13th that the railway companies had agreed to this course being adopted, providing that the inquiry be limited to rates and terminal charges without prejudice to other matters. Mr. Chamberlain suggested that the Commission should consist of the Railway Commissioners and two representatives of the railway companies and the traders; intimating also, that the question of preferential rates would be made the subject of special legislation. Both the Railway Association and the Railway and Canal Traders' Association held meetings on Monday last to consider this fresh aspect of affairs. The former merely passed a resolution pressing upon the Board of Trade the necessity of two disinterested statesmen of eminence being appointed members of the proposed Commission; while the latter considered it inexpedient and unfair to send the Bills to a Royal Commission at all, as such a course would entail on opponents all the expense that would be incidental to a contest before a Parliamentary Committee. Their opinion as to the scope of the inquiry is that it should be limited to the cost of conveyance of the articles scheduled in the Bills and the rates charged for such articles in England and other countries, in order to arrive at a just basis for a uniform classification. It, therefore, appears extremely unlikely that the matter will be settled for some time to come, as these inquiries have always proved to be very protracted, and there are already indications of difference of opinion as to the constitution and duties of the Commission.

THE proposal of a Royal Commission on Railways, to be built out of the elements of the existing Railway Commission, two representatives of the traders and freighters, two representatives of the railway managers, and two (if such can be found) of the independent wealth and statesmanship of the country, is of course an improvement upon the prospect of an interminable series of contests before nine or ten committees of each House of Parliament. But it is, at the best, an amateur treatment of a great national question. A commission, or a committee, as generally constituted, may, to a certain extent, thrash out the facts, but it does so in the form of a squabble. The anxious care that the members of the committee who represent the interest sometimes take to close the mouths and discredit the testimony of the witnesses called by B, is, in cases easy to point out, nothing short of scandalous. Opposing counsel sit on the bench, and try to guide the case each in his own way. In France, Germany, Italy, or almost any other civilised state, the first step to be taken in such a question is to call for the report of a competent expert. Were this done now, or even, if there be difficulty in fixing on a man of sufficiently commanding character, were two reports called for, one from the companies and one from the traders, a judicial body, however constituted, would have the materials for a calm investigation placed before them, far better than by the *ex-parte* statements of hostile counsel. An indefinite amount of time and of cost would be saved. And there would, at all events, be the satisfaction that this great question was attacked, rather with a view to its equitable solution, than as a scramble among opposing interests.

LORD CAMPERDOWN'S Bill for the regulation of powers of water companies, which passed the second reading on Tuesday night, and will probably be referred to a Select Committee, paves the way for a very desirable check on the powers that companies now possess of cutting off supplies for non-payment of rates in advance. No doubt the companies have to do with a certain proportion of troublesome customers, but, as the Lord Chancellor observed, they have obtained the practical monopoly of one of the first necessities of life

on very favourable terms, and the very moderate proposition in the Bill, that a company should not cut off the supply except on obtaining powers to do so from a magistrate or from some court of summary jurisdiction, will furnish exactly the amount of check which is wanted to protect the consumer from oppression, while leaving it open to companies to obtain power of summary procedure in cases where they can show good cause for it. The pretence of the Bill being an oppressive one to the water companies is absurd.

THE case of Spackman v. The Board of Works for the Plumstead District, decided by the House of Lords on the 26th ult., and to which we have before referred as being of considerable importance to builders, is also of importance as giving increased weight to the decision of the Superintending Architect to the Metropolitan Board of Works as regards the general line of buildings. The appellant Spackman had been summoned before the Magistrate of Greenwich Police-court under the 75th Section of the Metropolitan Management Amendment Act, 1862, in respect of certain shops erected by him in Lee High-road, which were alleged to be in advance of the general line of buildings in that road. The Magistrate had decided in the appellant's favour on the ground that the certificate of the Superintending Architect was not binding on the Magistrate, who heard evidence and inspected the premises, and was of opinion that the buildings were not in advance of the true general line of buildings. This decision was reversed by the Queen's Bench Division on the ground that the certificate did bind the Magistrate. The Court of Appeal confirmed the decision of the Queen's Bench and remitted the case to the Magistrate to direct the demolition of so much of the buildings as were erected in advance of the general line as certified by the Superintending Architect. The case was carried to the House of Lords with the result that the judgment of the Court of Appeal was upheld.

THE effect of this decision will be to materially increase the responsibility of the Superintending Architect, who will no longer be the assessor appointed to assist the Magistrate in the case of disputed lines of frontage, but the virtual judge or arbitrator, and the only duty of the Magistrate in these cases appears, from the judgment of the Lord Chancellor, to be to register the decisions of the Superintending Architect, and to make orders for the removal of buildings erected beyond the general line of buildings. It would further appear that not only has this officer power to determine the general line of buildings in the case of buildings actually erected, but that he may also define the line with respect to buildings proposed to be erected. This will be a considerable advantage, as hitherto it has been held that the Superintending Architect was not empowered to decline a line except when some building had been erected in advance of the general line of buildings. In the Lord Chancellor's own words:—"If the matter is to depend upon the Justice, the builder and the Board cannot go before the Justice until the building has been erected, and you have the same inconvenience which arose under the Act of 1855; whereas, if the Superintending Architect is to decide, the two parties may settle any question before him before any expense has been incurred or anything has been done." The decision of the House of Lords gives the Superintending Architect a power possessed by no other judge or tribunal in the kingdom, as his decisions are, practically, without appeal, provided, as the Lord Chancellor observes, his judgment was honestly given and the necessary preliminary formalities had been complied with.

IN Mr. Shaw Lefevre's evidence before his own Committee on the restoration of Westminster Hall, he stated that "the completion of the Westminster Palace according to Sir Charles Barry's design might be understood to be given up." Who has given it up, and when? That it will be deferred is likely enough. The object now is to prevent any-

thing being done which will stand in the way of its completion. The proposed "cloister" treatment of Westminster Hall, as now seen in the model, would not do so, though we regard it as "playing at architecture"; the paltry new building, proposed to stand at right angles to the north end of Westminster Hall, would stand in the way, and, as the Committee have not ventured to erect a canvas representation of that structure, we hope we may regard that as "given up." The completion of the cloister design, if carried out, and if Westminster Hall be left exposed to view, would emphasise the discrepancy between the scale of these details and those of Barry's building. The public who take any interest in architecture will hardly support the idea that the completion of a great national building is to be declared impossible because the Ex-First-Commissioner of Works does not like to be contradicted.

DISCOVERIES of considerable interest have recently been made at Eining, which is, presumably, the site of the ancient town Abusina. The excavators have lighted on a large Roman villa with extensive baths. Besides countless architectural matters, which in the arrangement of the heating apparatus have considerable technical interest, relics more distinctly human have been found. Among these are the skeleton of a woman, with by her side a jug, a glass urn, and tear-bottles, the last offerings to the dead; also the apparatus of her toilette hair-pins, pearl necklace, and bracelet; some slight sculptural remains, a woman's head in marble, and a votive stone to the honour of "Dea Fortuna Augusta Faustina," with an inscription of four lines; also a number of weapons, coins, rings, fibulae, spoons, and some tiles with Roman stamps.

IN the course of excavations at the Propylæa at Athens a number of cornice mouldings, made of porous stone, have been discovered. There seems little doubt that these belong to the older Propylæa, and that when the new building was erected, in the fifth century B.C., they were used, as was so often the case, as building materials. The stones are in excellent preservation, and have been brilliantly coloured in red, blue, and gold. They will, therefore, serve as valuable instances of decorative architectural painting. The account of these discoveries in the "Berliner Philologische Wochenschrift" is accompanied by a sketch of the south wing of the Propylæa, conjecturally restored and seen from the south-west. The new restoration, based on these recent discoveries, differs materially from that of Bohn, but the sketch given in the German paper is so exceedingly bad and meagre that it is hardly worth dealing with seriously.

A NEW society of artists is about to be founded at Paris, that of the Pastellists. Besides other eminent names among its founders, we notice those of MM. Baudry and Boulanger, of the Académie des Beaux Arts, and those of MM. Cazin, G. Duhufe, Duez, Jules Lefebvre, Émile Lévy, Th. Rousseau, and M^{me}. Madeleine Lemaire. The society, of which M. Roger Ballu is President, will open an exhibition in the April of each year, at the rooms of M. Georges Petit, its vice-president, in the Rue de Saxe. The first exhibition will open on the 1st of April next, and will include a very interesting collection of works by French masters of the last century.

THERE are some very good pictures to be seen at Messrs. Arthur Tooth & Son's Galleries in the Haymarket, notably two by Gérôme, "In the Desert" (26), and "The Bath" (109). The first represents a bright bay Arab horse lying with his head in his master's lap, apparently fallen from exhaustion; the horse is "and on" to the spectator, and the drawing and painting of the animal in this extremely difficult position form a triumph of technical power such as is not often met with. "The Bath" represents a blond girl kneeling on a seat by the bath waiting to receive a douche from a negro attendant in bright orange turban. Neither

picture has a grain of feeling; but, as representations in painting of the human animal and the equine animal respectively, they are perfect. Among other painters represented are Edouard Frère, Israels, Van Haaften, De Blass, Denly Sadler, Leader, Brett, Heffner, Th. Weber, &c. There are some good small architectural bits, especially a "Venice" by L. Senét. Four hunting-pictures, by Mr. T. Blinks, representing "The Run of the Season," are admirable studies of dogs in varied action.

THE proposal of Lord Brabazon, on behalf of the Public Garden, Boulevard, and Playground Association, to find work for the unemployed in laying out fresh squares and other places which are now in a neglected state, is a suggestion which may be said to be sound as well as philanthropic. The amount of work to be found is, of course, limited, but a good deal may be done with permanent benefit to the community. A lady has given 1,000*l.* to be expended in this manner, and Lord Brabazon hopes to find other funds forthcoming.

THE collection of Frederick Walker's water-colour drawings at Mr. Dunthorne's Gallery, in Vigo-street, is not quite as important or complete as we had been led to suppose, and we looked in vain for some well-remembered favourites. But even so much of Walker's work as is shown here is enough to afford more matter for study and pleasure than most exhibitions of a much larger size afford; there is nothing that is not masterly in its way. It serves to remind us again, rather sadly, what a genius was lost to English art, and what a great career cut short, by Walker's early death.

AT the Fine Art Society's room is to be seen a charming collection of sixty three drawings, by Mr. Alfred Parsons, illustrating "Shakespeare's River." These are various sketches on the Avon, many of them rather finished drawings, illustrating some beautiful bits of English scenery, and some of the best qualities of landscape art on a small scale. An account of the trip, given by the artist in a pamphlet accompanying the catalogue and embellished with some woodcuts, furnishes a general commentary on the collection, the drawings of each place mentioned being identified by marginal numbers.

AT the business meeting of the Institute on Monday, when a memoir of the late Mr. Hadfield was read, a number of his designs for churches were exhibited, which illustrate some of the best class of work of the Gothic revival, now a thing of history, but still dear to the memory and associations of many of us.

IF the drawings by Mr. G. W. Allan, member of the Scottish Water-Colour Society, which are now on view at Messrs. Dowdswells, represent anything like the average level of work among the members of that Society, it is artistically in a very flourishing condition. Mr. Allan has collected a series of drawings made in Venice, Spain, France, England, and Scotland, his native country rather predominating in the selection. These are drawings in a genuine water-colour style,—free, broad, and powerful for the most part; and many of them are of considerable interest to architects from the admirable delineation of some out-of-the-way bits of picturesque architecture with which few people on this side the Tweed are practically acquainted. Among these are the drawings of "St. Monan's Parish Church" (49); "Old Town Hall, Grail" (34); "Pittenweem Parish Church" (7); "High Street" of the same little town (47); and the better known "Elgin Cathedral" (1). There are some good Thames and Venetian studies also.

THE "Society of Lady Artists" opened their annual exhibition in Great Marlborough-street this week, the private view being last Saturday; but we regret to say the quality of the exhibition does not tend at all to modify the opinion we have hitherto expressed that no good artistic object is served by the existence of the society. Scarcely any of the really able

lady artists of the day are represented there at all; and the few works which one pauses to look at are all by those who do not require a special society to make them known (Miss Kate Macaulay, Miss Linnie Watt, Mrs. Marrable, and others). The bulk of the work only shows that there are a good many ladies who take pleasure in painting, but who would have no chance of a place in high-class general exhibitions. Any woman who has attained real artistic mastery and power can find a place for her works in general exhibitions, by the side of the works of men, "without distinction of age or sex." There is no pretext, therefore, for saying that women need an exhibition of their own to make their talents known. The majority of the works that are hung here would be refused in the best exhibitions, not because they are by women, but because they are deficient in artistic power and interest. Then why exhibit them?

THE erection of the new buildings at the High School, Edinburgh, as formerly described in these columns, is meeting with considerable opposition. At a meeting of the Committee of the Town Council an opinion was expressed that the erection of the proposed gymnasium and janitor's lodge would destroy, to a certain extent, the architectural completeness of the building, and proposals were made as to the propriety of taking active steps to prevent their being erected.

IT is not generally known that, according to the original plan, Princes-street was to have a continuous row of buildings on both sides. This was most fortunately prevented, but a beginning was made at the east end by the erection of what are called the new buildings, to the west of the General Post Office. The back of these buildings faces the west, and is far from tightly. The ground immediately behind them, which was occupied originally by stables, &c., has been acquired by the North British Railway, and upon this ground the Company proposed to build a hotel. This proposal caused an outcry from neighbouring proprietors, but it appears that the city does not possess a servitude over the ground. The erection of a hotel here would, if carried out in an appropriate manner, form a happy termination to the east end of this fine street. A proposal has been made that advantage should be taken of the proceedings of the railway company to have the line of frontage of the new hotel thrown back to the same line as that of the north façade of the Post Office, an improvement much needed at a point where there is frequently a conjunction of traffic, and which, if not carried out, may be a subject of lasting regret.

IT has been determined to remove *en masse* to an adjacent site the large house in Whitehall which was lately occupied by Lord Carrington. Careful estimates have been prepared, the necessary funds have been provided, and the responsibility for the work has been placed upon Major-General Sir Andrew Clarke, R.E. The house stands upon Crown property, and is one of the very few domestic works of the architect, Sir Wm. Chambers, which remain intact. Its exterior presents nothing architecturally remarkable; but the beauty of the interior is well known, and was partially illustrated a few months ago in the *Builder* (Aug. 9, 1884). There has of late years been too much activity on the part of the destroying angel, and many houses of great historic interest (amongst them the several residences of Milton, *e.g.*), which might have been wisely preserved for our posterity, have wholly disappeared. It is time that some effort should be made in high places to discountenance the wholesale destruction which has heretofore been going on around us. It is, therefore, with peculiar satisfaction that we regard this attempt to save from the spoiler one, at least, of the many characteristic works of our ancestors. It is estimated that structures of the class to which Lord Carrington's house belongs, may be removed hothly for one half the sum they would cost to rebuild. The intended experi-

ment in Whitehall, although common enough in America, is a novelty with us, and will be watched with general curiosity.

THE Burlington Fine Arts Club have got together in their well-known room a very valuable and interesting collection of examples of Persian and Arab art, the aim of the exhibition being to illustrate especially the more important phases of the art of Persia, "and its effluent arts of Damascus and Rhodes." Ceramic art is most fully represented; but there are also some beautiful examples of metal, some of them of special interest in regard to form and character, and, among the limited amount of textile fabrics to be seen are one or two specimens of remarkable beauty of design and execution. The catalogue is prefaced by a short analytical essay from the pen of Mr. Henry Wallis. We shall return to the subject, and consider the collection more in detail, the crowded state of our columns precluding any lengthened notice of it this week. Among the contributors to the collection are Sir Frederick Leighton, Mr. Holman Hunt, Mr. William Morris, Mr. G. Aitchison, Mr. Ionides, Mr. Louis Huth, and a good many other members of the club.

THE COMMONPLACE OF ARCHITECTURE.*

THE subject I have chosen for my lecture is certainly not the most attractive that could have been selected, and even seems to require some apology, for commonplace at first sight does not promise to be interesting. Lectures on architectural subjects generally deal with the grander side of architecture and its higher branches,—with buildings on a large scale, with the use of costly materials, or with sculptured and other adornments in stone, marble, wood, glass, or metal; and, as a rule, it is very proper that it should be so. When a subject has to be mastered we naturally attack first that side which seems to present it to us in its fullest development and in greatest perfection. If we want to study the poetry of our own or another language we naturally read first the great and not the minor poets. By studying the great masters, who are the recognised authorities, we very reasonably suppose we shall obtain a true idea of the nature and the scope of the national poetical style much more readily than if we began at the other end with the ballads and popular literature, or even the second-rate poets. And in the same way with painting; masters in each school first, and leaves for future and supplementary study that of their followers or less conspicuous companions. It is, therefore, very proper for architectural students to acquaint themselves first with what may be called the monumental architecture,—that of the great public monuments of the art in their own country and abroad, and to learn from them what architecture is at its best; for it is in them that they may expect to find it at its best, not only because those buildings are larger and more splendid than others, but because, being more important, it is natural to suppose that the most skilled workmen of the day were called to work upon them, and that they are, consequently, the fruit of the ripest experience of their style and age.

And yet while we study our art in cathedrals and minsters, palaces, and public buildings, it is obvious that very few indeed among us can expect an opportunity of erecting great architectural monuments of this kind; and while we study in museums the more delicate and exquisite triumphs of the minor plastic arts with which an architect has to acquaint himself, goldsmith's or silversmith's work, enamels, inlays, and the finer work of the chisel, or of the modeller in bronze, it is possible that we may very rarely have to make any direct use of our studies by designing or directing work of this elaborate and expensive nature. The knowledge of ecclesiastical architecture which we have acquired in the fanes of Rome, Vienna, or Amiens, or those of York, Ripon, and Beverley, or among the ruins of Fountains, Rivaux, and Byland, may never be called upon for more than a modest village church; and our know-

ledge of civil or domestic architecture gathered from the stately piles of Rome and Florence, or on the banks of the Grand Canal, or nearer home at Kirby, Knole, Andley End, Hampton Court, and Burleigh, or in the academic halls of our ancient universities, may never find an outlet more important than some suburban villa or small country parsonage.

There seems at first sight to be an irony in this disproportion between our studies and our performances, a disproportion to be found perhaps in all professions to some extent, but more strongly accentuated in ours than in most others. And yet it is in reality a natural and inevitable state of things. Architecture must be studied as a whole or we shall never understand the separate parts of the subject; our village churches will be ill designed unless we have studied our art in the minster as well as in humbler buildings more on the scale of our own, and we shall have small success in designing our small country-houses unless we know what can be done and has been done on a more important scale by the great masters of our art.

I would, therefore, say to the architectural student,—continue to study architecture as a whole; as an art applicable to great works and small; and to prepare yourself for whatever fortune may throw in your way. For if the high prizes and the splendid opportunities that fall only to the few should never fall to your share, knowledge and mastery of your art will be as useful to you in your own simpler work as if you had had the widest scope for its employment, and this knowledge and mastery is only to be had by the study of all that architecture has done and can do.

The student, therefore, need not be disappointed entirely, nor think his training thrown away if he finds himself confined to a less ambitious class of work than he had hoped for, and pictured to himself as entering into his future career. Like every other pursuit, architecture has its "commonplace"; and one object I have in view to-night is to point out the great importance of its commonplace side. There was no doubt a time when architecture was thought to be a luxury which only the wealthy few could command; but that time has happily passed away, and we have begun to recognise it as an art that may be applied to small things as well as great, and one whose function it is to make life pleasanter to the many as well as to the few. And as the lives of most people are necessarily commonplace, for otherwise there would be no meaning in the word, so the character of their homes to be consistent should be commonplace also; and unless architecture can adapt itself to commonplace requirements and commonplace circumstances it fails to be a popular art, and to nineteen people out of twenty it will be of no use at all.

What is it that ordinary men and women have a right to expect architecture to do for them? Its proper function is to take up the work where the art of building stops, and to provide us with houses that are not only well built and wholesome, but attractive and pleasant to live in; with churches that are not merely large enough to hold the congregation, but also decorous and solemn; with halls and places of public assembly, that besides being convenient and airy have an appearance and a dignity befitting their purpose. As long as we have eyesight and sense to distinguish one form and one colour from another we shall never think it enough that our house is substantially built, conveniently planned, well drained, and properly ventilated; all these conditions come at the beginning, they belong to the art of building, and lie outside the province of architecture entirely; they are matters of course, without which we should not be content to live in the house at all. We want something more than this: our home must be pleasing to the eye; its outline must be well imagined, its doors and windows well proportioned, its colouring harmonious, and such decorative features as we are able to afford ourselves must be artistically designed, however simple and unpretending they may be. We want pretty wall-papers, harmonious draperies and carpets, and characteristic furniture; above all, we like our house to have some individuality of character, like ourselves, who are not quite of the same pattern as other people.

All these are really very commonplace demands, and are really within every one's reach, he his means as small as you please, provided he goes to work in the right way to get it. And yet there is, perhaps, nothing more

difficult to find than a successful piece of architecture of this commonplace kind, because, as a rule, men do not go to work in the right way to achieve success within these restricted limits. On the contrary, they generally refuse to be bound by these limits, and seem to think that a house which satisfies these modest requirements does not come within the province of architecture at all, unless they add something to give it an architectural character. It is, as a general rule, precisely this addition which is the ruin of it. The requirements above named make very little demand upon positive architectural details; they afford scarcely any opportunity for them; they are even inconsistent with their presence, and if we insist on dragging them in, they destroy the appropriateness of the building to its circumstances. This is the secret of the execrable design of most of the houses built for professional or commercial men that are springing up in and near our great towns. I do not know whether Leeds is an exception to the rule, but unless it is very superior in taste to London and other English towns, your own experience will tell you that it is impossible to take a walk in the suburbs without having your eyes shocked and your temper ruffled by the vulgar architectural pretence of nearly every other house you see. The provoking thing about it is that the very persons who live in these houses from choice, or are forced to live there from necessity, do, in theory at all events, profess to admire, and in great measure honestly do admire, simplicity. What is the ideal country home that the citizen delights to picture to himself in imagination, whether he thinks he should like to retire and spend the autumn of his days? Some gray farm-house of lichen-covered stone or mellowed brick that he has seen in his holidays, some larger cottage than usual with high tiled roof, dormer windows, and rustic porch, approached by a straight walk between flower-beds and clipped hedges. In imagination, at all events, he longs for rustic simplicity. His ideal is unpretending and homely enough, and there is no reason in the world why he should not realise it if, as I have said, he goes to work in the proper way. And how does he realise his dream? or rather, how does his architect or builder, or both together, realise it for him? No simple cottage or farm-house for them. They ran up miniature turrets, containing inaccessible rooms, and covered with high steeple-crowned roofs; they round off their corners or disguise them with bay windows placed in an absurd manner obliquely across the angle of the buildings, strange excrescences that fritter away money, weaken the construction, and add nothing whatever to the commodiousness of the rooms. They crown the roof with ridiculous or useless balustrades surrounding lead flats, on which no sensible person would ever think of setting foot. They flank the little doorway with odious columns and carved capitals that seem put there to call your attention to the fact that there is an arch to be carried. The walls are bedecked with cheap terra-cotta ornaments, the gables armed with finials or hristling with spikes, the balconies and railings furnished with showy cast-iron work. But I need not exhaust the catalogue of the various splendours or offences of villa architecture. We are all, unfortunately, only too well acquainted with them; they haunt us in our walks and drives, and meet our gaze as we turn the pages of the weekly architectural papers. There are, I suppose, people who like this kind of work, or, at all events, holders think there are such people, because otherwise our suburbs would not be so constantly disgraced by it, but I think most of those who live in such houses live there because they have to put up with what they can get, from necessity and not from choice. The citizen who dreamed of a farm-house or rural cottage, although he calls his new house a grange or a farm, or a cottage, and names it after this or that tree, plant, or flower, can hardly delude himself into the belief that he has got what he sighed for, and has in fact been somewhat hardly dealt with.

It would be easy to follow this subject from the suburbs into the crowded streets of our great towns, where ordinary shops and private houses that call for no display are loaded with unmeaning ornamentation, which, if not had in itself, becomes bad because it is unmeaning, having no justification in the purposes or uses of the building to which it is applied.

But it is not my purpose to tie you with a distribe against Cockney architecture, and I should be sorry to think your Association

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numbered among its members any one who required to be warned against the sins of vulgarity and pretentiousness of which it is guilty. These buildings stand self-condemned in the eyes of any one whose judgment is worth having, and although it is an unhappy fact that they are designed and carried out by men who call themselves architects, there can, I willingly believe, be no reason for my occupying your time with them any further. My object is a different one. I wish to point out that these offences against good taste and propriety would not be committed if architects and the world generally recognised the principle that architecture has a commonplace side, and that it can find plenty to do in the way of making our buildings beautiful and attractive without such violent struggles to be original and picturesque.

There are, of course, men in whose eyes architecture is a matter of orders and entablatures, columns and arches, traceries and moldings, and who cannot conceive the possibility of its existing without them; just as there have been and still are painters who think that a picture must represent some grand historical or heroic scene, or some strange natural effect, or some unusual piece of landscape, and who think ordinary scenes of every-day experience unworthy of their pencil. But we know very well what tedious dull work these painters have left us, and how little interest their ambitious canvases possess, and we gladly turn away from their handiwork to the simple unaffected pictures of nature as we know her, in which we find not only more of human interest to satisfy us, but more truth, closer knowledge of nature, and keener artistic sensibility. For it implies a certain dulness of the imagination when it can only be aroused by violent appeals; we do not need to shout except to a deaf man; and so in art extravagant designs calculated to impress vulgar observers will offend and wound those who are less thick-skinned and more impressionable. And do not forget that many modes of architectural design that are appropriate enough to monumental buildings become extravagant when applied inappropriately to commonplace objects. Architecture is good and noble only so long as it is suitable and appropriate to the circumstances or occasion of its employment, and consequently for the commonplace of ordinary life we must have a commonplace architecture.

This is merely saying in other words that good art depends on an accurate sense of proportion: that just as a good literary style depends on the nice accommodation of words to the ideas intended to be conveyed, and to the intelligence of those to whom it is intended to convey them, so a good architectural design depends for its merit on being proportionate to the dignity and character of the building, and of those who use it and to whom it belongs. If it falls in this nothing else will suffice to redeem it. It matters not how good its details are if they are inappropriate, nor how much skill and thought has been bestowed upon them if they are misplaced.

Now, those purely architectural forms which have been developed in what, for want of a better word, I have called "monumental" buildings, are clearly disproportionate and misplaced in the dwelling-houses of ordinary people of moderate means, and, consequently, they never fail to offend. The little roofs of such houses as these require no conical or pyramidal excrescences to break their skyline, nor their narrow frontage any turrets or breaks to interrupt them. Their small windows want no traceries to block them up, nor do their puny doors require shafts with base and capital to carry their insignificant arches. All these are impertinences and vulgar intrusions: they are like the cheap finery worn by people who wish to dress like those who are richer than they are: they make sensible persons reflect that the money they cost might have been much better spent in making the walls thicker or the timbers larger, or the rooms bigger, and that the house might have been not only much more comfortable but much more comely if it had been less showy. The old houses of a moderate size that so charm us in town and country had no need of any of these forced extravagances. Straight simple roofs, ending in plain gables, sufficed for them; their windows, if divided at all, were divided by simple mullions of a pattern which runs through a whole county or district with little or no variation; their doors were surrounded by the simplest moulding, or in the

later Post-Gothic style by a plain architrave surmounted perhaps by a modest hood for shelter. Indoors the same simplicity prevails: there are plain square rooms, with no intentional irregularities of shape; a methodical arrangement of plan according to a type generally accepted for buildings of that class; there is no restless attempt to avoid the ordinary way of planning; everything is straightforward, unaffected, modest, and, in a word, commonplace.

Architecture, then, may be commonplace and yet charming. Indeed, it is a question whether the total sum of pleasure which we receive from the art does not owe more to these humbler examples than to its more splendid achievements. For it is of more direct consequence to us that the homes we live in and those of our friends whom we visit should be pleasing and in good taste, than that our neighbourhood should be adorned by a few magnificent buildings. And that they may be pleasing and in good taste it is essential that their architecture, furniture, and decoration should all be in proportion to one another, and to the scale and importance of the house itself, and to the circumstances of its building. It is difficult to define exactly the limit which divides the sphere of positive architecture from that of commonplace. Indeed, it is impossible, for exceptional cases arise which defy general rule. It certainly does not depend on considerations of size, for many very large buildings, such as warehouses and railway stations, have only commonplace uses to fulfil, and nowhere are architectural impertinences more offensive than in them. And in the case of dwelling-houses it would be absurd to say that houses of, for instance, a certain rental, may be treated in a more distinctly architectural manner than those of a lower rental,—though, of course, as a rule, houses should be simpler in proportion as they are smaller. There is, however, one large class,—indeed, the largest class,—of ordinary residences, which, from its circumstances, admits only of commonplace treatment, and never falls to be offensive unless it is treated in that way. I mean houses that are built wholesale to cover a building estate, built probably by one man, very likely from one set of plans, and at one time.

It is possible that no more difficult problem could be set to an architect than the successful achievement of a large building scheme of this kind. If anything were wanting to prove that we have only to use our eyes to see what deplorable failures, from an artistic point of view, most such schemes result in. To say nothing of those cases, the most numerous of all, where the houses are designed by persons who know nothing of architecture and who would not succeed in any kind of building, the result is often very little better where an architect is employed whose work elsewhere we have had reason to admire and respect. The speculative builder asks for a design for a single house which is to be made use of over and over again some twenty or thirty or even a hundred times in the roads or streets which he has laid out. In his ignorance he supposes that if he gets a good design from a good architect his estate will be covered with well-designed houses; and so it might be if the architect had a chance of designing all the houses, but in fact he designs only one. Grant that he makes this design the best he can, and that if only this one house were built it would be an excellent piece of architecture, still the mere repetition of it so many times in close proximity is fatal. The better it would be if it stood alone, the worse it is if only one of a series, and this may be taken as an absolute rule and a very proper test for this kind of building.

In designing a single house, which is to stand among others by different hands, or, perhaps, quite alone, and especially in building for the person who is to live there, an architect may legitimately indulge himself in original fancies, and give his house a distinctive and individual character. He will consult the habits and tastes and occupations of the owner, and, if they are in any way special, he will arrange his house on a special plan; and the architectural features, however simple, will have some sort of individual character, in consequence of being designed for a particular building, and with some knowledge of those who are to live there. It is only on these terms that domestic architecture of a really high order is attainable nowadays, and it was only under the same conditions that the delightful domestic architecture of the past was produced.

But, if a house with any individuality of design such as this is taken and multiplied twenty-fold, thirty-fold, or a hundred-fold, the special features become meaningless, the original fanes cease to be original and become tedious, and the design, which pleased singly, nauseates by repetition. This seems to me the reason why building estates that are laid out and built over from the designs of really good architects are so constantly very little better than those that are built over by very inferior men of no pretensions to architectural skill. The design is made as if for a single house, and might, possibly, have been very successful in the case of a single house, and for that very reason it is ruined by repetition over a large area.

Now, it is of no use decriing the system of wholesale speculative building: it is the order of the day, and one of the necessities of our age, I suppose, which cannot be dispensed with. The people who can find the ready money required for building a house for themselves are very few compared to those who can find the means to pay a high annual rental, and it is, perhaps, impossible to build a single house at as cheap a rate as several at once. We must accept the system of speculative builders, building leases, wholesale use of designs, and all the concomitants of this extremely artificial mode of providing houses for the many, and we must try to make the best of it.

Now, do what we may, the conditions are commonplace enough, and that is the very first thing to be recognised if we are to succeed in making anything tolerable of such building as this. And if fitness, or exact correspondence with the conditions and circumstances of the occasion, is the mainspring of all good architecture, the style of such buildings must be simple and commonplace. It can hardly be too plain and too free from individuality of design. Only the simplest architectural features, and such as are most obviously connected with the construction, can on any account be allowed, and even of them the fewer there are the better. No caprices or fancies of ornament must be attempted, because, however good they may be singly, they pall by repetition; no quaintness nor picturesqueness of form will be tolerable because it is like a *bon-mot*, which becomes stale if told too often.

If it is objected that the result will be monotonous and tiresome, I reply that the monotony is inevitable whatever you do. You cannot place twenty houses of the same pattern in a row without monotony whether they be plain or gorgeous, simple or fantastic; but it is certain that the monotony will be less tiresome if they are all plain than if they are all gorgeous, or all simple than all fantastic. We must boldly face the monotony of the system and reflect it in our design, and take care to make it as little tiresome as we can. The speculative builders of 100 years ago understood this much better than those of the present day. The squares and streets with which the Bedford, Portland, and Portman estates in London were covered at the end of the last century are far more suitably designed for their purpose than the modern houses in Belgravia and at South Kensington, built by people who thought they knew a great deal better. Harley-street and Gower-street are monotonous if you like, but they are not more monotonous than Grosvenor-gardens or the other "terraces," "gates," and "squares" that have sprung up during the last twenty years to the north, east, and south of Hyde Park or Kensington Gardens; for if the former is a monotony of brown brick, the latter is a more tedious monotony of polished granite columns, stucco finery, and cast-iron trumpery. It is surely far worse to be loud than to be silent, and far better to be dull than to be vulgar.

This wholesale method of building, then, offers no legitimate sphere for positive architectural design, which would only invite attention to its monotony and emphasise its commonplace character. But it does not follow that an architect is altogether debarred from doing a great deal to make houses of this kind interesting and, even in a minor degree, beautiful. It is true he must give up the idea of any strong architectural effect, or any pronounced architectural character in the exterior, and confine himself to a rather neutral and restrained method of design, though even here he can study the proportion of his doors and windows, the levels of his string-courses and parapets,

and the vertical and lateral divisions of his elevations, so as to ensure agreeable proportions of part to part; and he can study carefully the few ornamental features for which there is occasion,—the doorway, the ironwork, the balcony, the chimney-caps,—so that they shall all be graceful and pleasing without being obtrusive, and while one and all thoroughly well designed, still so abstract and neutral as to bear repetition without becoming tiresome. But once indoors an architect has no lack of opportunity, even in these commonplace houses, of showing his skill. The other ninety-nine houses are now out of view, and he may employ more positive forms of design without fear. The last-century houses in London to which I have referred teach a very useful lesson in interior decoration with simple means, and contrast very favourably with their modern-built rivals. Externally they are simple enough,—mere fronts of honest brown brick with rectangular windows and round arched doors. But both windows and doors are evidently proportioned on some accepted canon, and have that "right" look about them that shows they have been thought of by the architect, and not left to mere haphazard, and the whim of the builder's forman. The ironwork of the glazed fanlight over the door, and of the balconies on the first floor, is simple and conventional, and does not call for much notice, but when you do happen to notice it you find it, within its own modest sphere, almost perfect in grace of line and excellence of workmanship. In the interior, if it has escaped the barbarisms of modern decorators, and preserved its original fittings, as is the case with a house on the Portland estate, which it is my fortune to live in, you will find fireplaces with pretty Italian marble chimney-pieces in the best rooms, delicately reeded, and with delightful little plaques carved with Classical subjects and little rosettes, or inlaid with thin veneers of coloured breccia; simpler fireplaces in other rooms, with mantelpieces of wood enriched with festoons and wreaths, moulded in a composition of whiting and glue, all varied in the different rooms, though, of course, used over and over again in the several houses; architraves and cornices over the doors of the best rooms, executed in the same way with little vases, rosettes, and swags of foliage; and doors to the principal rooms of beautiful rich mahogany. Living, as I do, in one of these houses, and by no means a large or important one, I can testify to the constant pleasure to be derived from the little evidences of thought and refined judgment observable in almost every detail. These houses were built, either by the Brothers Adam, who were engaged on this estate, or by followers of theirs, who imitated their manner, and prove conclusively that wholesale speculative building is by no means necessarily productive of uninteresting houses, if only it be done by men with true artistic sense of proportion, who are content to offset themselves so far as any bold architectural elevation is concerned, and to build in a commonplace way to suit commonplace requirements, without, however, neglecting to make every detail within the narrow limits they have imposed on themselves graceful, appropriate, and pleasing.

Contrast with these the showy productions of the modern speculator in house property. Everything is reversed. Outside are pretentious ornaments that no one notices because they are monotonously repeated from house to house, while inside everything is starved just where one would value some attention to detail; or, if there is any ornamentation at all, it is of a careless, coarse kind, that disgraces one and impels one to remove it if possible. The very mouldings round the door-panels are enough to drive one out of the house, especially when one recollects the delicate details of the architraves and doors in the older houses I have just described.

Although, therefore, the interior architecture of ordinary dwelling-houses of this class must be confined within narrow limits, there is abundant room left for its free exercise. It is a wonderful what may be done to make an ordinary room attractive or the reverse by very small differences of design. Let any one who has to build a plain house of little architectural pretension try what he can do by simply drawing out to a large scale, say of 1/2 inch or even half an inch to a foot, the four walls of the principal rooms, with their windows, doors, chimney-pieces, bookcases, and upboards in their proper relative places, and

the skirting and cornices round the walls, and if he has never tried it, and, I believe, it is very seldom tried in practice, he will be surprised to find how many ideas will suggest themselves to him by way of improvement, and with what very slight alterations of proportion and arrangement, and at what very small expense he may raise the character of the room from that of a mere chamber of accidents to the dignity of an architectural composition.

The same considerations that govern the architecture of a commonplace residence should govern the interior decoration. Here, too, everything in order to be appropriate and in proportion should be somewhat commonplace. Elaborate decorations, whether of architecture painting or sculpture, are suitable only for public buildings, churches, or palaces, and are not only thrown away, but positively offensive in the rooms we live in. Even in palaces and noblemen's houses it will be found that the great halls and galleries, with sumptuous decorations and splendid furniture, are kept for show and occasions of state, while the family live habitually in smaller rooms furnished much more simply and unpretendingly.

And so in ordinary houses of a smaller kind, any decoration of an ambitious or striking and unusual kind is misplaced, out of key, and disagreeable. How true this is may be seen every day, especially in the houses of those people who pretend to taste and are afflicted with the fashionable æsthetic craze. They think that they cannot go wrong if they cover their walls with Mr. Morris's papers, of which they generally choose the most pronounced designs, and hang their little rooms with a paper that would suit one of four times the size. They hold that there is safety in sad greens and virtue in dark and dirty colours, and they use these with the most dismal effect in rooms that with simple treatment might be made cheerful and light. One is haunted in these houses by the shadow of art. There are "art colours" advertised nowadays, as if art lay in certain colours, and not in the skillful use of any and all colours whatever; there is "art furniture," as if any good furniture whatever could be made except by the aid of art. By "art" nowadays is understood not the making of these things well and beautifully, but the putting in of plenty of little turned balusters and painting them of a dingy colour. Of all the furniture that has ever been made, even in the most Philistine time of the nineteenth century, nothing has been turned out so bad as the chairs, tables, sideboards, and chimney-pieces that fill the pages of the illustrated catalogues of the "art shops" of the present day. They show no skill in workmanship, no refinement of execution, no grace of line, no beauty in the mouldings, no delicate touches of carving; but in place of these are undistinguished outlines, crude forms unmeaningly heaped together, coarse brackets, and unworkmanlike finish, which, it is hoped, may be carried off by a little cheap turnery and some vulgar scrolls or leaves, not even carved, but coarsely incised in the surface of the wood.

But it is not only because or when the details are bad that such a room is an offence to an artist; it offends because the whole scheme of decoration is disproportioned to the scale of the house and the commonplace uses of the room. Rooms in small houses are not wanted for show, but for use, and an æsthetic drawing-room which is set out as if for the stage of a theatrical entertainment is not a place in which ordinary human beings can live at their ease. However powerful an impression it may make upon the casual caller, it is not a place to be lived in and used, and that ought to be the first consideration in furnishing and decorating a living-room.

This suggests what I venture to propose to you as a useful maxim, applicable not only to the humbler kinds of architecture of which I have been speaking mainly to-night, but to the art in all its branches, high and low. It is this; that those things with which we are constantly in contact, and which we are constantly using, should be of a neutral or commonplace character. If they are not of this character they are sure to be tiresome, fatiguing, and, in the end, disgusting. One does not want to be always examining the chairs we sit on, the papers on the walls of the rooms we live in, the implements we are always handling, the furniture by which we are constantly surrounded; and if they are all designed in such a style that they make constant demands upon our attention, and are always clamouring for notice, they are sure

to end by boring and disgusting us. In proportion as things are common they should be quiet and unobtrusive. This is not inconsistent with their being in their own way beautiful and worth examining. On the contrary, I would have every detail in the house carefully designed and fit to bear examination: the mouldings on the doors, the sections of the architraves and linings, the chimney-pieces, stairs, balusters, and the hundred other little members of the design of the building should all be studied carefully and well-proportioned; and though nothing should be needlessly obtrusive, everything should show care and thought when looked at closely. So with the furniture and decoration. The colouring should be quiet and harmonious, and the designs simple and restrained, and above all proportionate in scale to the modest size of the apartments. The furniture should be simple and graceful, without being fanciful or ostentatious. Our aim should be that the room should be thoroughly usable in the first place; a drawing-room where there is no table on which we can find room for a book, or where we can sit down and write a letter, is a misery, and had art; and in the next place it should be beautiful with that beauty which arises from fitness, from good proportion, from careful though unobtrusive design, and from tender harmonies in quiet keys.

A successful design on these modest principles is quite difficult enough to satisfy the most ardent student of architecture. It demands much more knowledge, much keener artistic sensibility, much higher powers of design than many more important phases of our art. When I commend you to study the commonplace side of architecture, and to confine yourselves to that unless you have a special call to rise above commonplace to grander subjects, I do not ask you to give up art, or to sink to a lower grade as artists, but simply to study the proper mode of dealing with one class of subjects rather than another. To tread among architects the path that Jane Austen marked out among novelists is surely a sufficiently high standard for the holdest aspirants amongst us. It is no doubt a more splendid thing to build cathedrals and public buildings, palaces and mansions, than parsonages and village churches or small houses, just as "Rob Roy" or the "Antiquary" may be considered grander achievements than "Emma" or "Persuasion," but there is surely not less art required for success in one field than another. To make a commonplace story interesting, and even exciting, as Miss Austen has done, in which the incidents never rise above the importance of a pic-nic or a dinner-party, and to keep us in breathless suspense to know whether Catherine Morland goes for a drive with John Thorpe or for a walk with Henry Tilney and his sister, requires consummate skill and supreme art which any one might be proud to approach. And, just as Sir Walter Scott admitted that, though he could do "the big bow-wow" well enough, this young lady was his superior in depicting ordinary daily life, so may it be that many a celebrated architect, who has earned fame by large national works, may fail to succeed when commonplace architecture only is required so well as many a less distinguished man who works truthfully and modestly within the narrower limits to which common sense and good taste confine him.

As to the value to the world of good, simple, and inexpensive house architecture, it would be superfluous for me to say much. These are the houses in which most of us live, and we have most of us in our time suffered from the ugliness and shortcomings which generally distinguish them. It is not enough that the general standard of architecture should be raised so far as concerns our great national monuments, if we are condemned at our own homes to live in the midst of work that is both coarse and careless, and also extravagant and pretentious. We want the improvement to extend to our own roof, and it touches us more nearly that our homes should be made pleasant and beautiful, and our daily life sweetened by association with comely and appropriate surroundings, than that our streets should be filled by splendid buildings of greater public consequence. There is a noble field open for architects in this direction, and an appreciative public waiting gratefully to welcome and applaud their efforts.

I do not overlook what has been done in the last few years towards introducing a more

simple and unpretending style of domestic architecture, in which what is struck out in the way of positive ornamentation is more than made up by careful and thoughtful design of simple details. The school of what is very inappropriately called the "Queen Anne Style" began in the recognition of the quiet, homely grace of some Post-Gothic buildings, and it studied to work on the same modest principles. But no sooner did this style become fashionable and enter into the æsthetic cant of the day, than it began to grow as extravagant and pretensions as its predecessors, and now you may see more offensive work of this kind than, perhaps, any other. Whole fronts are overloaded with carved brickwork or terra cotta, broken pediments, pilasters, consoles, and balusters, in vulgar profusion, that go far to make the name of the good queen a by-word. It is curious that a mode of building which began by renouncing positive architecture should have thus run to seed in the hands of ignorant followers of the style, and should now exceed all others in impertinent extravagance.

I have confined my remarks to-night principally to ordinary domestic architecture, because the conditions and requirements of that branch are essentially commonplace to a greater degree than those of other buildings. But every architectural design, on however grand and splendid a scale, has its commonplace parts, which require to be treated in a commonplace way. It would be interesting to trace the mischief that has resulted to ecclesiastical and civil architecture from the neglect of this principle, but this would open a much larger field of inquiry than we can to-night enter upon, for it is already time that I should bring my lecture to an end.

The main point which I have tried to convey to you this evening is the necessity of cultivating a proper sense of proportion,—of taking care that the design shall be properly proportioned to the subject and the occasion. As an instance of disproportion or inconsistency, I have enlarged on the way in which the designs of ordinary dwelling-houses are constantly overdone with attempts at architecture for which they have no occasion. Such houses do not want extraordinary architectural display; they cannot carry it, and, in point of fact, the fewer actual architectural features they have the better for them. I have also pointed out the need of architects who will work on these humble and self-denying lines, and give us buildings well designed without being pretensions, and quiet without being insipid. That some self-denial will be required must be admitted. To younger men especially, freshly primed with their architectural studies of the past the temptation is, no doubt, strong to seize the opportunity which is at the beginning of their career so sadly infrequent, to realise some of the magnificent ideas that fill their imagination, even when there is no magnificent occasion for their realisation. It is no doubt hard not to be able to let off a little of their store of knowledge and ideas, but, hard as it is, the lesson must be learned that architecture misplaced is worse than wasted, and that design that is disproportionate to the subject is worse than thrown away. The old Latin poet warns those who would be poets not to write comedy in tragic verse, and tells them that if their characters talk in language disproportioned to their fortunes they will only make the audience laugh. And so it is with architecture: we must take care that our little fishes do not talk like great whales, or our work will only be ridiculous; and those who have only commonplace work to do must be contented to wait for more important occasions before launching out into architectural magnificence. Meanwhile, I have endeavoured to show that quite as much art is required in the simple restrained work which is alone under these circumstances admissible, as in work which is more distinctly architectural. Those to whose lot the more important buildings of their age do not fall, and whose life may be passed in work of a less conspicuous kind, will find plenty to interest them, abundant room for the display of considerable artistic gifts, and ample occasion for earning the gratitude of a public which has suffered too long from the vulgarity and impertinence of most modern domestic architecture.

Erratum.—In the letter on "The Stone used at Westminster Abbey" (p. 398, ante), read "sandstone" instead of "limestone" in the last line but four.

THE BUILDING TRADES' EXHIBITION AT ISLINGTON.

THE sixth annual Building Trades' Exhibition in the Agricultural Hall, Islington, was opened on Monday morning, although, as usual, a large number of the exhibits were not ready until Tuesday and Wednesday. In extent, the exhibition falls somewhat short of some of its five predecessors, and is hardly so varied in character as one or two previous displays we have seen. Novelties appear to be very sparsely distributed amongst the large mass of well-known materials and appliances. We are more than ever convinced that, for all practical purposes of comparison as to progress in details of construction, these exhibitions recur much too frequently. If held at longer intervals (say from three to five years) we think they could not fail to be much more useful and instructive than is the case under present conditions.

One of the strongest and best-represented sections of the exhibits is that comprising natural and artificial stones, concrete, brickwork, terra-cotta, &c.; and among the most prominent of the exhibitors in this section are Messrs. W. H. Lascelles & Co., who have quitted their accustomed place under the North Gallery and have come out into the centre of the hall, where a somewhat ambitious structure in their red concrete has been built up. It consists of a lofty porch supported by columns with Ionic capitals, with balustrading atop, and finials or terminals at each end. This porch and a bay window are from the designs of Mr. Bassett Keeling, and are intended for Victoria Mansions, Westminster. Messrs. Bacon & Co., Finchley-road, have a creditable display of pottery, terra-cotta, and brickwork. Hall's Patent Hanging Tiles (shown at Stand 121) are intended for facing old or new walls in courts, areas, and corridors. Some extra light is gained, and the tiles are secured by nails being driven into the joints of the brickwork. Curzon's "Impervious" Concrete Company (Stand 162), exhibit some paving concrete, laid *in situ* and in slabs. These exhibitors show also patent slate bricks for engineering purposes. Mr. James Brown, of Broad-street, E.C., has a display of moulded and ornamental bricks, but there is very little in novelty on the part of old or new exhibitors in this department, although the goods are apparently well selected. G. Middleton Edwards, of Gresham-street (Stand 195), presents dovetailed corrugated iron sheets (Hyatt's patent), to be used in combination with Portland cement concrete in the construction of fireproof flooring and walls. It is suggested that by the use of these corrugated plates attached to timber partitioning and covered with plaster, fireproof and weather-proof external walls could be constructed. This mode of construction would appear to be well adapted for the colonies and for districts subject to earthquakes. At the same stand, Edwards's patent metal laths are put forward as an acquisition in constructing fire-resisting ceilings. Wilkes's Metallic Flooring and Eureka Concrete Company (Stand 210) present an ambitious display in the form of a portico built up. The columns are of red concrete, but hollow. The shafts are surmounted by enriched capitals and frize, and entablature to harmonise. This firm has also in connexion a temporary structure to illustrate different samples of fibrous and fireproof plastering. Messrs. McLean & Co., of Cannon-street and Newark (Stand 228) submit some samples of their cement, and specimens of mouldings made therewith, together with samples of plaster of Paris and Portland cement. Messrs. Thomas Lawrence & Son, of Bracknell, Berks, have a noteworthy exhibit in the form of a profusely carved red brick porch or doorway, with oak door, the whole of the work having been executed by Messrs. W. Cabrit & Co. The workmanship is exceedingly creditable, though much of it is woefully misapplied, for we hold it to be a great mistake to carve, especially with such elaboration as is here shown, a material so unfitted for such treatment as brick. Mr. George Wright, of the East Acton Brickworks (Stand 166) shows a somewhat attractive structure erected for the purpose of showing the adaptation of moulded bricks for ornamental purposes. More than one of these brick structures in the exhibition is overloaded with ornament, and the fantasies and freaks of the so-called "Queen Anne" work are altogether eclipsed with the surfeit of figures and heraldic and other devices that are pressed into service, to the astonishment of the beholder. Messrs.

F. Rosher & Co., Blackfriars (North Side 331), present, as usual, an excellent display of varied goods. Mr. J. Matthews, Royal Pottery, Weston-super-Mare (Bay 24) exhibits Poole's well-known patent bonding square-cornered roofing tiles, very extensively used at present. The Woolpit Brick and Tile Company (Bay 23) have on view special dark red facing bricks, white ditto, and machine-made and hand-pressed white bricks, all well turned out. Webb's Worcester Tiles Company (Stand 181) exhibit a good assortment of geometrical mosaics and encaustic tiles for floors, and printed tiles for walls, ceilings, borders, furniture, &c. White's Hygienic Rock Building Composition for securing strong and impervious walls is shown at Stand 332, North side, under tests which demonstrate its efficacy. The Dunton Green Brick and Tile Company have on view some good specimens of red and white facing and moulded bricks, roofing-tiles, &c. Messrs. May & Co., of the Bentball Works, Jackfield, near Ironbridge (Stand 156), are exhibitors of decorative majolica and mosaic work arranged at for a recess, and of encaustic and other tiles. Hitchins's Fireproof Plastering Company have erected a structure under the east gallery of the hall, to show the applications of their material.

The exhibitors of natural building stones were almost entirely absent from their allotted stand in the beginning of the week, although several well-known firms were announced in the catalogue. Messrs. Trickett & Sons, of Millwall, a firm former years, show some good specimens of rough-hewn and squared building stone of various descriptions. Messrs. Pictor & Son of Box, Wilts (Stand 23), show specimens of Bath stone, Box Ground stone, Stoke Groom and Corsham Down stone, and stones from Farleigh Down and other well-known quarries. An artificial material having all the appearance of a hard natural stone, and designated "Croft Adamant" is exhibited by the Croft Granite Brick, and Concrete Company, of Croft, near Leicester. A structure with traiered windows of various styles is raised *in situ* to illustrate the capabilities of the material. Windows are shown in the four sides of the building of many different styles in the tracery composing them. The material takes an excellent finish and the walling of the different sides of the structure is varied from squared rubble to irregular pointing.

In the department of prepared house-joinery there are sundry specimens of skilled workmanship, worthy of notice and commendation. There is also a varied assortment of imported Swedish joinery, which is sold now at prices that would have been paid a few years ago to the joiner for labour only. Most of this imported work is well seasoned. Messrs. W. H. Lascelles & Co., in addition to their concrete exhibits, employ some creditable and neatly finished joiners' work. Among these is an excellent pine chimney-piece with overmantel, from a design by Messrs. Ernest George & Peto. In high-class joinery in connexion with staircase and handrail construction, Mr. S. Ransom exhibits some admirable specimen in oak, walnut, mahogany, pitch-pine, &c. The joinery exhibits of Messrs. Thomas Andrews & Son, of East Molesey Mill, Hampton Court (Stand 71) are exceedingly good. Mr. S. Putney, of Baltic Wharf, Harrow-road (Stand 165), exhibits a novelty in what he calls Patent "Paradillos" solid wood flooring, floor-borders, panels, dados, and V-jointed boards. The tonguing or interlocking adopted in this system of jointing, which has already been noticed by us, is very ingenious, and without simple. By means of this method of jointing a really good floor is obtained at a comparatively small cost. We recommend visitors to inspect Mr. Putney's exhibits. Messrs. Esdale & Co., City Saw Mills, Wenlock Basin (Stand 208) have on view a varied collection of general joinery work, including English, American, and Swedish goods. Messrs. W. & R. Crow (Bays 67, 68, 69, Arcade) display a very large assortment of joinery work. Messrs. M. C. Duffy & Son, of Bermondsey (Stand 24), are exhibitors of a plentiful variety of balusters, newels, and general turnery,—good and cheap. Mr. J. F. Ebner, of Clerkenwell-road (Bay 21), has an excellent display of his well-known Hungarian parquetry and his hydrofoe parquet. This latter is capable of making a very good fire-resisting and impervious floor, and is well worth the attention of architects. Mr. Ebner also shows some very elaborately-carved

lades, executed in Belgium, and some good chimney-pieces and over-mantels, besides a variety of mosaic panels, most of which are very creditable in design and execution. Messrs. Scheibler Bros. & Co. (Stand 53) are exhibitors of some good parquetry.

There is but a scant display in wood-working machinery. Messrs. F. W. Reynolds & Co. (North side, 327-8) make a very fair display of mortising, planing, tononing, and thickening machines, but they were not in full operation on the day of our visit. Machines are shown suited for hand-power in small workshops and for steam-power. Messrs. M. Powis Bale & Co. present some planing and thickening machines, but these being scarcely in position on the occasion of our visit, we cannot venture in a description. Some other machines for purposes connected with building are shown; or instance, Mr. W. Johnson, of Leeds, exhibits rick-making and pressing machines, which are worthy of the notice of brickmakers, sewer contractors, and general builders. Messrs. Lewis & Lewis (South side, 303), of Cambridge Heath, London, aim at great efficiency and economy with their high-speed steam mortising machine. They also show hand-sawing machines, boring machines, and contractor's portable steam engine with latest improvements. Messrs. Sagar & Co., Halifax (South side, 305), exhibit a good power cased planing and thickening machine. This is used for taking stuff out of what is technically called "twist," surfacing, and straight or taper work. Mr. B. S. Hindley, of Queen Victoria-street, and B. Bourton Dorset (North side, 321), besides his well-known horizontal and vertical engines, shows a circular and hand-saw bench for hand-power, complete, with rising and falling panels. This is a very compact machine, with its boring-table, hand-saw adjustable fence, and fast and loose pulleys for hand or steam power, as may be required. Messrs. E. P. Austin & Co., of West Drayton, are exhibitors of machinery and appliances needed for use in the brickfield. Mr. E. Houghton Brown, of Mill Pond (South side, 296), shows some useful plant and machinery for builders' use. Messrs. Burney & Co., of Millwall (Stand 2), are exhibitors of wrought-iron cisterns and tanks of varied forms and capacities.

Of the decorative exhibits, the Lincrusta and General Decorating Company's stand, and that of Messrs. Woolams & Co., are among the most prominent. The last-named exhibitors are, as usual, a very excellent display of admirably-designed wall-papers, which have the additional merit of being coloured entirely without the aid of arsenical pigments. Messrs. George Jackson & Sons, of Rathbone-place (Stand 164) have on view some good specimens of callings, cornices, friezes, columns, &c., in bronze plaster. The Indestructible Paint Company (Stand 200), and the Electric Paint Removing Company (Stand 155) exhibit their specialties.

The St. Pancras Ironworks Company (Stand 23) are exhibitors of their stable-fittings, cow-house and piggy fittings, iron staircases, and some specimens of ornamental wrought-iron.

Stoves and grates are well represented by Messrs. George Wright & Co., of Queen Victoria-street (Bay 19), who exhibit slow-combustion and other stoves in combination with marble and wood chimney-pieces, tiled hearths, &c. Their louvre fire-bars, to which we have previously called attention, should be seen by visitors. Messrs. Yates, Haywood, & Co., at the eastern end of the hall, are large exhibitors in the same department of industry. Mr. Harry Hunt (Bay 8) shows the Hygiene Ventilating Hall Stove and the Crown Jewel Stove. In connexion with stoves, we may mention the heating apparatus shown by Mr. Renton Gibbs, of Liverpool (Stand 198), and Messrs. Messenger & Co. (Bay 13), who show their "Loughborough" boiler in conjunction with a span-roof conservatory constructed on their system. Of oaks, lock furniture, electric bells, and builders' ironmongery generally, there is a varied display. Messrs. Archibald Smith & Stevens (Stand 76) exhibit Stevens & Major's patent hydraulic door spring and check, and Russell's patent "Binatone" Locks and Furniture. Messrs. Broughton & Co. (Stand 252) show their "Chelsea" centre-bit mortise locks, of which we spoke in detail a short time ago. Messrs. Chambers, Momery, & Co., of Bishopsgate-street (Bays 55 and 56 of Arcade), exhibit cottage ranges and kitcheners, as well as their patent wall-ties. Messrs. W. & R. Leggett, of Bradford (Stand 11), show their handy and easily-worked appliances

for opening and closing fanlights, skylights, &c. Messrs. Meakin & Co., of 84, Baker-street (Stand 170), exhibit their sash fastener and opener and their solid-frame oilable sash-pulleys. Messrs. Smith & Turner, of Bartholomew-close (Stand 33), exhibit their specialties in the way of door-springs and hinges and water-bars for French casements. Mr. Alfred Gill (Stand 192) shows some patent lock furniture, which is very simple, and appears to be likely to prove effective. Messrs. C. D. Douglas & Co., of Queenhithe (Stand 81), are also exhibitors of lock furniture. Electric bells are shown by Mr. Julius Sax, of Great Russell-street (Stand 122a). Messrs. Ecks, Callow, & Co., are exhibitors in the same department.

Among other exhibits, Messrs. Attwood & Co. (late Salmon, Barnes, & Co.) show their patent revolving shutters and school divisions, as well as a model of an expanding grille for a shop-front in lieu of shutters. Mr. Thaddens Hyatt, of Farringdon-street, E.C. (Stand 161), shows varied display of his prismatic pavement lights and lights of various forms for the purpose of illuminating basements and areas. Messrs. Clark, Bunnell, & Co., Limited (Stand 13), show their revolving shutters, metallic Venetian blinds, some good constructional ironwork, and a capital self-sustaining lift. Mr. J. Stannah (Stand 200), exhibits a very good 5 cwt.-power lift, with iron-framed cradle and iron guides; this lift, which is worked by a small gas apparatus, is provided with an effective safety apparatus. Messrs. Hayward Brothers & Eckstein (Stand 126) exhibit their admirable semi-prism pavement-lights, the merits of which are too well known to render their enumeration necessary here. Their self-locking coal plates appear to meet the end in view in a very effectual manner. The same firm are exhibitors of Hayward's Sheringham inlet ventilators and Boyle's mica outlets. Other exhibitors of ventilators are Messrs. Ewart & Son, of Euston-road (who occupy Bay 3 and the centre of the Hall and show some ornamental zincwork), and Messrs. Robert Boyle & Son (of Holborn Viaduct). Mr. F. H. Smith, of Queen Victoria-street (Stand 9) exhibits his "siphonic aspirator" system of ventilation; and Messrs. C. Kite & Co., of Chatham-street (Stand 150), show their exhaust roof and chimney-breast ventilators, and other appliances, of which we have spoken in terms of commendation on previous occasions.

Exhibitors of other sanitary appliances are not very numerous, but Messrs. John Bolding & Sons, of South Molton-street (Stand 120) have a very good representative display of water-closets, bath-fittings, &c. Messrs. Brazier & Son, of Blackfriars-road, are exhibitors in the same department, as are Messrs. Capper, Son, & Co., of Fenchurch-street, who exhibit their "twin-basin" closets in a new form,—that is, adapted for use as "pedestal vase" closets, without woodwork boxing-in. Mr. F. Botting, of Baker-street, Portman-square (Bay 4) exhibits a few things which merit the attention of visitors, including Lyne's patent ventilated closet, Durrans's patent sanitary appliances, a smoke-machine (very portable and convenient) for testing drains, air-tight covers, &c. In Barstow's patent combination water-filter, shown at Stand 72, the water first passes through a natural stone, with which the upper portion of the filter is lined, and afterwards through granulated carbon or charcoal, the latter being renewable from time to time.

We have been necessarily brief in our notes, but they will be sufficient to indicate the general scope of the Exhibition, which will remain open until Saturday, the 28th inst.

The Burns Memorial in Westminster Abbey.—On the 7th inst. the Earl of Rosbery unveiled the national monumental bust of the poet Burns in the Poets' Corner of Westminster Abbey. Mr. Wilson, chairman of the Memorial Committee, said that the monumental bust had been subscribed for with the shillings and pence of the admirers of the poet in Switzerland, Bengal, New Zealand, Nova Scotia, America, England, and Ireland, and in almost every town in Scotland. The committee had selected as the artist Sir John Steell, a veteran member of the Royal Scottish Academy, who had produced no fancy likeness of the poet, but one based on the portrait of Burns by Nasmyth. The work is broad and powerful in style, and full of character; a very successful example of a monumental portrait bust.

WESTMINSTER HALL RESTORATION COMMITTEE.

At the sitting of the Committee on Friday, March 13th, Mr. H. W. Brewer was examined, and produced the drawing of "The Old Palace of Westminster," which was reproduced in the *Builder* for Nov. 15 last. He explained that the drawing was intended to convey some idea of the appearance of the buildings as they existed during the earlier portion of the reign of Henry VIII.; that the drawing had been produced after very considerable research, the examination of very numerous ancient views and documentary evidence, both published and unpublished. Mr. Brewer was strongly of opinion that the ancient palace and the abbey formed one single group of buildings, and that no thoroughfare passed between them; in fact, that the conditions were pretty much the same as one sees at Windsor, where the Collegiate Church and buildings of St. George are inclosed within the walls of the castle. That this state of things continued until the construction of St. Margaret's-street, which necessitated the demolition of no less than four ranges of ancient buildings, is proved by the following extract from Smith's Westminster:—"Hell and Paradise, two portions of the Old Palace, were pulled down in 1793. . . . St. Margaret's-street was made out of St. Margaret's lane, and 34 ft. of that part of the Palace of Westminster where 'Tudor Buildings,' erected by Henry VIII., originally stood, and a portion of the old 'Fish Yard.' At the end of this lane stood the ancient brick buildings called Heaven and Purgatory. . . . Another portion of the Tudor buildings which projected 72 ft. into St. Margaret's-street was also pulled down in 1793."

The construction of Abingdon-street necessitated the removal of other ancient buildings, and thus the Palace and the Abbey became two separate and distinct groups of buildings. Mr. Brewer pointed out that the old Palace could not, at any time, have possessed anything in the nature of a "land front," still less could the west side of Westminster Hall have served that purpose, because there was documentary evidence which seemed to prove, beyond a doubt, that the space to the west of Westminster Hall, between it and St. Margaret's-lane, had been occupied by buildings as early as the reign of Edward III. A list of the buildings restored by Edward II. and III., derived from the existing accounts for these works, and published by Smith, mentions "The Seneschal's Chamber on the west part of the Great Hall," "The Marshal's Chamber under the Great Hall," "Staircase from the Seneschal's Chamber into the small court opposite the conduit," "A conduit in the form of a leopard, within the wall under the hall, called 'Stanneyn,'" "Buttery under the Seneschal's Chamber," "A kitchen in Pergate [Purgatory] ward," "Tower above the Marshal's Chamber," "House called 'Hölle' [Hell] under the Exchequer," "Council-room in Exchequer, 'Saitaria' or 'Salting-house,' under the Exchequer," "Door of Hell in the Exchequer," &c.

Mr. Brewer pointed out also that there are several grants of buildings existing upon this site during the reign of Henry VII. One of these, dated Sept. 20th, 1185 (that is, within one month of Henry VII.'s accession), specifies that "Several mansions within the Palace of Westminster were by letters patent granted to Anthony Keene, esq., for his life. The parcels comprised in this grant are there stated to be 'all the mansions belonging to the king within the Palace of Westminster,' together with the custody of 'Paradise and Hell,' within (evidently close to) Westminster Hall; three tenements which Jacob Fry held and occupied; the custody of Purgatory, within the ball aforesaid, which Nicholas Whitfield had and occupied; a certain house called Potans House, under the Exchequer; and also a tower called 'Lo Greenelates,' which John Catesby held and occupied, which tower and tenements are there said not to exceed the annual value of 21l. 6s. 8d."

We know that Heaven, Hell, and Purgatory were to the west of the hall, and there can be little doubt that the building called in the earlier documents "Paradise" is the same as that called in later times "Heaven." Now this being the case, it seems evident that the site was built over considerably before the reign of Henry VIII.

Mr. Brewer was of opinion that the kitchens and offices connected with Westminster Hall

must have stood to the west of the hall, as there was no other possible site for them, and that the west side of the hall was only visible from two or three small courtyards, but could never have been seen from a distance, and that this accounted for its being so much more plainly treated than the north front, which was, of course, always visible from New Palace Yard. Mr. Brewer thought that the west side of the hall should be repaired, preserving all its ancient features; he could not see the necessity for a cloister, but if one were erected he thought it should be little more than "a penthouse," and might possibly be merely a temporary erection. If this were not sufficient to preserve the Norman walling, he thought it better to leave it alone altogether, rather than to erect a new building against the old hall; he also considered that nothing should be done which would render the ultimate carrying out of Sir Charles Barry's design for the completion of the Houses of Parliament an impossibility.

Mr. Ayrton was then examined. He disapproved of the proposed scheme, and considered that if anything was done, Sir Charles Barry's design should be carried out. Although he himself did not care much for architects, yet the nation having selected Sir C. Barry's design, he thought that the design ought not to be set aside for that of any one else, and he thought some of the ornament might be omitted.*

At a subsequent sitting Mr. E. P. Loftus Brock, F.S.A., gave evidence at length with respect to the antiquarian features of the building. He pointed out that originally the erections on the west side of the hall were but of one story in height, of Henry III.'s time, probably erected as an abutment to the old Norman hall, the wall of which was bending. This one story building was raised from time to time as the need for further accommodation occurred. The heights were never uniform, and there was no evidence that they were as regular as now proposed. He objected to the high two-story design on the ground that it hid the fine range of old windows of the hall except the upper portions only, a defect which did not apply to the lower design.

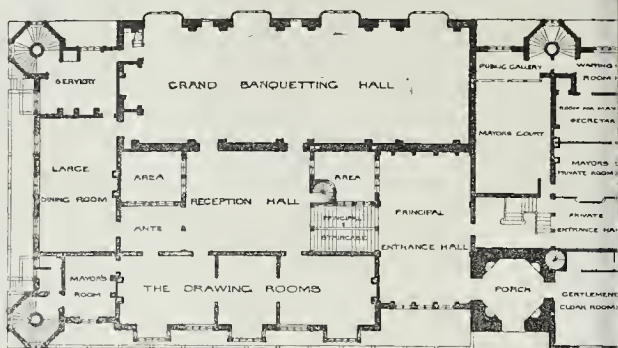
FREE LECTURES TO ARTISANS AT CARPENTERS' HALL.

The fifth of this successful series of lectures was delivered on the 12th inst. by Professor Alexander B. W. Kennedy, M. Inst. C.E., who took as his subject "A Piece of Steel." In the course of his lecture, which was full of interest, the lecturer expressed the hope that before very long mild steel would, to a considerable extent, supersede wrought and cast iron. Castings were frequently made from the open-hearth furnaces at a price greater than that of cast iron, and with considerable difficulty and uncertainty. There was no reason to imagine, however, that these difficulties were insurmountable.

The sixth lecture was delivered on Wednesday evening last by Professor Bonney, who discoursed of "Flint," dealing, firstly, with its composition; secondly, with its production; and, thirdly, with its uses. Flint, he stated, was composed mainly of minutely crystallised silica, being most abundant in the chalk, but being found also in almost every kind of limestone rock. The formation of a flint was, to some extent, a process of replacement, and at the same time, a process of accumulation around certain spongy organisms. Broken up it made excellent road-metal, for which it was especially utilised in the eastern parts of England. When ground up and mixed with china clay, it was employed in the manufacture of porcelain. It was also largely used for building purposes, and that chiefly in the eastern counties. The professor concluded with an interesting account of the flint implements of the Stone Period.

The City and Guilds of London Institute.—Dr. Sylvanus P. Thompson, of University College, Bristol, has been appointed Principal and Professor of Physics at the Finsbury Technical College. The duties of Principal have hitherto been discharged by Mr. Philip Magnus, the Director and Secretary of the Institute, who temporarily undertook them pending the complete organisation of the College. As Professor of Physics at Finsbury, Professor Thompson succeeds Professor Ayrton, F.R.S., who has now been appointed Professor of Physics at the Central Institution.

* In other words, Mr. Ayrton would spoil the building by cheapening, as he said it the Law Courts. It is fortunate that if the building is carried out, Mr. Ayrton at least will have no control over it.



Design for a Municipal Mansion.—Plan.

Illustrations.

SIR C. BARRY'S DESIGN FOR COMPLETING WESTMINSTER PALACE.

We publish this week a drawing showing the design made in 1854 by the late Sir Charles Barry, to show the treatment he proposed for the north front of Westminster Hall, with adjacent buildings, part of the New Palace at Westminster, and in accordance with them, whereby the hall itself would acquire greatly inquired dignity, and be externally incorporated with his design for the complete building. Sir Charles, while anxious to retain the great characteristic of Westminster Hall in its noble roof, as seen from within, was evidently of opinion that externally the building did not merit the same consideration, and would not harmonise with the more important structure of which in future it was to form a part. It will be seen from the view that he proposed an entirely new gable, and between the angle towers, and from plans left by him which we have seen, he proposed to have a grand arch at its north end of like treatment to the arch at its south end, which now forms the entrance from the hall into St. Stephen's Porch. He also proposed to reface and heighten the angle towers, which now have so insignificant an effect, by raising them in a like style to the rest of the building. It will thus be seen that whenever New Palace Yard is made (as in old time) the Grand Entrance Court of the Palace, its treatment would be at least as magnificent in an architectural point of view as the river front now is, and as the land front would be if carried out in accordance with his designs as published in the *Builder* of the 21st of January last. As the Westminster Hall Committee is now sitting, under whose consideration that design will doubtless come, we may return to the subject, and the public accommodation which would be provided, to which so much reference was made by Mr. Charles Barry in his evidence given before the Committee on the 20th of November last. For the present we can only express a hope that the legacy left to the nation by one of the greatest architects of our own times will not be inconspicuously thrown away.

NEWBURY DISTRICT HOSPITAL.

The above-named hospital, illustrated in this number, was originally designed for eight beds (male ward 4, female ward 3, and single ward 1 bed), and, by flags, I showed how the male ward could be extended for three additional beds, and the female ward for one additional bed. It is now decided by the committee to obtain tenders for the erection of the building as shown on the plan (with male and female

wards for four beds each), with alternate mates for the extra cost of enlarging the ward to seven beds, as shown by the drawings, and, if funds permit, this latter arrangement will be carried out. The committee also decided to make the corridors 6 in. rather than shown. A cubic space of rather 1,200 cubic feet per bed is given to the male female wards, and of 1,300 cubic feet to single ward. The ventilation of the wards is effected by means of fresh-air inlets through T. Boyle's "mica flap valves" a ceiling level into a flue carried up along the smoke-flue in chimney-stacks. The wards are to be warmed by ventilating open grates. A detail of the ward window given; nearly all the other windows have the ordinary lifting-sashes, and in all cases, a deep bead on the sill the admission of air at the meeting-joint. The walls throughout will be built of h faced externally with selected red bricks r the first-floor level, and above that plastered rough cast stucco,—the front gable and dormer being half-timbered. The mortar and plating throughout will be in Selenitic cement. The roofs are to be covered with permanent g slates, with red tile cresting. The floors of corridors, passages, water-closets, &c., kitchen and offices are to be of concrete; the other floors of tongued yellow deal. The internal work is to be of the plainest character, and to be varnished throughout.

Water supply will be obtained from the waterworks, and great attention will be paid to the sanitary arrangements.

The cost of the whole, exclusive of the furniture, &c., is estimated at about 1,800l.

H. G. TURNER.

DESIGN FOR A MUNICIPAL MANSION. SOANE MEDALLION.

We illustrate this week the design by Mr. B. Mitchell which obtained the Soane Medal this year at the Institute of Architects, and which a reduction of the principal floor plan annexed. The author of the design has realised the idea of the stamp of building required better than any of the other competitors, though in this case the tower is a little superfluous and conveys too much the idea of a town-hall. Architecturally, the plain mass of the tower contrasts well and successfully with the rich fenestration of the adjoining portion of the building.

SKETCHES, MELROSE.

The view of the east window, Melrose Abbey, and the carved terminal from a wall arcade of the cloister, are reproduced from the pen drawings of Mr. T. MacLaren, who obtained the medal of merit in the competition this year at the Pugin Travelling Studentship. The carving is an unusually naturalistic specimen of Gothic foliage, and a very good piece of pencil drawing.



DESIGN FOR A MUNICIPAL MANSION
IN COMPETITION FOR THE SOANE MEDALLION
ROYAL INSTITUTE OF BRITISH ARCHITECTS 1885

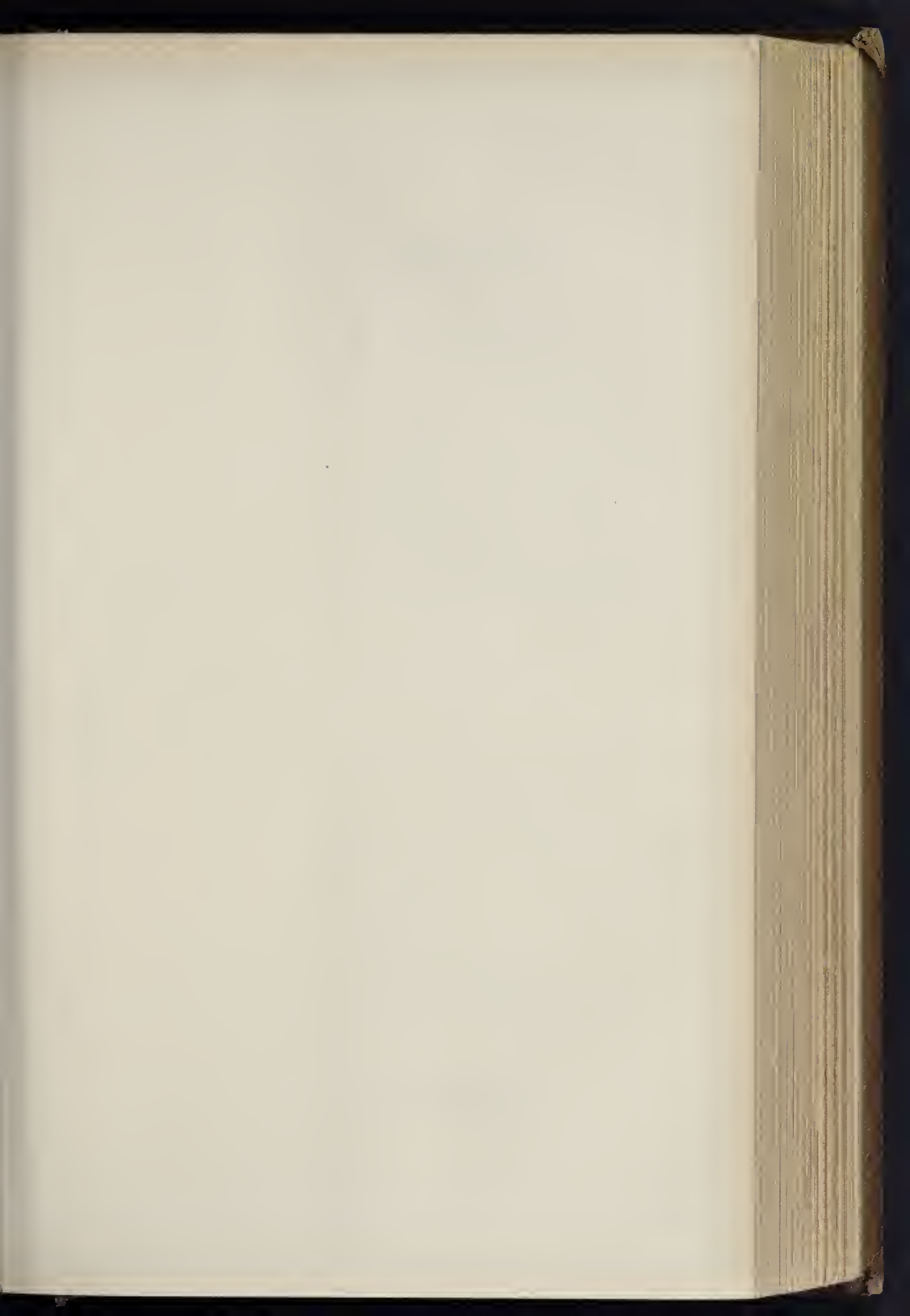


DESIGN FOR A MUNICIPAL



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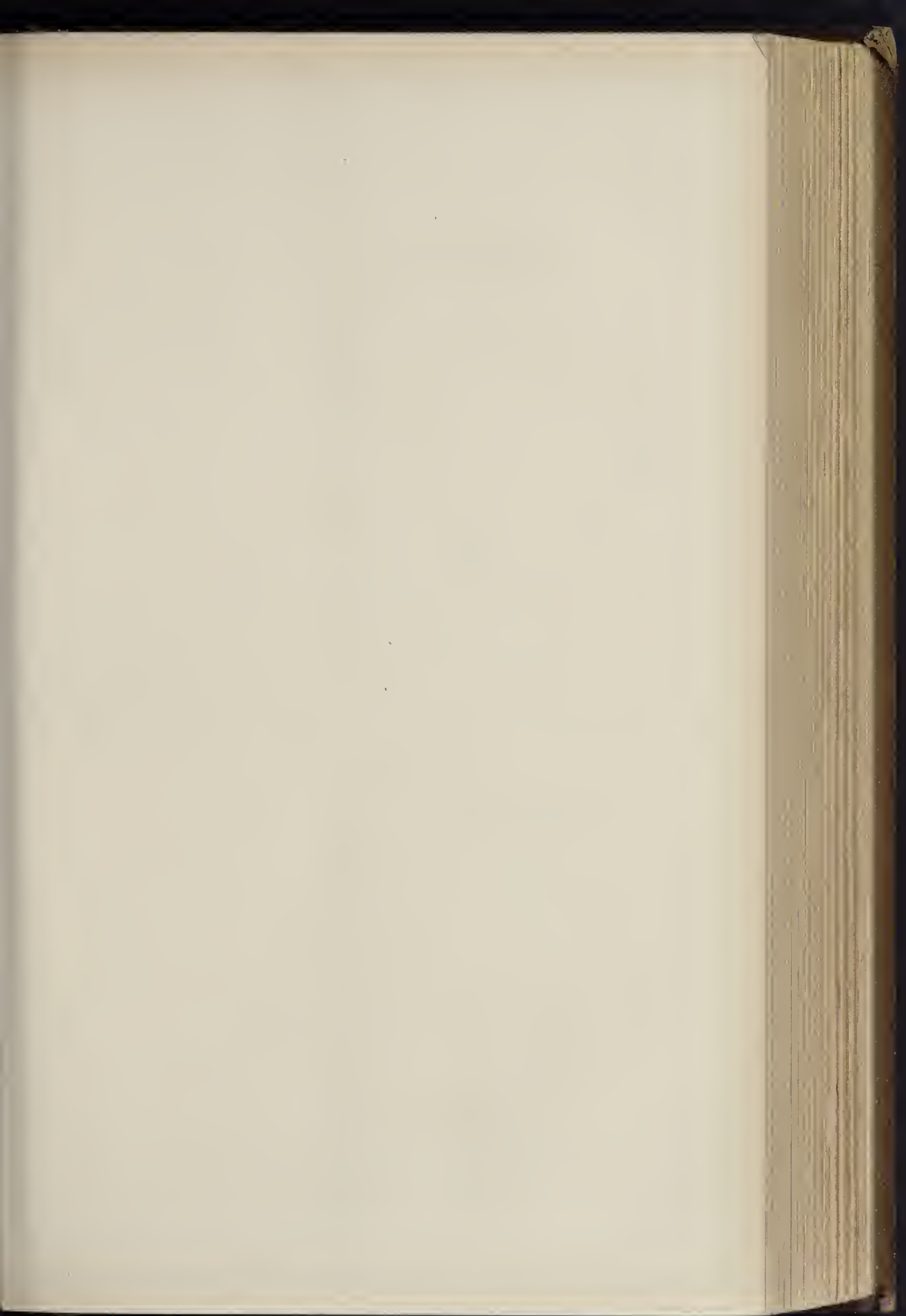
By Mr A. B. MITCHELL.

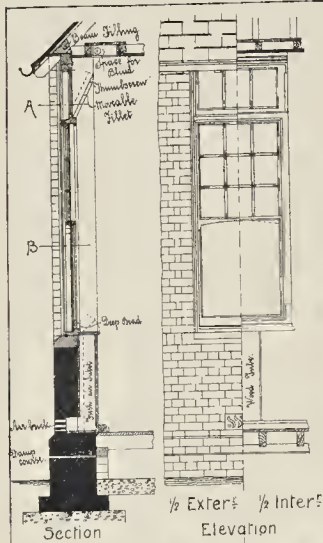




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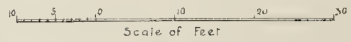




Details of Ward Windows



Sketch Perspective View from South



South East Elevation [front]

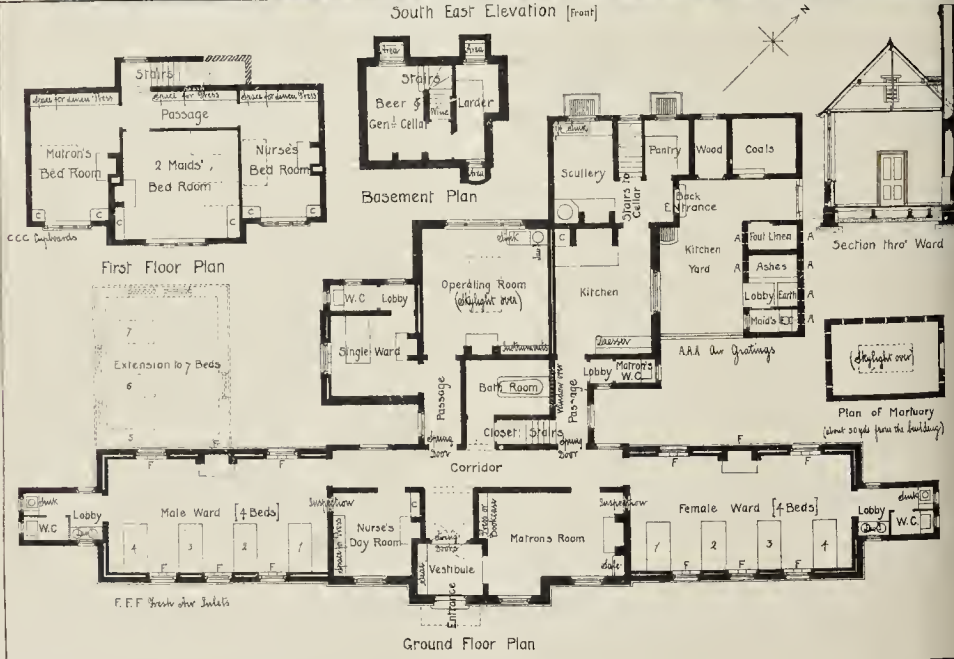


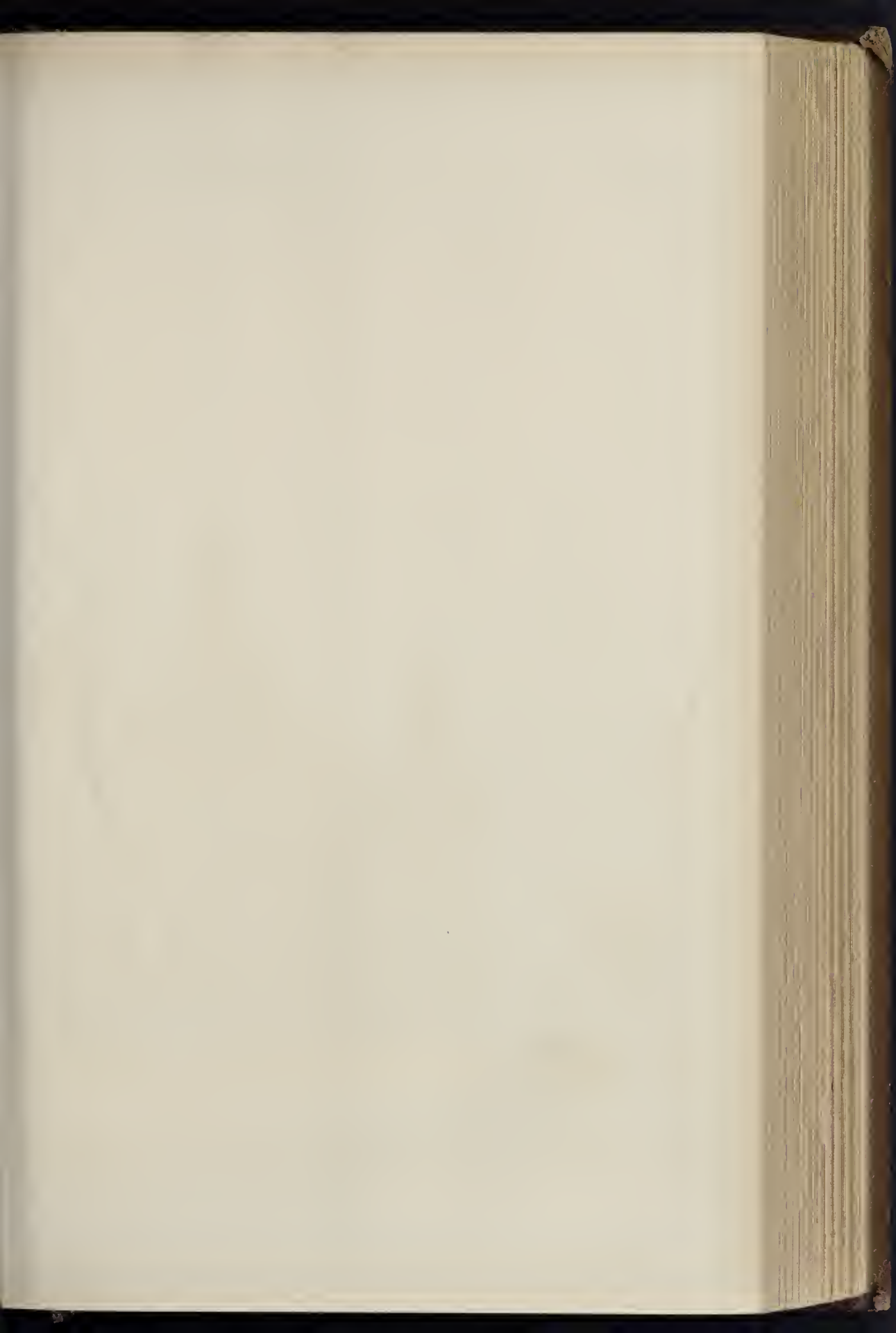
PHOTO LITHO SPRAGUE & CO. LONDON





*Pugin Travelling Studentship
Medal of Merit, 1885.*

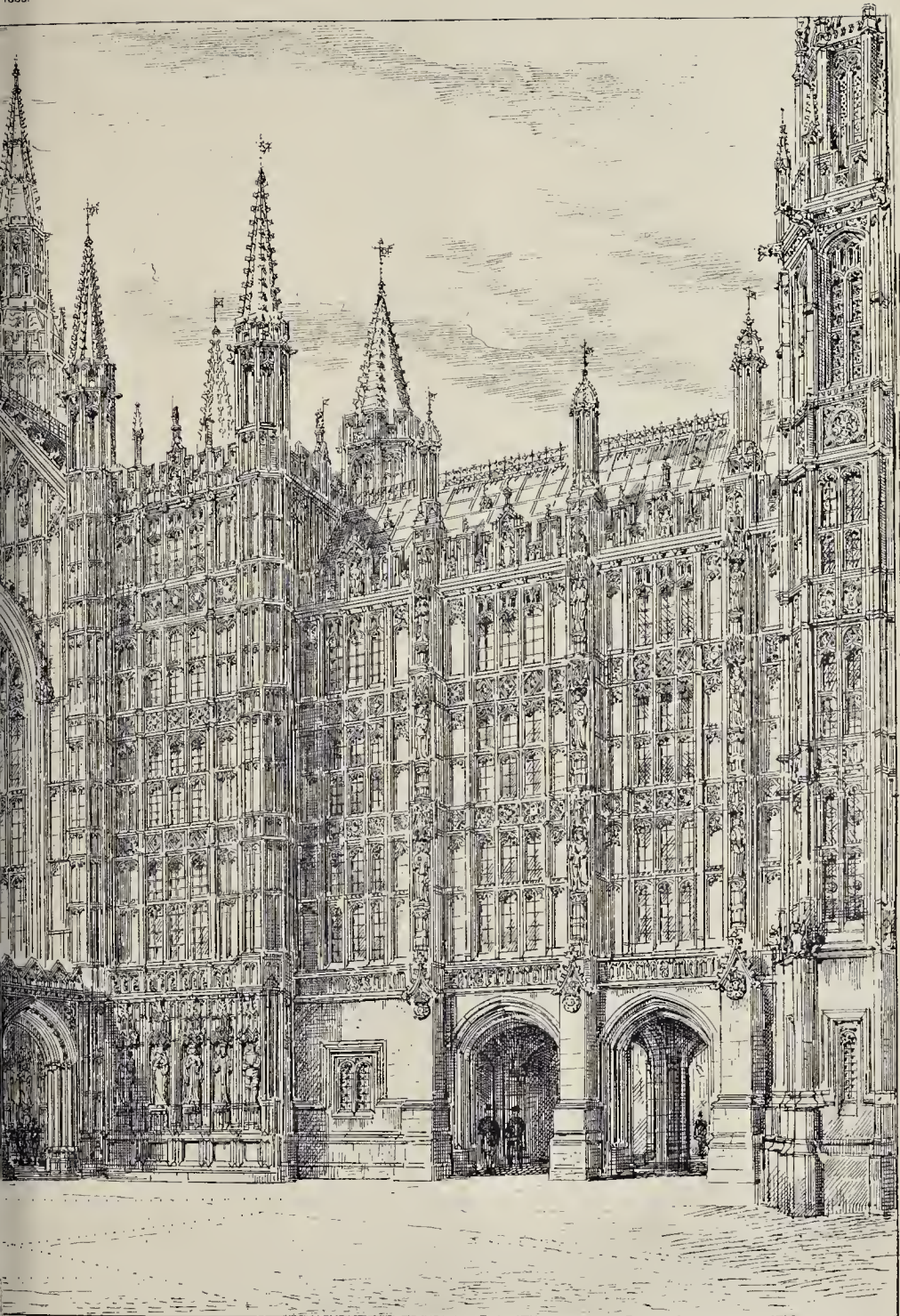
EAST WINDOW, MELROSE ABBEY
FROM A DRAWING BY MR. T. MCLAREN





© Ken Photo Lith & Printer.

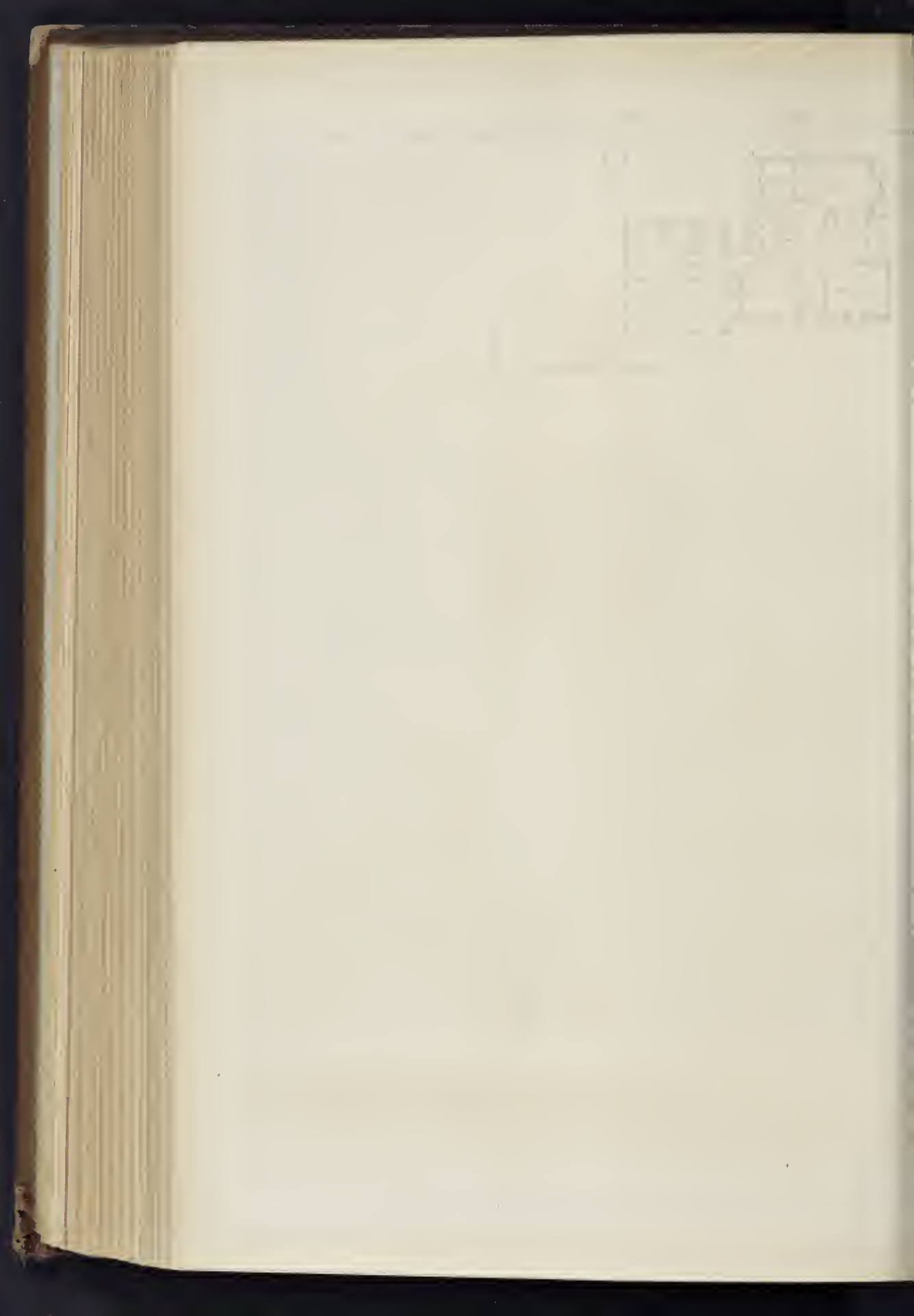
COMPLETION OF NEW PALACE AT WESTMINSTER
VIEW OF THE SOUTH SIDE OF NEW PALACE YARD AND WESTMINSTER HALL, AS I

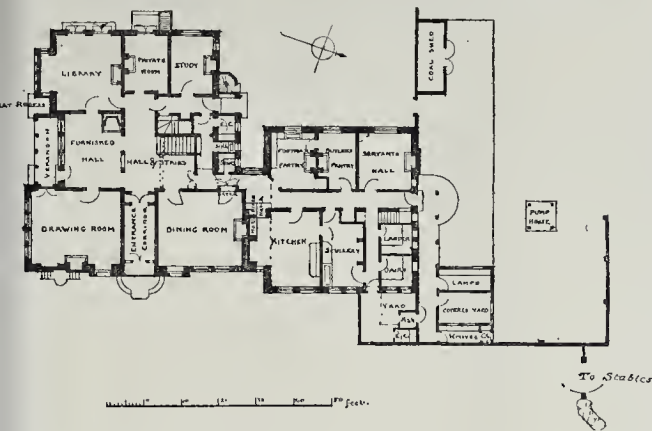


8, Castle St. Holborn, London E.C.

DESIGNED BY THE LATE SIR CHARLES BARRY, R.A.

ON ENTERING THROUGH THE PROPOSED ALBERT GATE FROM PARLIAMENT STREET.





"Collyers," Petersfield.—Ground Plan.

"COLLYERS," HAMPSHIRE.

This house was planned to meet special requirements. The elevation of the principal front, which we to-day publish, is reproduced from a drawing exhibited in last year's exhibition of the Royal Academy, the highly original and artistic character of which we commented on at the time. It is carried out in red brickwork pointed with coloured cement, the door and window dressings and carved work in red Shawk stone, and a few moulded bricks.

The pilasters to doorway, and the hemi-vase above it, are in white hard marble. The panels to arch is inlaid with small en glazed black and white half-tiles. Out of the hemi-vase rises the tilting-spear, which supports the arch above, and which is represented as anchoring out below into (olive) leaves and fruit. A dove flies down from behind the field, &c.

The works were carried out by Mr. John Cook, of Southampton, under the careful direction of the architects, Messrs. Bateman & Bates. All the carving was executed by the senior partner, Mr. Bateman, who informs us that he "had neither time to make elaborate detail drawings, nor temper to see them weakly carried out." We give also a small ground-plan.

BUILDING STONES.*

The oolitic limestones which extend from Wiltshire to Yorkshire comprise the well-known Bath and Portland beds, and the Caen stone of Normandy is of the same formation. These limestones derive their name from the fact that they are composed of a number of minute oviform bodies like the scales of a fish, cemented together in a calcareous matrix. As a rule, the stone is very soft when first quarried, but hardens with exposure, and ranges from a white to a yellowish tint: it is a siliceous organic remains. There are four distinct bands of stone in the oolitic series, viz.,—

1. The inferior oolite, which occurs chiefly in Wiltshire, and from which the stone for Winchester Cathedral and Tewkesbury Abbey is obtained. The best quarry at the present time is at Painswick. (2) The great or Bath oolite, which is of considerable thickness in the neighbourhood of Bath, and is generally worked by tunnelling, as in Messrs. Pictor's quarries at Bath, which extend for many miles underground, and large pieces of stone have to be left to support the roof of the workings. Very large blocks of this stone can be obtained. Among the best known quarries of Bath stone may be mentioned Corsham Down, Monk's Park, Dumbleton Down, Box Hill, and Doulting. The average analysis of Bath stone is: carb. of lime 5, carb. of magnesia 2.5, iron and alumina 1.7, water 1.7. The average specific gravity is 2.3. It will be particularly noticed that this stone contains no silica. The great oolite formation extends northwards of Bath into North-

amptonshire and Lincolnshire, the chief quarries being at Barnack, near Stamford, the stone from which was used at Peterborough Cathedral; Ketton, from which many of the Cambridge colleges were built; and Ancaster, near Sleaford. The latter stone is often crystalline in its formation, and is an excellent building stone. (3) Coral rag, which passes from Somerset to Yorkshire with numerous interruptions. This is a rubbly stone, and is hardly ever found sufficiently compact to be used for building purposes. (4) Portland stone. This is harder and more durable than most of the lower members of the oolitic series; it is cream-coloured and full of organic remains; in fact, such a quantity of large fossils are found in it that it is unsuited for delicate work. This stone derives its name from the Isle of Portland, where it is found, the chief quarries being Gosling's, Vern-street, Waycroft, and Grove. The total thickness of the stone here is about 70 ft., but only about 20 ft. of it, and that in different layers, are suitable for building, the layers differing much from one another. First comes what is called the true Roach, which is very hard and suitable for engineering purposes, but contains such large fossils, chiefly the one well known as the Portland screw, that it is scarcely useable for ordinary building; then the white bed, which gives the best stone on the west side of the island; then the bastard Roach; and then the base bed. This bottom bed is known in the market as "hest bed," a curious corruption of the word base, but it is only in special situations on the east side of the island that this bottom bed is the best. During the last two centuries Portland stone has been extensively used in London: St. Paul's Cathedral, the Reform Club, and Goldsmiths' Hall may be mentioned as some of the principal examples. Of the oolitic limestones Portland is certainly the best adapted to resist atmospheric influences, but the modern stone does not seem to be so hard as that which was used in the seventeenth century. The average analysis is carbonate of lime, 95.16; silica, 1.2; carbonate of magnesia, 1.2; iron, &c., 0.50; water, 1.6. Its specific gravity is 2.2.

In France the great oolite formation yields the beautiful Caen stone, which is very fine-grained and uniform in texture. This stone has been largely exported into England, and no finer stone can be used for interior work; but many parts of Canterbury Cathedral show only too plainly that it cannot be depended upon in a damp climate for exterior use. Mr. Hull, in his work on "Building Stones," has the following interesting remarks on Caen stone:—"The introduction of Caen stone into Britain is curiously interwoven with history. It was probably introduced shortly after the Norman Conquest, having been a favourite stone with the architects who followed the fortunes of William Duke of Normandy and his successors. Its introduction into Ireland may have been of a still earlier period, corresponding to the introduction of Norman and Lombard styles into that country. In England, however, it was largely used in cathedrals and other buildings down to the middle of the fifteenth century, when Normandy was lost to Britain, and it is

only in modern times that its use has been revived."

An English stone closely allied to the Caen stone has recently been pushed energetically in the London market, although it has been in use for many years in the neighbourhood of the quarries. I allude to the Beer stone found near Axminster, in Devonshire, with which the new Empire Theatre, in Leicester-square, has been faced. It is a close-grained, even-coloured stone, but somewhat friable, and I fear that it is scarcely likely from its composition to stand the trying ordeal of the London atmosphere.

Although each class of building-stone contains numerous sub-classes, I have now described the three great divisions which comprise the principal building stones, and I must ask you to follow me in a brief consideration of the qualities which are required in a stone for it to endure when exposed to the weather. I put aside altogether the use of stone for ornamental internal work; what we want to know is, will a stone stand exposure? Now before this question can be answered it is necessary that we should have some sort of notion of the causes of the decay of stone. These are, in the main, two,—disintegration and decomposition, the former acting mechanically and the latter chemically, and the two causes generally act together. All stones, even granite, absorb a certain quantity of moisture, some more, some less, and, as a general rule, those which absorb the most water are most liable to disintegration, because, after absorption, on the occurrence of the slightest frost, the absorbed water expands, and, by mere mechanical pressure, forces apart the minute particles of which the stone is composed. Hence the rate at which a stone absorbs water and the readiness with which it parts with it are very important elements to be considered, much more so, in fact, than the total amount of water which a stone will take up. Experiments have frequently been made to ascertain the proportion of water to its own bulk that a stone will take up when completely saturated; but, although this is an important fact to know, practically stone in a building never has to submit to such a test. It is the constantly-recurring showers and the generally moist atmosphere of this country which play such havoc with our building-stones, and it will be readily understood that if one sample of stone when completely saturated absorbs ten per cent. of its own weight of water and another only eight per cent., yet if the former take three times as long as the latter to become saturated, it is, *ceteris paribus*, the better stone. A complete series of experiments as to the rate of absorption of water would be of great service, but care would have to be taken that at the outset of the experiments all the specimens should be perfectly dry, otherwise the results obtained would be misleading. No kind of stone is so variable in this property of absorbing moisture as sandstone, and hence it is extremely important to test it beforehand.

In London, and in any place where the climate is damp and the atmosphere smoky, the mechanical disintegration of stone is largely assisted and frequently started by chemical decomposition, and in order to guard against this a careful examination of the chemical analysis of a stone is very desirable. The sulphuric and hydrochloric acids in the atmosphere, which are readily taken up by rain-water, act upon the calcareous ingredients of stone, producing oxidation or hydration; where mineral salts occur, various chemical reactions take place, and minute crystals are formed in the interior of the stone which effloresce outwards; and where organic matter exists, as in the case of nearly all stratified deposits, this gives rise to nitration. Inorganic matter, such as the quartz-crystals which form so large a component in the structure of granite, and the

* The following quaint quotation from Herrison, who wrote in Queen Elizabeth's time, and who endeavoured to establish a better reputation for English quarries, is interesting.—"Our elders have from time to time, following our natural vice in milking of our own commodities at home, and desiring those of other countries abroad, most esteemed the Caen stone that is brought out of Normandy, and make even in these our days following the same vain, doo covet in their works to use no other. Howbeit, experience on the one side, and our skillful mason on the other, doo affirme that in the north and south parts of England, and certain other places, there are some quarries which for hardness and beauty are equal to the outlandish greet. This may also be confirmed by the King's Chapel at Cambridge, the greatest part of the square stone whereof was brought thither out of the north."

† See *Builder* for July 12, 1884, p. 61.

Continuation of a paper by Mr. John Slater, B.A., at the meeting of the Architectural Association on the 1st. See p. 367, ante.

eroded grains of which enter very largely into the composition of many of the sandstones, is not acted on by these acids, so that in a sandstone the nature of the cementitious material which binds the grains together is the important point to be looked to; the more siliceous this is and the less calcareous the better. In fact, you may lay it down as a general rule that the more silica you have in a stone the better. If the cementing substance is calcareous, that is, composed of lime, its presence can be detected by the use of dilute hydrochloric acid poured on the stone, which will cause effervescence, and if a powerful action is set up this will show that carbonate of lime is present in considerable quantities. When we come to the limestones their main constituent is carbonate of lime. In the magnesian limestones there is a certain proportion of silica, and they are also crystalline in texture, and it is to these qualities that they owe their durability; but their chief constituents are carbonate of lime and carbonate of magnesia. The Commissioners of 1830, who recommended the use of this stone for the House of Parliament, correctly appreciated its good qualities, but they appear totally to have ignored the fact that magnesia has a strong affinity for sulphur, which exists so largely in the London atmosphere, and hence has resulted the terrible decay in the stone used in the Houses of Parliament. When we come to the oolitic limestones, such as Bath, we find no silica at all, but almost entirely carbonate of lime; but as the stone is soft and easily worked, it has been largely used for coverings and dressings to brick-built houses in London, and it looks very well when first put up. But in the case of the majority of the pretentious stone enrichments of suburban houses, no care whatever has been taken that the stone should be weathered before using, and it is no uncommon thing to find such stone crumbling away after two years' exposure. But however well this stone may have been weathered, it is extremely doubtful whether it ought under any circumstance to be used in a smoky atmosphere. For dry climates where there is little smoke, and for internal work, it is, however, admirably adapted, as it can easily be worked into most intricate moldings; but it must always be remembered that in external work elaboration of ornament means increased liability to decay.

You see, therefore, how necessary it is to ascertain something about the chemical composition of a stone. But what I may call its mechanical properties are no less important. You must examine (1) its hardness,—a soft, easily cut, stone will not, as a rule, be so durable as a hard crystalline one; (2) its weight,—as the denser a stone is, i.e., the greater its specific weight, the more likely it is to last; (3) its compactness, i.e., the closeness of its structure; (4) its porosity; and (5) its colour, if uniformity is desirable. Mr. Hull says that an original bluish grey tint should be avoided, as this indicates the presence of iron, and oxidation will frequently produce an uneven yellowish tint. Now, all these latter points you can examine for yourself, and you should always have a specimen of the stone you intend to use in a building to make a few tests of it. There are two other very simple practical tests which I may mention: one is called Smith's test, and it is to take some small chippings from a piece of stone which has been well wetted and put them in a glass of water, and let them remain for some time and then gently shake the glass; if the water gets somewhat turbid it shows that there is a certain amount of earthy matter present in the stone. Another test is to boil small pieces of the stone in a solution of sulphate of soda, after which the stone will disintegrate if it be of a perishable nature. This test is, however, a very severe one, and I do not think it would be necessary to discard every stone which did not stand this test.

When a stone has once begun to decay it is very difficult to stop the process, but several different methods of treating the stone on its first being fixed in order to prevent decay have been recommended, such as Soredmey's, Hutchinson's, Ransome's, Köhlmann's, and others, but as I have not had any practical experience of them I can say nothing about them. I have used boiled linseed oil, which certainly prevents water entering the pores of a stone, but it slightly darkens the colour of the stone, and I am disposed to think the application ought to be renewed every few years.

I have frequently mentioned the bed of a stone,

and you are all familiar with the clause in a specification which says that stone should always be laid on its natural bed, and it is well that we should all clearly understand why this is so desirable. I have pointed out to you that nearly all our building-stones have been formed by the deposit of sedimentary matter, layer upon layer, and that these layers have consolidated during the lapse of ages, partly by chemical action, partly by heat, and partly by enormous pressure, and however compact a stone thus formed may now appear, all these layers are really existent. Now if you can imagine a great piece of cardboard a foot thick formed of numerous sheets of paper gummed together, and then pressed into a compact mass, you will have some sort of notion of the structure of one of these building-stones. If you were to take such a piece of cardboard and press it in the same way in which it was pressed during its manufacture, you would only consolidate it the more; but if you were to put it on end, then begin to squeeze it, you would not have much difficulty in separating the various sheets from one another, and they would soon begin to fall away, and this is precisely what takes place when stone is not laid on its natural bed. Of course you would not often find that the ordinary pressure of superincumbent weight would actually squeeze out the layers of stone, but it would tend to loosen them, and would greatly facilitate the entrance of water between the layers, which would speedily begin to flake off. There is one other practical point which should always be carefully attended to, and that is that the bedding joints of blocks of stone should be accurately dressed and perfectly level. If this is not looked to, you will get unequal pressure and cross strains set up, and stone is one of the worst materials possible to resist cross strains, which is the reason why we so frequently see lintels over window openings cracked.

In conclusion, I must repeat one caution which I have already alluded to, and that is, do not take any stone on the credit of its name. The quality of the stone extracted from a quarry is always changing, and for a large building it is necessary constantly to examine the blocks of stone as they are delivered from the quarry. If you do this, if you also submit specimens of stone to a few simple tests, and ascertain its nature, you will be spared a great deal of worry and disappointment in seeing your buildings begin to decay before your eyes.

[Specimens of the various kinds of stone referred to were exhibited, and their mechanical and chemical characteristics exemplified, during the reading of the paper.]

THE SANITARY USES OF DISINFECTANTS.

ASSOCIATION OF PUBLIC SANITARY INSPECTORS.
A PAPER ON "Disinfectants," prepared by Dr. J. W. Tripe, Medical Officer of Health for the Hackney District, was read by Mr. G. B. Jerram (the President) at the last meeting of the Association of Public Sanitary Inspectors, Adam-street, Adelphi. Strictly defined, Dr. Tripe regards as disinfectants such substances as when used in proper quantity, and under suitable conditions, take away from any infected body or thing its power of reproducing itself in an uninfected body, and he divides them into two principal classes, viz., germicides which destroy, and antiseptics which arrest, the active principle in specific contagion or infection. In order to be properly employed, the limits within which any particular disinfectant works should be so definitely known that each might be precisely adjusted to the work it is best fitted to perform. An infinitesimal amount of infectious matter was often sufficient to produce the most violent results, and the great danger of filth was not its mere offensiveness, but the presence therein of morbid elements in a solid or gaseous form. Disinfection, to be useful, must, therefore, be perfect. It was unfortunate that the three desiderata of cheapness, general utility, and freedom from poisonous qualities could rarely be found in the same disinfectant. The interesting experiments made by Dr. Klein on swine, some of which were briefly described in the preceding paper, if confirmed by further experiments, that sulphurous acid gas was one of the most powerful of "aerial disinfectants," and would justify the preference now generally accorded to it. The practice of sprinkling with disinfectants was worse than useless as most certain and useful disinfecting agents. The respective advantages and disadvantages attending the use of the desiccating processes of Fraser, of Jennings, of Lynn, and of Ransome, were com-

pared. The proper use of disinfectants which were not germicides was also indicated. Crude fluid, carbolic acid, chlorine, Burnett's fluid, and the more recent disinfectants,—euchlorine, sporocid and chloratum,—being all here referred to. The last-named agent was considered unsatisfactory because it neither removed offensive smells nor destroyed bacteria in sewage, unless added in an inordinate proportion. Carbonyl of lime was an element in McDougall's powder and in Gubert's, and an efficacious mixture for cesspools and drains would be found in a mixture of quicklime and caustic soda in the proportion of 6 lb. of lime to one pint of acid. Terebene was a powerful deodorant.

The offensive smell from the openings of sewers in our streets we believe to be best remedied by placing animal charcoal in perforated trays between the openings; but to be effective the charcoal must be kept dry and be frequently changed. The lecturer, in conclusion, said he had not exhausted the list of useful disinfectants, many of which, like salicylic acid, were chiefly used as preservative agents. Some others, such as arsenic acid, chromic acid, and corrosive sublimate were either too dangerous or expensive for ordinary use.

In the discussion which followed the reading of the paper, Mr. Kinzett, the chairman, and several of the sanitary officers present, expressed opinions as to the practical use of disinfectants. Mr. Kingzett considered that the most satisfactory yet known, because they could be applied to the largest variety of purposes. No disinfectant could, however, be useful for all purposes, as the properties which rendered them efficacious in some cases would not fit them for others.

At the opening of the proceedings a testimonial was presented to Mr. Legg, consisting of a purse and twenty guineas, subscribed for by the members and presented by the President, and the customary vote of thanks to the lecturer brought the proceedings to a close.

THE WESTMINSTER HALL COMMITTEE

SIR,—In the evidence given by Mr. Ayrton before the Committee, now sitting, on Westminster Hall he stated that his opinion was that nothing should now be done to prevent the plan of Sir Charles Barry being carried out, so far at least, as that design comprises a building extending along St. Margaret-street from St. Stephen's Porch to a point in a line with the north front of Westminster Hall; that it should terminate there, but be united to the north front of Westminster Hall at the flanking tower of that front; the whole in accordance with the design of Sir Charles Barry.

It may be well to state that though this would not, as I think, do all that would be desirable, inasmuch as it would not enclose New Palace Yard as the great entrance court of the New Palace, it would have, at least, the advantage of bringing into harmony all the external façades of the New Palace, and I should welcome such a scheme for that reason, as far as it goes.

Now that some of the buttresses of Westminster Hall have been restored in model only, with detail necessarily entirely out of scale with that of the New Palace, the effect is, I think, so unfortunate as to make evident the desirability of screening the Hall, as proposed by my father, with (as I am glad now to hear) the approval of Mr. Ayrton.

A glance at the drawing of my father's design, published in the *Builder* of the 24th of January last, will at once show that it perfectly lends itself to such a partial execution of it, and that a good and complete effect would then be produced when viewed from the end of Parliament-street.

I have stated roughly that the cost of realising the whole of my father's design, including the enclosure of New Palace Yard, would, I estimate, be about 500,000*l.* To carry out the portion to which I have above referred would cost about 220,000*l.* out of the total of 500,000*l.*

Such portion of the design would provide eight committee-rooms on the principal floor and the floor over, larger than those in the river front (which are often found too small for important committees), as well as twenty-six other rooms available for public use on the ground-floor and the upper floor, or thirty-four additional rooms in all.

CHARLES BARRY.

1, Westminster-chambers, 10th March, 1885.

International Inventions Exhibition.—His Royal Highness the Prince of Wales, President of the International Inventions Exhibition, has fixed Monday, the 4th of May, for the opening of the Exhibition.

* Some notes of the discussion which followed the reading of the paper will appear in our next.

THE DECORATION OF ST. PAUL'S CATHEDRAL.

It is sufficiently easy to write a few lines of criticism upon the decorations now set in the cathedral, but we can well appreciate the fact that the committee has evidently found the greatest difficulty in arriving at a conclusion as to feeling its feet on solid ground. It must be forgotten that the examples of such decorations are few; that in this country, at least, nothing of the sort has been done, whilst the building to be dealt with is the second largest church of its class in Christendom. Before offering any remarks on the cartoons, we may not unreasonably attempt to face the difficulties which arise.

Perhaps the first is that of scale. We all know that a fault, very prominent in St. Peter's dome, less prominent, but still very present in St. Paul's, is the clumsy scale of the details, and, as it does, the apparent size of the arches by at least one-third. This defect obscures its climax in the monstrous key-stones of the whispering-gallery, which gallery is saved from appearing as a mere cornice of the scale given it by the rich wrought-ironing with which it is crowned.

The second question which rises, and which is submitted should never have arisen had the so-called decoration been rightly conceived, is the matter in hand that which it pretends to be, the decoration of the existing building, or are the decorations to take the place, using St. Paul's as a mere vehicle for the play of such decorations?

A third point is, what relation are the decorations to bear with regard to the treatment of the entire building?

Are we entitled to take a master work to destroy in it the relation of parts which its originator established, to dwarf it in effect, and alter its structure for the sake of displaying our decorations?

With regard to the first question or difficulty, we cannot be doubted that we cannot be wrong in our decoration is manifestly subservient to, and not dominant over, the design of the author of the building. What do we find? Although the detail is large and crushing in scale, the "decorations" dwarf it to mere insignificance. That which made the building look tall is now made itself to look small. Our eyes cannot get free from the coalheaver prophets and gesticulating giants posturing in the spandrels of the pendentives. The decorations are out of scale. This brings us, at once, to question number two. There should be but one answer to this. There can be no doubt that the present works entirely sacrifice the cathedral and turn it into a mere shell, on the blank faces of which efforts are being vainly made to rival Michelangelo. But is Michelangelo's work sublime merely because it is big, and is imitation of his work appropriate to St. Paul's, even if there were any living man who could approach his power? He could do what he liked on the roof of the Sistine Chapel. That building is hardly an architectural work. The pylons do not crush their surroundings in the way that the cartoons in the pendentives at St. Paul's assert themselves above the building by professing to decorate.

If we are to choose between the cartoons on the north or south side of the dome, the north side has the advantage. It is more numerous in its parts, more interesting, and does not possess the plainness that which is, no doubt, somewhat of a fault in the design of the church, an excess of light in this part,—a height so excessive that it reduces the nave and choir to insignificance. A cartoon on the south side is as crushing in scale and as commonplace as could be imagined, and makes the pointed section of the dome more crowded than it was before.

The idea of the dome is that of a great closed space, and undoubtedly that was Sir Christopher Wren's notion of it. He starts on the floor with eight sub-divisions, then divides into twenty-eight, grouping these in a subordinate way. The cartoon on the north side brings us back again in the most direct way to eight sub-divisions, quite ignoring Sir Christopher Wren's multiplication of parts which carries the eye from the eight great arches.

Wren's system of multiplication emphasised space, but this system of decoration merely emphasises height. The value of the ironing above the whispering-gallery to give life to the drum of the dome has been already

noticed. The decorators have, however, been anxious to set Wren to rights, and to crush his poor efforts.

All manner of devices have been tried on the drum.

On the north side a gigantic text, with thin letters on a gold ground, reduces a good high wall to a mere band, and brings a surface of almost unbroken gold so near the eye that it completely kills the gold in the dome above. One would have supposed that the gold and sameness would have increased as the decoration increased upwards. And, after all, a great flat surface of gold is not decoration; it is merely glare.

The attempt at decoration of the drum on the south side is truly melancholy. This space, the great continuous wall which seems to tie together the base of the dome, is emphatically subdivided into eight parts, exactly as Sir Christopher did not do it. To effect this, the over-large keystone of each great arch is surmounted by a still more prodigious bust of a prophet, or some other worthy, peering out of a circle, over the railings. Each circle is joined to its neighbour by enormous and uninteresting scrollwork, so that that part of the building, which by the ingenuity of its designer was left quite plain, and gave one the sense of horizontality and continuity, is now cut up into eight parts, emphatic and enormous.

Below the whispering-gallery are a series of eight spandrels,—fields for the decorator. Upon these there were faint traces of an architectural type of decoration following the inclosing lines of the spandrels.

The decoration thus suggested was, perhaps, commonplace enough, but, at least, it did not sacrifice the building. This is, however, done away with, and enormous figures of evangelists and prophets half fill the spaces, leaving vacant large areas of the gold ground on which the figures are depicted. From many points of view these figures are little better than black silhouettes on a ground of yellow light. From every point they simply crush the building, and do not even fit the spaces they pretend to occupy. Figures seated on thrones or in circles or hexagons would by such a treatment, at least, be wedded to the architectural lines of the building they are supposed to decorate; as they now appear, the feeling suggested is that the spandrels are too small and the picture is cut down to fit them. Setting aside the text on the gold ground, the unoccupied surface of the spandrels now shows the greatest amount of gilding, and has the effect of fixing the eye at this level. The ceilings in the "Stanze" at the Vatican would have suggested some more suitable treatment, something less assertive.

The third point that has been raised is "What relation are the decorations to bear to the treatment of the entire building?"

We cannot suppose that the gilding is to come to the floor level. The structure, unlike St. Peter's, is of stone, and cannot with propriety be faced with marbles. We have then a sober key of colour to begin with; the enrichments increase as we ascend, and Wren has left large spaces on the vaults obviously for decoration. If a climax of glare is established before we are half-way up; the whole scheme, as established by him, is overthrown.

By way of further destroying his surfaces and the repose of the building, the coffered soffits of the four great arches carrying the dome have been touched with a commonplace French grey. These great soffits, perhaps the most important constructive arches in the building, have hitherto presented to the eye an enriched surface; they seemed full of power to do their work. The one that is painted is frittered away into a mere gridiron of vertical and horizontal lines. The sense of structural unity is obliterated.

If we are entitled to deal with a master work as we choose, and make of it a mere vehicle for our decorations, and to alter its structural lines, then perhaps a justification may be found, not only for the cumbersome prophet, but even for the suggestion to put up sham coffering over the "quarter galleries." It would be absurd to profess admiration for Wren's treatment of this part of the church. But can a defence be found for putting coffers on a vertical face, and in immediate juxtaposition with the coffers on the soffits of the great arches? Even if Wren had done it elsewhere in a diminished form (and he has not in any place that is the least similar to this), it would not make it defensible here.

There is one decoration which Wren has already begun, and which, if carried round the church, would not only add to the effect, but assist the scale of the building. I refer to the gilt railing on the great cornice at the west end of the nave. This rail is unnecessarily high, and need not be continued of the same height. The lower it is kept, within reason, the greater scale will it give. As so many experiments are being tried, it may be suggested that one in this direction should also be tried.

A few boards painted dark stone colour, and with imaginary railings thereon, would, at once, show the effect.

SOMERS CLARKE.
15, Dean's Yard, S.W., March 11, 1885.

IRON TIE-RODS IN SPIRES.

SIR,—An architect informs me that it is a general practice to introduce tie-rods of iron to resist the "spread" of spires.

Molesworth gives 71 x pressure = power required to overcome the friction of stones on stones, which I take to imply the stability of a very flat spire without tie-rods.

If unnecessary, the introduction of rods of iron must be a great evil, unless, indeed, they gradually form channels by their expansion and contraction, and so have room to play without injury to the masonry.

* * * It is unquestionably a great evil; nor is it correct to say that it is a general practice.

TAXATION OF SURVEYORS' CHARGES IN COMPENSATION CASES.

SIR,—Referring to the letter of Mr. Banister Fletcher, which appeared in your journal of March 14th [p. 398], we must repeat that there was an utter want of principle displayed in the taxation in the case referred to in our previous letter (p. 359). We were drawing attention, not to a general principle, but to a particular application (or non-application) of the principle. You would not have been troubled by us if two surveyors' fees had been allowed; but, as a matter of fact, the total sum allowed did not nearly amount to one surveyor's fee upon Ryde's Scale, and we considered that a further injury was done to the profession collectively and individually by the manner in which this inadequate amount was apportioned.

If the taxing-master had even said, I will allow one surveyor's fee on Ryde's Scale, there would have been some principle in it, but to allow one surveyor 37l. 16s. and another 6l. 6s. was putting the matter in the most objectionable form, as clients have an erroneous idea, that the taxing-master is an expert, and is giving to each surveyor the amount to which he is properly entitled as remuneration for services rendered, and it is a positive injury to make it appear that a surveyor of high position is to be compensated for services such as were rendered in the case referred to by a payment of 6l. 6s. or over 37l. 16s.

LEE BROS. & PAIS.

THE SEWAGE DISPOSAL QUESTION.

SIR,—I do not know whether it has ever been considered practicable by experts to treat sewage with sulphate of lime or plaster of Paris. If a small quantity of this material be stirred into sewage and allowed to settle, the water will be quite clear and odorless, and the solid parts precipitated into a stiff mass, which could afterwards be dried and sold for manure. The value of gypsum or sulphate of lime for manure is, I believe, alone considerable; and it would be increased in value by the addition of sewage. On a large scale the sulphate of lime could be produced in London at about 25s. per ton, and one ton would produce one ton and a quarter of dried precipitate.

W. B. WILKINSON.

Architectural Association.—The fourth

Saturday afternoon visit of the Architectural Association was made, on the 14th inst., to the new Infirmary for the Hampstead Workhouse, at New-end, built from the designs of Mr. C. Bell, of Dashwood House, Broad-street. About forty members assembled, at three p.m., at the Infirmary, and were met by Mr. Bell, who conducted the members over the building. The Infirmary is the largest circular ward that has been built in England up to the present date, being 50 ft. in diameter. The circular form was adopted in order to avoid interfering with the light and ventilation of the adjoining buildings. We gave a plan and description of the building in the *Builder* for February 2, 1884. The members afterwards visited Messrs. Read Bros.' new beer-bottling stores at Kentish Town, of which Mr. Theodore K. Green is the architect. Here the members were received by Mr. Green. A view and description of these buildings appeared in our pages a few weeks ago (February 7).

The Student's Column.

DESCRIPTIVE GEOMETRY.—VII.

We have already several times applied the general method of finding the vertical trace of a plane on a new elevation; it consisted in drawing a horizontal line of the plane

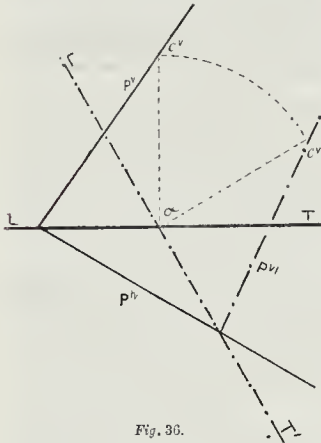


Fig. 36.

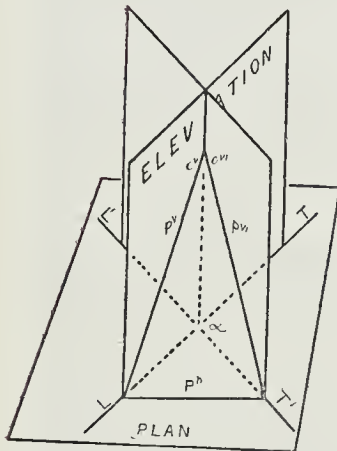


Fig. 37.

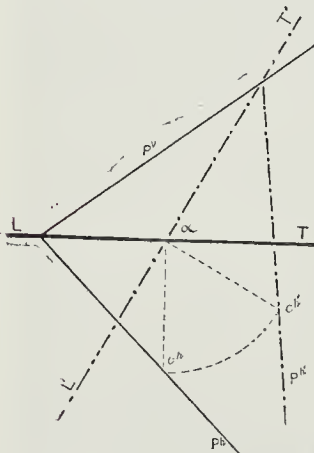


Fig. 38.

and finding the point where this line penetrated the new elevation, giving us thereby one point of the trace required; but in many cases we have a much shorter way of finding a point of the new trace as given in fig. 36, for the two elevation planes intersect one another in a vertical line over α as seen in sketch fig. 37; therefore the height of C^v over $L^1 T^1$ will be the same as that of C^v over $L T$. The same operation holds good when the plane of the plan is changed so as to make an auxiliary plan, as in fig. 38; it is exactly the same case as the former, only the intersection of the horizontal planes is a horizontal line, as can be seen by fig. 39, which represents the operation in perspective.

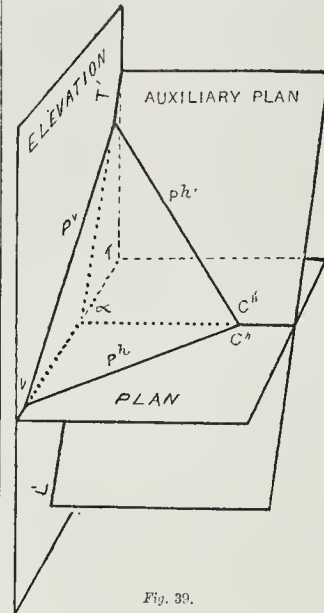


Fig. 39.

Applications of the method of using auxiliary projection planes; in other words, auxiliary elevations and plans.

Given a line D by its projections D^v and D^h ; select other projection planes in which the line D will be perpendicular to the plan,—in other words, in which D will be vertical.

We first make a new elevation on $L^1 T^1$ parallel to D^v when we shall see D^v with its real inclination; then we make a new plan on $L^{11} T^{11}$ which

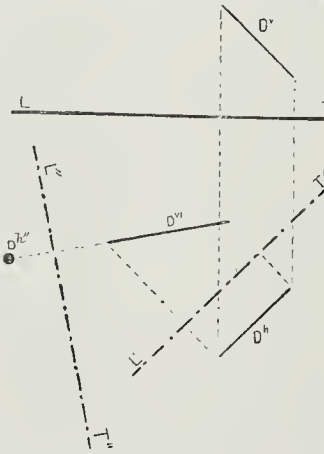


Fig. 40.

we select perpendicular to D^v . In this last projection of the line D we shall have for D^{11} only a point at an equal distance from $L^{11} T^{11}$

as D^h was from $L^1 T^1$, and D^{11} will, of course remain the elevation. To realise this operation the student need only turn the paper round so as to place $L^{11} T^{11}$ horizontally before him, but if he have time, we strongly advise him to construct the whole operation with pieces of board for the divers projection planes and a piece of wire for the line D. (See fig. 40.)

Given a line D by its projections D^v and D^h ; select other projection planes in which D will be perpendicular to the elevation.

This is exactly the same problem as the former, except that we begin by first making a new plan on $L^1 T^1$, parallel to D^h , and then we finish by making a new elevation, D^{11} , perpendicular to D^{11} , as in fig. 41.

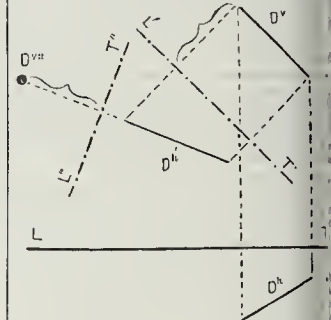


Fig. 41.

Given a plane P by its traces P^v and P^h ; select other projection planes in which P will be perpendicular to the plan itself.

We begin by making an elevation on a plane at right angles with our plane P; for this we simply take $L^1 T^1$ perpendicular to P^h , and draw the new trace P^{11} by one of the methods already known. The plane is now defined by the traces P^v and P^{11} , but, if we change our horizontals

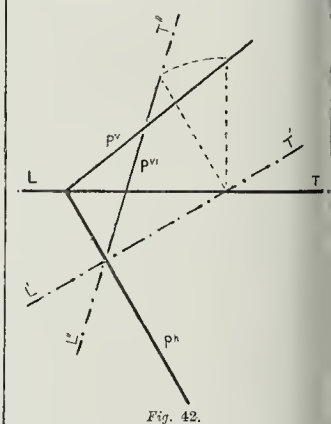


Fig. 42.

plane of projection and take for $L^{11} T^{11}$ the trace P^{11} itself, the plane P will be contained in our plan; there will be no more horizontal trace whatever, and the vertical trace will be our ground-line itself. (See fig. 42.)

Soudan Expedition.—Messrs. Fraser & Fraser, steam hoiler-makers, Bromley-by-Bow, obtained the order for the supply of nine immense wrought-iron tanks, to occupy the entire hold of the s.s. *Woodcock*, which is to be stationed at Snakim as a water-ships for the use of the troops. The order was received by Messrs. Fraser & Fraser on Saturday, February 28; the iron which had to be expressly made for the work in Staffordshire, was delivered to them on the following Saturday, March 7; and in one week—viz., on Saturday, March 14—Messrs. Fraser & Fraser had the satisfaction of delivering and fixing the whole of the tanks in the hold of the vessel. This is quick work.

RECENT PATENTS. ABSTRACTS OF SPECIFICATIONS. Fire-extinguishing Apparatus. G. J.

Water pipes are led to each room or passage for operating the valves are marked with the letters of each room, and connected to the valves by means of cranks or rods. The levers may be operated by the building if wished. A pipe is laid to each room, which terminates with a jet or nozzle and water is turned on to extinguish fire.

Filter. F. H. Landon. A filter is made sufficiently buoyant to float on the surface of the liquid to be filtered, which is used in any suitable tank. It has legs to rest on it resting on the sediment at the bottom of the tank, and its lower portion is perforated for the escape of the liquid, which escapes through a tube passed over the side of the tank.

Finishing Plaster Casts. F. Von der Berlin. This is an apparatus and process for finishing and leveling plaster-casts. They are hardened, dried, and conserved by applying suitable fluids spray producer. The spray producer is a novel ingenious mechanical arrangement which insures the complete dispersion of the preservative solution over the whole surface of the cast.

Pulleys. O. R. Olsen. A hub, arms, and a narrow rim are first cast in one piece, and a rolled or sheet metal outer rim is riveted over the outer one.

Flue Mouths. T. F. May. The mouth of the flue or chimney is made of metal contracting as it rises from the fire-grate. This contracted portion may be made in one piece, or in sections joined together, the inside being smooth so as not to obstruct the flue.

Metallic Lathing. B. Scarles, Clinton. A cloth is employed to receive the plaster. Strips upon which the wire cloth is secured are used with a flange on each side by which they are fixed in place with a longitudinal channel between them; they are rolled or struck from sheet metal, preferably galvanised iron, and are strong and easily bent into any desired shape for plastering concave, convex, or irregular surfaces. The wire-cloth is attached by staples, and the strips are fixed by nails passing through the wire with heads that overlap.

APPLICATIONS FOR LETTERS PATENT.

7.-2,648, W. Hayhurst, Cramps for Carriers, Joiners, Cabinetmakers, &c.—2,663, J. Drawplate for Domestic Fire Ranges, &c.—J. A. and J. Hopkinson, Hot-water Apparatus for Domestic and similar purposes.

23.-2,691, C. Billington and J. Newton, Knobs to Spindles.—2,715, J. Oliver, a Knob with Removable Grating for Fireplaces.

27.-2,718, E. Adams, Self-closing Application and Check for Doors, and Apparatus in Connection therewith.—2,731, E. Deacon, Locks for Doors and other Purposes.—2,742, R. Golden, Improved Plastic Compounds.

2.-2,749, E. Taylor, Ventilating Apparatus for Application to Windows, &c.—2,751, S. E. Improvements in Sash Fasteners.—2,767, E. Nichols, System of Water Waste Preventers.

71.-2,775, W. Donald, Manufacture of Refractory Materials and Bricks.

3.-2,788, E. Prince, Adjusting and Fastening Windows without Sash Weights or Cords.—J. J. Waterworth, Improved Ornamental Panel.

452, B. Badham, Combined Manhole Covers Ventilators for Sewers.—16,883, J. Gully, Improved Door Spring and Lock.—43, V. Bittner, Joining Inlaid Floors.—82, H. Curzon, Safes against the Bursting of Water-pipes from

Tongueing, and Thickening Woods.—1,928, T. Gelder and J. Wilson, Draw-plate for Fire Ranges.—2,069, J. Jeavons and G. Reynolds, Portable Dustbins.—390, F. Kellow, Building Bricks.—948, C. Longbottom, Improvements in Door or other Knobs or Handles, and Attaching same to Spindles.—1,132, J. Wate, Endless Saw Machines.—1,596, E. Wilson and Others, Improvements in Chimney Tops.—1,633, A. Clark, Improvements in Lathing.—1,961, W. Holt, Chimney Tops and Flues.—2,160, E. Colton, Improved Wall Decorations and Method of Manufacturing the same.—2,326, J. Smith, Mounting or Attaching Door Handles.

COMPLETE SPECIFICATIONS ACCEPTED. Open to opposition for two months.

4,230, E. Wright, Improved Chimney Cowl.—4,544, W. Johnson, Brickmaking Machinery.—7,111, J. Watson and J. Spoor, Kilns for the Manufacture of Portland Cement.—7,601, T. Messenger, Water-waste Preventers.—7,763, T. Watson, Improvements in Drain Pipes.—8,028, J. Mountain, Improvements in Water-closets.—23, D. Aubert, Apparatus for Opening, Holding, and Closing Ventilators, Skylights, &c.—1,483, J. Morrison, Jan, and A. Emery, Fixing Handles and Knobs of Doors to the Latch Spindles.—5,121, J. Tomkins and S. Napper, Improvements in Baths, Lavatories, &c.—7,015, T. Hellwell, Improved Method of Securing Sheets of Zinc or other Material for Roofing Purposes.—7,723, P. Dalton, Hot water Apparatus for Warming Buildings, &c.—14,443, A. Putney, Wood Flooring, Ceilings, and Dadoes.—1,410, H. Pearson and G. Morris, Street Grilles and Covers for Water-closets, Privies, &c.—1,627, R. Evered, Improvements in Rack Pulleys for Window Blinds.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT. MARCH 9.

By BLAKE, HADDOCK, & CARPENTER. Croydon—The Haling Estate, freehold land, 11bs. 2s. 0p. £20,000

By DOWSETT & WOODS. Blackheath—Ground-rents of 714, a year, reversions in 81 and 89 years. 1,550

Clapton—A profit rental of 67l. a year, term 27 years. 500

Sutton, High-street—Freehold land, with erections thereon. 523

By MULLETT, BOOKER, & CO. Hyde Park—22, Westbourne-terrace, with stabling, 52 years, no ground-rent. 4,850

By Mr. WILKINSON. Shepherd's-bush—121, Godolphin-road, freehold. 510

By HENRY DONALDSON. Hornsey—Ground-rent of 33l. a year, reversion in 69 years. 825

Kingsland—Nos. 65 to 75 odd, and 83, Tottenham-road, 30 years, ground rent 144. 1s. 1,110

Islington—Nos. 14, 15, and 16, King Henry's road, 40 years, ground-rent 8l. 560

By W. HALL. Hendon—Ground-rents of 36l. a year, reversion in 98 years. 720

By WAGSTAFF & WARMAN. Upper Holloway—Nos. 29 and 30, St. John's Park, 66 years, ground-rent 11l. 890

MARCH 10. By MESSRS. KILGAT. Chiswick, Grove Park-gardens—"Brookville," 84 years, ground-rent 10l. 10s. 610

By H. A. FIELD. Highbury—137, Phillimore-road, 92 years, ground-rent 5l. 15s. 285

MARCH 11. By FULLER, HOBBY, SON, & CASSELL. St. Mary Axe—24, Bevis Marks, freehold, area 1,010 ft. 3,210

By THURGOOD & MARTIN. Bedford-row—3, Prince's-street, freehold. 860

MARCH 12. By BRAY, WEBB, & CO. Upper Holloway—"Mercer's-yard"—"Glanville Villa," 82 years, ground-rent 13s. 725

By NORTON, TRIST, WATNEY, & CO. St. Martin's-lane—4, West-street, freehold. 680

By H. J. BRIS & SONS. Bethnal-green—122 and 123, Scarborough-road, 69 years, ground-rent 12l. 840

Mile-end—14, Maplin-street, freehold. 381

Bethnal-green—14, Elm-street, freehold. 465

North Bow—55, Hewlett-road, freehold. 2,010

By NEWBORN & HARRING. Tottenham-court-road—46, Warren street, freehold Burton-crescent—Improved ground-rents of 184, a year, term 21 years. 201

Banking—14, Wokingham-road, freehold. 470

Islington—39, Canonbury-square, 17 years, ground-rent 11l. 408

By E. SIMSON. Camberwell—Ground-rents of 40l. a year, reversion in 88 years. 680

Nos. 29 and 22, New Church-road, freehold. 850

Borough—8 to 11, Pleasant-place, 61 years, ground-rent 18s. 545

Brixton—1 to 7, Dexter-road, 81 years, ground-rent 33l. 1,630

Old Kent-road—17 and 18, Surrey-square, freehold. 190

Bermondsey—2 to 14, Longley street, 58 years, ground-rent 40l. 2,825

MARCH 13. By R. J. COLLIER. Edmonton—Stanley-road: Twelve houses, unfinished, 99 years, ground-rent 50l. 8s. 225

Tillston-road—Eleven houses, unfinished, 69 years, ground rent 46l. 4s. 265

Nos. 1, 3, and 5, Tillston-road, 93 years, ground-rent 13l. 15s. 270

MEETINGS.

SATURDAY, MARCH 21. Edinburgh Architectural Association.—Visit to Caroline Park and Granton Castle.

MONDAY, MARCH 23. Surveyors' Institution.—Continued discussion on "Leasehold Enfranchisement." 8 p.m. Society of Arts (Cantor Lectures).—Mr. J. Hungerford Pollen on "Carving and Furniture." III. Age of Gibbons, Bone, and that of their Successors. 8 p.m. Inventors' Institute.—8 p.m. Leeds and Yorkshire Architectural Society.—Mr. Walter Smith on "The Architecture of the Last Half-century." Edinburgh Architectural Association.—Mr. William Bruce on "Timber-fronted Houses to Lammmarket and Milne's-court." 8.30 p.m.

TUESDAY, MARCH 24. Builders' Clerks' Benevolent Institution.—Seventh Annual Dinner (Holborn Restaurant). 6.30 p.m. St. Paul's Ecological Society.—Mr. Somers Clarke, F.S.A., on "Some Churches of North Germany (Lubeck, Lüneburg, &c.)." 7.30 p.m. London and Middlesex Archaeological Society.—(1) Mr. G. L. Gomme on "The Westminster 'Folk-Moot.'" (2) Mr. John E. Price on "City Excavations: Recent Researches." 8 p.m. Institution of Civil Engineers.—Mr. P. W. Williams on "The Electrical Regulation of the Speed of Steam-engines and other Motors for Driving Dynamos." 8 p.m. Anthropological Institute.—(Three Papers.) 8 p.m.

WEDNESDAY, MARCH 25. Carpenters' Hall, London Wall (Free Lectures to Artisans).—Mr. John Slater, B.A., on "Roof Coverings." 8 p.m. Civil and Mechanical Engineers' Society.—Mr. H. A. K. Grible on "The Oratory, South Kensington, from a Scientific Point of View." 7.30 p.m. British Museum.—Mr. W. St. C. Boswell on "Assyrian and Babylonian Antiquities." V.—(Chaldean and Assyrian Libraries.) 2.30 p.m. Builders' Foremen and Clerks of Works' Institution.—Quarterly Meeting of Directors.

THURSDAY, MARCH 26. Society for the Encouragement of the Fine Arts.—Mr. James Orrock on "The English Art." 8 p.m. Institution of Telegraph-Engineers and Electricians.—Professor Oliver Lodge on "The Seat of Electro-motive Force in a Voltaic Cell." 8 p.m. Society of Antiquaries.—8 p.m.

FRIDAY, MARCH 27. Royal Institution.—Professor Sir H. E. Roscoe on "The Spectrum of the Coal Tar Colours." 8 p.m. Institution of Civil Engineers (Students' Meeting).—Mr. F. Platt on "The Compound Principles as Applied to Locomotive Engines." 7.30 p.m. British Museum.—Prof. J. F. Heddets on "Medieval English Remains." VI. (Sports and Pastimes.) 2 p.m. SATURDAY, MARCH 28. Architectural Association.—Visit to Fishmongers' Hall. 2 (Two) p.m. Building Trades' Exhibition at Agricultural Hall.—Closing day.

Miscellaneous.

The Suakim-Berber Railway.—A Parliamentary paper has been issued containing the articles of agreement between the Government and Messrs. Lucas & Aird in respect of the construction of the Suakim-Berber Railway. The agents, as the contractors are described, are to construct "for the War Department for the purposes of the expeditionary force sent out to Suakim, and according to the orders and under the control of the general officer for the time being in command of the same force, a 4 ft. 3 in. gauge single line of railway from Suakim, and thence in sections to or so far as wards Berber as may from time to time be ordered in writing by the Secretary of State; and also an 18 in. gauge single line of railway in or about Suakim, as may from time to time be ordered by the Secretary of State." The staff will be paid by the Government, and rationed and clothed by the War Department. If any of the working staff should be killed by the enemy in the Sudan, or die from wounds or from the effect of the climate, his representatives shall be entitled to a gratuity equal to one year's pay. The agents are to receive a commission of 2 per cent. upon all expenditure by the War Department, such commission not to exceed on the whole 20,000l.; and they will be entitled to a further sum not exceeding 20,000l. if the railways shall be satisfactorily completed in the judgment of the Secretary of State. There is a condition that the contract shall not be sub-let. Some dissatisfaction having been expressed in Parliament in consequence of an order for pumping engines in connexion with this railway having been given to an American firm, it is satisfactory to know that although this is the case, yet the order for the boilers, of which large numbers are required, has been placed with the well-known firm of Robey & Co., engineers, Lincoln. Norfolk County Surveyorship.—Mr. T. H. B. Heslop, C.E., District Surveyor to the Kingston Highway Board, has been elected by the magistrates to the office of County Surveyor for Norfolk.

The Artisans', Labourers', and General Dwellings Company.—The eighteenth annual general meeting of this company was held on the 11th inst. Mr. Ernest Noel, M.P., presiding. The report showed that the rental for the year 1884 amounted to over 84,000*l.*, the net revenue being 67,610*l.*, out of which dividends upon the preference capital amounting to 12,073*l.*, and interim dividend upon the ordinary capital 20,832*l.*, had been paid. It was now proposed to pay a dividend of 5 per cent. on the ordinary share capital for the second six months of the year, carrying over 4,000*l.* to revenue reserve and 1,771*l.* to next year's accounts. The increase of capital during the year had been 125,200*l.*; the total amount paid up to Dec. 31 was 1,171,860*l.*, the authorised capital being 1,000,000*l.* in ordinary shares, and 750,000*l.* in preference shares 4 per cent. The completed estates of the company in London are Shaftesbury-park, S.W., and Queens-park, W., comprising nearly 3,400 separate houses. The cost of repairs upon these estates shows a decrease for the year as compared with 1883 of 1,047*l.* At Noel-park, N., the new estate of the company, work had been pushed on with rapidly, so that at the close of the year 743 houses, including those built or commenced in 1883, were completed, over 460 being let and occupied. This estate, when completed, will comprise 2,600 houses. The directors have had under consideration the question of acquiring a central site for the purpose of erecting block-buildings as dwellings for the industrial classes. The report and statement of account having been adopted, and the dividend declared, the retiring directors and auditors were re-elected.

Liverpool Engineering Society.—At the last meeting of this Society Mr. W. E. Mills, President, in the chair, a paper by Mr. J. J. Webster, Assoc. M. Inst. C.E., entitled "Notes on Constructional Ironwork," was read by the author. After referring to the enormous amount of ironwork used annually in the construction of warehouses and offices, as giving ample opportunities for studying the different modes of construction, he discussed the various forms of beams, and especially those of the rolled-girder type, and showed the errors of design occasionally committed. He said that the tables of safe loads given on published sheets of sections were not to be relied upon, and that in all cases the safe load should be calculated in each particular case as a check. He then went into the investigation of the strength of such beams, and showed how they could be calculated. The question of independent and continuous girders was then considered, and he showed how in many cases girders were designed and constructed as independent girders, yet from the nature of their position in the building and the application of the load they were actually acting as continuous girders, and should, therefore, have been designed as such. He next considered the different forms of joints and covers, and afterwards went into the investigation of columns.

Cemetery Chapels.—It is proposed, by the Local Board of Great Harwood, to lay out a cemetery, the area of which will be barely five acres; but some difficulty has arisen with regard to the erection of chapels, the Board, for economy's sake, desiring to erect one chapel, to be used in common by Churchmen, Dissenters, and Roman Catholics. Objections have been raised to the adoption of this course, and the Local Government Board sent down one of its inspectors (Mr. Stephen Terry) to hold an inquiry into the matter. It appeared from the evidence given by the architect (Mr. Angelo W. R. Simpson, of Blackburn) who had prepared plans for the cemetery, that the cost of one chapel would be about 620*l.*, while the erection of three separate chapels would cost nearly 1,200*l.* extra. It was suggested, as a compromise, that possibly three separate chapels under one roof could be erected for a total of about 1,400*l.* Do any of our readers know of so small a cemetery having three chapels, either under one roof or under separate roofs, or separately disposed upon the ground?

Coventry Sewage.—The Town Council of Coventry have decided to considerably enlarge the sewage works of their city to meet increase in population, and have instructed Mr. Mellis, C.E., to carry out the work. The sewage of Coventry has for the last ten years been dealt with by a combined system of chemical precipitation with filtration through land, and the operations have given general satisfaction.

Architectural Section of the Philosophical Society of Glasgow.—The closing meeting of the Architectural Section of the Philosophical Society of Glasgow was held on Monday evening last, Mr. James Sellars, the President, in the chair. Mr. W. P. Buchan read a paper on "The Past and Present Conditions of Plumber Work from their Sanitary Aspect." The paper was illustrated by several diagrams. In the course of the discussion which followed, Mr. Campbell Douglas said the great point that Mr. Buchan had urged on them was one that had been growing into their knowledge during the last ten or fifteen years, for chemical science had demonstrated that gases were constantly arising from decomposing matter, and that steps must be taken to prevent these coming silently and insidiously into their houses. Mr. Whyte, the Assistant Master of Works, said that traps alone would never keep out gases, and that ventilation was equally necessary. He also agreed with Mr. Buchan in condemning the use of small two-gallon cisterns for water-closets. The Chairman proposed a vote of thanks to the lecturer, which was heartily agreed to. The election of officers-bearers was then proceeded with. The following gentlemen were elected to office:—President, Mr. William Landless, architect; vice-presidents, Mr. David Thomson, architect, and Mr. Alexr. Muir, builder; treasurer, Mr. James Howitt, measurer; secretary, Mr. A. Lindsay Miller, architect; members of Council, Messrs. John Honeyman (architect), T. L. Watson (architect), Thos. Gildard (architect), James Sellars (architect), W. P. Buchan (sanitary engineer), John Dansken (measurer), William Howitt (measurer), C. T. Bowie (decorator), R. A. McCilvray (plasterer), Wm. Gilfillan (marble cutter).

Birmingham Architectural Association. The annual dinner in connexion with the Birmingham Architectural Association was held last Tuesday evening, at the Grand Hotel, Colmore-row. The President, Mr. F. B. Osborn, occupied the chair, and among those present were Messrs. W. H. Kendrick (Vice-President), Victor Scruton (Hon. Sec.), the Hon. R. Lytton, J. Cotton, A. Reading, F. Cross, F. G. Hughes, A. Hale, H. Cleve, W. Doubleday, D. Arkell, J. K. James, H. Lloyd, F. Newton, J. Pratt, E. Taylor, T. Tonks, T. Gann, P. Spencer, Lukin Smith, F. Hart, &c. The President, in proposing the toast of "The Association," remarked that the Association was deserving of the most hearty support, as it was the only representative assembly of the profession of the art of architecture in the town, and also on account of the important educational work it was doing amongst students and younger members of the profession. Mr. Kendrick responded, suggesting that representations should be made to the Town Council for the establishment of a Technical Museum for the benefit of the profession, and observed that in the new Art Gallery accommodation might be found for a section devoted to the interests of the Association. Mr. Doubleday gave "The Health of the President," and urged that the Post-office authorities should be requested to allow the designs for the new Post-office to be confined to Birmingham architects.

Acton and the Thames Valley Sewerage Scheme.—Although the Acton Local Board has accepted tenders for the construction of a separate system of sewage disposal, at a cost of 75,000*l.*, it is understood that Sir Joseph Bazalgette has advised the Board to connect its district with the proposed Thames Valley scheme. Acton proposed to spend nearly 40,000*l.* on sewage precipitation works and an outfall into the river at Chiswick, the whole of which will be unnecessary if Acton determines to join the Thames Valley Scheme. Mr. Mansergh, one of the engineers of the Mortlake Scheme, has prepared a sewage diversion scheme for the Thames Valley which embraces even a wider area than that included in Sir Joseph Bazalgette's scheme. Besides the sewage of the Thames Valley, Mr. Mansergh proposes to divert at the same time that of the two districts of Brent (which includes Hendon, Finchley, Edmonston, and the Barnets) and the Lea, which embraces Enfield, Edmonston, Tottenham, Walthamstow, and Leyton. The main sewer which will carry off the sewage of this wide area, commences at Houslow, follows, but outside, the boundary of the metropolitan area, and ends at an outfall on the Mucking Flats, Sea Reach, where it is proposed to erect works for the chemical treatment of the sewage. The cost of the whole system is estimated at 1,045,000*l.*

Proposed Copper Trade Institute. Swansea paper states that an effort is being made to found a Copper Institute on the part of the Iron and Steel Institute, and with every prospect of success. Some of the most important objects sought to be attained to facilitate inter-communication between persons connected with the trade, with regard to all matters relating to production, manufacture and use of copper or alloys, excluding all questions of wages and regulations; to promote the more extensive application of copper by making its properties and advantages more widely known; to facilitate the discussion at periodical meetings of practical and scientific questions appertaining to copper; to supply its members with reports of the prices, stock, consumption, and of statistics of copper; and to encourage exertions to promote the prosperity of the copper trade by awarding medals and premiums for paper and inventions, which, after the discussion their merits, may be considered worthy of rewards.

The Late Sir Charles Froke.—An elaborately sculptured mural tablet, in alabaster and marble, has just been erected in St. Peter's Church, Cranley-gardens, by Lady Froke, in memory of her husband, the late Charles James Froke, Bart., of Cromwell House, South Kensington, who was the founder and patron of the above church. Her ladyship has also erected a similar tablet in St. Paul's Church, Oslow-square, to the memory of Sir Charles, who built and founded the church also. The tablets are the work of Henry Terry, of the Lambeth-road.

The Civil and Mechanical Engineers' Society.—An ordinary meeting was held on the 11th inst., the President, Mr. C. A. M.L.C.E., in the chair, when a paper on "Stagnation" was read by Mr. Charles Berthon (Leith, R.A.). The author strongly advocated the abandonment of all other materials than steel for guns, and argued that it was not only the cheapest but the best material, and in fact would have been the material always employed but for the extreme difficulty of obtaining large masses of reliable quality.

Huish Episcopi.—A three-light window has just been erected in the Parish Church of Huish Episcopi, Somerset, by Mr. Nicholl, in memory of her husband, the late Major-General Nicholl, C.B., of the Royal Artillery. The subject illustrated is "The Angel at the Tomb," and the artists are Messrs. Mayer & Co.

Church Gasfittings.—Messrs. Jones & Willis, of Birmingham and London, have just completed, under the superintendence of the architect, the whole of the gasfittings at Holbeck Church, Leeds.—The same firm has also supplied the gasfittings and chimneys for St. Anne-in-the-Grove Church, Halifax.

TENDERS.

For the erection of two swimming-baths in Gosdun-street, Whitechapel, for the Commissioners for Public Baths and Washhouses, Whitechapel. Mr. John Hudson, architect, 63, Leman-street. Quantities by Mr. C. Stanger:—

J. Bidout, Charrington-street	26,187 17 0
A. Saunders & Co., East Dulwich	5,981 0 0
Paine Bros., Stamford Hill	5,977 0 0
W. J. Botterell, 110, Cannon-street	5,963 0 0
A. & E. Braid, Chelsea	5,812 18 0
McConnell, Sutton, Surrey	5,365 0 0
F. & E. J. Wood, Cleveland-street	5,167 0 0
A. Reed, Bedford-street, Stratford	4,937 0 0
W. J. Hack, North-street, Poplar	4,906 0 0
T. Norton & Son, Frederick-street, Stratford	4,877 0 0
J. R. Hunt, Bow Common	4,866 0 0
Lathey Bros., Battersea Park	4,910 0 0
O. T. Gibbons, New Broad-street	4,884 0 0
J. Greenwood, St. John-street, Mansfield, Notts	4,803 0 0
A. Eaton, High-street, Whitechapel	4,844 0 0
D. D. & A. Brown, Camberwell	4,841 0 0
Soullier Bros., Bethnal-green	4,824 0 0
W. Marriage, Fencars-lane	4,810 0 0
J. Mowlem & Co., Westminster	4,780 0 0
T. Little, St. Leonard, Whitechapel	4,770 0 0
Priceley & Gurney, Great Church-street, Hammersmith	4,770 0 0
W. Gregar, Stratford	4,669 0 0
G. Stephenson, Hampstead	4,568 0 0
John Bentley, Waltham Abbey	4,565 0 0
England & Thompson, Leytonstone	4,548 0 0
S. J. Scott, Bloomfield-street	4,533 0 0
W. Scrivener & Co., Finsbury	4,520 0 0
Howell & Son, Lambeth Palace-road	4,427 0 0
J. Brickell, Manor Park, Essex	4,300 0 0
Mark Gentry, West Ham-lane, Stratford	4,289 0 0
G. B. Collyer, Fleet-street	4,135 0 0
G. Roberts, South Norwood	4,093 0 0

* Accepted subject to the approval of the High Court of Justice and the Local Government Board.

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Table with 5 columns: Nature of Work, By whom required, Premium, Designs to be delivered, Page. Includes entry for 'Largest Chapel, &c.' with a premium of 211 and 104 1/2.

CONTRACTS.

Table with 5 columns: Nature of Work, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page. Includes entries for 'Liberals Club, Whitehall-place', 'Sewers', 'Waterworks', and 'Public Works'.

Table listing names and amounts, likely a list of contributors or contractors for a specific project, including 'J. W. Wyles', 'North Bros.', and 'O. T. Gibson'.

Accepted for the formation of a lake in Southwark Park, Bermondsey, for the Metropolitan Board of Works.

Accepted for the construction of sewers, &c., in the Pleck and Birchville Districts, for the Walsall Town Council.

For new shop-front in High-street, Wolverhampton, for Mr. J. Steen. Mr. J. R. Veall, architect.

Accepted for new Church Mission-room, Codsall Wood. Mr. J. K. Veall, architect. Wolverhampton.

For forming roads and paths, and draining additional land at the Woolwich Cemetery, for the Burial Board.

Table listing names and amounts for various construction projects, including 'Knight, Northfleet' and 'Carter, Asnerley'.

For new road and drainage, North Town, High Wycombe. Mr. Arthur Vernon, architect.

Accepted for restoring and enlarging St. Mary's Church, Alfrick, Worcester. Mr. Aston Webb, architect.

For additional class-room, and extending the infants' cloak-room, at the Maryland Point School, Leytonstone-road, Stratford, for the West Ham School Board.

Table listing names and amounts for various construction projects, including 'G. J. Hoskins' and 'Hearle & Son'.

For the erection of vicarage house, for St. George's, Perry Hill, Catford. Mr. Gordon M. Hills, architect.

Table listing names and amounts for various construction projects, including 'Totens & Sons, Kensington' and 'Sikhs, Catford'.

Accepted for the construction of roads and sewers on the Park-road Estate, Crouch End. Mr. Wm. Hodson, jun., surveyor.

For the erection of an addition to the brewery, Aston, Birmingham, for Messrs. J. Ansell & Son.

Table listing names and amounts for various construction projects, including 'Surman & Son' and 'Bloore'.

For alterations to the Star Brewery, Walton-on-Thames, for Messrs. Jason, Garvey, & Co.

Accepted for repairing eleven houses at Blythe Hill, Catford Bridge. Mr. Willis, architect.

For rebuilding No. 21, Godgee-street, on the Foyster Estate. Mr. Josiah Houli, architect.

For alterations at the Prince of Wales public-house, North-street, Pentonville, for the City of London Brewery Company.

PUBLIC APPOINTMENTS.

Table with 5 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page. Includes entries for 'Inspector of Nuisances' and 'For building warehouses at Blossom-street'.

Table with 5 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page. Includes entries for 'For the erection of a factory in the High-street, Catford' and 'For pulling down and re-building Nos. 3 and 4, St. Mary-at-Hill'.

Accepted for various works in the District of the Hornsey Local Board. Mr. T. de Courcy Meads, engineer and surveyor.

Contract No. 1. Surman & Son, £1,770 0 0; Bloore, 932 0 0; Jeffery & Son (accepted), 850 0 0; Smith, 842 0 0.

For alterations to the Star Brewery, Walton-on-Thames, for Messrs. Jason, Garvey, & Co. Mr. T. Willis, architect.

Accepted for repairing eleven houses at Blythe Hill, Catford Bridge. Mr. Willis, architect.

For rebuilding No. 21, Godgee-street, on the Foyster Estate. Mr. Josiah Houli, architect.

For alterations at the Prince of Wales public-house, North-street, Pentonville, for the City of London Brewery Company.

For sewerage, levelling paving, flagging, metalling, and channelling the following private streets, namely, Daniel-street, Maria-street, Coke-street, Peppas-street, and Fern-road, for the Council of the borough of Harwich.
Mr. Henry Ditcham, Borough Surveyor. Quantities supplied.—

Carter, Anselmy	£2,519	1	9
Wood, Chelmsford	1,577	0	0
Capon, Manningtree	1,633	1	11
Saunders, Dedham	1,450	0	0
Adams, Moorgate street	1,410	3	7
Gunn, Harwich	1,407	4	6
Upson, Dovercourt	1,372	8	0
Trew, Ipswich	1,339	0	0
Moran, Harwich	1,311	19	0
Ridley, Dovercourt (accepted) ..	1,201	0	0
Trueman, Hackney	1,174	0	0
Street, Colchester	1,011	3	1
[Surveyor's Estimate	£1,387	0	0]

For the erection of model lodging-house, Westminster.
Mr. Eryn T. Graud, architect, 13, North-street, Westminster. Quantities by the architect.—

John Newton	£1,378	0	0
Geo. Howard	1,348	10	0
Benjamin Wells	1,303	0	0
Geo. Stephenson	1,244	0	0
Geo. F. Wright	1,217	5	3
A. Doughty	1,166	0	0
Geo. Ufe	1,159	0	0
John Garrud	1,137	0	0
Bray & P. ne	1,130	0	0
Burrell & Norton	1,119	0	0
W. & F. Croker	1,110	0	0
Balsam Bros.	1,100	0	0
Ward & Lumble	1,187	0	0
Lucks & Hooker	1,169	0	0
Walker Holt	1,050	0	0
E. C. Howell & Son	1,051	0	0
Austin & Emery	1,151	0	0
T. Higge	1,033	0	0
G. O. Collyer	997	0	0
Geo. Roberts (accepted) ..	918	0	0

Accepted for the removal of earth and formation of streets, with the requisite drainage, on the Albion Estate, Stalybridge, for the Executors of the late Mr. Robert Platt, Mr. Gregory Gill, architect and surveyor, Stalybridge. Quantities by the architect.—

W. H. Worthington, Manchester ..	£800	0	0
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For new day and Sunday schools at Newton Moor, Hyde. Mr. Gregory Gill, architect. Quantities by the architect.—

Aaron Haughton, G. dley	£1,300	0	0
John Bredbury, Newton Moor	1,181	15	0
Edwin Simpson, Hyde	1,138	0	0
S. & J. Bennison, Dukinfield	1,199	0	0
Isaac Cropper, Dukinfield	1,075	0	0
Thos Warrington, Newton Moor ..	1,035	0	0
Samuel Robinson, Hyde (accepted) ..	1,029	0	0
Shaw & Casner, Stalybridge	1,025	0	0
Carside, Barns & Co., Stalybridge ..	1,025	0	0
Castle Hill Sanmilla Company, Stalybridge	1,000	0	0

Accepted for extensions to St. John's schools, Dukinfield, Cheshire. Mr. Gregory Gill, architect. Quantities supplied by the architect.—

James Crooks, Dukinfield	£378	0	0
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For shops and alterations to property, for Mr. J. Stales, South Shields. Mr. Henry Grives, architect.—

James Wills, South Shields	£350	0	0
Robert Allison, Sunderland	319	7	6
Edward Anderson, South Shields ..	315	15	4
Haugerston & Grashy, South Shields ..	280	10	0
Wm. Wilson, South Shields	283	16	11
Gillies Bros., South Shields	279	0	8
W. R. Gauldie, Jarrow	278	8	5
Jas. Nichol & Sons, South Shields ..	277	11	0
Jno. Yeates, Jarrow (accepted)	250	0	0

For pulling down and rebuilding No. 15, Queen-street, Messrs. Spalding & Auld, architects. Quantities by Mr. G. Fleetwood.—

Higge & Hill	£8,556	0	0
C. Ansell	6,496	0	0
J. Woodward	6,317	0	0
L. H. & R. Roberts	6,363	0	0
J. Murrell	6,334	0	0
Colls & Sons	6,291	0	0
Patman & Fotheringham	6,271	0	0
O. Iwatt & Son	6,199	0	0
Hill, Beddall, & Co.	6,184	0	0
Ashby Bros.	6,124	0	0
Martin, Wells, & Co.	5,509	0	0

For the erection of two cottages at Old Church-road, on Stepney Manor, for Mr. Freeman. Mr. H. F. Simmonds, architect. Cambridge Heath.—

Chillingworth	£310	0	0
Probert	230	0	0
Hardy	210	0	0

Works at Licensed Victuallers' Schools, Kennington.—
Mr. Benjamin Cook, of Stroucture-street, writes to say that in the list of tenders for new lavatories, &c. at the Licensed Victuallers' School, published in our last (p. 491), his tender was erroneously scribbled to "B. Cooper." The mistake was not ours. We printed the list as it was sent to us.

Schools, Shirley.—In reference to the list of tenders (published in our last, p. 402) for new schools in Spring Park-road, Shirley, near Croydon, we find that the name of the builder whose tender was accepted is Charles Bray (not Brass), of Wickham-road, Shirley.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., not later than four p.m. on THURSDAYS.

TO CORRESPONDENTS.

P. J. M.—F. W. K.—I. W.—J. H.—F. W. R.—E. J. T. (continued).—C. M.—L. de V. (shall have attention another week).—W. H. T.—F. E. M.—W. R. W.—W. W.—W. W.—(shall have attention another week).—A. K. (tar paving).—J. H. G. (cannot continue the correspondence).—A. K. (the subject).—(labour) (cannot answer).—Advertisements correspondents cannot illustrate their inside in our columns. We say and the progress for which the proposed alterations. Any such illustration is by no means so desirable or worthless as you seem to imagine. No same kind of alteration for a similar purpose.
All statements of facts lists of tenders, &c., must be accompanied by the names and address of the tenderer, not necessarily for publication.
We are compelled to decline pointing out books and giving addresses.
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.

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 notices should be addressed to THE PUBLISHER, and not to the Editor.

PUBLISHER'S NOTICES.

GOOD FRIDAY.—THE BUILDER for the week ending APRIL 4th will be based on THURSDAY, the 3rd. Advertisements for insertion in that issue must therefore reach the Office before THREE p.m. on WEDNESDAY. Letters of business and notices of advertisements, or ORDERS TO DISCONTINUE the same, must be at the Office by TEN o'clock on THURSDAY Morning.

CHARGES FOR ADVERTISEMENTS. SITUATIONS VACANT, PARTNERSHIPS, APPOINTMENTS, TRADE, AND GENERAL ADVERTISEMENTS. Each additional line (about ten words)..... 6s. 6d. Six lines (about fifty words) or under..... 6s. 6d. Terms for series of Trade Advertisements, also for Special Advertisements on front page, COMPANION CONTRACTS, BILLS BY Auction, &c. may be obtained on application to the Publisher.

FOUR Lines (about THIRTY words) or under..... 3s. 6d. Each additional line (about ten words)..... 6s. 6d. PREPAYMENT IS ABSOLUTELY NECESSARY. * * * * * STAMPS ONLY NOT BE SENT, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Government, W.C. DOUGLAS FOURDRINEER, Publisher. Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week must reach the Office before THREE o'clock p.m. on THURSDAY. The Publisher cannot be responsible for DRAWINGS, TESTS, MONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS IN STAMPING ADVERTISEMENTS OR ORDERS TO DISCONTINUE must reach the Office before TEN o'clock on WEDNESDAY morning.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, W.C. free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION. "THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 10s. per annum. PREPAID. To countries within the Postal Union, 25s. per annum. Remittances payable to DOUGLAS FOURDRINEER, Publisher, No. 46, Catherine-street, W.C.

Best Bath Stone.
WESTWOOD GROUND,
Box Ground, Combe Down.
Coraham Down, And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limited
Coraham, Wilts. [A]
Bath Stone.

ALL DESCRIPTIONS OF BEST QUALITY.

PICTOR & SONS,
BOX, WILTS. [A]
Doulting Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready fixing. An inspection of the Doulting Quays is respectfully solicited; and Architects & others are CAUTIONED against inferior stones. Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Somerset.—Agent, Mr. E. WILLIA No. 16, Craven-street, Strand, W.C. [A]

Doulting Free Stone For prices, &c., HAM HILL STONE, dress S. & J. STAIN BLUE LIAS LIME and Lime Merchants Stoke - nder - H Elmstert. [A]
(Ground or Lump),

Asphalte.—The Seyssel and Metallic Asphaltic Company (Mr. H. Glenn), Offices, Poultry, E.C.—The best and cheapest material for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and rooms, granaries, tun-rooms, and terraces. [A]

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphalts.
M. STODART & CO. Offices:
No. 90, Cannon-street, E.C. [A]

EVERY DESCRIPTION OF SEASONED WOODS AND VENEERS IN EXTENSIVE QUANTITIES.
B. J. HUDSON & SONS, Whitfield-street, W. Store-street, W.C., and Great Peter-street, S.W., London. Telephone No. 3,654, and Private Wire connecting Business Premises.

HOUSE ASHES & EARTH CLOSET. Awarded GOLD MEDAL I.H.E. 1884. See Stand F246, Building Trades' Exhibition. Sole Manufacturers, MORRELL'S SANITARY APPLIANCE Co., 4, St. Ann's-square, Manchester. [Adv]

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ILLUSTRATIONS.

St. Bartholomew the Great, Smithfield: North Aisle and Arcade, over which is a School; Interior, showing Iron Columns for supporting Factory Building over the Apse	443, 447
Sketches in Malta.—By Mr. E. Ingress Bell	452, 453
Design for a Sea-Side Pavilion: Plan and Elevation. Tito Frize, R.I.B.A.—By Mr. J. A. Campbell	456, 457
Labourers' Dwellings, Cartwright-street: Plans and Elevation.—Messrs. Davis & Emmanuel, Architects.....	467-461

CONTENTS.

Persian and Arab Art at the Burlington Fine Arts Club.....	437	Sketches in Malta.....	453	Provincial News.....	465
An Architect's Notes in Malta. By B. Ingress Bell.....	438	"Design for a Pavilion for a Fashionable 'Watering-place'"	463	School Building News.....	455
Notes.....	440	Architectural Association.....	463	Stained Glass.....	466
The Chelsea Vestry Hall Competition.....	441	Builders' Clerks' Benevolent Institution: Annual Dinner.....	464	The Student's Column: Descriptive Geometry.—VIII.....	465
Roof Coverings.....	442	Public Architectural Competitions.....	464	Varietorium.....	467
The Selection and Preservation of Building Stones.....	444	Rests of Houses.....	464	Recent Exhibitions.....	457
Competitions.....	445	Hayward's Self Locking Coal Plate (Illustrated).....	465	Recent Sales of Property.....	458
St. Bartholomew the Great, West Smithfield.....	446	Street Architecture in London.....	465	Meetings.....	468
Workmen's Dwellings, Cartwright-street.....	446	Non-Acceptance of Lowest Tender.....	465	Miscellaneous.....	468

Persian and Arab Art at the Burlington Fine Arts Club.



THE Burlington Fine Arts Club (Savile-row) opened their exhibition of Persian and Arab art (to which we briefly referred in a "Note" last week) on Thursday, the 19th inst.

It consists of upwards of 600 well-selected specimens of pottery, metal work, and textiles related to one another in certain styles of design and methods of work which are generally held to be common to Persia, Syria, Asia Minor, Arabia, and Egypt, of the fourteenth to the seventeenth centuries. These objects have been gathered from numerous private collections, and the discrimination which has guided the selection of them is suggestive to promoters of museums of art in exemplifying how much can be well done in comparatively small space. The very vastness of large collections often puzzles and misleads those resorting to them for purposes of study. Jostling one another, types of good and bad design, colour, and workmanship too frequently confuse the purpose of such collections; and the hideous and quaint find a justification in that importance which their presence is assumed to supply in support of conjectures on a putative nationality in style of art.

As its title implies, art claims the first attention of the Burlington Fine Arts Club, and it is comparatively an easy matter to define the limits of some exposition of art, whether from the point of view of subject in design, manufacture of object, or special use to which the class of object is put. But the Club has succumbed to an influence in vogue of attempting the elucidation of an ethnographical problem by means of artistic materials; and such questions as whether the geometric ornament of the Arabs, Persians, Syrians, or Sarcens was devised in the desert from Chaldean mathematical figures, or was the result of a Mosaic prohibition to imitate any subject of creation, are preferred to inquiries into the ornamental value of simple, elaborated, and indefinite expressions of involved angular forms. Then, again, the solution of ethnical uncertainties operates adversely to the study of methods of decorative manufactures, such, for instance, as lusted ware, which is not, from the standard of artistic effort, any more the special property of Persia in the sixteenth century than of the Gubbio potters of the same period; and, although the earliest traces of lusted ware are thought to have been found in

thirteenth-century ruins at Kerman and Natinz, who in truth knows whether kindred metallic lustre did not exist years earlier and at other far distant places? So mixed has become the conception of the purview of art that archeology, ethnology, and chronology are confused within it; nevertheless the present exhibition was obviously not undertaken to glorify Persia and adjoining countries as the only producers of certain beautiful objects. The beauty of the works is its central cause; and, in this respect, the position which "Persian and Arab" art may hold in a review of art generally is a foremost consideration.

As here displayed, the subject matter of Oriental designs is almost entirely without a secondary or well-marked interest, as of myths, religions, and history. Geometrically-ordered distributions of geometric forms, orderly arrangements of elegant calligraphical characters, of floral forms and of ornamental devices, conventional in character, predominate. For pottery, colours are used in harmonies of two or three tones, of which the chief are greens (copied from natural subjects), blues (imitated largely from Nankin porcelain), reddish purples (an empirical ensign of Damascus ware), and clay reds (in thick impasto, the mark of Rhodian pottery). In textiles the colouring is more varied, and where the use of the material associates itself with the princely hunter in his tent, animals such as tigers, cheetahs, and antelopes, appear, intermingled with palmettes, Zoroastrian cypresses, and graceful flowing forms; in velvets and other hangings we have flowers and diaperings of bold tulip shapes. On engraved metal works warriors on horseback (as clumsy as those in stamped and painted tiles) are wrought in occasional pointed panels, which serve as the *points d'appui* for intricacies of arabesques. For the rendering of such themes, certain of the modes of expression were brought to a high standard of perfection by the craftsmen; as, for instance, in even and transparent glazes upon earthenware; in fine vitreous ware, a near approach, perhaps, in the absence of necessary kaolin, to porcelain, in specimens of damascened metal (although Scandinavians and Hindus have done as well), and in the costly examples of carpets and golden weavings, in making which, few, if any other people, achieved such triumphs of close velvety piles and wondrous brocades.

But with all this, there is no sign of such acutely-developed perception, vivacity, facility of representation, and daintiness in craft, as exists in Greek, Japanese, and much Italian work. On the other hand, this "Persian and Arab" art no doubt bears the palm, if balanced with that art of India which has recorded Buddhist and Brahmanical rites and events.

After all, however, national rivalries had little to do with the production of "Persian and Arab" works. The wants of the mass stimulated the ingenious worker to make efforts to supply them; and the kingly heads of tribes and groups of people, the Timurs, the Khalifs and Shahs possessed a natural ambition to have things more rare, curious, and valuable than those used by their inferiors. Communities came to be more or less organised into art factories, and succeeded one another. The architectural monuments of earlier dynasties furnished the industrious craftsmen with attractive suggestions for novel purposes. Bodies of art craftsmen moved from place to place to execute imperial commissions. Inter-course, warlike and commercial, was, as it is now, a potent factor in creating imitations and adaptations. And a wave of Oriental art passed on to Europe to be stemmed and guided into devious courses by the differently-circumstanced artificers of the West.

This and much else may be gathered from the present exhibition, judiciously arranged to present an aspect rich in glow and contrast of colour and materials. A very few inferior specimens have unfortunately found their way into the collection. Above and between cabinets or glass cases, the greater number of which contain varieties of pottery, hang carpets, textiles, embroideries, and other fine fabrics. In Cabinets IV. and V. are specimens of metalwork; for the most part, engraved and pierced brass bowls, kettles, ewers, and candlesticks. But the more important of the metal works are near a fine trophy of objects in a recess at one end of the room. In the centre is No. 594, lent by Mr. William Morris, a large carpet of stately design, the elements in which consist of large pointed, curved-shaped panels, interlocking forms, similar in plan, though more fancifully treated in outline; amongst these recurrent figures are groups of floral ornament, some of which are careful representations of leaves, blossoms, and buds. The same character of design, with straight-lined diamond forms as the basis, is to be found in carpet No. 593, lent by Sir Hickman Bacon. The carefully-drawn floral forms,—as distinct from formal ornament,—are noticeable, too, in an exquisite velvet carpet, No. 355, lent by Mr. Salting, who also contributes No. 591, a marvellous carpet, refined in gorgeousness of effect, with light grounds of golden and silver threads picked out with velvet devices in rich blues and delicate greens, bordered with fair blue and yellow arabesques. This specimen is supposed to have been made by Persian workmen in Poland; but the evidence in favour of the supposition does not present itself on the face of the carpet, though there has been consider-

able effort to establish the reputation of a doubtful Polish factory.

Returning, however, to the metal works, two gaunt peacocks of brass (Nos. 262 and 312, lent by Mr. A. Ionides), studded with turquoise, lavishly engraved with ornamental letters and seated figures holding birds, occupy commanding positions upon the two cabinets containing respectively glass works, amongst which is a fine mosque lamp (No. 256, lent by Mr. J. Dixon, not up to the standard of those belonging to the Khedive, at South Kensington Museum), and tawdry Anatolian ware, and Gombroom glassy ware, or "porcelain translucent." These cabinets are numbered six and seven, and flank the recess in which Mr. Morris's carpet hangs. In front of this, low down, is an engraved white metal bowl, good in form (No. 265, lent by Mr. Morris); while to the foreground stand one of a pair of lofty candlesticks,—some 8 ft. high,—of pierced and engraved brass, partly overlaid with white metal (No. 268, lent by Sir H. B. Bacon), covered with Arabic inscriptions and interlacing ornament, but made for use in connexion with Christian rites, since, as the catalogue entry explains, the texts are taken from the "New Testament and from the Liturgy." This is interesting, and so is the moulded Agnus Dei with cross (the device of Knights Templars) upon a salt-cellar (No. 273, lent by Mr. Charles Elton, M.P.); and a rude rendering, on the Coptic lump-balances (Nos. 305 and 306), of the cross-winged heads or cherubimic devices, a favourite detail in English thirteenth century, as well as in twelfth-century Italian ecclesiastical embroidery and sculpture.

The oldest work of art in the collection is (No. 164) a marble fragment of a profile sculptured in bas-relief, attributed to the sixth century B.C., and recalling, in regularity of curled beard and hair, Assyrian treatment. It was discovered at Persepolis, in the year 1800, by Richard Strachey, father of the lender, Mr. R. Strachey, and demonstrates a higher type of drawing and modelling the human face than is discoverable in all the rest of the collection.

The Persians and Arabs are not remarkable in depicting the human form, though they have a distinct power in conveying energy in action to the curiously-represented members of the feline tribe and others, possible lions, probable cheetahs, and undoubted deer and antelopes. This may be remarked in the animals depicted upon No. 93,—a carpet lent by Sir Frederick Leighton. The influence of Chinese designs upon Persian pottery is conspicuous in Cabinet No. 3. Some specimens are marked with imitations of Chinese marks, but to the forms in blue and white the Persians gave, as a rule, outlines of black, which supply a special tone to the appearance of this class of ware. More curious, perhaps, are the Chinese dragons (No. 96) and the Fong Hoang or feathered chimera (No. 151), which appear in relief upon star-shaped tiles of dark blue and lustre. Near these latter is No. 144, lent by Mr. Holman Hunt. It occupies a central place over the chimney-piece, and is an oblong tile with Arabic inscription in relief, which contains the name of the "Expected Imam" of the Shah, also known as the Mahdi. The moulded or stamped ware with inscriptions upon grounds of scrolls and arabesques has kinship with very early specimens of this class of pottery, which has been long known in India, and the technical points of its make are allied with those of the ancient Egyptian bowl (No. 1) and vessel for offering libations to Osiris (No. 2), lent by Mr. Drury Fortnum. No dates are assigned to the examples of lustred ware in Case No. 11, though those of architectural importance, Nos. 507 and 508, lent by Sir H. B. Bacon are probably of the thirteenth or fourteenth century.

The great mass of wares, classified by similarity in design, and conveniently grouped under titles like Damascus and Rhodian, take shape in lamps, great rice-bowls, basins, plates, jugs, and long-necked bottles, and here the intermingling of the palmette, the Tartar cloud (a sort of waving riband ornament), the fine scrolls and concentric spiral lines, with flowers and figures, notwithstanding variations as to

colour, almost merges into one class of design the whole of the articles of use in decorating which these details are employed. Mr. Drury Fortnum's Damascus lamp (No. 527), with its inscriptions from the Koran and the record of Mustafa, the "poor" and "humble" painter, dated, A.H. 956, in the mouth of Jemazi-el-oola (*i.e.* June, 1549), and Mr. L. Huth's bowls (Nos. 529, 533, and 538) are splendid specimens in the central cabinet of Damascus and Persian ware; whilst in cabinet No. 10, of Rhodian ware, the pieces obtained by Sir F. Leighton direct from Rhodes and in Lindos have a paramount importance in furnishing data for a classification of similar works.

In so hasty a survey mention is necessarily omitted of many objects of great interest, and limits of space make it impossible to touch upon such involved matters as must arise in distinguishing between Broussa and Venetian velvets, or in assigning Sicily, at its Norman period, as the birthplace of the "Persian" ivory casket (No. 176) lent by Mr. H. Wallis. The collection is very remarkable in having brought to light a number of treasures never before publicly displayed together, and the Burlington Fine Arts Club has cause to congratulate itself upon the generous co-operation it has received from over forty contributors, amongst whom are such distinguished connoisseurs and amateurs as Mr. A. W. Franks, F.R.S., Mr. F. Du Cane Godman, P.R.S., Mr. C. J. Ross, Mr. Frank Dillon, and others.

It remains to say that the descriptions of the objects have been most carefully given in the catalogue, whilst Mr. Stanley Lane-Poole has translated the Arabic inscriptions. Mr. Henry Wallis has written a few pages of "Introductory Remarks." These latter, however, are scarcely worthy of the exhibition.

AN ARCHITECT'S NOTES IN MALTA.

BY E. INGRESS BELL.



FTER eight happy days passed in sailing over summer seas and under cloudless skies, the Island of Malta, heralded by Gozo and Comino, the outliers of the group,—breaks upon our view, bare, brown, and steaming hot. With our glasses we can see St. Paul's Bay, the white statue of the Apostle of the Gentiles marking the scene of his shipwreck. Next we descry the dome of the famous church at Monsta, read of by all in Fergussan, as to which more anon. We cannot help noting in passing how very ill its contour suits its position, and long for the vertical lines of tower or campanile to oppose the undulations of the surrounding hills. The picturesque outline of Notabile, the "Citta Vecchia," stands out clear and dark against the glowing western sky. Sliema, the Brighton of Malta, is quickly passed, and, with skillful piloting, the good ship is gliding serenely round the dangerous Dragut point, the rusty skeleton of a wrecked steamer lying forlorn upon the rocks, and under the very guns of Fort St. Elmo, about which the history of modern Malta turns. As we pass Fort Manoel we call to mind the time when Sir Walter Scott, in that last vain search for the health which was never again to be his, was kept in quarantine within its ramparts. We can see at the head of the long flight of steps the very gate at which he sat and received from behind a barrier the friends who flocked to visit him, whose hands he was so hardly restrained from grasping, forgetting that a partnership in his "guarance vail" would have been the certain penalty of such an indiscretion. The motion of the screw, to which we have grown accustomed, suddenly stops; perfect rest comes upon us with something of a shock, and our seaward journey terminates under the mighty flank of St. Michael's towering Bastion.

After the entertainment provided for us by the world-renowned Maltese divers, we drive apace up a narrow and tortuous white road, threading in and out between lines of white ramparts,—past priest, peasant, and beggar, all covered with a white powdery dust,—past trees of oleander and hibiscus, also white, across the drawbridge which trembles over the dark abyss of the

main ditch which separates Valetta from Floriana, the bottom of which no eye can see, and whence the poor Turkish prisoners quarried the stone of which Valetta is built,—through the somewhat modernised Porta Reale, guarded by colossal statues of the Grand Masters L'Isle Adam and La Valette; and the Strada Reale, the Royal Street, bursts upon our enraptured view; a mile long, straight as a line, and closed at its lower or eastern end by a white lighthouse, bright in its setting of sapphire sea. No art could have devised so effective a preparation for the scene as that imposed by the exigencies of the lines of defence through which it is approached, and few cities can show so glorious a perspective as that of the Strada Reale of Valetta.

There are traces in Malta of a Phœnician occupation,—witnessed by memorials of high antiquarian interest, of a Roman occupation,—witnessed by the lately excavated "villa," interesting alike to the antiquary and the artist; and there are here and there fragments of beautiful Sicilian architecture. But the real interest of Malta is bound up with the illustrious Order of St. John of Jerusalem,—those dauntless priest-warriors, who, upon their departure from Rhodes in the year 1523, found a refuge in the Island of Malta, and consecrated it by their heroism.

The incidents of the long defence of Fort St. Elmo,—of its fall, of the victorious resistance of Fort St. Angelo, and of the final abandonment of the siege by the exhausted and dispirited Turks,—may be read in the stately narrative of the Abbe Vertot, or in the more brilliant pages of General Whitworth Porter, who, as a soldier, writes with a fuller knowledge of the subject than the churchman could command. For us the immediate interest begins with the resolve of the Grand Master La Valette to build a city on Mount Sciebarra,—that barren promontory which, dividing the two great harbours, commanded the defences of both.

"Of all the several places which had been fortified before the siege, there was none of them better situated than Fort St. Elmo. It was, in a manner, the very key to both ports. The Grand Master, without neglecting to take care of the other forts, formed a design of enlarging this and of adding new works to it, and resolved likewise to build a town upon the same neck of land, to strengthen it with all the fortifications that art could possibly invent, and to make it the residence of the knights."—Vertot, ii. 41.

In furtherance of this design he sent for engineers and workmen from several parts of Italy,—and when the lines were marked out he, on the 25th of March, 1566, went in his robes of state, attended by all his knights, and with great ceremony laid the first stone of the city, which was henceforth to be called after his name.

"To perpetuate to the most distant posterity the memory of so remarkable an event, they threw on the foundation a great quantity of gold and silver medals, on which the city was represented, with this inscription,—

"MELITA RENASCENS."

We know, therefore, the circumstances of the foundation of the modern city, and we can guess the style of architecture which would result from the Grand Master's invitation to the Italian architects of the middle of the sixteenth century.

The "Order" was divided into eight "languages," viz, Provence, Auvergne, France, Italy, Arragon, England, Germany, and Castille, and each language had its separate "Auberge" or head-quarters. These inns were intended not only as the residences of the knights, novices, and serving-brothers of each section of the order respectively; but for the several reception of French, English, Italian, Spanish, and other pilgrims and strangers who might in their wanderings demand hospitality. Accordingly the architects framed their designs of ample dimensions, and in doing so set the key for all future Maltese building. The whole island was a quarry of soft stone, easily won and worked. It is not what we call a "weather stone," but it resists sufficiently well the climate of Malta. There the thermometer never falls below 45° Fahr.;

and fortunately so, for it is probable that an English winter following the rainy season would lay Valetta in ruins. Many of the inns built by the knights have been destroyed or converted to uses which have altered their distinctive character. That devoted to the English "language" appears to have been alienated to other uses soon after the "Reformation." But many of them still exist in all their pristine magnificence, to attest the lordly ideas of their builders. The Auberge de Castille is a palace appropriated as an officers' mess. The Auberge d'Italie is the headquarters of the Royal Engineers, and others are used as barracks. The Auberge de Provence is a club, and in it Sir Walter Scott was sumptuously entertained. Its banquetting-room, 90 ft. long, 50 ft. wide, and 45 ft. high, is a fair sample of the refectory or common room of these old inns. In plan they were arranged round a central court, the apartments on each side being approached by galleries or cloisters on the four sides. In these courtyards orange and oleander trees grow, brightening the interiors by their blossoms, and filling the air with fragrance. The halls, staircases, approaches, and domestic accessories are on a magnificent scale, and produce a marked effect upon all beholders; but the detail is coarse and the ornament meretricious and bizarre. Here, as elsewhere, the art of the smith appears to have been the last to yield, and to this day there is much grace and delicacy of design in the wrought-iron railings and balconies which adorn even the poorest houses.

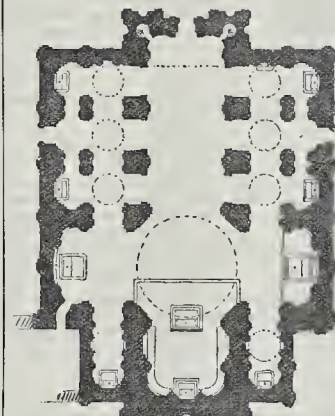
Valetta and its sister cities are built upon rocky promontories which slope from central ridges to the harbours. For the most part the streets are laid out, as in American towns, in straight lines, crossing each other at right angles. The longitudinal streets of Valetta decline towards the Mediterranean at gradients which do not preclude carriage traffic. But the transverse streets fall towards the harbours at gradients which have necessitated cutting their rocky surfaces into those "stairs" at which,—*teste* Byron,—each traveller "swears." No carriage can, therefore, pass along them, what is to say, comfortably, for your Maltese carrozzi driver would drive you down the side of a house; and the races at Notabile actually take place along a road which in steepness is little short of a precipice. The houses are consequently built with their floors and roofs stepped one above another, and each one is independently designed for the slice of frontage allotted to it. This not only diversifies the skyline, but leads to a variation in the architecture of the streets which the dwellers in level towns lose in a depressing uniformity of façade, and long horizontal lines of cornice. One misses at first the chimneys, which would further break up the skyline, and which in Italian towns are generally picturesquely designed. But the Maltese as a rule light no fires, although they feel the winter cold severely. They cook by the aid of a little lighted charcoal, the fumes of which escape through a tiny channel in the outer wall. You may count upon your fingers the houses which have a "range," and thus it happens that the chimney is absent. There are but very few inclined roofs in the island. One, of low pitch, at St. John's Cathedral; one to the palace; and a roof of high pitch to the new English church at Sliema. The rest are all flat, and give to the towns a Eastern look. They are constructed of timber beams laid 2 ft. or 3 ft. apart, upon which rough stones are placed, and above them a sort of concrete called "turba," which is in turn covered by a kind of cement called "diffone," trodden down by the naked feet of women. In the vast halls of the auberges the beams are mostly of chestnut, of considerable scantling, brought from Spain or Sicily. Their sides and soffits are painted in bright colours, and small cross-beams divide the interspaces into panels of various sizes and figures. These are also gaily decorated, but scarcely moulded or carved at all. The floors are similarly constructed, the upper surfaces being of rubbed stone and painted. The interiors of the rooms are not plastered, but the ashlar shows everywhere, and the architraves to doors, windows, &c., are in stone or

marble. Timber is used sparingly, as the island produces none. The rock would probably grow beech, birch, and pine. The Wellingtonia planted in the courtyard of the palace by the Duke of Edinburgh some twenty years ago is now a magnificent tree. But it is said that the Maltese have a superstition about trees, believing them to be inhabited by evil spirits, and that they cut down those which were planted by Sir Gaspard le Marchant when governor, and so robbed the island of much-needed green and more needed shade.

The Spanish "mirador," or corbelled and enclosed balcony, is a constant feature in Maltese domestic architecture. It enables the occupants of the rooms to which it is attached to enfilade the street in both directions, and it gives the gossips a coign of vantage of which they avail themselves to the full. These projecting windows have seldom any ornamentation other than a little carving on the corbels; but they are sometimes brightly coloured, and always cast deep and piquant shadows down the house front. With a strip of coloured carpet hanging therefrom, they assist in the general gaiety of the streets, and on "Festa" days play an important part in their decoration.

There is a curious similarity between the architecture of Malta and that of some of the Belgian towns, which is explained by the presence of the Spaniard. Spanish architects in great numbers were in all probability employed upon the city of Valetta. Those peculiarly licentious forms of Renaissance art which are distinctive of Spain,—those defiant discursive curly-wurly doorways and dressings, designed in what the late William Burges irreverently called the "God-dam" style, and which are plentiful in Antwerp,—have their exact counterparts in Valetta.

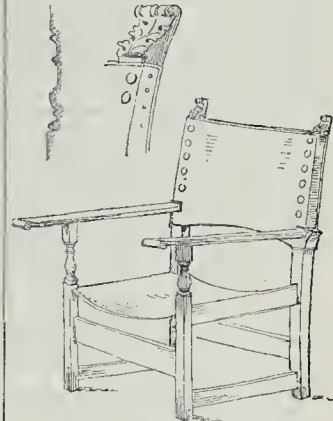
The ecclesiastical architecture of the island conforms in plan pretty closely to the type here sketched, and is impressive from its size and the liberal use of thick walls and broad surfaces. The exteriors are



Plan of Florian Church.

often disfigured by a redundancy of coarse detail and ill-executed ornament, whilst the antics which the saintly personages play who occupy the various niches are grotesque almost beyond belief. But the interiors are often grand, and well adapted for the religious use for which they are designed. The light is admitted through hidden lanterns in the crown of the domed aisles; by a clearstory; or by a ring of sparse lights in the drum of the central dome. This method of introducing the light from a concealed source suggests the favourite trick of Rembrandt, who hides his candle behind a curtain, and only allows its diffusive rays to be seen. Not only does this furnish a very artistic result, so far as a scheme of lighting goes, but it leaves the wall spaces at liberty for the display of pictures, &c. With few exceptions the pictures are not deserving of so much consideration; occasionally they are simply horrible. Where German artists have

been employed the result, if comparatively tame, is far more satisfactory. The Maltese are extremely devout, and the pictures which shock us secure, nevertheless, their warmest regard, and play, no doubt, an important part in the scheme of religious education. Almost every church has its treasures of gold and silver plate and sacred vessels, and in some of them the chalices, processional crosses, &c., are of great beauty and value, the knights having been allowed, on their expulsion from Rhodes, to take with them their church plate and furniture. Fortunately there is little stained glass in any of the churches.



Sacristan's Chair, Florian Church.

The peasants themselves have built their churches with their own hands, each one giving his labour and contributing his share of the materials. I saw a site near Misida marked out for a church by rows of flags of various colours. All day long a caretaker perambulated the vacant ground. But when the day's work in the fields was over, a hundred peasants were busy digging trenches, carting materials, and building the walls. And each day they continued the work, snatching between their ordinary labour and this labour of love a brief interval for a frugal meal of rye-bread and oil, a handful of figs, and a quiet pipe.

The church at Mousa is the show church of the island, mainly because of its variation from the common type. It is a copy,—with a difference,—of the Pantheon at Rome, "asses' ears" and all, and it has been treated by Mr. Fergusson in such detail that we need not go minutely into the particulars of its design. As usual, the exterior ornamentation is absurdly out of scale, and detracts from the really considerable dimensions of the edifice. Of the decoration of the interior the less said the better. It is sad to see the persistent expenditure of gold leaf and ultramarine with such dire results. I accepted an invitation to ascend the exterior of the dome, and found, to my confusion, that there are no parapets of any kind to protect the explorer of its many ascending ranges of masonry. One has to walk along the upper surface of the cornice, a mere ledge, with nothing to catch him if he stumble. The pretty handrail shown in Mr. Fergusson's woodcut does not exist. On the topmost platform but one I sat down to collect myself a little, when a "gamin" who had followed me up unobserved, seeing my embarrassment, thus addressed me:—"Sir, you are the fourth Englishman what have fall down from here and he found dead in our garden. You are the fourth!" "You are a nice boy," I said. "Yes, sir. Give me somsing." I should have liked to have given him "somsming"; but it was no place or time for contentions, and I dissembled.

The costumes of the peasants are, so far as the men are concerned, picturesque and full of colour. The wide-brimmed straw hat, the coloured shirt, the bare brown breasts and feet, the gaily-coloured sash worn round the waist, and the tight blue trousers make a bright and

pleasant *ensemble*. A bevy of workmen returning from work, their mule gaily caparisoned with coloured scarves of the peasant women's weaving, its neck encircled by bells which jingle in the clear air, is a pretty sight. As they draw nearer you perceive that one plays a violin, one a viol, one a mandoline, and they all sing in low plaintive voices some melodious song of love. The women's costume is sombre. The universal garment is the "Faldette" of black stuff or silk, according to the condition of the wearer. It is used as a covering for the head as well as for the shoulders, and was adopted, it is said, as a penitential garb in times of national sorrow, and as a protest against the white costume of the victorious Turkish women. The dresses of the ecclesiastics, both regular and secular, are varied and picturesque; especially that of the begging friars, who are, however, seen all over Italy and Spain, and are not peculiar to Malta.

A few weeks' residence is manifestly too short an acquaintance with the Maltese to warrant a sketch of their character. But I made diligent inquiry on the point from old residents. There are those who say that the Maltese do not always speak the truth (I am putting the statement my own way); that they have confused notions of property; that they are not so courageous as lions. For myself I am not conscious of having been deceived by any statement of theirs. I certainly lost nothing whilst with them, although I left my things about as I should not have done at an English hotel. Of their courage, or want of it, I could form no opinion. But I am well assured that they are an industrious, sober, thrifty, good-tempered, gay, and eminently moral race, and with these virtues,—which all admit them to possess,—they cannot be very bad. They are extremely courteous, with a native courtesy which has all the charm of the highest breeding. The man who took me over (literally) the Mousa Church was the analogue of the English navy,—a man who was employed as a labourer on the public drainage works. His wages for a long day were 10d. only. He took me through the church, the sacristies, the priest's house, and obtained for me specially a sight of the architect's original drawings. At parting I slipped 1s. into his hand, which he instantly returned, politely but quite firmly. My friend the *gamin* tried unsuccessfully to snatch it, and came in for a sound cuff. But my guide could not hear of being paid for a civility which he was only too willing to render. It was *kind of me*, he said, to take the trouble to examine the church, of which he was evidently so proud. I have looked over a good many churches in my time, English and Continental, but I never knew the guardian of any of them take this view. It is to be remembered that the gratuity which this poor man resolutely refused was more than a day's pay.

I have, on the whole, the very pleasantest remembrances of the island and its inhabitants. It has been strangely neglected by painters, who would find there thousands of pictures waiting to be painted. To the young architect it affords a wide field for discriminating study. It is, moreover, a place where hospitality is universal, and where an Englishman can enjoy the sights and sounds of a foreign clime, and yet feel himself completely at home.

British Archaeological Association.—At the meeting of this Association on the 18th inst., the Rev. S. M. Mayhew presided, and exhibited a large collection of ancient objects, mostly found in the City in some of the recent excavations. The first paper was by the Rev. John Edkerg, D.D., of Pekin, read in his absence by Mr. W. H. Rylands, F.S.A., on "Ancient Navigation in the Indian Ocean." Mr. J. T. Irvine read a description of the opening of a barrow at Croyland, Lincolnshire, in which were found some Roman remains, and also some prehistoric flint implements. With these were a great many objects of hard-baked clay, similar to the teeth of a barrow, and the opinion was expressed that they had been used for a similar purpose. Similar articles have been found near Peterborough.

NOTES.

THE question of dealing with Westminster Hall will, probably, be submitted to the House before long, and we must beg leave to repeat our caution to those Members who care at all about such subjects not to allow themselves to be coerced into sanctioning a foolish piece of costly archaeological trifling merely because the chairman of the "Restoration" Committee is pertinaciously bent on carrying his point (for that is really all there is in it), and those who may presently have to vote on the matter should read the full evidence (when published) and not trust to what has been reported in the *Times*, which has omitted all report of the evidence of some of those who were best qualified of all to speak on the matter, and who were adverse to the views of the chairman. Mr. Brewer's full and valuable evidence as to the probable former state of the site west of the Hall was reduced in that journal to a mere paragraph, and the evidence of Mr. Loftus Brock was omitted altogether. These gentlemen are only architects and men noted for special archaeological knowledge, and according to their opinion on a point requiring special knowledge of that kind is of course passed over in the leading journal as of no consequence. Our view of the whole matter will be found in the *Builder* of November 29th of last year, and we have seen no reason to alter it. The side of the Hall was never intended to be seen; the finials and huge battlements at present built up entirely dwarf the details of Barry's buildings (more so even than need be, for the buttress finials are very coarsely designed), and the proposed new rooms will be an absurd failure in regard to size and lighting. What should be looked to is the repair and restoration of the buttresses as far as is necessary for stability and architectural completeness, with the view of ultimately completing Barry's building as it was intended to be, and concentrating the Government work in proper apartments, and not pigeon-holing committees in the partitions between the buttresses of the Hall. Those who vote for this will find out when it is too late what a silly thing they have done; and it may be observed that the promoters of the scheme themselves have been obliged to drop their idea of the carriage porch in the lower cloister, which every practical man knew from the first to be absurd.

ON Monday Mr. Causton inquired whether, before the House was asked to decide on the question of the restoration of Westminster Hall, the painted screen in the two central bays might be removed, and the two buttresses finished temporarily in similar style to the pinnacles now exposed to view; in other words, that those interested might have an opportunity of seeing how the buttresses and flying buttresses would look without the screen: a matter which it is certainly worth while to see.

DURING the last week there has been on view at the Horse Guards the design, shown in plans, sepia drawings, and a model, of a projected Military Hospital for a site in a hot climate, designed by Major-General Sir Andrew Clarke and Mr. E. Ingress Bell. The hospital is a circular ward one, each ward having over it an open roof chamber or "Baracca," which constitutes a protection from the sun, and allows the air to circulate freely between this raised or extra roof and the actual roof of the ward. The wards are also raised 7 ft. from the ground by a hollow basement. In times of emergency the capacity of the hospital can be doubled by closing in the arches of the Baracca or roof story, and using the enclosed area for the sick and wounded: so runs the official circular in regard to the scheme, but it seems to us rather questionable whether it would be good sanitary policy thus to take away the advantages of the open and free passage of air between the roofs just when, from the admission of a double number of patients, the utmost sanitary advan-

tages would be called for. It is like saying, "under special circumstances we can take in double the number of patients, by foregoing the most important sanitary advantages of the hospital." The plans will probably be sent to the Academy exhibition, and we may be able to give an illustration of them shortly, when further remarks as to the adaptability of the building to the site will be more intelligible than they can be without the drawings. It may be observed here, however, that Mr. Bell has succeeded in making a very pleasing architectural effect out of the combination of circular wards, which is what cannot always be said of hospital designs.

ON Tuesday Lord Lunington called attention to what he described as the "extraordinary nature" of the Bill entitled "an Act to authorise the Widening of Parliament-street, Charles-street, and Delahay-street; and the Making of a new Street in the Parish of St. Margaret, Westminster, and for other Purposes," which would come before the consideration of the House of Commons. It was a Bill which transferred the whole responsibility of the Government, in regard to most important public buildings, to a private company. Lord Rosebery agreed that it was highly objectionable that this great site and its improvements should be left in the hands of a private company. The Bill was further objectionable inasmuch as it gave powers to a private company for a considerable period, without laying on them any compulsion to use those powers.

THE recent strike at Saltaire is a fact of the gravest importance. Distressing in itself, it is made doubly unhappy by its locality; and yet more menacing from the wage-disturbances which the signal thus given, like that of the fiery cross, is already arousing, from the Valley of the Mersey to that of the Clyde. Already reductions of wages have been announced at several mills in Burnley, Padiham, and Rossendale Valley; and strikes and lock-outs have followed. About 1,800 miners have received notice to leave the Thorncliffe, Tankersley, and Rotherham Collieries in fourteen days. In the Methley district, at Alerton, and at the collieries of the Weardale Coal Company, and of the Frystone Coal Company, notices of a like kind are given, as the alternative of a ten per cent. reduction in wages. The old Silkstone Coal and Iron Company have given twenty-eight days' notice. The coal-masters of the large coal-mining districts of Airdrie and Slamannan have resolved to reduce the wages of colliers sixpence per day. 40,000 men have been discharged from the South and West Yorkshire collieries. Two thousand men have left work in South Staffordshire and East Worcestershire, where it is said that wages have been reduced by from 10 to 40 per cent., or below the rate needed to support life, through underselling in the foreign trade. The colliers employed at the Bursley pits, more than 3,000 in number, those of the Alloft Colliery, and those of the Middleton Coal Company at Leeds, have received notices of a ten per cent. reduction, and the reduction of miners' wages is becoming general throughout Scotland. Glass-makers, miners, colliers, tailors, moulders, ironworkers, and many other trades have sent representatives to a meeting at Brierley Hill, South Staffordshire, which resolved to form a "federation of labour." The wages of jute-workers at Stratford have been reduced 15 per cent.

THE case of Chester v. Powell, which came before Vice-Chancellor Bacon last week, will be a warning to tenants not rashly to attempt to get rid of houses on the ground of a misrepresentation by the lessor. The house in question was on the well-known Hog's Back, and was supplied by water from rain-water tanks. The water during the tenancy ran short, and the tenant then refused to continue the tenancy, and so the lessor brought an action for specific performance. The defence was that there had been a false representation, namely, that the supply of water was sufficient, whereas, in fact, it was insufficient for the

wants of the household. It was proved, however, that during the lessor's occupation the supply had been sufficient, and that during that of the lessee the pipes had been stopped by leaves, and that, in fact, there had only been a very slight want of water. It was obvious that this was no real defence. People who take houses on places like the Hog's Back cannot expect as much water as if they lived in a valley. While tenants who with good cause bring landlords to book in respect of sanitary or other matters, have our sympathy, the landlord who is brought into court by an unreasonable tenant should not be left unpunished, for the lot of a successful litigant is not a bed of roses when the lawyer's bill is presented.

THE discussion last week in the House of Lords, on Lord Thurlow's motion to support the Trustees of the British Museum in their half-formulated project of opening the Natural History Museum on Sundays, resulted in a tie in the voting,—sixty-four on each side; which, in accordance with a wholesome conservative tradition of the Upper House, *semper parsimonia pro negante*, amounted practically to the adoption of Lord Shaftesbury's amendment, which recommended the opening of the national collections in the week-day evenings by electric light, but not on Sundays. Lord Shaftesbury based his recommendation on the fact that the South Kensington Museum had been open at night for twenty-eight years, with an evening attendance of 6,885,722 persons, and the Bethnal Green Museum for twelve years, with an evening attendance of 3,507,278 persons; that the British Museum reading-room had for some time extended its hours by the use of electric light, and that the Trustees had obtained estimates for lighting the whole Museum with electricity. There is unquestionably much force in these facts. They tend to indicate that as far as putting such institutions within the reach of the classes who are tied to daily hours of labour, the evening opening is sufficient. It is also by no means satisfactorily proved that the majority of the better set of the working class really wish for the Sunday opening of museums. Mr. Broadhurst, their best representative in Parliament, affirms that they do not. On the other hand, it is certain that on Sundays, when the weather is inclement, there is a great want of indoor resource for those who do not wish to remain in their houses all day; and the speakers on Lord Shaftesbury's side of the question forget that their objection, that Sunday opening involves extra labour for officials, applies even more strongly to evening opening six days in the week. As the question at present stands, however, we are inclined to believe it would be best to work for the evening opening of the museums first (now that the electric light gives additional facilities for it), and defer the Sunday question or the present. The former proceeding would be an absolute boon, which would give offence to no one; the latter would inevitably offend the feelings of many, and might not prove such an unmixt benefit as is supposed.

IT appears that in consequence of the expenditure of 70,000*l.* on the Blenheim pictures, the annual grant for the National Gallery is to be withdrawn for the present, being supposed to be committed by this special advance for a special purpose. We were under the impression that the Government had for once done a liberal thing in regard to art, but it seems it is only taken out of one pocket to put into another. It is true that the promise has been made on the part of the Government that any special opportunity of purchasing valuable works should be duly taken into consideration; but the position taken up will certainly throw great difficulties in the way of the National Gallery in the future acquirement of pictures, and form a kind of precedent for drawing the purse-strings tighter in regard to objects about which we are parsimonious enough at present, in all conscience.

THE scheme for a British Hospital at Port Said, in memory of Gordon, seems likely to come into practical shape; and it is satis-

factory to note the determination of the committee that as the hospital is to be a permanent memorial, it shall be constructed in the best possible form, and with the best sanitary arrangements. A Building Committee has been appointed to consider fully this portion of the subject, and to take professional advice thereon. That there should be a first-class British Hospital at Port Said is, of course, a desirable object in itself, and the memorial is suitable enough in spirit so far as it goes, though it seems strangely inadequate in relation to its object. However, Gordon will need no "piled stones" to keep his memory alive. History will take care of his name.

THE annual report of the Kyrle Society contains an account of what the Society has done during the year 1884 in giving voluntary work in connexion with decoration, music, and the provision of open spaces. Under the decorative branch, mission-halls, parish rooms, and club-rooms in the poorer parts of London have been decorated, as also a ward in the London Hospital, and the Children's Ward in the Poplar Hospital for Accidents. Above the public garden formed from the churchyard of St. John's, Waterloo-road, has been placed in mosaic, along the dull brick wall of the church, George Herbert's noble sentence:—

"All may have,
If they dare try, a glorious life, or grave."

It is characteristic of the truly missionary character of the Society that no names of any designers or executants are mentioned in reference to the art-work, the work being apart from all question of personal credit. Whether it is quite a sound theory to give decoration, in charity, any more than other kinds of assistance, may be a question; but, perhaps the efforts of the Society may serve to create an appreciation of and a demand for artistic embellishment where it does not at present exist, and the voluntary character of the work may be a necessary condition for getting in the thin end of the wedge. In the "Open Spaces Branch" the Society is doing admirable work, and really important to public health. Among other things, the disused burial-ground of St. George's, Bloomsbury, which was "choked with mouldering tombstones and rank vegetation," has been laid out as a public garden, under the care of the St. Pancras Vestry. The old burial-ground of St. Nicholas, Deptford, has been similarly laid out and transferred to the care of the Greenwich Local Board. The Society appeals for more funds to carry on this good work.

THE fourth Channel Islands' Art and Industrial Exhibition is announced to be held "in Guernsey and Jersey" during April. From the programme sent to us, it appears to run rather more in the direction of amateur work in the less important branches of art. "Crystoleum" pictures and artificial flowers in waxwork, &c., are amongst the things for which prizes are offered, and "shell work" and "leather work." Considering what these branches of art (?) generally amount to, perhaps prizes for *not* doing them would be more in the interests of artistic culture. Professional artists are offered a prize of 2*l.* "for the best painting on china, terra-cotta, canvas, paper, &c.," in the order named. We fear the Channel Islands are rather in a state of artistic as well as geographical isolation.

AT the meeting of the Institute of Architects last week, Mr. John M. Brydon read a protest in favour of three old monuments that are going to pieces, viz.: York Water Gate, Temple Bar, and Old Burlington House colonnade, concluding by moving "that the Council of the Royal Institute of British Architects communicate with the proper authorities, with a view to the preservation of York Water Gate, and the reconstruction on suitable sites of Temple Bar and the colonnade of Old Burlington House." The motion was supported by Mr. Eastlake and Mr. Phené Spiers, and partially opposed, rather to the surprise of many members, by Mr. Hebb, who objected that the two prostrate structures, if re-

edified, would have to be partially restored, and would not be genuine. Does Mr. Hebb prefer to let them rot away on the ground? Of course, there is a distinction between the case of York Gate which is still standing and only requires keeping in repair; and structures which are actually pulled down. But we reply that those structures are of great historic interest (Temple Bar especially), and very picturesque in themselves, and that their remains are still in sufficient preservation to enable us to set them up again, in the main, as they were; and it is a thousand pities to let them go to ruin. Moreover, the authorities have pledged themselves on both these points. Burlington House colonnade was removed on the distinct understanding that it would be preserved and rebuilt elsewhere; and Temple Bar was a few years since taken down under the same understanding. There is nothing to prevent the intention being carried out in both cases, except miserable parsimony and an indifference to architectural monuments. Mr. Hebb's amendment was not seconded; and, with all good feeling towards Mr. Hebb, we must say we are glad it was not. The original resolution having been carried, we hope the Institute will be able to persuade the official custodians of these interesting architectural remains to take the proper steps for their preservation.

THE CHELSEA VESTRY HALL COMPETITION.

MR. HUNT has presented his report on the drawings for the new Vestry-hall, and at the Vestry meeting on Tuesday night it was proposed, we understand, to conclude the matter at once; but more cautious counsels prevailed, and the drawings have been hung up in a building adjoining the present Vestry-hall for the consideration of members, before finally resolving on the course to be pursued.

The work is in reality an addition to the existing buildings, although the actual hall is to be a new one. The present block of buildings fronting King's-road is to be retained, and a T-shaped block of new building added in the rear, to contain a new Vestry-hall, a smaller hall, committee-room, kitchen and offices, retiring-rooms and a reception-room; the portion immediately adjoining the present buildings to be kept low so as not to interfere with present lights above. The new building will, in the first instance, have a very "hack" front on to some very poor and unsightly house property, which Lord Cadogan is anxious to improve away and make a good street as soon as the lease falls in; but as this will not be for sixteen years, the architectural effect, whatever it may be, of the new building, will be very much thrown away for a long time to come.

The Vestry are so anxious to prevent collision between the less virtuous of the architects and the less virtuous of their own body (for even vestrymen are not immaculate), that the virtuous majority have carried a resolution to cover up all the motives and distinguish the designs by numbers. Those recommended by Mr. Hunt for the first, second, and third premiums respectively are Nos. 25, 14, and 18. No. 26 is, as far as plan is concerned, very ineffective; the author's friends may call it "simple," but the simplicity is not quite of the right sort. The new building having to be approached through the old, the management of the connexion is a little test of the power of doing the thing effectively. No. 26 simply has a short passage, with ladies' and gentlemen's retiring-rooms opening out of it, with the doors opposite each other (not one man in twenty in public competitions seems to know how to plan these accessories), and this gives into an open cross corridor absurdly labelled "reception-room," which would really be like receiving people "in the open" instead of in a well-appointed ante-room. The large hall forms the stem of the T, and the small hall and committee-room the arms. A corridor runs up each side of the large hall, giving access to the smaller hall and committee-room, and to the platform entrance, and so far the access to the upper end is good and convenient. Architecturally the exterior is redolent of Queen Anne, and has a ponderous pediment with a round hole in the tympanum and a flourish of foliage under it; an order of pilasters, with a central window and niches in the interspaces; the wings are more simply

treated, with boldly-rusticated windows. The internal architectural treatment of the hall is suitable and effective; a mixture of mullioned windows with pilasters and circular arches. The windows are high up and rather small; the light would be somewhat deficient.

In No. 14 the hall is also placed as the shaft of the T, and the committee-room and smaller hall as the arms. The committee-room is placed so as to secure quietness, and cut off from the rest of the internal traffic of the building. The arrangement of the approaches and retiring-rooms is not better planned than in No. 26, except that the reception-room is a room, and not a lobby. The design has little to recommend it; the large pyramidal terminations to the principal features are very ugly and commonplace, and the coloured decoration for the interior of the hall is "a caution."

No. 18 is a far superior plan to either of the others in perception of architectural effect. The approach is through a vestibule lighted from a small dome over, and leads to a reception-room similarly lighted. Circular vestibules opening each way from this give access to the large and small halls, which are arranged en suite across the top of the T. The author has cleverly arranged these circular vestibules so as to mask the irregularity of angles arising from the want of parallelism in the lines of the site. Unfortunately there is no proper access to the platform at the end of the large hall, the only entrance to it being in the middle of its length. The arrangement of the two halls en suite is very effective, but as we understand the intention is to allow for the simultaneous use of these rooms for different purposes, this is practically a drawback; but it must be added that there is no hint as to this in the instructions, which only specify "a secondary hall, which may be used as a supper-room," a phrase which appears to imply that it should be connected with the large room, for large entertainments. The instructions generally are not at all explicit as to the ideas of the promoters in regard to the use of the various rooms. The planning of the approaches in this design is open to practical objections, and the committee-room (opening out of the first vestibule) is hardly retired enough. The whole plan, however, is susceptible of very effective architectural treatment, and the exterior, simple and unpretending though it is, is in better taste than either of the others. With some practical modifications this might be made as convenient as either of the others, and would make a much more pleasing and satisfactory building. The detail elevation of the interior of the hall shows good treatment of the architectural features, requiring only a little toning down in some details. If the small hall were cut off from the larger one, and the platform placed at that end of the larger hall it would be possible to arrange all the approaches satisfactorily, with very little modification, and the plan would then certainly be the best of the three; it would also, however, be the most costly.

A look through the other designs, so far as limited time allowed, did not lead us to suppose that any one of them would be superior, taken all round, to any of the three selected. The choice seemed to lie between Nos. 26 and 18. The first fails in being ineffective and almost absurdly naïve in its planning; the second in attempting a little too much in the way of effect without sufficient consideration of practical working; but it is the work of an able hand.

No. 21 is a better plan than most, and not ineffective in exterior elevation. No. 24 is well planned, and the internal design of the hall very elegant,—an elaborate Classic treatment. Several of the sets show great pains and elaboration in regard to detail and drawing, among which No. 46 is pre-eminent; but, architecturally, there is very little which can be said to rise above mediocrity.

Tanks for Suakin.—Another instance of quick work in this line may be noted. Mr. John Bellamy, of Millwall, made and fitted the tanks for the *Camel*, the order being placed in his hands on the 15th of February and the work completed, we are informed, to the satisfaction of the Government surveyors, on the 2nd of March. The tanks in the *Camel* were made to fit the vessel, and they were also fitted with strong internal bulkheads and with an elaborate arrangement of valves and pipes.

ROOF COVERINGS.*

You all know that there is a vast difference in the climatic conditions of different countries, and, in fact, of different parts of the same country. In some places the heat is nearly always very great, and rain of rare occurrence, but when it does fall it comes down in torrents, of the force of which we in this country have no conception; in other parts the snowfall in winter is so great that when the snow lies on the roof of a house the weight of it forms a very serious additional strain upon the rafters, &c. Now it is quite clear that it would be a most unwise thing to construct the roofs in the same way in these two districts; if a steep roof were formed in the hot country these torrents of rain would run off the roof with such velocity as to do serious damage; whereas, in cold countries, roofs must be steep in order to prevent too great an accumulation of snow on them. As a general rule, you will find that, starting from the hot countries of the South, the pitch of the roofs increases as you journey northwards. In Italy you have the flat roofs with wide overhanging eaves in order to get a good shadow; in Belgium you have the high-pitched gables which form so picturesque a feature in the Netherlands; and in Scandinavia you frequently get the exceptionally steep roofs of which Hitterdal church is such a striking example. The suitability of a roofing material depends very largely upon the pitch of the roof; tiles, for instance, which would make an excellent cover for roofs of a pitch of 50° being absolutely unsuitable to a roof of 26°. Some materials which were formerly in general use for roofing have now become almost obsolete. Shingles, for example, or shides, are frequently mentioned in old books, and yet they are scarcely ever seen now. These shingles were pieces of wood, measuring about 9 in. by 5 in., and feather-edged, which were laid over a roof very much in the way we now use weather-boarding. Of course such a roof as this was not very lasting, but these materials are still used in the West Indies. You may still see, in various parts of the country, roofs covered with large blocks resembling thin flagstones, and called tile stones, which may be very serviceable as a protection from the weather, but are so exceedingly heavy as to necessitate very strong timbering. In former times different districts of the country had different methods of constructing their roofs, but the facilities of transport are now so great that all local peculiarities are fast disappearing in a dead level of monotony, which may be that of excellence, but which is undoubtedly most uninteresting and hostile to picturesque views.

The principal roof-coverings now in use are tiles, slates, and metals. Tiles are of very great antiquity, and it is most probable that tiles of baked clay were used in the ordinary houses of ancient Greece, but of course these have all perished. Remains are found, however, of marble tiles which were used on the roofs of the temples. These were large thin slabs turned up at the two sides, rebated at the upper edge for hanging over a horizontal rafter or purlin, and with a notch on the under side of the bottom edge for lapping over a projection on the top edge of the tile immediately below. All the vertical joints were covered up with tiles hollow underneath and saddle-backed at the top, very much like our common slate ridge. As these generally terminated, both at the ridge and the eaves, with ornaments called palmettes, they must have formed a very striking roof-covering.

The earliest Roman buildings were probably covered with wooden shingles, but baked tiles were introduced at a very early period, some say in the time of Pyrrhus, about 300 B.C., and the manufacture was extensively carried on, and a very useful form of tile was finally adopted. These tiles were very similar to the Greek ones, having rims at the sides so that the water was diverted from the vertical joints, over which hollow tiles were laid, themselves overlapping. Another form of Roman tile was made, slightly narrower at bottom than at top, with raised rims on each side, so that the upper tile could be pushed down tightly into the one below it; and here again the vertical joints were always covered with other tiles. The Broomhall tile

* A lecture by Mr. John Slater, B.A., F.R.I.B.A., being the seventh of the series of "Free Lectures on Matters Connected with Building," given under the auspices of the Carpenters' Company. Delivered on Wednesday evening last, March 25.

of the present day is very much like the old Roman tile.

The Romans, you know, were great builders, and nearly all their methods of construction are worthy our attention at the present day, being characterized by great strength and solidity. The all-conquering Romans carried their methods of construction with them, and consequently of the greater part of Europe developments of the Roman tile are found. You will easily understand that hips would present rather a serious difficulty with these flat tiles and their cover tiles, and it is very interesting to notice how this difficulty was surmounted as the builders increased in skill. Sometimes exceedingly heavy and large hip-tiles were used, covering the other tiles on both sides, and the gaps were made good with mortar or cement; and sometimes very ingenious special form of hip-tile was moulded.

In the Middle Ages some splendid roofing tiles were made in France, and I suppose there have never been better tiles made anywhere than in the old province of Champagne during the thirteenth and fourteenth centuries. These were made with one nib for hanging over the lath and one hole for nailing, the rafters being spaced so as to suit the width of the tiles. These were laid breaking joint, and in order to ensure that the nail-hole should always be over the back of the rafter,—which would not be the case if the holes and the nibs were in the same position in every tile,—the positions were reversed in each course. Sometimes the exposed portion of the tiles was glazed, and this would certainly render them much more capable of resisting the weather than if they were merely baked, but it must have added considerably to the cost of their manufacture. To show the extreme refinement which was adopted, we find in many cases, that the upper edge of the exposed portion of the tile was chamfered off, and this would have the effect of reducing the risk of roofs being stripped by a high gale.

The two sorts of tile most used in England are the pantile and the plain tile, both of which are made of clay, purer and stronger than that used for ordinary bricks, and as tiles are a much thinner, greater care is required in their manufacture. The clay is ground and thoroughly mixed in a pug-mill, and then moulded into the shape of the tile required. The clay is prevented from sticking to the mould by dusting the latter with fine coal-dust or sand. Pantiles are not used except for an inferior class of house or for rough warehouse roofs, as it is difficult to keep them quite watertight for any length of time. The general size of a pantile is from 13½ in. to 14½ in. long by 9 in. to 10½ in. wide, and they usually show from 10 in. to 11 in. on the face when laid. They are laid en suite as slightly to overlap laterally, but they do not fit close enough to form a watertight joint, and therefore, when used for dwelling-houses, it is necessary to point them with mortar, which forms a somewhat unsightly joint. They are hung with nibs to fir or oak laths, and as they do not fit very closely at the bottom, a heavy gale of wind is likely to play havoc with a pantiled roof. The weight of a square of ordinary pantiles is about 10 cwt. You all know the appearance of pantiles such as are used in this country, but in Germany a simple hollow tile of semicircular section is used, laid alternately with the convex and the concave side uppermost. The Bridgewater tile is very similar to the pantile, but wider, and formed with a double roll.

Plain tiles are oblong in shape, measuring 10½ in. by 6½ in., and it is a curious fact that the size of plain tiles was expressly fixed by an Act passed in George III.'s reign, at which time heavy duties were levied on their manufacture. They are formed with nibs for hanging on the laths, or with holes for pegs or nails. As there is no lateral lap, it is necessary that each course should overlap the next but one below it, about 2½ in., and the gauge, i.e., the exposed portion of each tile, would thus be 4 in., so that more than half of each tile is covered up. The necessity for this lap causes a tiled roof to be very heavy, 600 being required for a square, and weighing something like a ton. It is somewhat of a moot point whether it is better to hang the tiles to the laths by nibs or by nails. I think I would give the preference to nails, if carefully done. The best plan is to close-board the roof and cover it with felt before laying the tiles. Some builders are fond of bedding the heading-joints in mortar; but I have very grave doubts of the advisability of this

practice. It makes the roof tighter at first, but by my own experience is that tile roofs almost always fail through the laths decaying, and allowing the tiles to slip, and the mortar, in my opinion, accelerates the decay. Certainly, in many old roofs that I have examined, if one part has been laid in mortar, and another not, I have generally found that part where mortar has been used in the worse condition. As far as appearance goes I know of nothing to surpass a good, rich, brown Broseley tile; but the great drawback to all tiles is that they are exceedingly porous, some of them absorbing as much as one-seventh of their weight of water in ten minutes, and the dampness caused by this has a tendency to rot the boarding and rafters underneath. A few weeks ago Mr. Ralph Nevill, described, at the Royal Institute of British Architects, a plan he had adopted for overcoming this drawback, and it was as follows:—The first laths over the top of the rafters as if plastering, and then drives rose-nails into the backs of the rafters, standing out about 1 in.; then covers everything with a layer of fine concrete or plaster about 1 in. thick. Before it gets quite hard the tiles are laid, and the tiles can be pushed into the yielding concrete with the thumb. Of course, only so much concrete must be laid at one time as will allow the tiles to follow on before it sets. The great advantage of this is that you get the porous tiles and the solid concrete on the side of the roof a hard, perfectly impervious slab of concrete, which must certainly keep the rooms under it much more equable in temperature, as well as drier, than the plan ordinarily adopted. It, of course, increases the weight of a roof considerably, and it appears to me that must increase the difficulty of executing repairs if tiles get broken, but I can very well believe that the repairs required would be decidedly less than in ordinary roofs, because the tiles have a solid bearing. Plain tiles are often laid in bay in country districts, and country builders are very fond of this method. There is no doubt that this adds to the warmth of the rooms under the roof, but I am afraid the hay would rot in decay and become very unsavoury, and I can hardly advise you to adopt this practice. There is one thing that you must remember in all ordinary tiled roofs, and that is the pitch of the roof should never be less than 20 degrees, and 60 degrees is much preferable. Of late years several attempts have been made to imitate and improve upon the old man plan of covering the vertical joints of tiles, and thus diminishing the weight of the roof by doing away with the necessity of such a lap. If tiles are moulded with a lateral lap, that they will fit into one another and form a water-tight joint, the successive courses need only overlap enough to prevent the rain driving underneath them, and this can also be prevented by forming a groove at the upper edge of one tile, into which a corresponding projection at the lower edge of the next tile would fit. I have seen several specimens of this new kind of tile. One is the patent bonding roll tile, the Broomhall tent tile, Phillips's patent lock-jaw roofing tiles, and the Bridgwater patent tile. The Bridgwater tiles manufactured by Messrs. Major are of two kinds, one with rounded rollers, called Roman tiles, and one with angular corrugations. They are large and beautifully made tiles, formed with a groove at the side, into which a corresponding projection in the next tile fits, and another groove at the top, so which fits a projection at the bottom of the tile next above it: each tile is very heavy, but it only overlaps its neighbour by about 2 in., so that the whole surface of the tile is available for covering, and the weight per square is only 5½ cwt. These tiles will lie very closely, and the weight of each is such that it is almost impossible for the wind to strip them. Price's patent tiles, supplied by Mr. Matthews, of Aston-super-Mare, have a different kind of lap, and fit into one another very closely. They are made of two colours: one of a natural tint of burned clay, the other coloured by manganese, but a slight rubbing or chipping will wear this off. Ninety of these tiles will cover a square of roofing, and will weigh about 5½ cwt. The Broomhall patent tiles closely resemble the old Roman tiles, except that the cover tiles are precisely the same pattern as the under tiles, only used with the opposite side uppermost. The under tiles are laid on the battens, about 7 in. apart, and the narrow end of the tile next above is pushed down till the splay of

the upper tile fits closely on to the shield of the lower one, giving a 3½ in. lap. These tiles are not nailed, but pegged down by wedge-shaped metal pegs, which keep them in position. When the lower tiles are in position the cover tiles are laid over the intervals between the lower tiles, overlapping the ledges of the latter. The cover tiles are nailed to the battens; 185 tiles will cover a square of 100 ft., and the weight is about 8 cwt.

Perhaps the most perfect form of interlocking tiles yet made are Phillips's patent lock-jaw tiles, which have very closely-fitting grooves and tenons at the sides and at the top and bottom. These tiles are moulded in patterns, arranged so that the rain-water is diverted from the grooved joints, and they fit into one another so closely that no nails are required except in very exposed situations, and they can be easily laid by the most ordinary labourer. Two kinds of this tile are made, the "single grip," of which 150 will cover a square weighing about 5½ cwt.; and the "double grip," of which 170 go to a square, and weigh about 7 cwt.

In all cases the clay for these patent tiles is most carefully prepared and tempered, and they are moulded under great pressure, thus making the clay very dense and diminishing its porosity. The difficulty with all these kinds of tiles appears to me to lie in the necessity of cementing the joints at the hips, no maker as yet having devised an interlocking hip-tile. Ridge tiles and verge boards have been made to suit the tiles, but the hips are in all cases, I believe, cemented.

I do not intend to take upon myself the invidious task of deciding which of these is the best form of tile, but they all have the advantage that you do not require anything like the same thickness of tiles, one above another, that you do with plain tiles, and hence you can very materially reduce the weight of your roof covering, and every one will see the desirability of this if you can insure impermeability.

I now come to what is probably the most extensively used roof-covering at the present day,—slate. You know that tiles are formed of burned clay; but what is slate? Many of you will probably be somewhat astonished when I tell you that slate itself consists of very little else than clay. Ages and ages ago the action of water was depositing in various places layer upon layer of very fine clay or mud, mixed with a little sand, and these layers gradually accumulated to a considerable height; then vast geological changes took place, and this clay became buried deeper and deeper under superincumbent masses of material, and was subjected to enormous pressure and enormous heat, till it became completely consolidated. That is also the way in which most of our building stones have been formed, and the bed of the stone is determined by the direction of the original layers; but in the case of slate, enormous terrestrial forces have acted on it in a lateral direction, and they have been so intense as to rearrange the layers so that they frequently lie in quite a different direction from that in which they were originally deposited. Along the lines of the new layers slate can, as you all know, be split into very thin sheets, and this quality renders it a most useful building material, because although it is very hard and dense, it can be obtained so thin without breaking that the weight of a superficial foot is very small, and, therefore, when used as a roof-covering it does not need a heavy supporting framework. Slate is one of the most compact and close-grained rocks, and has a smooth surface, so that water runs off it very easily, and consequently it can be safely laid on roofs at as low a pitch as 22½°. Curiously enough, it is most probable that its use was brought about by the necessity of finding some close-lying, easily-cut material for covering the high-pitched conical roofs which the Mediæval builders gave to their towers, as they were unable to cut tiles to suit these roofs. Notwithstanding this, its general introduction has acted prejudicially from a picturesque point of view. The quaint old hicken-covered tiled roofs, upon which the eye rests with pleasure in many an old English country town, have given place to the flat, dull, leaden-coloured slated roofs, which frequently seem so ashamed of themselves that they are glad to retire behind a parapet. But this is an age of utility, and though we may spare a word of regret for the picturesqueness of the past, there is no denying the fact that, from the point of view of closeness of fit, strength, and cleanliness, slates are superior to tiles for a dirty, smoky city.

The slates of North Wales are probably surpassed by none in the whole world, and I dare say many of you have visited the celebrated Penrhyn quarries near Bangor, which are situated in the neighbourhood of some of the finest scenery in the British Islands. There are, however, other very good qualities of slates to be obtained besides those of Bangor: Portmadoc slates, for instance, named from the port of shipment, but really obtained from Ffestiniog, Difwys, and other quarries in the neighbourhood. In Cornwall the Delabole quarries are much esteemed, and in the Lake District some excellent specimens of light green slates are found. Ballachulish and Dalbeattie, in Scotland, and Killaloe and Ashford Bridge in Ireland, may be mentioned as the principal places in those countries producing good roofing slates. The characteristics of good slates are that they should be of a blueish-grey tint, uniform in colour, and free from patches; that they should not be tender or friable at the edges; that they should have a good clear ringing sound when gently knocked together; and that they should absorb a very small quantity of water. If the colour be too light the slate will probably be of a stony, gritty texture; if it be a very dark blue you will generally find it absorb water too readily. This quality of absorbing water is, of course, very important, and you can easily test it for yourselves by placing a slate on end in a basin of water with about half its length immersed, and after remaining so for some time you will be able to see how far the dampness which is absorbed has risen in the dry part of the slate. It will not be necessary for me to describe in detail the various kinds of slates used for roofing purposes, such as ladies, countesses, duchesses, &c., as you probably know the names and sizes as well as I do. The kind chiefly used in London are the countess slates, measuring 20 in. by 10 in. It is necessary that slates should be laid so that each course overlaps the next but one below it to a certain extent, and the amount of this overhanging is called the lap. This should never be less than 2 in., and 3 in. is better. There will thus be as in tiles a certain width of slate in each course exposed, and this exposed part is called the gauge, its width diminishing as the lap increases. The way to find what will be the gauge is to deduct the lap from the length of the slate and then halve the remainder; thus, if countess slates are to be laid with a 3 in. lap,

$$\text{the gauge will be } \frac{20-3}{2} = 8\frac{1}{2} \text{ inches. Each}$$

course of slates should, of course, "break joint" with the course below it, and a double course should always be laid at the eaves. The valleys in slated roofs are generally laid with lead, which should be turned up under the slates at least 9 in. on each side, and my own opinion is that lead is the best covering for the hip rafters, but sometimes thick saddle-back slates are used with an ornamental roll, similar to what is used for ridges. As nearly as possible 170 countess slates go to a square of 100 ft., and their weight is about 7 cwt. Slates are laid either on battens, which are slips of wood, about 2½ in. by 1 in., nailed on the backs of the rafters, or to close boarding, which is the best plan, and each slate should be nailed with two copper nails, but they should not be nailed down too tightly or they will be liable to break during a heavy gale of wind. In France the slates are frequently not nailed at all, but secured by clips, the tops of which are secured to the battens, and the bottoms are bent so that the slates rest in them. The consequence is that the slates are free to move, and, although they rattle terribly during a high wind, they are really less liable to be blown off. The reason why slates are broken and blown off a roof during a heavy gale is rather a curious one, and deserves a short consideration. At first sight it would seem that a thoroughly well-slated roof, with each slate carefully nailed, and fitting closely on the one under it, would really offer no purchase for the wind to get under the slates and rip them off. Nor does it, and yet the slates are ripped off, as we see, every time a gale of wind passes over a city. I believe the explanation to be this. Under ordinary circumstances, as you are aware, the pressure of the atmosphere is the same on all sides, and consequently when no wind is blowing the pressure on the inside of a roof is just the same as that outside. But during a gale of wind there are

always exceptionally strong gusts that occur at intervals, and when a particularly fierce gust of wind impinges on a roof it is followed by a momentary vacuum; while this lasts, even though it be for two or three seconds only, the pressure on the inside of an ordinary roof is greater than the pressure on the outside, and the effect will be very much as if a gust of wind were blowing from the inside. Now, whenever any pressure is brought to bear upon any material it finds out the weak points. Just suppose that a gust of wind is blowing on the inside of a roof covered with slates on battens: the slates cannot move when they are nailed, they will resist the pressure then, but at their ends they can easily be forced up, and if they are forced up at their ends while tightly nailed at top they must break, and I really believe that this vacuum which occurs is the cause of the ends of the slates being forced up and the slates broken off. This shows how much safer it is to close-board a roof than to use battens, and it also explains why slates hung on the French system are not so much damaged during a gale. The ease with which slates can be cut to various patterns enables us, if we are disposed to do so, to give endless ornamental patterns to our slating; and in the Middle Ages builders were very fond of working their slates into all sorts of intricate forms, but you must bear in mind that slates when cut into patterns require more lap than when used square.

In cases where roofs are obliged to be constructed at a flat pitch metal coverings should be used, the principal being copper, iron, lead, and zinc. The use of copper for roofs is not very extensive, as it is too costly a material; but where expense is no object, it forms a very durable covering. Sheet copper is formed by heating the metal in a furnace and then subjecting it to pressure between iron rollers. It forms a very light covering, as it may safely be used in sheets not more than $\frac{1}{8}$ of an inch thick, which would weigh about 14 oz. per foot super. Copper slowly oxidises when exposed to the atmosphere; but, as is the case with zinc also, the oxidation is confined to the surface only, and it does not continue to eat into the metal as with iron. Copper has been used as a roof covering far more abroad than in this country; but one large building in London,—the British Museum,—is, I believe, almost entirely roofed with sheet copper. In localities where chemical fumes are abundant, copper should not be used, as it freely combines with most of the acids.

Iron is not a good material for a roof covering, as it is so surely eaten away by the process of oxidation, or, in familiar language, because it rusts very quickly. In order to prevent this, what is called galvanised iron is chiefly used for roofs. The process of galvanising consists in precipitating a thin coating of tin upon sheets of iron by means of weak galvanic action, and then immersing the sheets in a bath of liquid zinc. Thus treated, iron will last for a long while, but when used for roofs, it is almost impossible to avoid nailing it, and where that, sooner or later, water will make its way into the iron core, and this will begin to rust internally, and cause the thin external coating to come off in flakes.

One of the best and most durable coverings for roofs is lead. There are two kinds of lead, called cast lead and milled lead, the latter being formed from the former by passing it through a mill between the rollers adjusted so as to give the metal the required thickness, which varies from 0.68 in. to 0.33 in., the weight of these two extremes being 4 lb. and 14 lb. per foot super. Cast lead used to be preferred to milled; and even now, if sloping roofs are covered with lead, it will be advisable to use the cast, but for flats and gutters the milled lead should be used. Lead is frequently used too light, and you should never lay a gutter or flat with less than 7 lb. lead; but you may use the lighter qualities for flashings. Lead, in common with other metals, undergoes considerable contraction and expansion with changes in temperature, and consequently it should always be laid so that it is free to move without cracking, soldering and nailing being avoided as far as possible. It is this expansion and contraction that render lead undesirable for covering a sloping roof. During the warmth of the day it will expand, and during the night gravity it will expand downwards more than upwards, and consequently it will creep down the roof. Professor Tyndall stated that on the

roof of Bristol Cathedral the lead crawled down 18 in. in two years.

Milled lead is generally made in sheets, about 7 ft. wide and 25 ft. long, so that if you have to cover a large flat you must have lateral joints, and as the expansion and contraction are considerable, it would be unwise to lay it in sheets of the full length. The proper way of forming the lateral joints is to nail fillets of wood on the flat boarding. These should be about $\frac{1}{2}$ in. by 2 in., rounded at the top in order to avoid sharp angles, which would crack the lead. This should be dressed close up to and half way at least over the roll, while the next sheet is brought up to the other side of the roll and lapped completely over it and the turned up portion of the first sheet. If the lead is closely hammersd down with wooden mallets no nailing is required. When a cesspool is required in a gutter or flat, it is a very common thing to cut the sheet of lead into small pieces to fit the sides of the cesspool and to solder the joints, but this is a bad plan, and you should always form your cesspools out of single sheets of lead, hossed up, as it is called, without solder. In some positions, as, for instance, round skylights, nails are required, and these should always be of copper. It has been frequently remarked that lead is not now supplied of such good and durable quality as used to be the case, and Professor Frankland has made some important investigations on this subject, and curiously enough has arrived at the conclusion that it is because it is purer than it used to be. Lead always used to contain a considerable quantity of silver and arsenic, but the modern methods of extracting the silver are so much more perfect than they used to be, that there is now very little silver in the lead supplied to the London market, and this is the cause of its wearing out quicker. Another reason is probably to be found in the fact that we now use timber much less seasoned than it used to be. Oak, for instance, if not free from sap, contains pyroligneous acid, and this has a strong affinity for lead, which will be affected by it even if not in actual contact. Very minute holes are found in lead that has been laid on timber for some time, and these are formed by the tiny larvae of an insect called *Callidium bajulum*, which is nourished in wood, and has been known to make its way out by eating through sheets of lead one-sixth of an inch thick. It is important that the boarding on which lead is laid should be quite close, and, in fact, for good work it should be grooved and tongued. If you were to take up some sheets of lead that had been laid for some time over a hall like this, for instance, where gas is frequently burning, and large assemblies are held, you would be very likely to find, if the joints of the boarding were not close, that along those joints the lead had decayed and been turned into white lead on the underside, and on the top. This is caused by the fact that although moist air quickly tarnishes the bright surface of the metal, and forms a thin film of oxide, it does very little more than this by itself; but if a very small quantity of carbonic acid be present (and this, you know, is always given off from living persons, and also from the combustion of coal gas), the oxidation and decomposition proceed much more rapidly. You must not, therefore, imagine that any roughly-laid boarding will do for lead if you want it to last.

I now come to the last metal covering of which I have to speak, zinc. This metal, as many of you are aware, had for a long time a very bad reputation, partly deserved, because the early samples of zinc which were used in this country were much too thin and of inferior quality, and partly undeserved, because the men who laid the zinc did not know the proper way to use it. It has, however, been very extensively used on the Continent, and during the last fifteen years the consumption in England has enormously increased. This is largely owing to the enterprise of the Vieille Montagne Company, of Belgium, who supply the metal in a very pure state, and who, by means of their agents, have laid down the principles according to which it should be laid. Zinc should be absolutely pure, as it will very soon decay if it contains only a small percentage of iron. It is a very light covering, the No. 16 gauge, which is the thickest that, under ordinary circumstances, need be used, weighing only 24 oz. per square foot; a very material difference this from lead weighing 7 lb. per foot super. Its expansion and contraction are greater than that of any other metal, and hence

it is of the most essential importance that should be laid perfectly free and unconfined every place where solder has to be used has an element of weakness. Zinc can be laid without hoarding, but this plan can only be recommended for sheds and such-like places, but, if properly laid on hoards, it forms a covering scarcely inferior to lead. Messrs. Brahy & Co. have been kind enough to send some models showing the proper way of laying zinc. The hoarding should be even a close-jointed, and upon this wood rolls should be laid 2 ft. 10½ in. from centre to centre, under the wood rolls, and kept down by these placed at intervals of about 3 ft. zinc clips which are dressed closely against the side of the roll, and are then turned over, forming a fold which clips the sheet of zinc, which is turned up under it. Over the top of this roll is close dressed down a zinc cap, which is secured by small pointed pieces of zinc, which slip in under the hooked portion of the clip. This is the method of forming the lateral junctions between the sheets. The longitudinal junctions may be formed in two ways. If the roof has a slight fall clips can be nailed on the hoarding, and the zinc need only be dressed over and under these; but for a flat or gutter drips are required arranged in much the same way as for lead. It was formerly the practice to solder the zinc at the top and bottom of the rolls, but Messrs. Brahy have recently contrived to fold over the zinc, so that solid unsoldered stopped ends and rigid plates can be formed, and this is a very great improvement.

Very ornamental roofs can be formed with zinc tiles cast to a pattern, and the large Mansards at the Grand Hotel, Charing-cross, with the cresting, finials, lunettes, and everything, is formed of zinc. Of course these zinc tiles must be nailed, and the original plan was to punch the iron in the zinc through which the nail was driven, but the punched hole, of course, made a depression in which the water accumulated, and now the hole is punched from the underside, and a small convex boss is formed, in the centre of which the nail is driven, and the water is thus thrown off from the nail-hole. These zinc tiles can only be laid at a very steep pitch.

I have now described the principal roof coverings in general use. There are others such as thatch, asphalted felt, Dachpapp, a material much used in Germany, and consisting in the main of brown paper, and various others; but these are only used in exceptional circumstances.

THE SELECTION AND PRESERVATION OF BUILDING STONES.

In the course of the discussion which followed the reading of Mr. John Slater's paper on "Building Stones."

The President (Mr. Cole A. Adams) said that the thanks of the Association were due to Mr. Slater for the practical manner in which he had treated the subject. His hints for the guidance of architects in the selection of stone were particularly useful, and of no less importance were his remarks as to the proper bedding of stones on its natural bed. Insistence on this was familiar enough in specifications; but when it came to be practically applied it was not always possible to see that so important a requirement was fulfilled; for when a stone had been worked by the mason it was often very difficult (especially with certain kinds of stone) to tell which was its natural bed. Some masons, he believed, were in the habit of marking the stones they worked so that they might know afterwards which was the natural bed of the stone. As to the stone used at the Houses of Parliament, there was no doubt that its repair entailed an enormous cost to the country annually, and that this outlay would have been saved by proper care in the selection of the stone at the outset. But there were some who were of opinion that however carefully a stone might be selected and hedged, it was often irreparably damaged and rendered an easy prey to decay by the pernicious practice of "cleaning-down" by the masons,—especially when the building was finished some months, perhaps a few years, after some of the stones had been

* Read before the Architectural Association and printed in *extenso* in the *Builder* (see pp. 367, 423, ante).

placed in position. Those who held that opinion contended that each stone should be cleaned as it was placed in position, without any attempt at a general cleaning-down of the whole when the building was finished; for, they argued, when a stone was put into its place soon after it was worked, in the course of nature there was set up a kind of efflorescence on the surface, which in time became hard, and ought never to be disturbed. It was, in fact, an effort of nature for self-protection, and the case-hardening thus set up ought never to be interfered with, for its removal would leave room for the admission of the germs of disease. One mason with whom he (the speaker) had conversed on the subject thought that the dipping of each separate stone after working into a tub of prepared liquid lime was a good preservative. Mr. Slater had spoken of "weathered" stone, but how long after stone was quarried should it be kept before "working"? He could not help thinking that a great deal of the unhappy results in the shape of decaying stonework in recent buildings might have been prevented by proceeding a little more deliberately with the work than the hurry and bustle of the latter half of the nineteenth century allowed. He could not but think that the old builders, if only we went back fifty years, were not so "driven" as were the builders of the present day. In the old days, the erection of a building was not settled upon one week, commenced the next week, and finished a few months afterwards; but care was taken in the selection of the stone and other materials, so that if the work was proceeded with more slowly than was conformable to modern practice, the possibility of a much better result was almost assured. As to the use of linseed oil as a preservative, he presumed that the oil would sink into the pores of the stone, perhaps to the depth of an eighth of an inch or more; but what effect would that have on the face of the stone at some future time? He remembered Mr. Hamo Thornycroft once speaking of the Elgin marbles, and expressing his belief that they had once been decorated with colour, and that the vehicle or medium by which the colour was applied was oil. Mr. Thornycroft remarked that he was led to that conclusion by the fact that the skin of the marble appeared to have flaked off where it was most probable that the colour was applied.

Mr. L. C. Riddett, in moving a vote of thanks to Mr. Slater for his paper, observed that there was no doubt that during the last half-century the question of building stones for use in London had become a very important one; for, owing to the great facilities of transport which now existed, the varieties of stone to be obtained were much more numerous than in the days of Sir Christopher Wren. During the last fifty years many building stones had been tried in London, but nothing better than Portland stone had been discovered; indeed, it might be said that Portland stone was "your only wear" for London. As to Bath stone, he thought the architect who used it in London for external purposes was simply robbing his client. Any particular bed of stone was no doubt something like a brand of cigars—the stone obtained a certain name and repute so long as the bed held out. When the bed was exhausted the stone from possibly an inferior bed went by the same name, just as the name of a brand of cigars was retained even when the plantations which produced the tobacco from which they were first made had ceased to produce plants of the best quality. With regard to the stone used at the Houses of Parliament, he believed it was a fact that the Commissioners, after a very long inquiry, settled upon and recommended a particular stone, but failed to ascertain whether that stone could be obtained in sufficient quantity for so extensive a series of buildings. Architects were constantly plagued by the receipt of circulars advertising particular kinds of building stone, accompanied by testimonials and analyses given by gentlemen enthusiastic in their praises of the stones in question. There was only one advertisement for stone,—the evidence of its having endured in the buildings in which it had been used. We in London had no local stone, and, therefore, if stone were to be used at all, it must be a question of importation. Before deciding on what stone to import, the architect could only look around him and see what stone had worn the best in our London atmosphere. The evidence always seemed to preponderate in favour of Portland stone. He knew that Gothic men objected to Portland

stone because it wore so white and gave a bleached appearance; but, probably, if architects were to design with greater fitness and breadth of effect they would be able to discount that objection. He looked with considerable interest to the effect of the weather during the next twenty years on the New Law Courts,—the first large Gothic building in London in which Portland stone had been used for the exterior; it would be interesting to see whether Mr. Street had taken into account the bleaching of the stone which would occur after a few years. In the selection of building stones, the two problems to solve were the selection of a stone for external use, and the choice of a stone for internal wear, in steps especially. The wear of a stone staircase was so serious that the steps would generally require renewing during the first twenty-five years of a building's existence. He had seen a useful proposal in the drawings of one of the members of the Class of Construction, which consisted in the provision of movable stone treads, allowing of easy renewal. It might not be known to every member of the Association that when the Houses of Parliament were about to be built, Mr. C. H. Smith offered, for 200l. or 300l. a year, to test every block of stone brought upon the works. Sir Charles Barry asked that this might be done. The Government of the day intimated that they had no objection to Mr. Smith's offer being accepted, but that Sir Charles Barry must pay the expense which would be involved by its acceptance! As every one knew, the Houses of Parliament was a very elaborate building externally, and it was scarcely to be supposed that the masons selected the hardest blocks of stone they could find for the execution of elaborate details. Mr. Slater had referred to the use of linseed oil as a preservative of stone under certain circumstances. He had seen it directed in North Country specifications that the weatherings of all coping-stones, &c., should be painted. He was not sure but that the adoption of such a course would be harmful, for the effect of the top coat of paint would be to shut the damp in, and the result would be, probably, somewhat analogous to the injurious effects which followed from the painting of an oak sill. Twenty years or so ago the minds of stone-inquirers were very much exercised as to the methods of preserving stone, and various patented "solutions" for coating the material *in situ* were put forward, notably Szelemey's, Ransome's, and the water-glass process. In his opinion, all these things had been found wanting. Most of them had shelled as their basis, and it was only a question of time how long a preservative coating of that kind would last. Probably if stone could be worked in summer and kept unfixated through a winter it would be much better able to withstand the effects of the London atmosphere. The process of "cleaning-down" had, doubtless, much to answer for, and, as the chairman had said, it should either be done as the building was carried up, or left undone. But the process of "cleaning down" was one dear to the heart of the mason, although much of the interest of the building seemed to vanish as the scaffolding was struck. It should not be forgotten that there was a "dry cleaning" as well as a "wet cleaning," and that the former was much less injurious in its effect on the masonry than the latter.

Mr. G. H. Blagrove, in seconding the motion, said that one important and valuable stone not mentioned in Mr. Slater's paper, viz., Craigleith, which was very hard to work, and the particles which got into the lungs of the masons had a very deadly effect, being so sharp. He had been told that five years' work in such a stone would kill a man. He admitted that implicit faith was not to be placed in advertisements; but other materials than stone were advertised, and though many were advertised, few were chosen. As far as his experience went, Red Mansfield lost its colour after a few years' exposure to the weather. There was a Red Corsehill or Dumfries stone, which was of a darker red and kept its colour better in London, but this stone, he was informed by masons, was more liable to laminate. Yellow Mansfield stone was used in the Temple Bar Memorial, and was hardly distinguishable in colour from the Craigleith stone used in the same work. In stones where the differences of colour were sharply marked, there was, he believed, greater risk of the stone coming to grief than in stones where the

alterations of tint were gradual. As to detecting the natural bed of a stone, masons had a good many "dodges." One of them was to look for the mica in sandstones, the face that contained the greatest amount of mica being the bed.

Mr. Leonard Stokes thought that Corsham stone might be made passably durable for external work if it were rubbed to a smooth surface, so that the water might heretofore shot off from it. Although, no doubt, there was much to be said for bedding masonry on its natural bed, he had been told by a mason that every piece of masonry that overhung or was "throated" should be "joint-bedded." He thought there was some force in that.

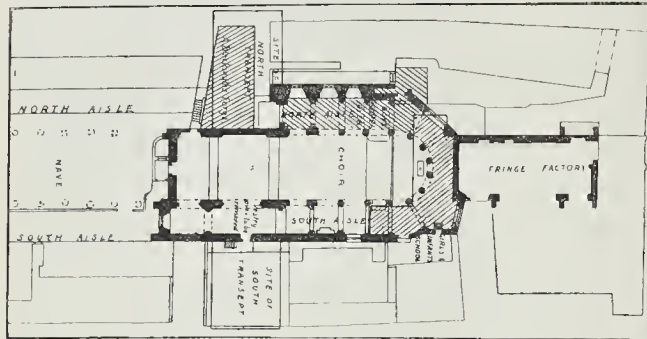
The Chairman having put the vote of thanks, Mr. Slater briefly replied, and the meeting was brought to a close.

COMPETITIONS.

Hartwood Asylum, Glasgow.—At a meeting of the Glasgow District Board of Lunacy, held on the 18th inst., the Chairman (Lord Provost McOnie) moved the adoption of the minutes of meetings of sub-committee on Hartwood Asylum. At a meeting of the sub-committee on 21st January, it was resolved, after discussion, to recommend the selection of ten architects who should be asked to prepare competitive plans, on condition that each of the ten architects who might compete should be paid a premium of 50l. sterling; that on payment of the premiums the respective designs should become the absolute property of the District Board; that the District Board should not be held as bound to execute the work according to any of the plans to be obtained; and that the District Board should be at liberty to employ as architect for the buildings either any one of the architects competing or any other party. In answer to an advertisement in the newspapers, it was reported by the clerk at a meeting of the sub-committee on 4th March that eighty-three architects had forwarded their names in response to the advertisement. The conditions of the competition were agreed to. It was suggested by Mr. Laing that a maximum sum should be named to the architect, and he suggested 120,000l. After discussion, it was agreed to leave the matter to the architects. The following architects were selected:—Baldie & Tennant; Campbell, Douglas, & Sellar; John Baird; James Thomson; Bruce J. Hay; John Burnett & Son; Francis Striratt; H. & D. Barclay; Henry Higgins, jun.; Landless & Clifford.

Blackburn.—A limited competition for new schools in connexion with the new Jerusalem Church, Blackburn, the estimated cost not to exceed 1,000l., has been decided in favour of Mr. Robert Nightingale, Town Hall-square, Bolton. Seven architects were invited, no premium except the appointment of architect being offered. Five of the architects competing were from Blackburn.

Edinburgh Architectural Association.—On Saturday last the members of this Association, under the leadership of Mr. Thomas Ross, visited Granton Castle, Royston, and neighbourhood. Mr. Ross, in the course of his remarks, said that in Granton they had a type of building which had been designed to resist attack, perched on the summit of a rocky knoll overlooking the Firth of Forth, with enclosing walls loopholed for guns, and a walk behind for the defenders. Much of this castellated character had, however, disappeared, owing to alterations which had taken place between the years 1544 and 1696. On the other hand, they had in Royston a stately house, built for the reception and entertainment of guests, but with little or no thought of defence; but, like Granton, extremely characteristic of the Scottish architecture of its period, and further interesting from the alteration it underwent in 1696, when its south front was transformed from the homely Scottish style, and of which Royston is one of the earliest and best examples. At Granton they had a building of the familiar L plan, with a circular staircase and entrance at the re-entering angle. The kitchen appears to have been in the north wing, and is now the only vaulted part of the main building. Perhaps the most interesting features of Granton are the surrounding walls, which follow anglewise the outline of its rocky site, and the skillful way in which the entrance has been chosen so as to be enflamed by a return in the wall at a point where the rock is highest and steepest.



St. Bartholomew-the-Great, West Smithfield.—Plan.

Illustrations.

ST. BARTHOLOMEW-THE-GREAT, WEST SMITHFIELD.

WE noticed in a previous issue the letter which appeared in the *Times* from the Rev. W. Panckridge, rector of this most interesting church, calling attention to its present condition, through the secular encroachments which have been made from time to time, and appealing for funds in order that the opportunity which has presented itself of purchasing these encroaching properties (shown on the accompanying plan) may not slip.

To those who do not know the church it would appear incredible that one of the finest among the very few Mediaeval churches remaining in the City of London has had for centuries, and still has, a frings manufactory overhanging the sanctuary, and occupying the actual walls of the Lady-chapel; a boys' school occupying the north triforium; and a blacksmith's forge the site of the north transept, blocking up the great arch of the crossing,—the vestry blocking up the opposite south arch.*

Our view of the east end shows the projection of the manufacturing premises referred to, and our other view shows the northern arcade, with the founder's tomb, erected to the memory of Rahers by Prior Bolton, who carried out considerable alterations to the church from 1506-32; and these two views show the interesting architectural character of the building.

In 1863 a Restoration Committee was formed by the late rector, the Rev. John Abbiss, and under the advice of the architects, Messrs. T. Hayter Lewis & William Slater, the church was considerably improved,—the floor lowered, the foundations of the four great piers repaired, the building drained and warmed, and many other necessary works carried out, though funds were not then forthcoming to purchase the encroaching properties. The architectural history of this church was published at this time by the Restoration Committee in the shape of an admirable lecture by the late J. H. Parker, C.B. An influential committee is now being formed, and we see by the circular which has been issued that Mr. Aston Webb has negotiated for the refusal of these properties, and from his report appended it appears that the amount required for urgent works, and the acquisition of the properties, will not be less than 20,000l.

We can only express a hope that the funds may be obtained and the church freed from these encroachments, which are a constant source of danger from fire, a serious hindrance to the well-attended services, and, we must add, little creditable to the great City of London.

WORKMEN'S DWELLINGS, CARTWRIGHT STREET.

THE block of labourers' dwellings, which we illustrate this week, is situated in Cartwright-street, a street running north and south between Royal Mint-street and Upper East Smithfield, along the eastern side of the Royal Mint.

A large area of unhealthy dwellings was cleared away at this spot by the Metropolitan Board of Works under the Artisans' Dwellings Acts, and in the early part of this year, the cleared land was put up for sale by auction in

* The portions which are overhanging are shaded on the plan.

lots by the Metropolitan Board, subject to covenants that it should be used for the construction only of workmen's dwellings, naming the minimum number of persons to be housed on each lot and the minimum expenditure to be incurred in building; and one lot, having 372 ft. frontage with a depth of about 60 ft., was bought by the East End Dwellings Company, Limited. The effect of these covenants running with the land has hitherto been to reduce the sums obtained for land so sold to something much below its normal value for ordinary commercial purposes, and also to limit the number of parties likely to become purchasers to a very narrow circle, the speculating builder having as yet hardly seen his way clear to profit in dealing with land hampered by these restrictions. Hitherto, in fact, the building on the "unhealthy areas" cleared under the Artisans' Dwellings Acts have been chiefly erected by the large associations, such as "The Improved Industrial Dwellings Company" or "The Peabody Trust," or, in some cases, as Petticoat-square, by the public authorities in themselves.

From this restriction of competition it has followed that, notwithstanding the great outcry in the early part of last year as to the insufficient number of, and the over-crowding in the dwellings of the town poor, there were large blocks of vacant land, cleared by the public authorities in various parts of London, waiting to receive the buildings which should meet the alleged want. Month after month, nay, year after year, this land continued vacant. The large Associations had their hands full and their capital invested, though the land, cleared at the ratepayers' expense, might be purchased at a price less than its value and far less than its cost to the ratepayers.

This state of things existed and still exists in the Whitechapel district, perhaps to a greater extent than in any other part of London, and attracted the attention of the Rev. S. A. Barnett, the energetic Vicar of St. Jude's, Whitechapel. He saw further that the large public associations have hitherto chiefly provided dwellings for the well-to-do artisan class rather than for the lower grades of the wage-earning class, taking as an axiom that no man with a wife and children should occupy less than two or three rooms at a corresponding rental.

Now the greater number of the day labourers at the East End of London earn upon the average less than 1l. a week, though many months may have to be fed out of that small wage, and it was for that class that accommodation of a better kind was more urgently required. As a result of much discussion and many meetings of sympathising friends at the house of Mr. Barnett, a company, called The East End Dwellings Company, Limited, was formed with a view to try the experiment of building a block of dwellings for the worst paid class of labourers on some of the vacant land in Whitechapel, and the first act of the new company was to purchase at auction from the Metropolitan Board of Works the site in Cartwright-street, on which the block of buildings we illustrate has since been erected.

The nominal capital of that Company is 100,000l., of which 50,000l. was at once issued, and no difficulty was found in obtaining a sufficient number of shareholders.

The directors of the new company resolved that their building in Cartwright-street should

be experimental in character, inasmuch as a greater number of the tenements should be of roomed tenements so arranged that they might be let as two or three-roomed tenements to the tenants who could afford to pay the extra rent.

Considering the destructive habits to be expected in a certain number of their tenants they resolved that every part of the building should be of the strongest and simple character, and with a view to the general arrangement of the building and its details they took counsel with many who, as owners, rent collectors, or visitors, had obtained considerable knowledge of the habits and requirements of the class for whom the buildings were principally intended.

After much discussion they resolved to adopt the outside balcony plan of access, with shop open inlet passages to the groups of rooms that three open staircases, one at the centre and one at each end, would give sufficient access to the balconies on the upper floors and provide safe egress in the event of fire; that the balconies should be in the rear rather than at the front; that wash-house accommodation should be provided in the large common back yard or play-ground; and that, as it was impossible, without unduly increasing cost, to give a separate water-closet to each tenement, it would be best to construct groups of latrines (separate for men and women) on each landing of each staircase, these being flushed by automatic flushing tanks acting periodically.

It was also arranged that each landing of each staircase should be furnished with a waste tap and sink for drawing water, instead of laying water on separately to each room, so as to reduce the plumber's work to a minimum.

A large room has also to be provided to be used hereafter as a club-room, or for such other purposes as might in the future be found desirable.

The buildings have been planned in accordance with these views by Messrs. Davis & Emanuel, the architects to the company.

Peccar interest attaches to this block of buildings from the fact that it is, on a moderate scale, an attempt to solve the great problem of the satisfactory housing of the lower working class as a paying speculation rather than as a matter of benevolence, and the working of this company will be watched by many, for it is to a great extent a pioneer company, and if fairly successful may not only extend its own operations, but bring into existence a number of similar undertakings.

Its success or non-success depends on its balance-sheet, and at this moment one side only of that balance-sheet can be defined.

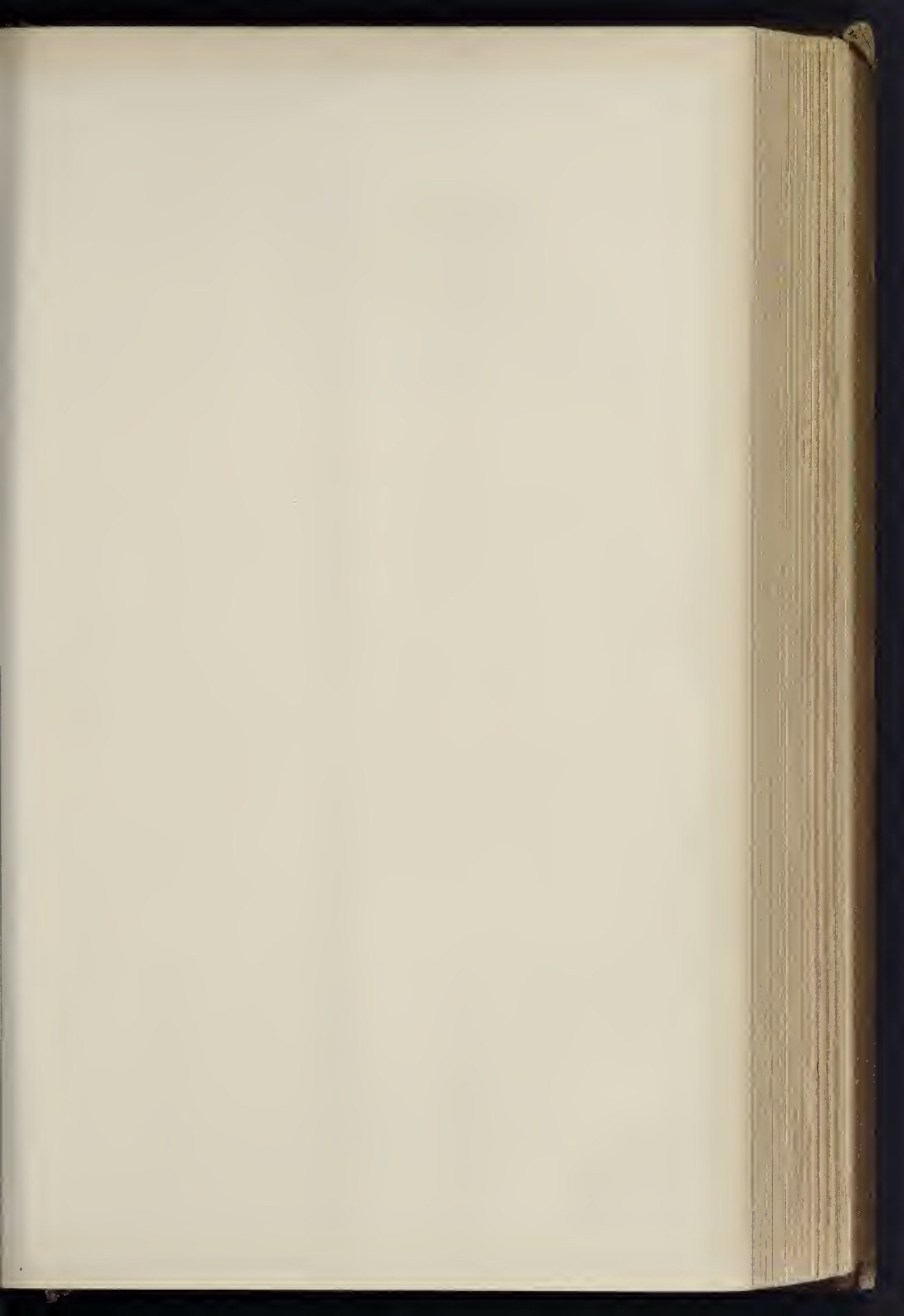
The buildings are sufficiently advanced to enable us to calculate with certainty their costs and it seems likely that as soon as they are finished tenants will begin to flock in. Assuming, however, that the buildings are rapidly filled, it still remains doubtful how much will have to be deducted from gross rental for outgoings in respect of rates, taxes, and, most of all, repairs; and on this point the success or non-success of the scheme very greatly depends.

To the general public the most interesting point is the rental per room which the company must charge in order to secure to itself a dividend of five per cent. on its outlay, and a secondary point of interest is the amount of ground-rent which each room will have to bear. Treating this last point first, we may state that the site contains 25,420 ft. super., and was purchased at auction for 3,650l. At twenty years' purchase, this means a rent for the ground of slightly under 1½d. per foot super. Now the building will contain 281 lettable rooms, thus making the ground-rent per room as nearly as possible 13s. 3d. per year, or 3d. per week; this will give some idea how small a proportion of the rack rental per room is represented by the ground-rent per room, and how large a proportion of the rack rental is represented by the interest on building outlay and by rates, taxes, and repairs.

Below is a tabulated statement of the capital expenditure involved in this experimental undertaking:—

Cost of site	£3,650
Leveling site and excavating and concrete foundations	1,318
Building contract let to Mr. S. J. Jerrard, of Lewisham	13,793
Probable extras, fittings, and architects' commission, say	1,239
	420,000

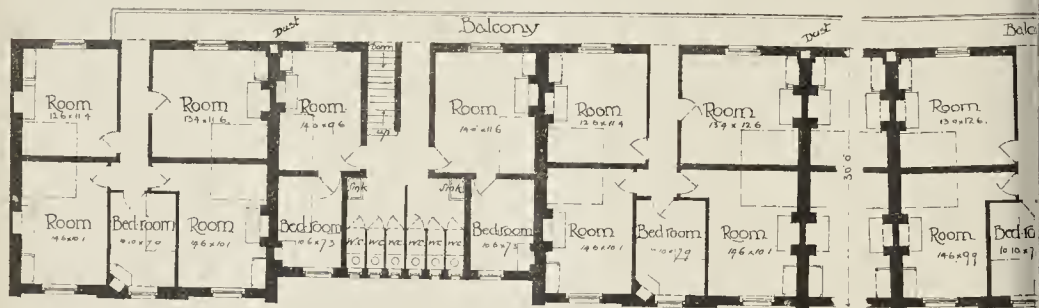
Now, to pay 5 per cent. net interest on



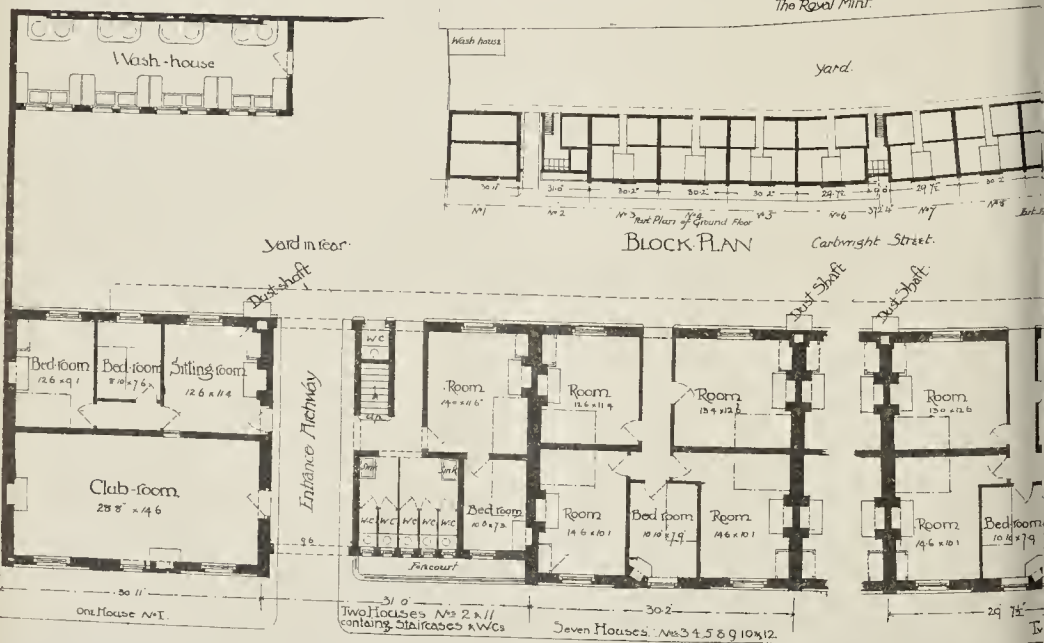


Entrance

Surface of Broadway falls 1 in 4.6



PLAN OF 1ST, 2ND, 3RD, AND 4TH FLOORS



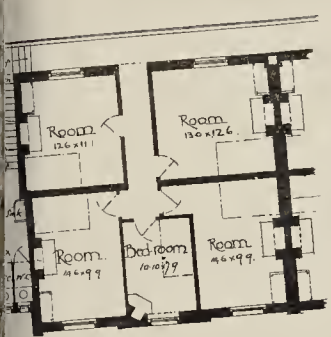
The Royal Mint.

BLOCK PLAN

GROUND PLAN

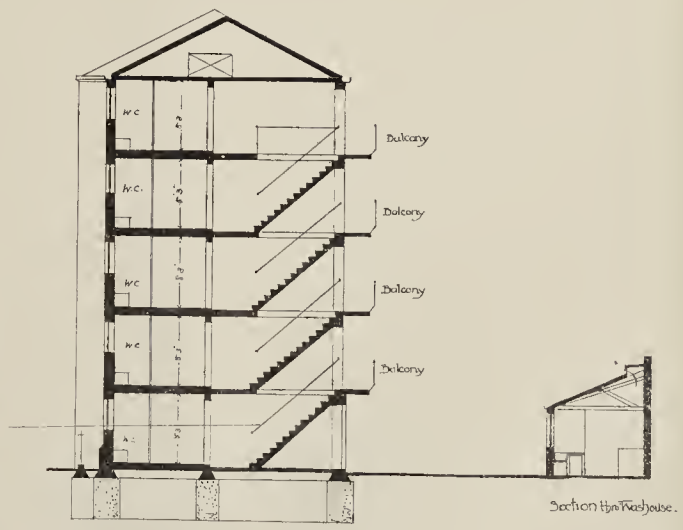
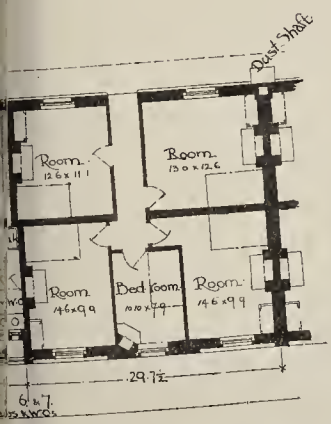


Surface of Roadway falls 1 in 300

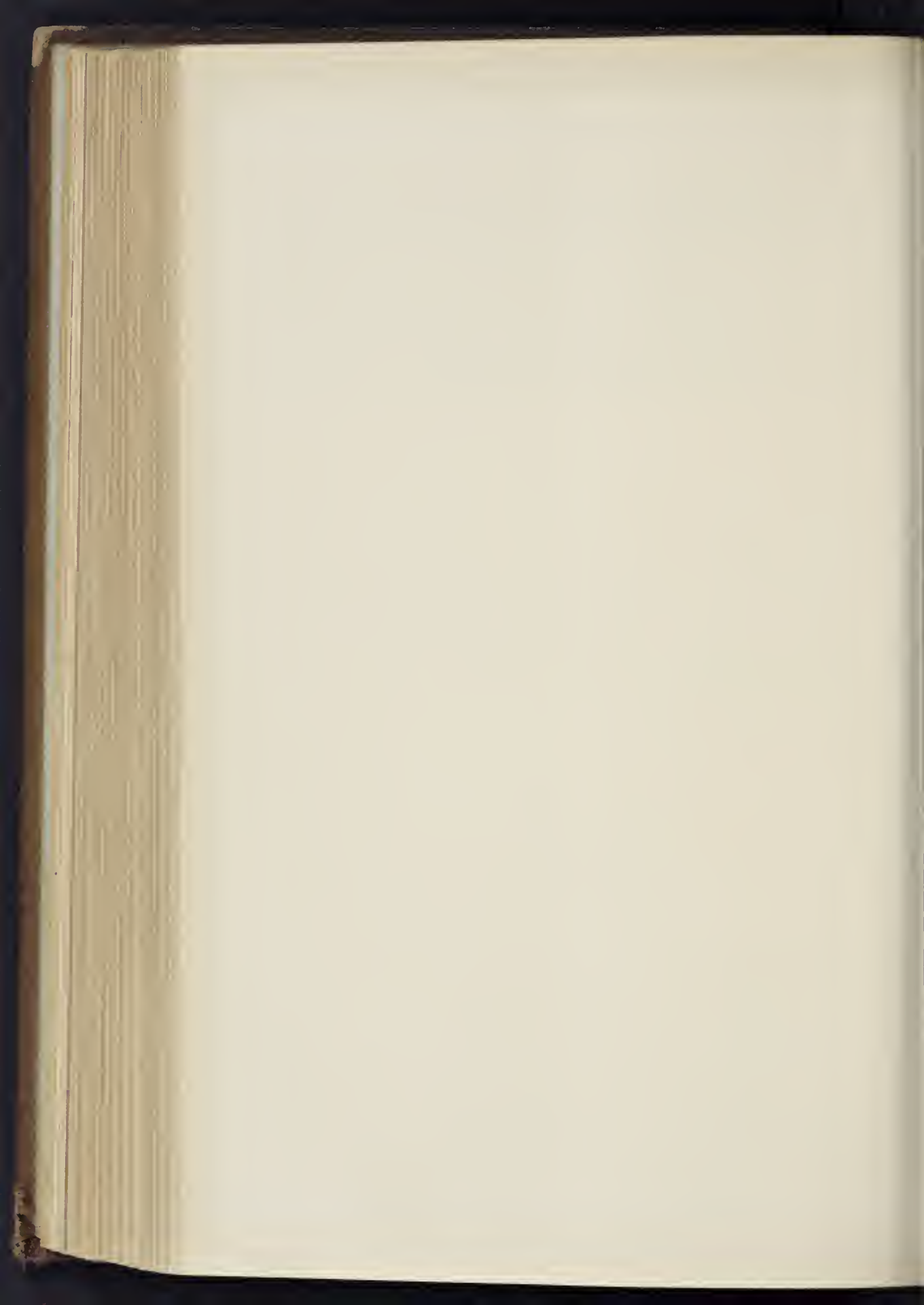


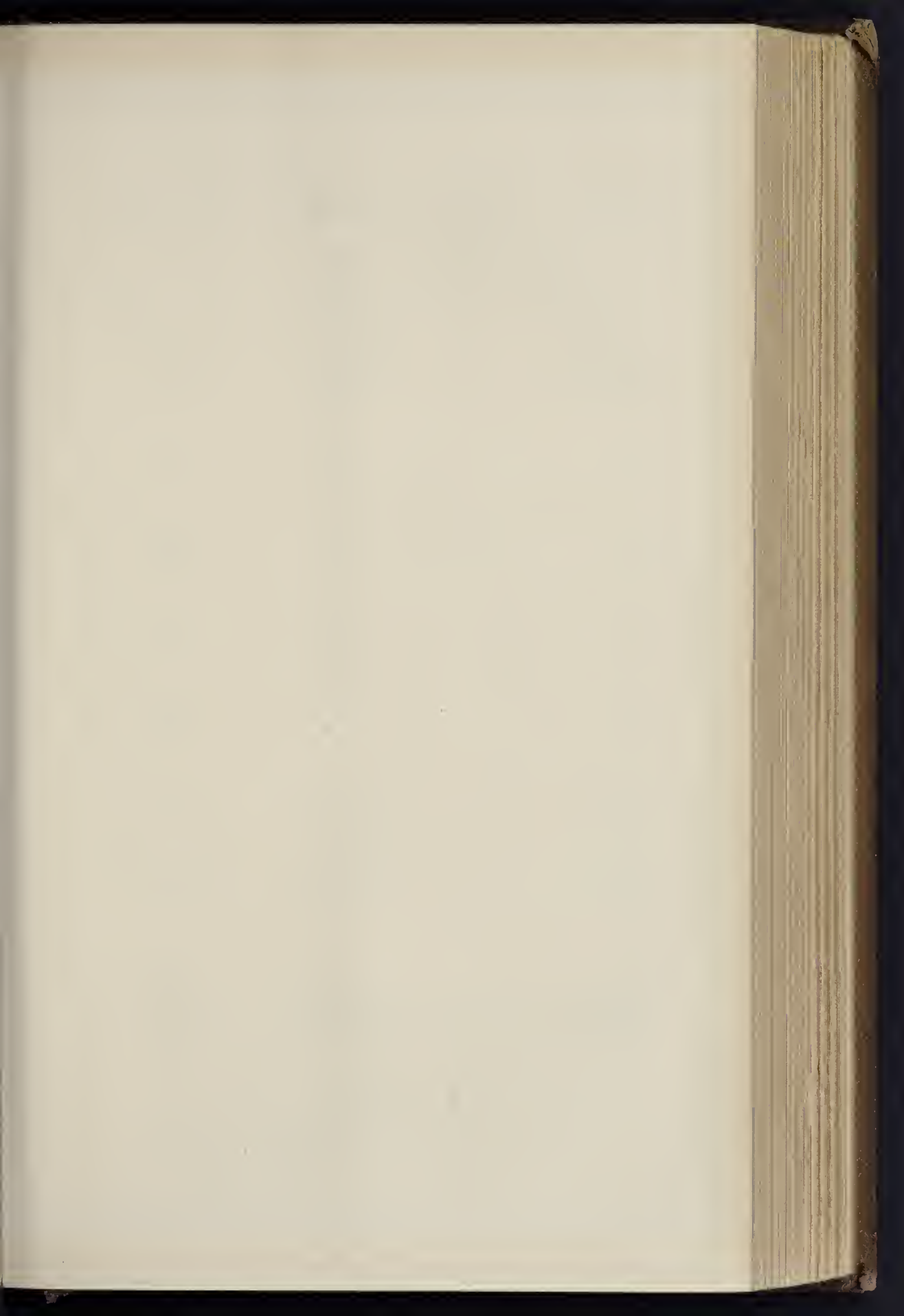
THE EAST-END DWELLINGS COMPANY LIMITED.
LABOURERS' DWELLINGS, CARTWRIGHT STREET ROYAL MINT STREET

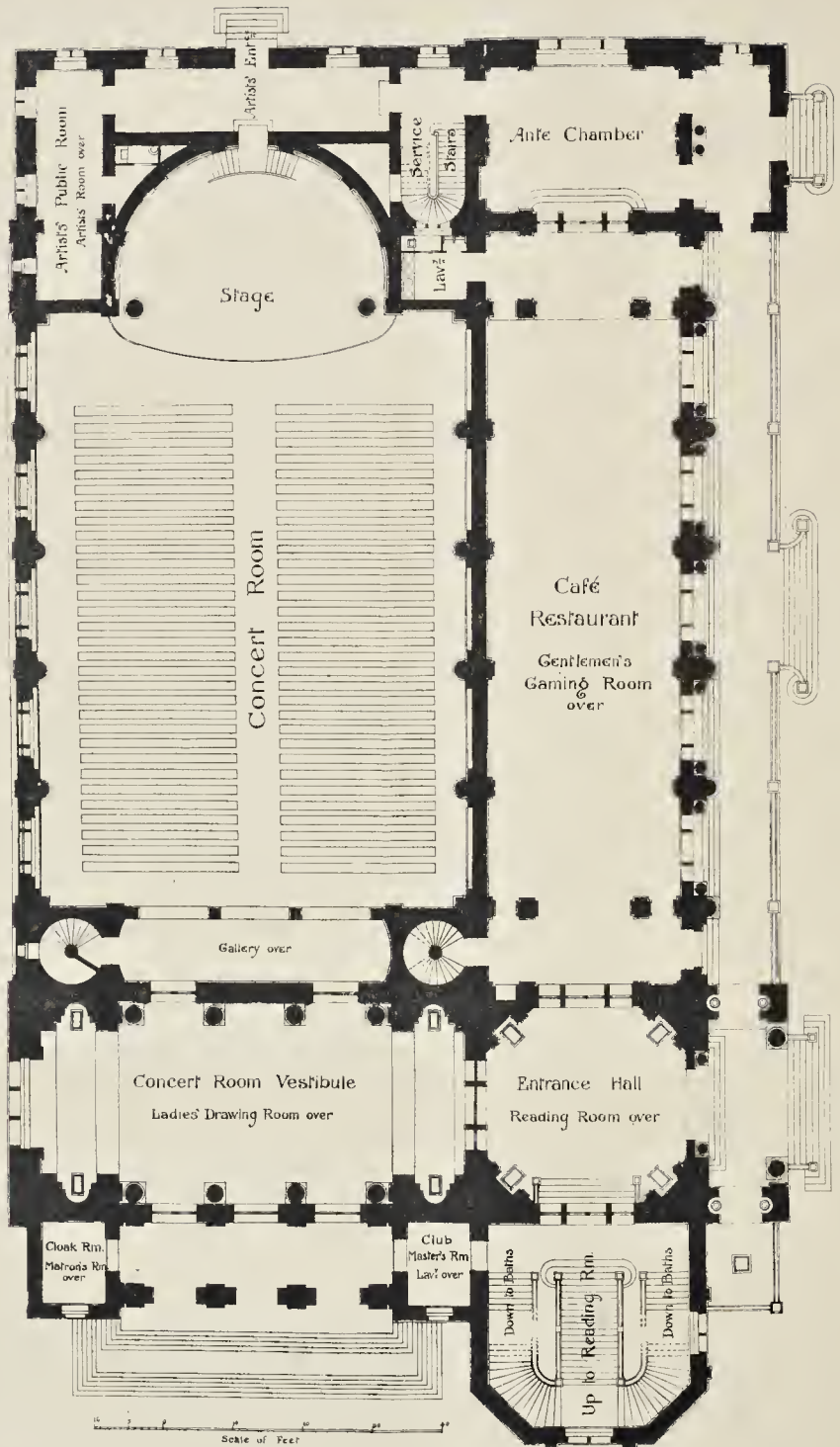
M^{rs} DAVIS & EMMAUEL Architects.



TRANSVERSE SECTION thro STAIRCASE.



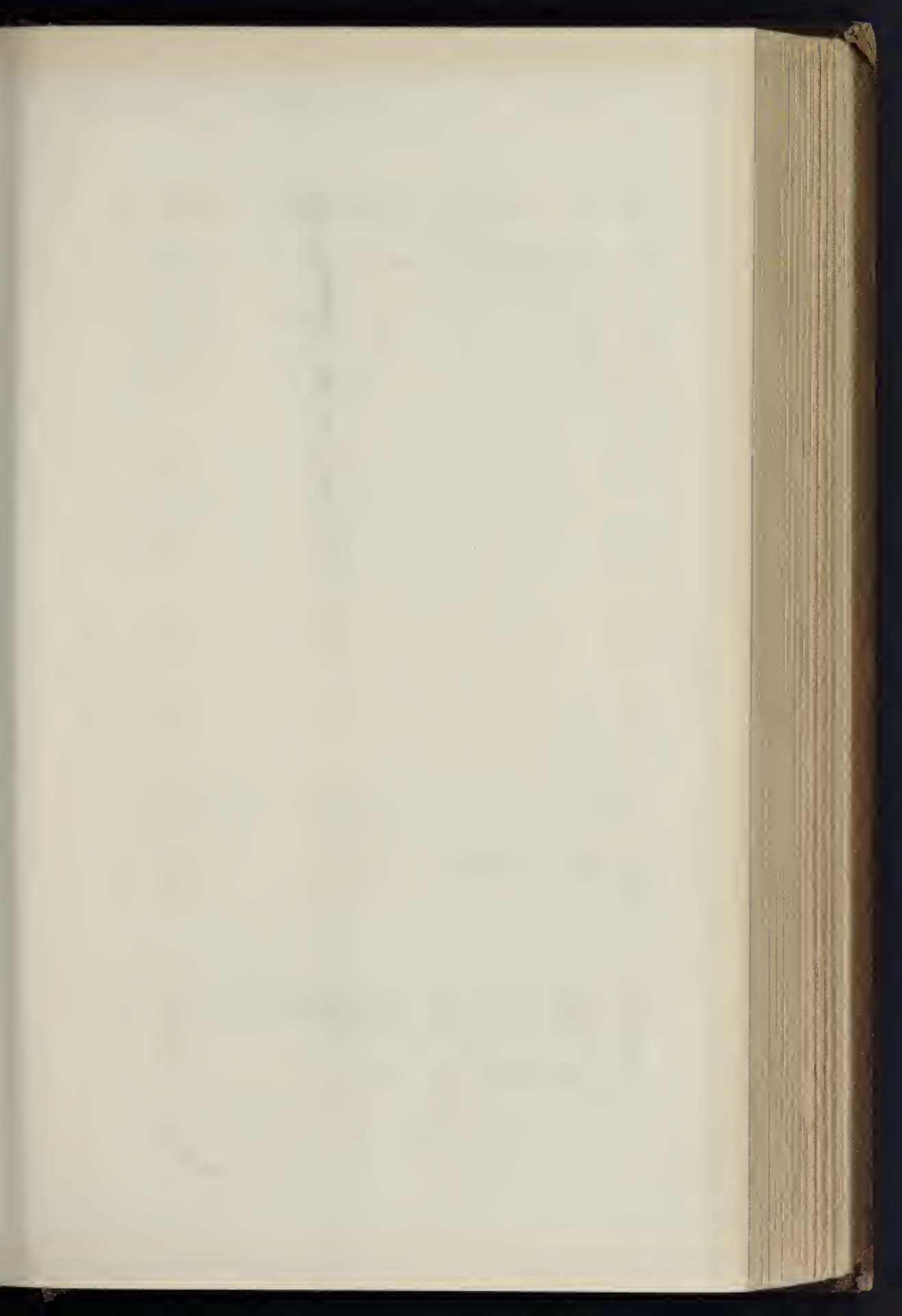




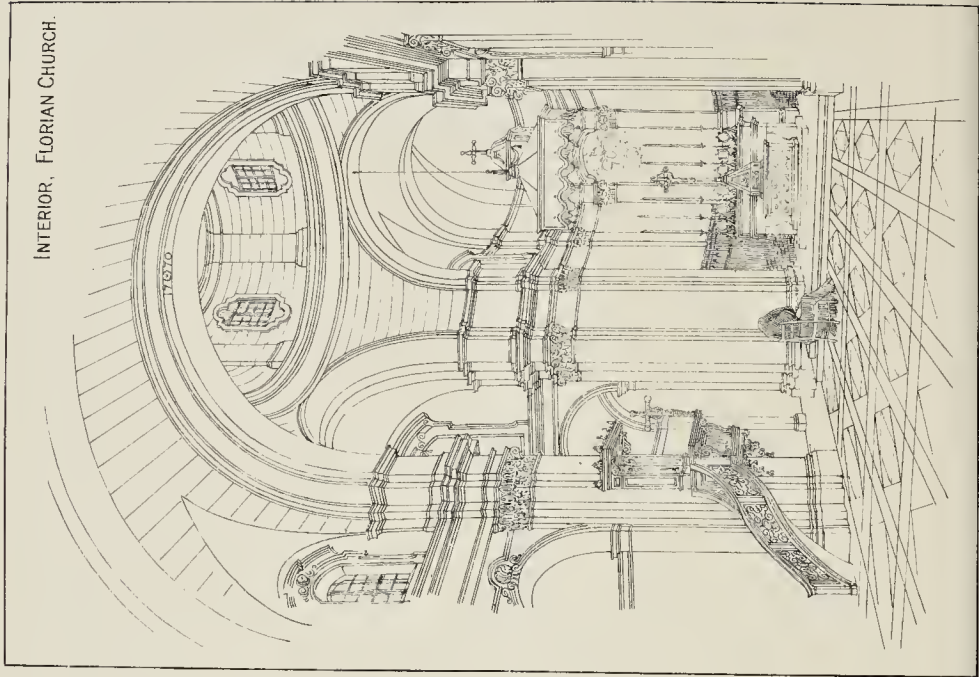
JITE PRIZE. R.J.B.A., 1885.

DESIGN FOR A SEA-SIDE PAVILION, By MR. J. A. CAMPBELL

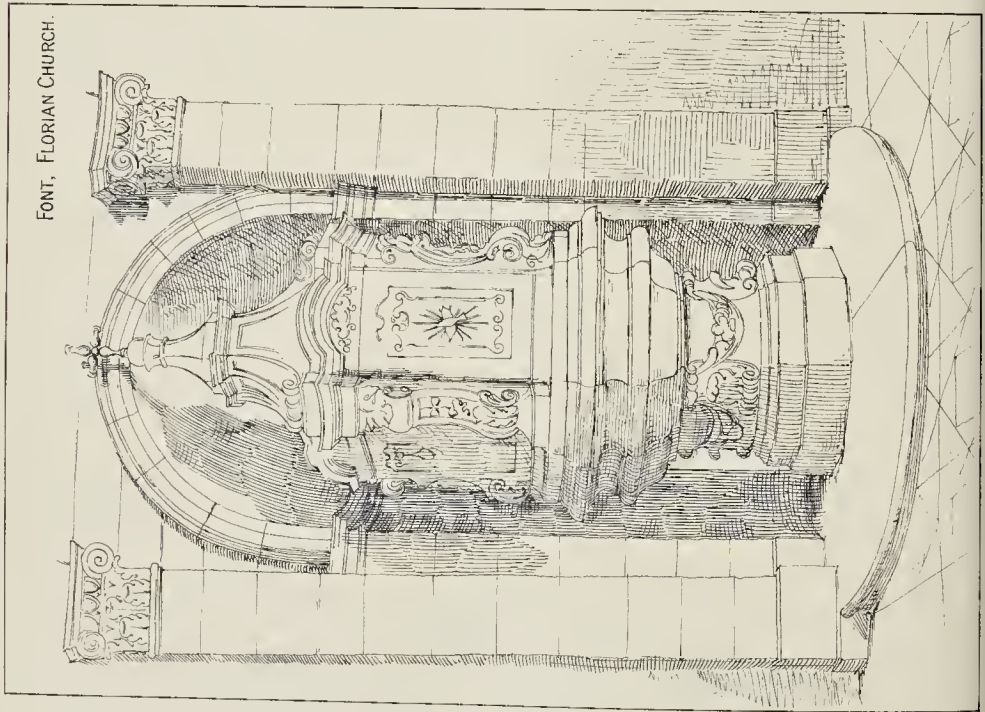
PLAN.

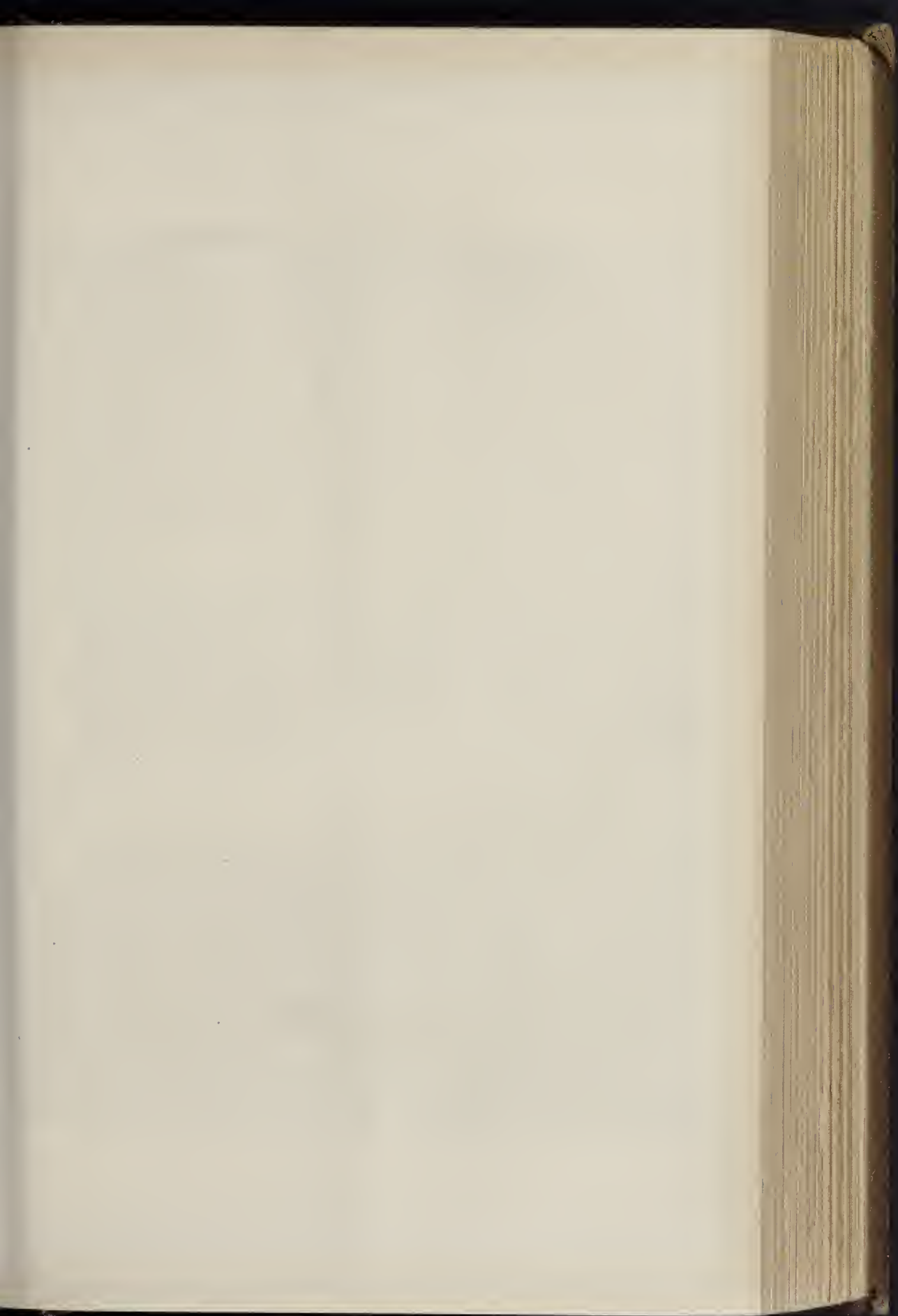


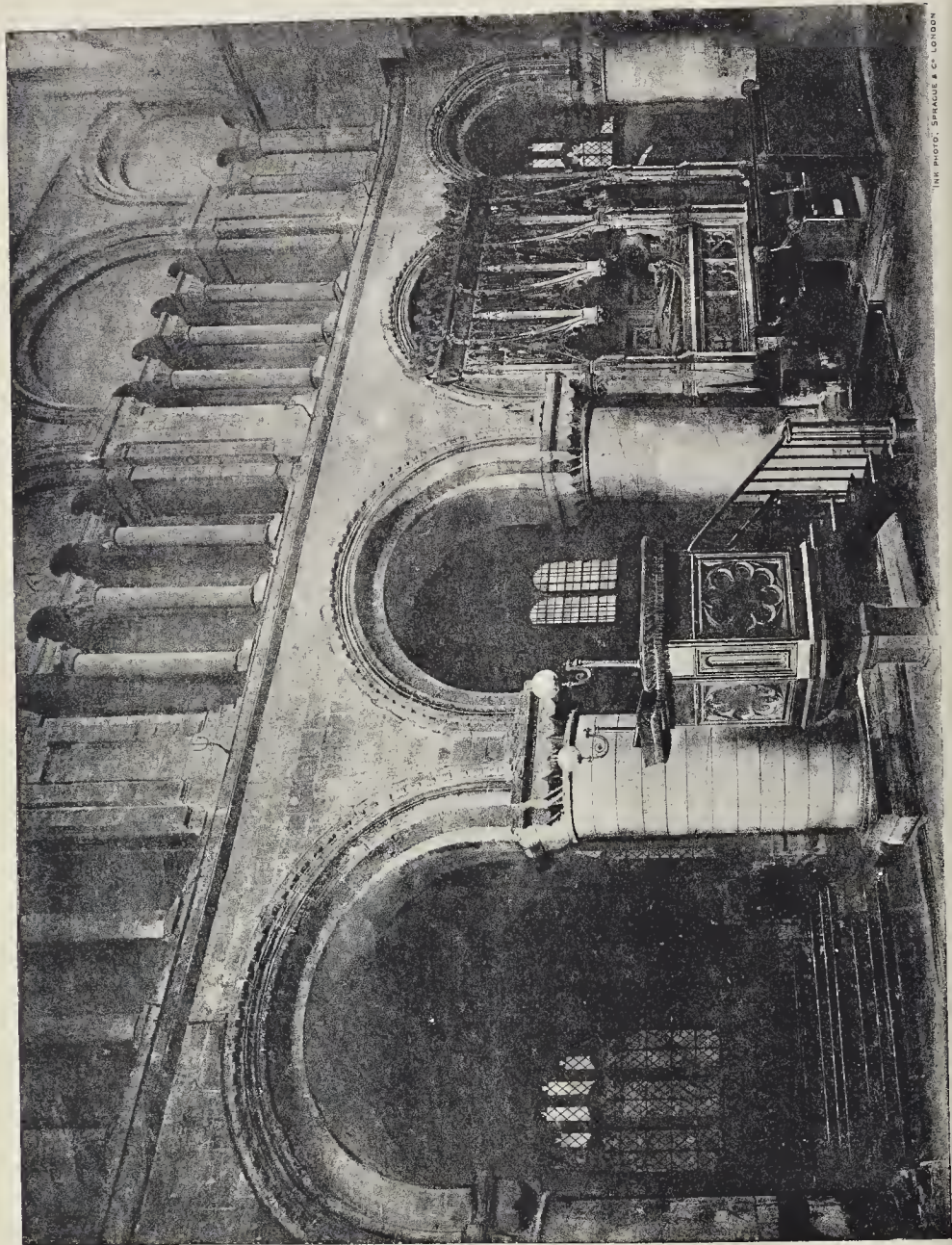
INTERIOR, FLORIAN CHURCH.



FONT, FLORIAN CHURCH.







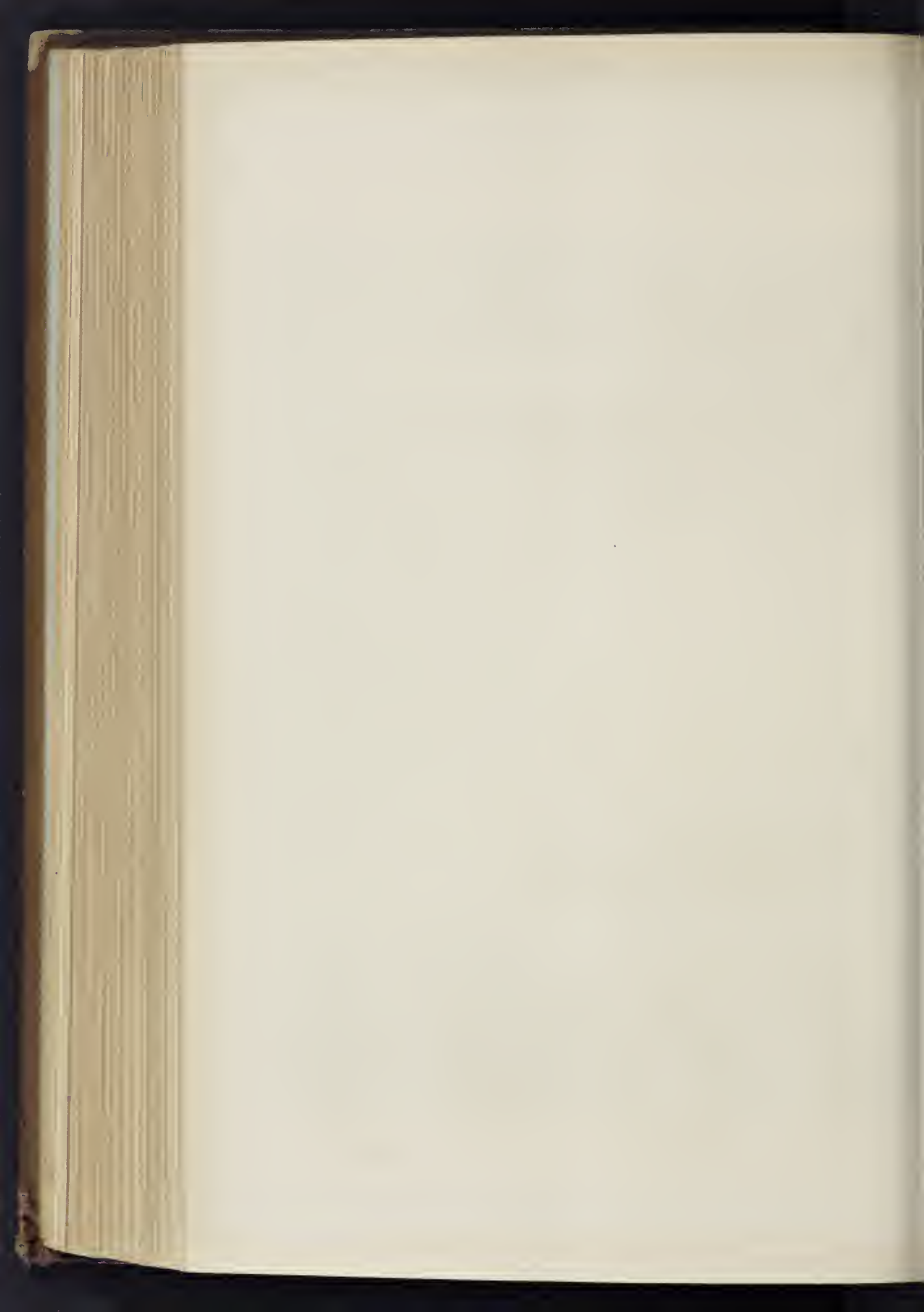
THE PHOTO, SPRAGUE & CO. LONDON

ARCHITECT D.

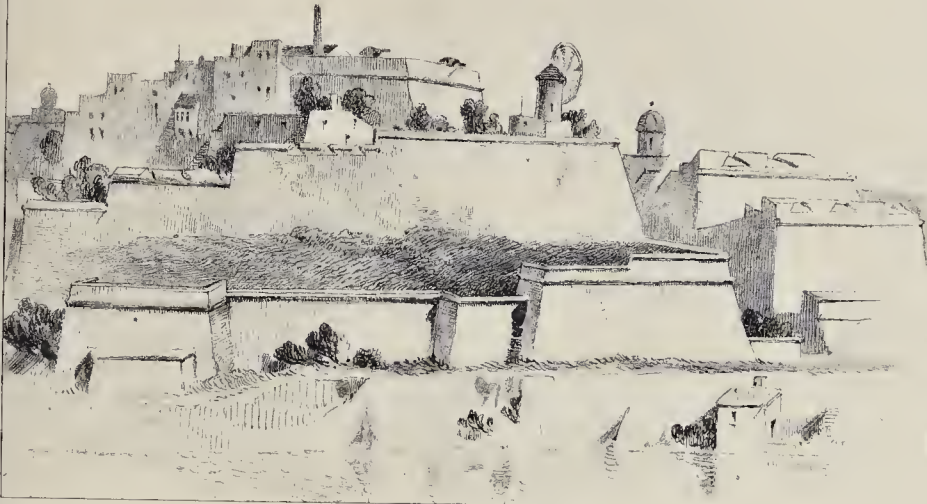


THE PHOTOGRAPHERS, W. & A. G. LONDON.

ST. BARTHOLOMEW THE GREAT, SMITHFIELD
INTERIOR LOOKING EAST, SHewing IRON COLUMNS FOR SUPPORTING
FACTORY BUILDING EXTENDING OVER THE AISLE.



ST. MICHAEL'S BASTION.



CITTA VECCHIA.

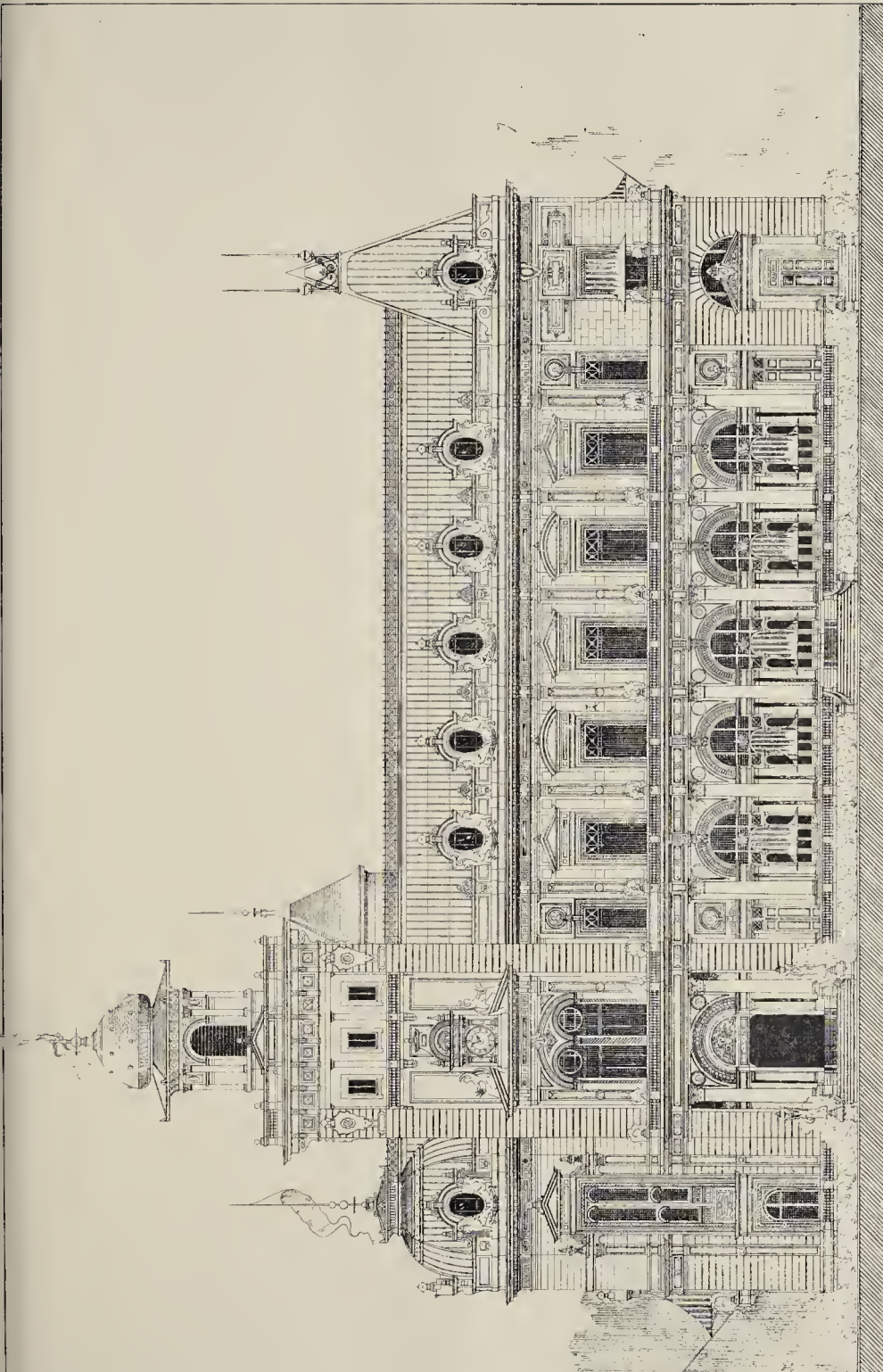


STREET VIEW.



INK PHOTO, SPRAGUE & CO. LONDON

SKETCHES IN MALTA.
SEE "AN ARCHITECT'S NOTES IN MALTA," BY MR E. INGRESS BELL.



F. Kell, Photographer, & Printer, 8, Castle St., Bohman, London, E. C.

TITE PRIZE. R. J. B. A., 1885.

DESIGN FOR A SEA-SIDE PAVILION. BY MR. J. A. CAMPBELL.
ELEVATION TOWARDS THE SEA.

100% capital, the net earnings must be 1,000% or more. Those who have had experience in the housing of the lower grade of the labouring class say 50 per cent., viz., one-half of the gross will be absorbed by allowances for unfurnished and irrecoverable arrears, and by rates, management expenses, and repairs. Whether this is so, the future balance-sheets of the company will tell. If it be true, then the annual rental obtained from this building will be 2,000%. We have already said there are 281 lettable rooms, and this will necessitate an average annual rental of 7l. 4s. per room, viz., as nearly as possible an average of 2s. 9d. per room per week, to be paid to the tenants. The lowest rent for a room in the building will be 1s. 9d., the best 3s. 3d.

Another item of public interest is the cost of the building. The total building, exclusive of land, is likely to be about 100,000l., now, adding to the lettable rooms an allowance for the caretaker's room and the kitchen, the building may be said to contain 300 rooms, viz., about 57l. per room, a result which does not compare favourably with the cost of the speculative builder in our suburbs. A superior class of work, however, must be accounted for the cost, and that, no doubt, will keep down the item of repairs in the company's future balance-sheets. A special expenditure has been incurred in the flooring, but concrete and artificial stone have been used for staircases and landings throughout. The hearths throughout are without trimmings, but formed with concrete in a solid mass on the floor to ceiling under. The fireplaces have chimney-pieces, but have margins of Staffordshire brick projecting slightly beyond the wall face of the work. Each of the latrines has a separate outside window in the outer wall, and is well lighted,—the belief of the directors being that there is darkness there may be filthy. As we are informed, have been spared the details of this building, and it may be hoped that success will attend the East End Housing Company in their interesting experiments.

SKETCHES IN MALTA.

These sketches have been made by Mr. E. Bell in illustration of his article on "An Architect's Notes in Malta," for our issue p. 438.

DESIGN FOR A PAVILION FOR A CONSIDERABLE WATERING-PLACE.

Above is the precise wording of the report set by the Council of the Institute of Architects for the Tite prize, and perhaps interpolation of the unfortunate word "conceivable" may be taken to justify the Doric style of the design by Mr. Penrose, which obtained its author the honor for this year, and which we will cite in the present number. There is a deal of clever and elegant detail in it, some of which we will give on a larger scale. The plan is suitable for the purposes of the building, and the whole is very creditable to its author, although, as we before observed, it does not really represent Sir William Tite meant to encourage the awarding a prize for the study of Italian architecture.

Wood-Block Flooring.—Amongst the exhibits whose goods were not noticed in our last week of the Building Trades' Exhibition at Islington is Mr. Roger L. Lowe, of Perth, who entered the lists too late for the inclusion of his name in the catalogue. Mr. Lowe's improvement in wood-block flooring is (amongst other things) the fastest of the blocks upon the hard, dry surface. It is secured by his patent composition, which not only secures the blocks to the concrete, and at the same time prevents them from dampness. Mr. Lowe contends that the usual method of laying the blocks in mortar is wrong, both in theory and practice, as the water in the cement swells the blocks or, at the same time, afterwards they shrink and become loosened.

ARCHITECTURAL ASSOCIATION.

The ordinary meeting of the members took place on Friday, the 20th inst., Mr. Cole Adams, President, in the chair.

The following new members were elected:—Messrs. Montague Sellin, R. W. Roe, H. D. Wilkinson, W. G. R. Bousfield, Theodore Moore, J. W. Lee, F. E. Haarer, and R. H. Mew.

A letter was read from Mr. Thomas W. Aldwinckle, stating that he would be happy to place 20l. at the disposal of the Association for a travelling studentship for this or next year. Mr. Aldwinckle, it was stated, had made a similar offer to the Royal Institute of British Architects for a studentship of 50l. A cordial vote of thanks was passed to Mr. Aldwinckle for his handsome offer.

The next visit, it was intimated, would take place on Saturday, the 28th inst., to the Fishmongers' and Merchant Tailors' Halls.

Votes of thanks were passed to Mr. Charles Bell for kindly conducting a party of members over the new Infirmary at Hampstead, and to Messrs. Read for allowing the members to inspect their Bottling Stores at Gospel Oak, as mentioned in our last.

It was announced that the Sketch-Book Prize Committee had awarded the first prize of four guineas to Mr. G. G. Wallace, and the second prize of two guineas to Mr. H. H. Kemp.

Mr. F. C. Penrose, M.A., then delivered a lecture "On Proportion in Architecture, especially as exemplified in the works of the Greeks." Mr. Penrose commenced by stating that the press of business had prevented his writing a paper, as he had intended. Proportion in architecture, he said, had two branches; one, and that the more important, might be epitomised as the *fortiter in re*, and the second as the *suaviter in modo*. The first was doubtless the more important, but no perfection had ever been attained unless both were combined. The first point was the due adaptation of a building to the needs for which it was designed,—the adaptation of support to the mass it had to bear. This was absolutely necessary in all good architecture, but, at the same time, it did not entirely produce beautiful results. It was, therefore, necessary to combine with it a certain artistic feeling, difficult to describe, which, whether known or unknown, was combined with rhythmical proportion. A well-educated artist would produce graceful works. He might not think that he had combined elegance with harmonious qualities, but, nevertheless, it would be found in ninety-nine cases out of a hundred that he had done so, consciously or unconsciously. It was not necessary that he should be bound and tied by any scheme of proportion, but at the same time there were methods of proportion which might be used as rules, just in the same way that a clever draughtsman would by the hand produce a straight line, which he could have done much more easily by using a ruler. There were certain rules which might be serviceable in attaining results more readily, and these might be frequently used to simplify and expedite matters, while even to those who had not had a full artistic training they might prove useful. The Greek buildings would be found to illustrate these methods admirably in both respects, and he would consider the way in which Greek architecture was developed. There were two branches in the great Greek family, the Doric and the Ionic. The Dorians had a great deal of communication with the Egyptians, and from them learned the massive style of architecture prevailing on the banks of the Nile. The Ionians, on the other hand, were influenced by the Phoenicians, whose architectural attainments were recognised by Solomon when building his temple. At Athens, above all places, the two branches were combined. In the Peloponnese and Northern Greece, and especially in the colonies in Italy and Sicily, the Doric almost entirely prevailed, but, although it produced noble results, the elegance of these works was not comparable to those at Athens. There were two kinds of proportion, one the proportion of strength, the masculine; and the other that of elegance, the feminine. This last was well illustrated in the Ionic, and as Athens contained the characteristics of the styles, he would point out to them the Acropolis and its immediate precincts. Mr. Penrose here described at some length Michaelis's plan of the Acropolis, and then passed on to consider the chief buildings,—the Parthenon, Propylæa, the Erechtheum, and conjoined temples, as exemplified

by Mr. Fergusson's plans.* He also exhibited a diagram showing the development of the proportions of the Doric style, and a profile of the architrave from the great temple of Corinth, from which it would be easy to suppose that the entablature went to a great height. He also showed drawings of the entablature of the older and newer Parthenon, the Temple of Theseus, and later examples. These last, he said, seemed to show that the limit of dignity had been passed, and that the Greeks had drifted into a style too flimsy for the spirit of Doric architecture. The style would bear no more attenuation, and, therefore, other styles took its place, because entablatures of that amount of delicacy were suited to the Ionic or Corinthian, which then became the leading styles. One consideration in the matter of proportion was this,—support must not only be provided sufficient for the superstructure, but what, by tradition and custom, people had been led to believe was necessary. If we were now to begin to form ideas of the proportions suitable to trabeated buildings, without any knowledge of what had gone before, we should probably arrive at something very much lighter than the Greeks did. It was, perhaps, fortunate, however, that we had not to do so, as a very large element of surplus strength in the works of nature should be found, and is felt to be necessary. The Greeks, by degrees, gradually refined and refined, until, at last, they refined the Doric in too great a degree, and it was then necessary to give it up. But we have to consider what to do nowadays, to come to a right conclusion in these matters. We ought to know what the ancients did, and not necessarily copy them (indeed, it was almost impossible to do so exactly), but the principles they had elaborated were for all eternity. The best and highest development of the Ionic was the Temple of Erechtheus, where there was excellent proportion between the columns and the entablature. This was solid enough for all purposes, and yet did not weigh too heavily on the columns; but had this entablature been put on Doric columns, it would have seemed a misfit. This temple was not only an example of the fitness of the support to the entablature but would also illustrate the matter of proportion, respecting means to an end, or the fitness of a building for its purpose. The plan was as irregular as that of any Mediaeval building, not purposely or strangely influenced by considerations of site, or otherwise. Any Gothic building erected with perfect freedom of site, and with no difficult constraining circumstance, was quite as regular, and never more irregular than the Erechtheum at Athens. There was a necessity to make a feature on the south side of it where it was opposed to the Parthenon, and this was solved by the erection of the exquisite Caryatid portico, the usual columnar structure being unsuitable, as the height did not allow of a pediment. The figures were so placed that they bore strongly on one leg, while the other was eased, and this in every case towards the middle of the portico. The straighter folds of the drapery were thus utilised to produce the general effect of fluted columns, and here was an instance of the proportion of support to superstructure. Wherever the circumstances of the case required freedom and relaxation, the Greeks were as easy as possible, but wherever symmetry was called for they were most rigid, and determined to carry it out with extreme accuracy. It was much the same in nature, where they would find the limbs of animals not balanced in the middle of their bodies, but placed symmetrically one to the other. When the Ionic had run the greater part of its course, the Corinthian order was developed. Mr. Penrose then referred to the traditional origin of the Corinthian capital, and stated that the earliest example was to be found in the Temple of Bassæ, built in the time of Pericles. He also explained a drawing of the Choric monument of Lysicrates, or lantern of Demosthenes. The capitals of this little circular temple were extremely beautiful, and somewhat of an adaptation of them could be seen in the façade of Exeter Hall. A capital from the Horologium of Andronicus Cyrrestes, or Tower of the Winds, was next referred to. This was the town clock of Athens, having a sun-dial with eight

* See Mr. Penrose's lecture, at the Royal Academy, on "Greek Architecture," reported in the *Builder* of March 7th, p. 334.

faces on the outside, and containing internally a water-clock. The four porticoes of this building had elegant quasi-Corinthian capitals. The Corinthian order became the rule at Rome, whilst here it supplied the order for the enormous Temple of Jupiter Olympius, in the time of Antiochus Epiphanes. The history of the Corinthian Order was well known, and he would not deal with some of the lesser parts of the structures, notably bases and mouldings, and their proportion in the case of light and shade. The Greek mouldings were invariably formed of portions of the conic section; the circle, however, being rarely used, the lines never becoming parallel, though tending towards it; and thirdly the hyperbola, with its advantages of gradation and variety. The Greeks used the ellipse very much for their egg-and-tongue ornaments; the parabola was used for the section of the cornices; while the hyperbola was a favourite curve. The Doric capital had a branch of the hyperbola in it, the curve always becoming straighter and straighter, and the way in which it caught and distributed the light was wonderful. This was the case where the light was strong, but in a paler atmosphere it would not produce one-fourth of this effect. There was also plenty of room for contrasts, because of the strong shadows and exquisite gradations of light. When the Greeks made use of contrasted curves they did not employ such curves as the Romans did, where there were circles butting against one another, but there was either a flat ellipse or parabola, which became straight at the point of contact and then curved out again to the concave figure. (Mr. Penrose here exhibited a table of Greek mouldings, prepared by Professor Donaldson, and which showed that the circle was hardly ever used.) The Greek Ionic volute was a different thing from the Roman one, and Vitruvius gave a rule for producing it by a system of centres and circular arcs. Good Greek examples, however, would not adapt themselves to this rule, and he had been led to try another method for himself. In the Ionic volute there was a hollow in the centre of the eye, which was afterwards filled up with a boss. The meaning of that hollow, he believed, was for placing in it a little instrument which admitted of volutes being easily drawn. The figure was that of the spiral of Archimedes, the unwinding of a string from which gave all the characteristics of the Ionic volute. He had tested the helical or snail-shell curve against the capitals of the Erechtheum and the Propylæa, and found that his view was confirmed. Having spoken of the proportion of fitness, he would refer to rhythmical proportion. The plans of the temples invariably gave true proportions in length and breadth, though others were also found internally. In the case of the Parthenon, all the main proportions of the parts directly opposed horizontally or vertically would be found to compare with one another. Mr. Penrose here explained several tables of proportions.* The Greeks gave to the outlines of their columns extremely delicate curvature, and made use of the hyperbola in doing so, because of its being the only manageable curve. They wished to have a variety of shape between the upper part of the column and the lower. If, therefore, they had employed a portion of the circle the result would have been of the nature of a nine-pin, while by employing the hyperbola it gave a fully-developed sweep at one place, and a perfectly straight line at another. By this means they got great variety, and all this with a departure from the straight line of less than $\frac{1}{4}$ in. in 32 ft.

The Chairman, in opening the discussion, remarked that the leaders of the revival of Greek architecture many years ago were bound by hard-and-fast rules to give chapter and verse for every building they designed, which tended towards a too mechanical feeling. Mr. Penrose, however, had shown that the same freedom ran through the most beautiful specimens of Greek work, as was to be seen in the best examples of Gothic. In the early days of the Gothic revival Pugin demanded that chapter and verse should be given, but as time went on there had been a breaking away from actual copying, and an adoption of breadth and freedom. There had been a drifting into the "Queen Anne" style, and now there was a tendency to return to the Classic. Might they not, therefore, be led from the bad Classic which charac-

terised so much of the Queen Anne work to a study of the pure Greek?

Mr. J. A. Gotch, in proposing a vote of thanks to Mr. Penrose, asked where the measurements were taken from in comparing the length of a temple with its width? A reproduction of the Choragic monument of Lysicrates could be seen forming the steeple to a church in Regent-street.

Mr. G. H. Blagrove seconded the vote of thanks. The curves of the conic section, he added, approximated closely to natural curves. He could imagine, without investigating the matter, that natural curves produced in vegetation would be allied to the catenary curve.

The vote of thanks was then carried by acclamation.

Mr. Penrose, in replying, said that the measurements of the length or breadth of a temple were taken from the point of the upper step. He was not aware whether the Greeks took their pyramidal construction from the Egyptians or not.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

ANNUAL DINNER.

The seventh annual dinner in aid of the funds of this Institution was held on Tuesday evening last in the Venetian Saloon of the Holborn Restaurant, Mr. James Greenwood (J. & J. Greenwood), President, in the chair. About 225 members and friends of the Institution sat down to table. The usual loyal and patriotic toasts having been duly honoured (Captain A. Stuart Harrison of the First City of London Engineers, responding for "The Reserve Forces").

The Chairman proposed the toast of the evening, "Prosperity to the Builders' Clerks' Benevolent Institution." He observed that the Institution had now been in existence for nineteen years, and its income had been steadily increasing, the receipts last year amounting to 7397.4s.* There were now fourteen pensioners receiving relief from its funds, the males receiving 25s. per annum, and the females 20s., but it was the earnest wish of the Committee to increase these pensions to 30s. for the males, and 25s. for the females. The Institution had also purchased two presentations to the Orphan Working School at Havestock-hill, and they were very desirous to purchase a third presentation (the cost of which would be 2627.10s.), without having to sell out any of their Stock. They were very anxious to be able to maintain a third child at the orphanage. In conclusion, Mr. Greenwood appealed to builders' clerks to be mindful of the good old maxim that "God helps those who help themselves," and urged them to subscribe to the Institution in larger numbers than they do at present, not only with the view to make some provision for their own possible necessities in the future, but also in the hope that they may be able to feel the gratification of having done something by their combined efforts to relieve the necessities of their fellow-men, be less fortunate than themselves in the battle of life. The toast was very heartily received.

Mr. Howard Colls, a past President of the Institution, proposed "The Architects and Surveyors," coupled with the names of Mr. J. Conly and Mr. Ellis Marsland, architects, and with those of Messrs. Stoner and Leonard for the surveyors. Messrs. Condy, Stoner, and Marsland replied.

The other toasts included "The Builders," proposed by Mr. E. C. Roe and replied to by Mr. T. F. Rider; "The Past Presidents," proposed by Mr. Edwin Brooks, treasurer, and responded to by Mr. Thomas Sirling; "The President," proposed by Mr. Joseph Randall; and "The Visitors," proposed by Mr. W. Scrivener and replied to by Mr. Morgan Ross.

During the evening the secretary (Mr. H. J. Wheatley) announced subscriptions and donations to the amount of nearly 300l.

Obituary.—The *Lynn News* announces the death of Mr. William Adams, the senior member of the firm of Adams & Son, Wisbech. The deceased, who was within a few days of seventy-nine years of age, was a native of Wisbech, and was articled with Mr. Swanborough, an architect and surveyor holding a high professional position in the town, and extensively employed by public bodies in those days. For about thirty years the deceased held the offices of Town Chamberlain and Borough Surveyor of Wisbech, but retired from the same some years ago in consequence of his increasing private practice. He was also Engineer to the Nene Navigation Commissioners and the Wisbech Canal Company.

* Further particulars as to the financial position of the Institution will be found in our report of the recent annual meeting. (See *Builder* for Feb. 28 last, p. 323.)

PUBLIC ARCHITECTURAL COMPETITIONS.

We have been requested to publish the following additional list of forty-nine architects who have signed an agreement, in accordance with the suggestion made in a memorandum addressed to the President and Council of the Royal Institute of British Architects, May 24th, 1880, pledging themselves not to take part in any public architectural competition unless one or more professional assessors, established reputation are appointed to advise the promoters on the relative merits of designs submitted in competition:—

Allan, E. C.	Indson, A. B.	Siddall, W. J.
Arden, A.	Jackson, S.	Smith, F. J.
Arnott, F.	Leech, C. S.	Strawbridge, G.
Arnold, W. A. T.	Luskitt, G.	Tanner, W.
Baker, C.	Morton, W. S.	Thomas, R. J.
Banks, F.	O'Connor, F.	Tsanley, J. B.
Bevis, C. W.	Parker, J.	Tyldesley, W. M.
Bishop, J. E.	Pearson, E.	Vickers, A.
Burrows, S. E.	Pinder, K. G.	Walmisley, J.
Cowan, R. A. C.	Pite, W. A.	Ward, J.
Colman, T. W.	Pither, F. L.	West, J. G. T.
Davies, P. D. R.	Quick, F. W.	Whitbread, R.
Ferguson, G. W.	Rogers, F.	Williams, S. W.
Gadd, G. H.	Ryan, W. P.	Witts, J. W.
Goddard, R. W.	Savery, C. E.	Worley, R. J.
Henson, W. H.	Shiner, C. M.	Yates, T. C.
Hodgson, H.		

Mr. Ewan Christian (President of the Royal Institute of British Architects) and other architects have not signed the agreement, on the ground that they do not now compete, but the same time heartily support the objects of those who have signed the agreement.

(The number of signees now amounts to 1,431 (see *Builder* for May 24, 1884, p. 762).)

REARS OF HOUSES.

By Section 29 of 18 and 19 Vic. c. 12 (The Metropolitan Building Act), it is enacted that:—

"Every building used or intended to be used as a dwelling-house, unless all the rooms can be lighted, ventilated from a street or alley adjoining, shall have the rear or side thereof an open space exclusively belonging thereto of the extent of at least 100 square feet."

And the Metropolitan Management and Building Acts Amendment Act, 1882 (45 Vic. cap. 1), Section 14, enacts that:—

"Every new building begun to be erected upon a lot not previously occupied in whole or in part by a building after the passing of this Act intended to be used wholly or in part as a dwelling-house, shall, unless the Metropolitan Board of Works otherwise permit, have direct access thereto and in the rear thereof an open space exclusively belonging thereto of the following extent: Frontage not exceeding 15 ft., the extent of the open space is to be 150 square feet at the least, and so on to frontages exceeding 30 ft., when the open space is at least 450 ft. Every such open space shall be free from any erection thereon above the level of the ceiling of the ground story, and shall extend throughout the entire width (exclusive of party or external walls) of such building, the rear thereof. The provisions of this enactment shall be in addition to and shall form part of the rules of the Metropolitan Building Act, 1855, and the said Act shall be construed accordingly."

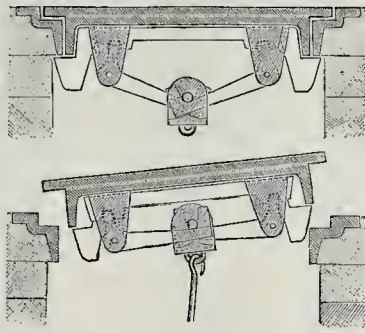
Great difficulty arises in the construction of these two sections, but the consensus of opinion seems to be that section 29 of the Act 18 is so far repealed where it is inconsistent with section 14 of the Act, 45 Victoria, cap. 1, and that even if the rooms can be lighted and ventilated from the street or alley adjoining the buildings must now have a space at rear, according to the frontage occupied; the same, unless the Metropolitan Board of Works' dispensing power is exercised or ground has been previously occupied by other buildings. A further difficulty also may arise in cases where there is a doubt as to which the rear of a house, as, for instance, that a house built between two parallel streets, in such a case it would be well to get the Board to define the open space to be left.

Rapid Tunnel Driving.—We are informed that the distance accomplished last week by Colonel Beaumont's tunnelling machine through the red sandstone under the Mersey was six seven yards, which is stated to be "the fastest on record." The heading now being driven and which is nearly completed, has a length of about 950 yards, and this, as we have the previous heading of about 700 yard length, are intended for effecting the ventilation of the main tunnel. The total distance driven by Colonel Beaumont's tunnelling machine (which cuts a circular heading rather than 7 ft. in diameter) in connexion with the Mersey Tunnel is about 2,250 yards, which includes first operation, viz. the boring of the drain heading.

* For these see *Builder* of the 14th inst., p. 372.

HAYWARD'S SELF-LOCKING COAL PLATE.

In our notice of the Building Trades' exhibition last week, we briefly referred to a coal-plate, which has a protecting ring ed in the pavement into which the coal-plate is dropped and immediately secured locked by projecting bolts on each side, fastened by an ingenious arrangement of two all levers with a small weight suspended on the centre. The plate can be pushed up when required by a broom-handle or stick, or by a rod connected to the centre light.



The wood-cut clearly shows the simplicity of the arrangement. The dangers of insecure coal-plates are manifest, and it appears to us that builders and householders will find in this new coal-plate (manufactured by Messrs. Hayward & Eckstein, of Union-street, Borough) that can be desired to ensure security.

STREET ARCHITECTURE IN LONDON.

SIR,—Is anybody interested in the street architecture of London, or are we all,—artists, architects, and editors, and merchants, and engineers,—so busy with the affairs of Afghanistan I Egypt that we cannot see what is going on before our eyes?

A fine street is at last being made, in the very heart of the metropolis, which will unite the north and south in a grand sweep of traffic. It is that all Londoners should be thankful. It begins from the Haymarket to Oxford-street, that the British Museum, at one hand, will be able to shake hands with Pall Mall at the other. But, just as this great highway curves on Oxford-street, having escaped the perils of the old, St. Giles's and Bloomsbury, lo! a sudden obstacle rises in its path. This obstacle does at first sight seem very formidable. It has architectural beauty, it possesses no anti-architectural interest, it recalls no tender memories of departed genius, it bears no specially sacred associations,—it is nothing more than a small public-house, the Black Lion, at the corner of the street. Nevertheless, it appears to be much for the Metropolitan Board of Works get over. The sweep of traffic is made to go around it, and one of the finest streets of London is made to end with an architectural goblin.

Now there must be some reason for this. Nobody would designedly break the beautiful curve with which two such streets would unite by the projecting angle of a tap-m. The Board of Works are bound to take the money of the ratepayers; and if the cost of demolishing the beer-shop is too extravagant, then say so, and we shall at least commend them for economy. The Board of Works cannot rough-sword over the rights of private property; and if the real lion that stops the way is some great and inexorable landowner, again say so, and we shall sympathise with their impotence. But, in contending the cost, do let them forget that if they fail to extinguish the little public-house that ramps at the corner of Duke-street it will be quite enough to deride with derision one of the noblest schemes of the improvement of London.

March 23, 1885. WYKE BAYLISS.

NON-ACCEPTANCE OF LOWEST TENDER.

On p. 366 of your paper for March 14, you give a decision of the late Mr. Justice Willes (who was one of our most eminent judges) upon a case of fifteen years' since. "It is contrary to common law; for it may well be that a tender may be so made as to be obviously incompatible with sound business, or may be made by a person unadvisable to employ." Now, sir, I wish to ask if neither of these two objections can be urged against the contractor, and still more if he, the contractor, is bound by the conditions of contract,—say, for a sum of 40,000*l.*—to provide sureties to the amount of 10,000*l.*, and start the works by placing 50*l.* worth of plant upon the ground, and also to retain ten per cent. retention money, what justice is it in the advertiser's not accepting the lowest tender? A reply from your able and impartial pen would be highly appreciated.

AUGUST KRAUSS, Contractor. Old-street, Bristol.

* The decision in *Spencer v. Harding* was that Justice Willes, Keating, and Montague Smith, in their judgment delivered by the first named, in fact of this decision having remained unquashed for fifteen years indicates that it is a sound one, and reasons why an employer might not wish to

accept the lowest tender might be given; for instance, the lowest tender but one might be by a local man, and the difference between his tender and that of the lowest not very great, and the employer might prefer, either from neighbourly feeling or because he could communicate more easily with the contractor, to accept that of the local man. *Prima facie*, an employer will get the work done at the least possible cost, and so will in most cases naturally accept the lowest tender, but it is ridiculous to suppose that employers will, as a rule, ever bind themselves to accept the lowest tender, and so be obliged to accept the offer of a man about whom they may know nothing. In the case given by our correspondent probably an employer would accept the tender unless he had other reasons to the contrary. Our correspondent, however, does not seem to see that there can be no injustice in an employer not accepting the lowest tender when he has not expressed his intention in the advertisement to accept it. If he had expressed his intention so to do, then clearly he would be under a legal and moral obligation to accept the lowest offer. Moreover, the contractor is in no worse position, if he bids the lowest tender and be not accepted, than if he bids the lowest but one and not accepted; he makes an offer simply on the chance that it may be the lowest and may be accepted.

PROVINCIAL NEWS.

Bournemouth.—One of the oldest houses in Bournemouth, the Tregonwell Arms, is at last being pulled down, in the course of making a new street to the Beckford Estate, under the superintendence of the architects, Messrs. Kemp-Welch & Pinder. By some, its demolition seems to be regarded as almost an act of sacrilege. Though not an ancient historical building, it has been regarded locally with a kind of veneration, partly from the fact that it is one of the oldest houses in the town, and partly because its retired position and ivy-mantled porch gave it an air of respectable old age, that was in contrast to the more modern buildings which have gradually grown up around it. Thirty-five or forty years ago the Tregonwell served the double purpose of inn and post-office, and the letters are said to have been sorted in the public bar. Times have changed since then, and Bournemouth has attained a popularity such as at that time was never dreamed of.

Stratford-on-Avon.—An ancient house, dated 1597, a building of great interest to all visitors to Shakespeare's town, has of late shown signs of decay, the beam carrying the upper floors having given way. The whole of the ground-floor front has been taken out, and a new front, more in character with old work, has been put in, consisting of strong oak mullions and transoms filled in with lead-work. The front removed was about 80 or 100 years old. Mr. T. W. F. Newton, of Waterloo-street, Birmingham, was the architect.

Whitfield.—By the generosity of Miss Wood, the Church of St. James, Whitfield, Glossop, has been furnished with a new clock, manufactured by Messrs. J. W. Benson & Co., of Ludgate-hill, E.C. The frame is horizontal, which allows any part to be removed without disturbing the rest. All the wheels are of gunmetal and the pinions of steel, cut from the solid, and, as both wheels and pinions are engine-cut, their accuracy is secured. The dials, four in number, are 4 ft. in diameter in richly-gilt skeleton iron-work. The escapement is Graham's dead-beat, and the pendulum is compensated to counteract the variations of temperature. The clock strikes the St. Mary's, Cambridge, quarter chimes, and the hours on a tower bell of 12 cwt.

Bristol.—The Bristol Waterworks Company are engaged in making an important addition to the means of supplying Bristol and the neighbourhood with water, a large portion of which is nearly completed. The work undertaken will cost close upon a quarter of a million, and will so strengthen the supplying power of the company as to enable it to meet the growing requirements of the population that it has to serve. An additional reservoir is in course of construction at Barrow, where there are already two immense storage reservoirs, and the company have also acquired new springs at Sherborne. The necessary mains are being laid from that place to Durdham Down, Bristol, some fifteen miles. A portion of the work has been most difficult, necessitating the making of a tunnel through Ursleigh-hill, Whitchurch. The levels are so uneven just here that tunnelling to the length of a mile became absolutely necessary. Operations were commenced some fifteen months since, and are now practically completed. On the invitation of the contractor a party of friends assembled at the tunnel on Monday last to witness the operation of blowing in the wall of stone separating the two parts of the tunnel, it having been driven from both ends simultaneously without an intervening shaft. The engineers are Messrs. John Taylor & Sons, 27, Great George-street, Westminster, S.W.; Mr. G. Gooch, superintendent engineer; Mr. Sellick, inspector; and the contractor, Mr. A. Krauss, of Bristol.

Newcastle-on-Tyne.—About 20,000*l.* is to be expended in making additions to the Newcastle City Lunatic Asylum at Colododge. Mr. Arthur B. Plummer, of 46, Cloth Market, Newcastle-on-Tyne, is the architect for the work, which will shortly be commenced.

SCHOOL-BUILDING NEWS.

York.—A new day-school, in connexion with the Roman Catholic Mission the English Martyrs in Blossom-street has been opened. The school is a two-storied red brick structure, relieved with stone dressings. The cost of the edifice has been upwards of 2,000*l.* Messrs. Goldie, Child, & Goldie, of London, were the architects, and the contract has been carried out by Messrs. Biscomb & Sons, of York.

Snydale (near Pontefract).—New Board Schools here, for the accommodation of 325 children, were opened on the 9th instant. The style of architecture is an adaptation of Domestic Gothic, red brick being the material used for the walls, with Ancaster stone for window-heads, cills, mullions, tabling, and other dressings. The schools, with master's house, stand on half an acre of ground, given by Mr. Rowland Winn, M.P. Messrs. Macfarlane, of Glasgow, have supplied the castings for eaves gutters and lavatory ranges. The schools are warmed with old style hob-ranges, specially made from designs approved by the architect. The amount of contract has been 1,937*l.* Messrs. Jackson, Bros., of Goole, were the contractors, and Mr. William Shackleton, of Pontefract, was the architect.

STAINED GLASS.

Gillingham (Kent).—A painted window has recently been erected in the parish church here to the memory of the late Mr. Runney, of Stubbin's House, Lancashire (father-in-law of the vicar). The window, which consists of two lights and tracery, is treated in the fourteenth-century style, and the subjects are the Marys preparing Spices and the Marys at the Tomb. The window has been designed and executed by Mr. Charles Evans, of Warwick-street, Regent-street, W. The large painted east window, erected in 1869, has also undergone extensive alterations in detail and colour by the same artist.

Capetown.—A large Munich stained-glass window has been erected in St. George's Cathedral, Capetown, in memory of the Right Rev. Henry Alexander Douglas, Bishop of Bombay, who for some years prior to his appointment to that see was Dean of Capetown. The subject represented is the "Charge to Peter," and the artists are Messrs. Mayer & Co. **Knarsborough.**—The first of the aisle windows in Holy Trinity Church has been filled with stained glass. Messrs. Powell Brothers, of Leeds, are the artists.

Elland.—A two-light memorial window has been placed in Elland Church, Yorkshire, from the studio of Messrs. Powell Brothers, of Leeds.

The Student's Column.

DESCRIPTIVE GEOMETRY.—VIII.

GIVEN a plane P by its traces P^h and P^v , select other projection planes in which P will be part of the elevation plane itself.

Here we begin by making a new plan on a $L^1 T^1$ perpendicular to P^v , and then make a new elevation with $L^{11} T^{11}$ on P^h , as in fig. 43. In both these problems each change of projection plane means altering the projections of all the other parts of the figure one may be studying, as well as the traces of the plane P. (See fig. 43.)

Given a plane P on which a cube is placed, of which $a^h b^h$ is the horizontal projection or plan of one side of the base, draw the cube completely in plan and elevation. (See fig. 44.)

We shall call $a c$ the other side of the base of the cube, and $a d$ its height. The problem consists in finding the projections of the points $a b c d$. To do this we shall, as in the former

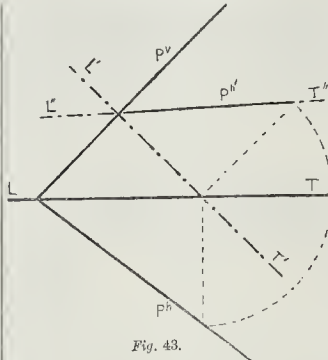


Fig. 43.

problem, make a new plan and elevation, in which the plane P will coincide with the plan itself.

We first make a new elevation by taking $L^1 T^1$ perpendicular to P^h , then draw P^{v1} ; as the points a and b belong to the plane P, the elevations a^{v1} and b^{v1} will be on P^{v1} , we shall find them by carrying from a^h and b^h lines perpendicular to $L^1 T^1$ up to P^{v1} . Then we make a new plan, taking P^{v1} for our $L^{11} T^{11}$, and plane P coincides with the plane of the plan. The new plans of a and b will be a^{h1} and b^{h1} , we can draw on this plan $a^{h1} c^{h1}$ the other side of the base of the cube; as for the vertical angle $a d$, we know that d^{h1} will fall on a^{h1} , and that the elevation of d will be in d^{v1} at a height above $L^{11} T^{11}$ equal to the side $a b$. This done, we draw the plans of $a b c d$ according to $L^1 T^1$ and then the elevation of these same points according to $L^1 T^1$, following the methods we have studied above. Then we can easily complete the other sides of the cube, as we know that their projections are parallelograms.

This problem is nothing but an application of the preceding ones to a special case, and is

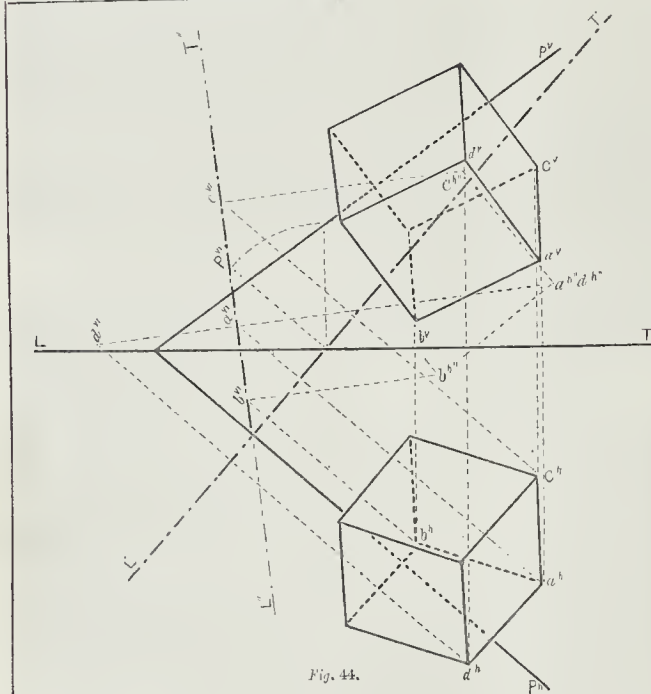


Fig. 44.

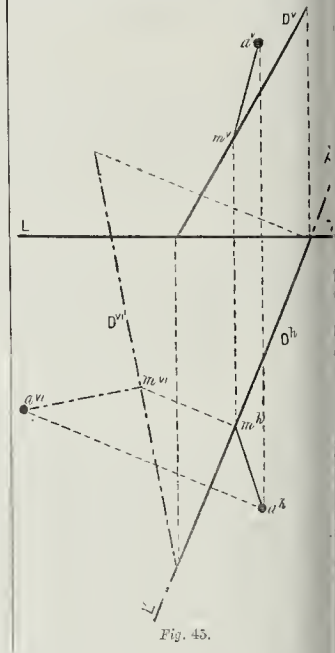


Fig. 45.

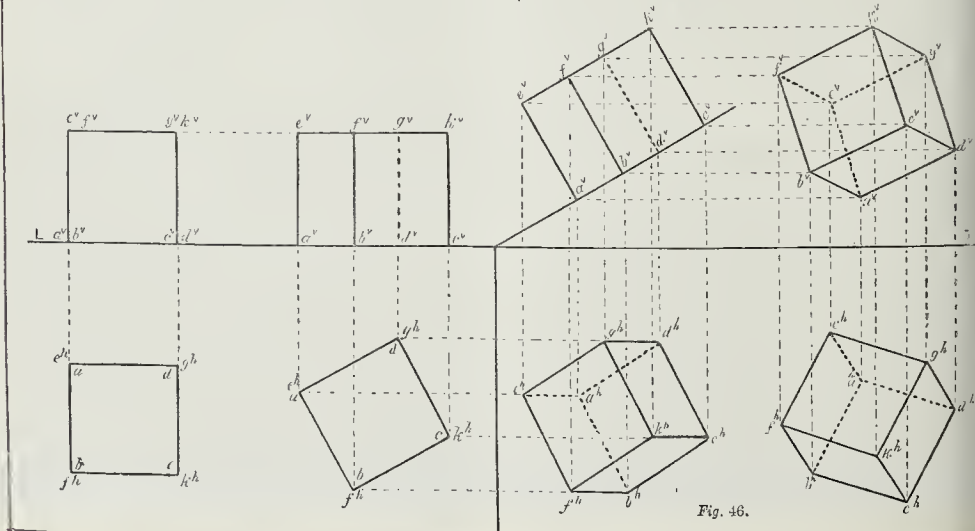


Fig. 46.

1 worthy of being reproduced on a large scale as an exercise.

on a point a and a line D, draw a perpendicular line from a to D.

We make an auxiliary elevation both of the and the point, taking D' for L' T'. In this position, we know that the elevation of the perpendicular will be at m' perpendicular to and we can easily draw the plan and elevation of the point m on the old projection planes according to E T. The method we used for insuring the length of the hip of a roof would be as the length a m distance of the point A the line D, if we desired it. (See fig. 45.)

Draw a cube in any position whatever. This is done by making successively four elevations and plans as in fig. 46, which we hope clear enough not to need any further explanation.

VARIORUM.

Art Designer (11, Paternoster-buildings), quarterly publication, conducted and edited by us, we believe, in great measure, by us, contains in its last issue, and in its extra supplement of designs only, a series of very pretty outline drawings of work for chintzing; heads, figures, and flowers. — "Sanitary Chronicles of the Parish of Marylebone" for January, 1885, by Mr. Alexander Wynter Blyth, Medical Officer of Health (printed by order of the Vestry) afford record of much useful work done or in hand under Torrens's Act has been taken in regard to three houses in Grafton-court, as to which the surveyor (Mr. H. Tomkins) is of opinion that no structural alteration or repair would render them fit for human habitation, therefore, he recommends that they be demolished. A shameful tale of overcrowding revealed by the following paragraph:—

Prosecution.—For several months a front kitchen at 18, Upper Rathbone-place, was known to be overcrowded, and notices had been served to decrease the number of the inmates. It was difficult to ascertain whether the notices had been obeyed or not; for those slept there left before the hour at which an inspector legally enter the premises. On the 29th of March, however, Mr. Phillips paid an early visit, and in one had three women, a man, and a child. On the floor were two other women and two dogs. The magistrate made an order for the abatement of the nuisance, and imposed a penalty of 20s., with 25s. costs.

The "Builder's Blue-Book" for January, 1885, apparently issued under the auspices of the Central Association of Master Builders of London, is a small but very useful handbook of information about the institutions connected with the building trade. The first number is no means complete, however. Some useful information as to water companies' charges for water for building operations is given. The publication is to be issued quarterly.—The "Tall Chimney Construction," read before the Civil and Mechanical Engineers' Society in January, 1878, and December, 1883, Messrs. R. M. Bancroft and F. J. Bancroft, reported in the Builder on those occasions pp. 461, 490, of the volume for 1878, and 52 of the number for Dec. 29, 1883), have been revised, partly re-written, and considerably enlarged by the authors, and are about to be issued in book form. We understand that the work will contain fully-dimensioned descriptions of upwards of eighty shafts in brick, stone, wrought-iron, with weights, cost, &c., and accompanied by a large number of diagrams. The publishers will be Mr. John Calvert, of Messler, and Messrs. Farcombe & Co., of Essex.—"Street's Indian and Colonial Cattle Directory" for 1884-85 (Street & Co., Cornhill, E.C.) is the tenth issue of that exceedingly valuable work of reference. It contains well-executed maps of all the principal districts, and the work appears to have been carefully compiled. Classified lists of missions and trades are given, and a glance at the particulars set forth in connexion with the leading colonial cities shows that its authors and surveyors are as numerous, comparatively, as they are in London and our provincial towns. For instance, in some there are between sixty and seventy architects, while in Sydney the number amounts to 100.—Messrs. Kendal & Dent's "Chart of the World" (published at Cheapside) is a curiosity in its way. It shows at a glance the exact difference between which mean time and the local time at all principal towns throughout the world.

Upwards of 300 dials are shown,—198 for English towns, twenty each for Scotland and Ireland, and sixty-eight Foreign and Colonial.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

38, Sanitary Traps. W. Henman.

The outer arm of the trap is funnel-shaped, and is either joined to or made in one with a short length of vertical pipe, by which it is connected with the soil-pipe below and the ventilating pipe above. The inner arm or arms are at an angle of about 45 deg., and formed to receive the connecting-pipe from the water-closet, bath, lavatory, or sink. The object is to prevent the entrance of sewer-gas to buildings through faulty joints by avoiding the use of untrapped joints in the building altogether.

211, Exhaust Ventilators. G. W. Wehh.

The ventilator consists of a tube of gauze or perforated zinc, forming a continuation of the shaft. It is circular or otherwise in section, and mounted on a square base-plate. In the plate, and parallel to the sides of it, are oblong holes communicating with the interior of the shaft and covered by vertical cages whose outside faces are made of gauze, the other three being of sheet metal. At right angles to the diagonals of the square, and occupying about half the space between the outside angles of each pair of side cages, are two vertical sheet-metal plates. The whole is surmounted by a pyramidal cover. The wind blowing along the surface of the perforated plates draws or exhausts the air or smoke through them.

1,677, Planes. A. H. Valda.

This relates to an arrangement for preventing wear of the cutting edge of planes during the return stroke. A roller or slide moves in contact with the inclined surface of tapering rails, which are fixed to and are parallel with the length of the plane. The edge of the rails is flush with the bottom of the plane.

10,014, Chimney or Ventilator Tops. H. K. Bromhead.

The chimney top or ventilator is constructed with a series of wedge or cone-shaped apertures or channels, slightly inclined upwards to prevent draught. The tops of these apertures may be open, closed, or partially closed, and a concave cover may be attached to the upper part of the chimney-top or ventilator by hooks and a plug.

259, Girder and Fireproof Floors. H. H. Bridgman.

The girders which carry the floor are cast or rolled on a flange running along the web between the top and bottom flanges. The flooring rests upon the intermediate flange of which the position is fixed by the intended thicknesses of the common joists and concrete. The girders may be smaller than those made of two rolled joists, one above the other, and for a floor having a span of 20 ft., 12 bays of 10 ft., to carry 2½ cwt. to the superficial foot, suitable girders will be 12 in. by 5 in.; with common joists, 4 in. by 1½ in. or 3 in. by 3 in., placed at a distance of 2 ft. apart.

260, Fireproof Floors. H. H. Bridgman.

The floor is constructed without hollow space under the boards, the thickness being thereby reduced and the floor rendered less easily combustible. When the floor-boards are of sufficient thickness they are prepared with grooves in their lower edges. Felt or brown slag or lime is spread between the floor-boards and concrete.

554, Doors for Blocking or Fortifying Tunnels. R. Roper.

The doors are made on turn-tables or arranged to slide up or down or across the line from suitable recesses in the roof, floor, or side. When the tunnel is to be closed, the turn-tables are revolved until the doors abut on projections cut in the side walls. The direction is so arranged that in the event of a train colliding with the door, it is the more securely closed.

661, Ventilator. E. Woolfenden.

A tube, placed inside a casing in the roof of the building communicating with the atmosphere, and has its upper end fitted with a revolving cap or cover and its lower end closed by a hinged door. The cover is provided with a feather, so that the perforations in it will be always facing the wind, and thus air will enter the tube and escape into the building through suitable openings near the lower end of the tube below the casing. Foul air will pass away through the space between the casing and the tube, a cover being fitted to exclude the rain. The inner tube is fitted with a damper to regulate or shut off the current of fresh air.

1,558, Preventing Smoke in Open Fireplaces. R. Wright.

A fine powder, compounded of sea-coal and lime or burned limestone, is sprinkled on the top of the fuel in a box with a perforated cover, so as to effect combustion without the evolution of smoke.

2,524, Access Pipes to House-drains and Soil-pipes. G. C. Davies.

The cover screwed over the aperture for cleaning and inspection is rendered gas-tight by a groove and tongue, the joint being stuffed with asbestos, rubber, or white lead and tallow. The inner face of the cover is formed to the curvature of the pipe, with the object of avoiding any recess in which paper or anything likely to choke the drain could lodge. Rings are provided to the cover for the purpose of removing it.

APPLICATIONS FOR LETTERS PATENT.

March 6.—2,940, N. Bonnett, Window Fastener.—2,964, J. Prince, Improvements in Brick and other Kilns.—2,977, A. Kohlhofer, Improved Construction of Domestic Stoves.—2,985, H. Kinton, Improvements on Water-closets.

March 7.—2,992, J. Bonland, Improved Brick, Quarry, or Slab, for Forming the Smoke and Air Flue in Chimney Stacks.—2,999, E. Newton, Improvement in Frame Saws.—3,012, R. Hale, Joint Connexions for Sanitary, Drain, and other Pipes.—3,021, J. Quirin, Parallel Vices.—3,022, H. Haddan, Machinery for Cutting and Dressing Stone.—3,032, J. Gibbon, Ventilation of Sewers, &c.—3,038, H. Lake, Improved Material for Covering Walls and Ceilings.

March 9.—3,047, T. Normanton, Apparatus for Preventing the Bursting of Cisterns and Pipes by Frost.—3,062, W. P. Buchan, Improvements in Ventilators.—3,065, P. Simons, Improved Tile.—3,070, J. Garrett, Construction of Heating and Ventilating Flues.

March 10.—3,086, G. Taylor, Attaching Door and Other Knobs to Spindles.—3,097, J. and H. Rust, Improved Vitreous Material for Paving Purposes.—3,099, W. Defries, Lubrication of Hinges.—3,105, L. Beauvais, Improved Portable Wastaband.—3,138, G. Martin, Improved Method of Securing Slates to Roofs.—3,139, F. Scheffer, Cement or Lime Kiln.—3,130, J. E. and F. B. Beside, Glazed Structures.

March 11.—3,177, G. Collings, Ventilator for Dwelling-houses and other Structures.—3,183, H. Ransom, Apparatus for Setting Saws.—3,186, W. Royston, Ornamentation of Woodwork.

March 12.—3,213, J. Butler, Apparatus to Regulate the Stroke of Tools for Slotting and Shaping Machines.—3,223, M. Syer, Double Action Flushing Apparatus.—3,227, E. and A. Marples, Improvements in Spokesnaves.—3,228, J. Taylor, Pipe Joints.—3,230, H. Taylor, Movable Ventilating Sewer Manholes and Frames.—3,232, A. Maher, Automatic Door Closing and Locking Apparatus.—3,248, D. Sugg, Inverted Gas Burner.—3,251, G. and E. Hammer, Black or Coloured Plaster, Cement, &c., for Writing Surfaces on Walls, &c.—3,255, W. Mead and S. Jenner, Chimney Top or Ventilating Shaft.

March 13.—3,262, T. Messenger, Interlocking Coupling Joint for Water, Gas, or Steam Pipes.—3,283, R. Pearce, Opening and Closing Fanlights and Casements.—3,284, R. Pearce, Opening and Closing Fanlights and Casements through an Outer Wall.

March 14.—3,315, D. Macdonald, Damp Proof Walls.—3,334, J. Humphreys, Automatic Gas-heating Apparatus.—3,349, E. Biggs, a Spring Hinge.

March 16.—3,368, G. Whiteside and J. Hoyle, Apparatus for Brushing and Cleaning Planks or Timber preparatory to Planing, Cutting, or Sawing.—3,371, J. Hughes, Rack Pulleys.—3,383, W. Souter, Improvements in Water-slide Gasaliers or in Gas Chambers.—3,384, E. Davis and M. Morris, Improvements in Pickers.—3,391, H. Howard, Double Action Shutter Cabinet.—3,396, H. Sans, Improvements in Hinges.—3,405, W. Lake, Improvements in Pavement.

March 17.—3,422, D. Thomson, Improvements in Ventilating.—3,443, J. W. Lowe, Improvements in Pipes.—3,464, R. Eyraud, Flushing Cisterns.

March 18.—3,477, T. Wilson and H. Johnson, Chimney or Ventilating Cowls.—3,482, T. Hawkins, Glazing with or without Putty.—3,488, G. Stephens, Coloured Ornamental Glass for Windows or Decorative Purposes.—3,493, J. Anderson, Automatic Saw-setting and Sharpening Machines.—3,502, W. Goebel, Gas Burners.—3,512, E. Summorfild, Adjusting and Fixing Door Knobs to Spindles.

March 19.—3,534, O. Flagstad, Improvements in Vices.—3,536, F. Nevill, Improved Instrument for Measuring Angles.—3,549, W. Lea and J. Beech, Adjustable Brackets or Supports.—3,552, J. Barnett, Improvements in Stoves.—3,571, A. Sauvé, Joints for Iron Pipes.—3,579, J. Johnson, Improvements in Means for Decorating Surfaces.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,250, W. M. and W. G. Macvittie, Window Fastenings.—8,217, J. Fottrell, Improved Hygienic Concrete.—17,014, H. Defty, Gas-lighting Apparatus.—1,422, W. Devoll and O. Howl, Tubo Vices.—1,634, W. Collinson, Construction of Silos.—1,799, A. Keighley and A. Watson, Holdfasts for Carpenters, Joiners, Cabinet-makers, &c.—1,875, A. Putney, Improvements in Wood Flooring.—2,001, W. Thompson, Construction of Concrete Buildings, &c.—2,063, E. Wheatley, Improvements in Gasaliers.—2,095, J. Doulton, Fireproof Floors.—2,323, G. Oulton, Soldering Irons heated by Gas Jet or Flame.—2,349, A. Clark, Combined Truck and

Ladder.—2,373, B. Gordon, Flushing Apparatus.—7,581, T. Potter, Construction of Silos.—12,019, W. Potts, Ventilating Apparatus.—1,355, G. Campbell, Improvements in Fire-grates, 1,469, J. Holden, Ventilating and Smoke-consuming Apparatus.—1,431, A. Laneff and W. Jones, Brick-cutting Tables.—1,893, G. Hammond, Mitre Cramp Frame.—2,223, J. Gibson, Securing Slates to Roofs, &c.—2,247, J. Horne and S. Hollyman, Chimney-pot for Preventing Down-draught.—2,364, P. Hanway, Water-closet Seats or Covers.—2,451, M. Bressan, Industrial Product for Panels, &c.—403, M. Macleod, Laying Asphalt Pavements, Roofs, Roads, &c.—1,777, G. Clunb and G. Exton, Door Locks, Latches, and Furniture.—1,888, G. Ellis, New Portable Pavement or Flooring.—1,962, D. Lee, Adjusting the Movable Parts of Window Sashes, &c.—2,092, A. Campbell and J. Ash, Improvements in the Catches of Door Locks or Fastenings.—2,187, R. Evered, Bell-work Fittings.—2,233, H. Cleave, Lath Backing for Plaster Work.—2,319, T. Normanton, Water-pipes and Flushing Cisterns to prevent Bursting by Frost.—2,519, M. Brown, Combined Bedstead and Bath.—2,742, L. Golden, Manufacture of Improved Plastic Compounds.—2,797, E. Reynolds, Siphon Water-waste Preventer Cistern.—2,870, D. James and J. Harsant, Water-waste Preventers.—2,873, S. Kirby, Gully Traps.—14,997, W. Burdock, Improvements in Glazing.—1,940, J. Easby, Automatically Closing the Aperture of Closet Seats.—2,453, G. & S. Messenger, Ventilators and Chimney Cows.—453, A. Wilway, Regulating Temperature in Dwellings and Buildings.—2,555, J. White, Ventilating Cows.—2,626, J. Stevens and C. Major, Spring Hinges for Doors.—2,691, C. Billington and J. Newton, Fastening Knobs to Spindles.—2,749, E. Taylor, Ventilating Apparatus for Windows, &c.—2,751, S. Hurst, Sash Fasteners.—2,905, P. Walker, Ventilators.—2,919, W. Tebbitt, Chimney Top or Sanitary Ventilator.—2,923, J. Garon, Draught and Dust Excluder for Doors.—2,940, N. Bonnett, Window Fastener.—2,956, E. Collier, Attaching Knobs to their Spindles.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

5,277, T. Dale, Warming, Ventilating, and Disinfecting Hospitals and Other Buildings.—7,451, A. Bell, Rope Pulley Blocks.—7,517, T. Robinson, Slides for Horizontal Saw-Frames.—7,795, A. Keaney, Sockets for Chisels and other Tools.—7,972, D. Bostel, Improvements in Water-closets or Urinals.—8,997, O. Gibbons, Making and Ornamenting in Relief Plastic Clay, Slabs, Tiles, Plaques, and Architectural Ornaments.—10,114, W. Lake, Improvements in Mosaic and similar work.—10,662, C. Greenbridge, Apparatus for Raising and Closing Window-sashes, Panels, and Shutters.—13,028, B. Knight and J. Deant, Pulley Frames of Sliding Chandeliers and Gaseliers.—13, W. Wegner, Improved Staircase.—1,443, R. Stoffert and T. Dykes, Improvements in Girders.—1,601, H. Bridgman and J. Russell, Warm-air Stoves.—4,997, T. Clayton, Ventilating Apparatus.—5,693, G. Burnell, Improved Privy.—5,195, B. Baron, Draught, Dust, and Rain Excluder for Doors.—8,250, W. A. and W. G. Macvittie, Window Fastenings.—8,297, C. Tighe, Adjusting Door Knobs on their Spindles.—8,317, J. Fottrell, Improved Hygienic Concrete.—9,338, F. Wildgeoose, Safety Sash Fastening.—6,817, H. Westman, Domestic Open Fire-grates.—8,249, T. Twyford, Flushing Wash-out Closet Basins and Ventilating same when in use.—8,251, W. M. and W. G. Macvittie, Attaching Cupboard-Turn Tongues to their Spindles.—8,385, D. Gesterator, Improvements in Stencils.—8,415, J. Brierley, Improvements in Chimney Tops.—8,468, H. Sutcliffe, Improvements in Lavatory or Cabinet Stand Wash-basins.—11,224, H. Williams, Window-sash Fastener.—11,990, E. Jones and J. Cunningham, Sash Fasteners.—12,783, P. Mooney, Wash-out Water-closets.—12,811, J. Donald, Grating Docks.—1,033, E. Hill, Hanging and Supporting Window Sashes.—2,161, H. Faja, Apparatus for Treating Slurry or Slip in the Manufacture of Portland Cement and Bricks.—2,189, A. Reddie, Folding Gates.—5,368, G. Spratt, Improvements in Screw-drivers.—5,757, J. Kay, Attaching the Catches of Door Locks or Fasteners.—6,180, F. Preston and Others, Water-closets.—8,259, F. Primrose and J. Mellows, Improvements in Glazing.—8,339, J. Stones, Automatically Shutting and Opening the Egress from and Access to Hoist Wells.—10,164, S. Bivort, a New or Improved Mode of Flooring.—12,787, W. Corteen, Improved Methods of Opening and Closing Windows.

Non-acceptance of Lowest Tender.—A writ has been issued against the Mayor and Corporation of Cardiff, on behalf of Mr. A. Krauss, contractor, of Bristol, for breach of faith in not accepting his tender for the new reservoir works at Llanishan, the tender being the lowest. The plaintiff claims 1,000*l.* and the amount expended in the preparation of his tender.

A New Presbytery is to be built at Alexandria from designs by Messrs. Pugin & Pugin, of 19, Surrey-street, Strand, and Westminster.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MARCH 10.
By SEDGWICK, SOY, & WEALE.
Watford, Essex-road—The Residence called "Guilborough Villa," freehold 4,650

MARCH 17.
By R. A. NUTLEY.
City—159, Fenchurch-street, and 21 and 22, Lime-street, freehold, area 1,400 ft. 16,700
Portman Estate—47 and 48, Upper Berkeley-street, 39 years, ground-rent 9*l.* 2,260

By A. SAVILL & SON.
Bedford-row—3 to 6, Great James-street, and 6, Cook Pit-yard, 28 years, ground-rent 328*l.* 3,500

By DEBENHAM, TEWSON, FARMER, & BIRDGWAYTER.
Chelsea—31, Markham-square, 57 years, ground-rent 7*l.* 10*s.* 6*d.* and 57 years, ground-rent 4*l.* No. 1, Markham-place, 61 years, ground-rent 4*l.* Paddington—14, Dartington-terrace, 73 years, ground-rent 5*l.* 5*s.* 300

By HARRIS, VATCHAM, & JENNISON.
Upper Thames-street, Archer-alley—A quantity of old building materials 165

By MADDOX & SON.
Hampstead, West End-lane—"Oakland House," 81 years, ground-rent, 8*l.* 900

By FRANKBURNER & CO.
Wandsworth-common—Freehold land, 8*l.* 1*r.* 1*p.* Fulham—Freehold land, 11*l.* 2*s.* 3*d.* and Three Houses 13,000

Margate—A plot of freehold land, 9*l.* 1*r.* 37*p.* Smithfield, 29, St. John-street—Freehold 6,050
Hampstead, Greenhill-road—A plot of freehold land 3,800

By MURRELL & SCOBELL.
Goodman's-fields—65, Mansell-street, 18 years, ground-rent 100*l.* 1,000

By WILKINSON & SON.
Brighton—6, Preston-street, freehold 1,280
Nos. 42 and 43, Upper North-street, freehold 715

MARCH 18.
By F. S. PARKER.
Harlesden-hill—Ground-rent of 8*l.* a year, reversion in 23 years 370
Ground-rent of 8*l.* 8*s.* a year, reversion in 43 years 790
Ground-rent of 13*l.* a year, reversion in 13 years 400

By J. F. LASH.
Hackney—13, Cadogan-terrace, 69 years, ground-rent 6*l.* 6*s.* 310
Stepney—24, York-street, term 74 years, no ground-rent 63

By J. BAKER & WILKINSON.
Oxford-street—45, Wells-street, 15 years, ground-rent 7*l.* 865

By REYNOLDS & EASON.
Camden Town—3 and 5, Jeffrey-street, 25 years, ground-rent 8*l.* 455

MARCH 19.
By J. G. & A. PEBBOLD.
Mile-End—52 to 68 even, Shandy-street, freehold Nos. 40 and 48, Rutland-street, 22 years, ground-rent 10*l.* 830

By C. W. MILGAR.
Hampstead—Improved ground-rents of 22, 1*r.*, term 67 years 445

By PHILLIPS & SON.
Kentish Town—5 and 8, Willingham-terrace, 79 years, ground-rent 13*l.* 450

By BALL, NORRIS, & HADLEY.
Britton—29, Northway-road, 88 years, ground-rent 6*l.* 10*s.* 250

By NEWSON & HARDING.
Clapton—67, Clarence-road, and a plot of land, freehold 1,070
Holloway—59, Caledonian-road, 57 years, ground-rent 9*l.* 980

Nos. 2 to 12 even, Mildmay-road, 47 years, ground-rent 24*l.* 1,515
Dalston—9, Norfolk-street, 7 years, ground-rent, 4*l.* 10*s.* 400

No. 105, Graham-road, 76 years, ground-rent, 7*l.* Finsbury Park—2, Prahr-road, 80 years, ground-rent 4*l.* 5*s.* 415

By A. BOOTH.
St. John's Wood—15 and 16, Belgrave-road, 65 years, ground-rent 21*l.* 970

By S. CHAPWICK.
Eastbourne—7 and 8, Sussex-park, freehold 1,420
Drury-lane—Ground-rents of 4*l.* a year, reversion in 51 years 1,150

Islington—187, Copenhagen-street, 53 years, ground-rent 4*l.* 10*s.* 585
Stoke Newington—Coyhold ground-rent of 26*l.* a year, reversion in 24 years 4,010

Strand—Nos. 276 and 277, freehold 1,060
Charing-Cross—The lease of 7, White-church-street, and 33, Scotland-yard, 19 years 1,330
Finslco—An improved rent of 106*l.* a year, term 22 years 1,330

MARCH 20.
By BAKER & SONS.
Bournemouth—The Boscombe Spa Hotel, 66 years, ground-rent 120*l.* 5,100
Croydon, Morland-road—Freehold land, 7*l.* 1*r.* 12*p.* Malden—1 to 19, South View villa, 65 years, ground-rent, 40*l.* 1,500

Hendon Station Estate—Six plots of freehold land 540
Hoxton—52 to 55, Britland-street, 14 years, ground-rent 2*l.* 625

Peckham—Ground-rents of 66*l.* a year, term 59 years 1,280
Wandsworth-road—Ground-rent of 9*l.* a year, 22 years, and short reversion 375

By Peto, YETTS, & CO.
Peckham—8, York-grove, 27 years, ground-rent 6*l.* 10*s.* 200
Fulham—1 to 8, Stanley-road, 69 years, ground-rent 15*l.* 6*s.* 1,480
Stanley-road—A plot of leasehold land 60

By PHILLIPS, LEE, & DAVIES.
Southgate—9, Himesdale-road, 30 years, ground-rent 5*l.* 195

MEETINGS.

SATURDAY, MARCH 28.

Architectural Association.—Visit to Fishmongers' 2 (Two) p.m.
Building Trades' Exhibition at Agricultural Hall, Closing day.

MONDAY, MARCH 30.

Society of Arts (Lector Lectures).—Mr. J. Hunge, Pollen on "Carving and Furniture." IV. The Gibbons, Boule, and that of their Successors (contd.) 8 p.m.
Estate Exchange.—Annual Meeting of Members, 8 p.m.

TUESDAY, MARCH 31.

Institution of Civil Engineers.—Discussion on the proposed Bill by Mr. P. W. Williams on "The Electrical Regulation of Speed of Steam-engines and other Motors for the Dynamometer." 8 p.m.
Birmingham Architectural Association.—Mr. H. C. Arlison on "Artisans' Dwellings and Acts of Parliament." 7.30 p.m.

WEDNESDAY, APRIL 1.

Carpenters' Hall, London Wall (Free Lecture, Artisans).—Professor T. Roger Smith, F.R.I.B.A., "Some Celebrated Timber Roofs." 8 p.m.
British Museum.—Mr. W. S. C. Bonnewen on "Arian and Babylonian Antiquities." VI. (The W. Heaven). 2.30 p.m.

Builders' Foremen and Clerks of Works' Institution Ordinary Meeting. 8.30 p.m.
British Archaeological Association.—Mr. Alfred C. Easton on "Ancient Glass." 8 p.m.

General Meeting of the Society.—Mr. William Park, F.R.I.B.A., will read a paper upon "Lunatic Asylums." 7 p.m.

SATURDAY, APRIL 4.

Edinburgh Architectural Association.—Visit to Ros Castle and Chapel.

Miscellaneous.

Sunshine Recorders.—The Royal Meteorological Society opened its sixth annual Exhibition of Instruments on Wednesday, the 1st, at the Institution of Civil Engineers, Great George-street, S.W. This exhibition is devoted to Sunshine Recorders and Solar and Terrestrial Radiation Instruments. With regard to the first-named class of instruments it is stated that the first attempt at obtaining an instrumental record of the amount of sunshine was made by Mr. J. F. Campbell's Islay, in the year 1854, when he mounted hollow glass spheres filled with acidulated water in the centre of a cup of mahogany, so arranged that the sun's rays were focussed on the interior of the cup and burned it. The lines burning, therefore, indicated the existence of sunshine. Solid glass spheres have been substituted for the hollow ones, and cards in metal frames have replaced the wood; but in its principle the sunshine recorder of 1855 differs little from that erected on Richmond-terrace, Whitehall, thirty years ago. Other modes of recording sunshine are based on the action of the end of the other end of the spectrum on the actinometer instead of the heat rays. Among workers in this direction may be mentioned Marchand, Pécamp, Sir Henry Roscoe, and others. The most recent improvements in this direction are those by McLeod and by Jordan.

Iron Exports of the United States.—At a time when the importation of American manufactures is engaging some amount of attention, the following figures may be of value as showing the amount of iron and manufactured iron exported from the United States to Quebec, Ontario, and Manitoba during the last three months of the fiscal year ended June 30, 1884, viz.:—Pig iron, 9,620 tons; iron, 1,188,544 lb.; hand, hoop, and scroll iron, 401,631 lb.; ingots, bars, and rods of steel, 1,889,664 lb.; locks and other building hardware, value 404,222 dollars; machine iron, 1,855,514 dollars; plates and sheets of iron, 1,163,008 lb.; plate and sheets of steel, 172,704 lb.; stationary engines, value 12,000 dollars; other iron and steel manufactures reached considerably over a millions dollars value. Even steel rails were exported 1 year from the United States, and there is some competition with foreign supplies.—*Plumbing and Decorating Chronicle.*

National Agricultural Hall Competition.—The directors of this company have arranged with Messrs. Lucas & Sons, Kensington, to execute the necessary erections and levelling required to place the ground in a fit state for the erection of the superstructure. We understand that the quantities for the whole of the works, including the roof, are now being prepared, with a view to inviting tenders.

The Franciscan Monastery at Upton.—designed by Messrs. Pugin & Pugin, has just been commenced. Mr. J. Gregar, of Stratford, is the contractor.

ompsen Memorial Home, Lisburn.—Building, which was begun in August, is now completed and open for the reception of inmates. It was built and vested to the memory of the late Dr. Wm. pson, F.R.C.S.I., M.D., who met with death by accident on the Great Northern (Ireland) about two years and a half ago. The building is of red brick and red stone. It has been planned to accommodate fifty-two patients and twelve nurses servants, with provision for extension. Corridors and staircase are warmed by a low-pressure hot-water pipes, supplied by R. A. Parnell, of Glasgow, who also the laundry drying-closet. The wards are warmed by Mr. D. O. Boyd's school heating grates. Messrs. R. Waggood supply the hydraulic passenger-lift, capable of a couch and patient or two Bath chairs. Internal plumbing, which, owing to the nature of the building, is necessarily extensive, has been carried out by S. Clements & Acheson, of Belfast. The piping, done by Mr. John Hall, of Belfast, is peculiarly worth attention. The heating, carried on metal brackets outside the plaster of the walls, is made to act as picture-rods round the walls of the wards and along the corridors. The pipes, to supply the brackets, &c., are of this pipe. This arrangement has also the advantage of exposing a leakage, which occurs. Mr. C. C. Macarthy, of Belfast-buildings, Belfast, fitted the electric throughout. The building was carried out by Mr. Robert Corry, from the plans and the superintendence of Mr. Godfrey W. pson, of Belfast. Mr. Peter Butler, of Down, was the clerk of works.

Rock Life Assurance Company.—The new prospectus of this company (one of the oldest of the London companies, having been established in 1806) contains several features worth attention. A special point is made of a new form of life policy issued by the Company, under the title of "Investment Policies," embracing non-forfeiture; fixed surrender values printed on the policies; provision for old age, the premiums ceasing after a definite number; and "large profits for good lives." It is claimed that by this plan every insurer will be able at once to know the maximum amount of payment he will have to make for his assurance. The Company have also issued a small pamphlet giving examples of the application of investment policies to partnership arrangements.

The Lectures at Carpenters' Hall.—The last of the course of free lectures to Artisans at Carpenters' Hall will be delivered on Wednesday next, the 1st of April, by Professor T. Roger Smith, on "Famous Timber Roofs." The Right Hon. the Lord Mayor, Master of the Carpenters' Company, will take the chair.

Uppington.—The ancient church at Uppington, near Shrewsbury, is about to be restored and enlarged, at the sole expense of the Duke of Cleveland, the lay rector. His Grace has appointed Mr. J. P. Pritchett, of Darlington, architect, and a Faculty has been obtained to carry out the work according to his design.

Kingsbury.—The old and interesting church: Kingsbury, Middlesex, is about to be restored and enlarged, from the designs of Messrs. Newman & Newman, architects, Tooley-street, London Bridge.

Sway (Hants).—A chance is to be added to the Church of St. Luke, Sway, Hants, from designs by Messrs. Kemp-Welch & Pinder, architects, Bourne-mouth.

For new schools, Goodrich-road, Honor Oak, for the School Board for London. Mr. Thomas J. Bailey, architect. Mr. T. Thornton Green, quantity surveyor:—

J. R. Hunt	£18,812 0 0
W. Tongue	18,941 0 0
H. Hart	18,815 0 0
Patman & Fotheringham	18,778 0 0
Wall Bros.	18,700 0 0
Groves & Son	18,441 0 0
W. Shepherd	18,224 0 0
W. Downs	18,545 0 0
Lather Bros.	18,478 0 0
Wood Bros.	18,475 0 0
Oldrey	18,000 0 0
W. Boyce	18,000 0 0
W. & J. Croaker	17,980 0 0
S. J. Jerrard	17,883 0 0
Stimpson & Co.	17,788 0 0
C. Wall	17,757 0 0
Holloway Bros.	17,757 0 0
C. Cox	17,734 0 0
H. L. Holloway	17,699 0 0
W. Johnson	17,539 0 0
Kirk & Randall	17,332 0 0
E. C. Howell & Son	17,107 0 0

For the Farnham main sewerage works. Contract No. 2. Mr. James Lemon, M.Inst. C.E. Quantities supplied:—

John Jackson, Westminster	£14,888 0 0
Tom Street, Colchester	15,841 0 0
W. H. Dearn, Eastbourne	12,263 0 0
Prowse & Lee, Liverpool-street, London	12,216 0 0
W. J. Botterill, Cannon-street, London	11,997 0 0
Bottoms Bros., Battersea	11,945 0 0
E. Peill & Sons, Bromley	11,823 0 0
T. B. Hayer, Llandport	10,730 0 0
W. H. Hill & Co., Cardiff	10,700 0 0
Bendie Bros., Brith, Kent	10,617 0 0
William Schofield, Bucklersbury, London	10,580 0 0
Geo. Smith, Newcastle-on-Tyne	10,442 0 0
Geo. Cowdery & Son, Gloucester	10,442 0 0
H. J. Sanders, Southampton	10,400 0 0
John T. Whetham, Weymouth	9,975 0 0
Joseph Bull, Sons, & Co., Southampton	9,773 0 0
B. Cooke & Co., Battersea	9,688 0 0
T. P. Hall, Portsmouth	9,630 0 0
G. A. Smith, Dorking	9,390 0 0
R. C. Trimm, Walton-on-Thames	9,342 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Baths	Cor. Beotle-cum-Linacre	50l., 25l. and 10l.	May 1st	ii.
Oratory	Wimbleton Local Bnd	Not stated	Not stated	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Works, St. James's Church, Andlem	.....	Lynam & Rickman	March 30th	xxii.
Division of Five Houses, Wallington	Chelsea Vestry	G. R. Strachan	March 31st	ii.
Acton Local Board	Horace Furnor	T. Spearing	do.	ii.
Admiralty	Admiralty	C. Nicholson Layley, C.E.	do.	ii.
Wandsworth Bd. of Wis	do.	do.	do.	ii.
B. Christian	do.	do.	do.	ii.
Vestry of St. Matthew, Bethnal Green	Official	do.	April 2nd	xxii.
Midland Railway Co.	A. A. Langley	do.	do.	ii.
Com. of H.M. Works	Official	do.	April 8th	ii.
Ratcliffe & Holdsworth	do.	do.	April 10th, &c.	xxii.
Com. of Sewers	Official	do.	April 12th	ii.
Bournemouth Com.	R. W. Peregrine Birch	do.	April 14th	xxii.
Great Western Ry. Co.	do.	do.	do.	ii.
Compton Gifford Lcl. Bd.	G. St. Pierre Harris	do.	April 18th	xxii.
Chislefield School Bnd.	Birmingham Public Works Committee	W. S. Till	April 20th	xxii.
Walter, Sen, & Wood	The Committee	do.	April 22nd	ii.
E. P. Loftus Brock	do.	do.	Not stated	xxii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Works	Farnham Main Sewer	3l. per week	April 4th	xviii.

TENDERS.

For new counter, pewtering, bar-fittings, &c., at the Lord Raglan Tavern, Shernhall-street, Walthamstow, for Mr. Sharp. Mr. H. F. Simmonds, Cambridge Heath, architect:—

W. & J. Burrow	£258 0 0
Lumley & Co.	241 18 0
Sanders & Sons	214 15 0
Rogers	210 5 0

For dwelling-house in Lea Bridge-road, Leyton, for Mr. Wedge. Mr. H. F. Simmonds, architect:—

Lipcomb	£340 0 0
Ling	249 0 0
Barton	245 0 0
Hardy (accepted)	250 0 0
Probert	250 0 0

For the erection of St. Joseph's Novitiate, Blackrock, cc. Dublin (including main building, kitchen wing, and completion of chapel), for Very Rev. J. Duif. Mr. John L. Robinson, M.R.I.A., architect, 198, Great Brunswick-street, Dublin. Quantities by Mr. H. M'Connell:—

Wm. Donnelly	£2,677 7 8
R. Tools	8,964 16 5
Thomas Mackay	8,827 0 0
Gahan & Son	8,416 0 0
F. Moore	8,000 0 0
Jno. Cunningham	7,744 6 2
M. Meade & Son	7,730 0 0
Greg. Murphy	7,550 0 0
S. Breen & Son	7,408 0 0
Jos. Long (accepted)	7,139 15 8

Accepted for lodge, Westgate-road, Beckenham, for Mr. Albemarle Gator. Mr. R. W. Collier, architect:—

Arnold & Son, Bromley	£547 0 0
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For alterations at the Crown Tavern, 27, Vere-street, Strand. Mr. William C. Livermore, architect and surveyor:—

Mansfield	£280 0 0
Mansell	261 0 0
England & Thompson (accepted)	253 0 0

For the erection of house and offices at North Finchley, for Mr. Boverton Redwood. Mr. E. J. May, architect. Quantities by Mr. R. C. Glead:—

T. L. Green	£1,989 0 0
Maites & Harpur	1,987 0 0
S. Parmenter	1,851 0 0
Fairhead & Son	1,836 0 9
Groves & Son	1,878 0 0
L. & W. J. Fatman	1,895 0 0
W. Scrivener & Co.	1,865 0 0
E. Lawrence & Sons	1,850 0 0
W. Smith, Camberwell	1,839 0 0

For the erection of additional stabling for Messrs. Carter, Paterson, & Co., at their depot, Maple-road, Penzance, under the superintendence of Mr. William Eve, architect. Union-court, Old Broad-street:—

Harris & Wardrop	£984 0 0
Aldridge & Jenvey	880 0 0
F. Higgs, Station Works, Loughborough Junction (accepted)	790 0 0

Accepted for warehouses, 180 ft. by 89 ft. and 163 ft. by 40 ft., at Millwall, for Mr. J. T. Morton, under the superintendence of Mr. William Eve, architect, Union-court, Old Broad-street:—

Harris & Wardrop.
[On Schedule of Prices.]

For rebuilding St. Michael's Vicarage, Wakefield. Mr. William Watson, architect, Wakefield:—

Flower Bros. (Excavating, Brick, and Stone Work)	.....
C. F. Bycroft (Slating)	.....
C. Driver (Plastering)	.....
J. Loyd (Carpenter and Joiner's Work)	.....
G. Thompson (Plumbing, Glazing, Ironwork, Gas-fitting, and Bell-hanging)	.....
C. Turner (Painting)	.....
Total	£1,352 17s. 6d.

[Sixty tenders were received.]

For alterations to the Boar's Head public-house, Fleet-street. Mr. R. A. Lewcock, architect:—

Colls & Sons	£1,400 0 0
Keble & Nelson	1,369 0 0
R. Maer	1,176 0 0
W. Shurmmr	1,143 0 0
S. Godden	950 0 0
Jackson & Todd	919 0 0

For rebuilding on the sites of Nos. 495 and 497, Oxford-street, for Messrs. Hammond & Co. Messrs. T. Chatfield Clarke & Son, architects. Mr. H. H. Leonard, surveyor:—

Abby Bros.	£3,718 0 0
Clarke & Bracey	8,549 0 0
Holland & Hannen	9,389 0 0
Bywaters	8,334 0 0
E. Conder	8,253 0 0
Brown, Son, & Blomfield	8,250 0 0
Colla & Son	8,200 0 0
Patrick & Son	8,127 0 0
E. Lawrence & Sons	8,033 0 0
B. E. Nightingale	7,853 0 0
J. T. Chappell	7,798 0 0
Hall, Beddall, & Co.	7,684 0 0

For building a chapel at St. John's-hill, Wandsworth, for the Committee. Messrs. T. Chatfield Clarke & Son, architects. Mr. H. H. Leonard, surveyor:—

H. S. Lee	£1,885 0 0
Adams & Sons	1,650 0 0
W. Smith	1,628 0 0
Avies & Son	1,610 0 0
B. E. Nightingale	1,473 0 0
W. Robinson	1,450 0 0
Turtle & Appleton	1,444 0 0
W. Johnson	1,400 0 0
S. J. Scott	1,400 0 0
Searchfield & Son (accepted)	1,384 0 0

For renovating Primitive Methodist Church, Richmond, Surrey:—

Carless & Co., Richmond	£35 0 0
C. Mason, Kew	80 0 0
Lambert & Barnes, Richmond	58 12 0
Robt. Johnson, Richmond (accepted) ..	58 0 0

For new printing-office for Messrs. H. & C. Franklin, Twickenham. Mr. John Warne, surveyor, Teddington:—

F. J. Messum	£310 0 0
F. Rose & Sons	375 0 0
J. Cordery	365 0 0
Potter (accepted)	350 0 0

For the restoration of the Parish Church at Morvil, Pembrokeshire. Mr. E. H. Lingen-Barker, architect:—

Griffiths & Thomas, Kilgeran (accepted) ..	£455 0 0
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For constructing a new road and sewer on the Dovecot House Estate, Green-lanes, Tottenham. Mr. William Hodson, Jun., surveyor, Philip-lane, Tottenham:—

Thos. Rowley, West-green (accepted) £301 13 3

For alterations to the Caledonian public-house, Stoke Newington-road. Mr. J. Stiles, architect:—

Ollis Bros.	£3,350 0 0
S. Goodall	2,120 0 0
W. Shurmur	1,890 0 0
W. Mower	1,795 0 0
Steel Bros.	1,478 0 0

Accepted for the execution of sundry works of repair, alterations, and additions, sanitary works, &c., at the St. Pancras Infirmary, Dartmouth Park-hill, Highgate, for the Guardians of St. Pancras. Mr. H. H. Bridgman, architect, 42, Poultry:—

S. B. Lamble (lowest tender)	£1,279 0 0
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For fitting-up coffee-house at No. 55A, Houndsditch, for Mr. Ferry:—

G. Mower	£157 0 0
Spice	154 0 0
Tilley	149 0 0

For further extension to lavatories, &c., at the Licensed Victuallers' Schools. Mr. W. T. Farthing, architect:—

W. Shurmur (accepted)	£211 0 0
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For the erection of a steam boiler and heater at the St. Luke's Workhouse, Shepherdess-walk, City-road, for the Guardians of the Holborn Union. Messrs. H. Saxon Snell & Son, architects, 22, Southampton-buildings, Holborn:—

Marshall & Co.	£415 0 0
Fraser & Co.	385 12 0
Fraser & Fraser	356 12 0
May Bros.	323 10 0
J. Collis (accepted)	282 18 0

Accepted for villa residence, Tangle Park Estate, Hampton. Mr. E. L. Swatman, architect, 33, Parliament-street:—

J. Singleton	£750 0 0
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[No competition.]

Accepted for alterations to the Prince of Wales public-house, North-street, Pentonville, for the City of London Brewery Company. Mr. W. J. Jewhurst, architect:—

W. Shurmur	£24 0 0
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SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 49, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Ed. F. and D. C.—M. and Co.—A. K.—C. H. (thanks)—A. W. R. S.—W. C. T.—M. Bros.—D. and Co.—W. F. P. (no space)—I. S.—C. B.

All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily by publication.

We are compelled to decline pointing out books and giving addresses.

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.

Letters or communications (beyond new 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.

PUBLISHER'S NOTICES.

GOOD FRIDAY.—"THE BUILDER" for the Week ending APRIL 4th will be issued on THURSDAY, the 3rd. Advertisements for insertion in that issue must therefore reach the Office before THREE p.m. on WEDNESDAY, the 1st. Alterations in Standing Advertisements, or ORDERS TO DISCONTINUE the same, must be at the Office by TEN o'clock on TUESDAY Morning.

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SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under

Each additional line (about ten words)

Terms for Series of Trade Advertisements, also for Special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c., may be obtained on application to the Publisher.

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FOUR Lines (about THIRTY words) or under

Each additional line (about ten words)

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** Stamps must not be sent, but all small sums should be paid by Cash in Registered Letters or Money Order, payable at the Post-office, Covent-garden, W.C. to DOUGLAS FOUNDRINES, Publisher.

Addressed to No. 49, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on FRIDAY.

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

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY morning.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 49, Catherine-street, Covent-garden, W.C. free of charge. Letters will be forwarded if addressed in envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied night from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum, PREPAID, to countries within the Postal Union, 26s. per annum. Remittances payable to DOUGLAS FOUNDRINES, Publisher, No. 49, Catherine-street, W.C.

JUST PUBLISHED.

J. A. BERLY'S
UNIVERSAL ELECTRICAL DIRECTORY.

Price 10s.] For 1885. [Price 10s.

This book contains, amongst other trades, a very complete list of Manufacturers of Electric Bells, Alarms, and other Electrical Domestic Appliances.

WM. DAWSON & SONS,
Nos. 148-9, UPPER THAMES STREET,
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Best Bath Stone.
WESTWOOD GROUND,
Box Ground, Combe Dol
Corsham Down,
And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limi
Corsham, Wilts.

Bath Stone.
ALL DESCRIPTIONS OF BEST QUALITY
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BOX, WILTS.

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The stone from these quarries is known as the "W. Beds," and is of a crystalline nature, and doubtably one of the durable stones in England. It is of the same crystalline nature as the "bedrock," but finer in texture, and suitable for fine mouldings.

THE CHELYNCH STONE.

THE BRAMBLEDITCH STONE.

HAM HILL STONE.

Greater facilities have been provided working these quarries, and the stone supplied in large quantities at short notice.

Prices, and every information given application to **CHARLES TRASK & SONS**, Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—**Mr. E. WILLIAMS**, 16, Craven-street, Strand, W.C.

Douling Free Stone For prices, & address S. & J. STODART & CO., Quarry Owners, & Lime Merchants, Stoke - under - Ilminster.

Ham Hill Stone! Ham Hill Stone of best quality and durability, apply to **JOHN HANN & SON, Quarry Owners, Montacute, Ilminster. Establishd. 1837. Agents, MATTHEWS & GEARD, A Wharf, Regent's Park Basin, N.W.**

Asphalte.—The Bessell and Metallic Asphalte Company (Mr. H. Glenn), Office Poultry, E.C.—The best and cheapest material for damp courses, railway arches, ware rooms, granaries, tum-rooms, and terraces.

Asphalte.
Soyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
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EVERY DESCRIPTION OF SEASONED WOODS AND VENEER IN EXTENSIVE QUANTITIES.

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Great Peter-street, S.W., London.
Telephone No. 3,654, and Private Wire connecting Business Premises.

ARTISTIC + VENTILATION.

SHARP & CO. Hygienic and Hydraulic Engineers.

TESTIMONIAL

From **WALTER REID, Esq., M.D., &c.** (who conducted TESTS for GOVERNMENT.)

GENTLEMEN,
I have completed experiments with your Ventilator. I consider it a most effective Ventilator.

Speciality: "CONTINUOUS" System of House-Drain Ventilation, Up- and Down-Cast Ventilators, to suit every style of architecture.

HYDRAULIC RAMS (FYFE'S PATENT) & SANITARY APPLIANCES.

Health Exhibition Awards: 1 GOLD, 1 SILVER, 4 BRONZE MEDALS

11, HOLBORN CIRCUS, LONDON, E.C.

The Builder.

Vol. XLVIII. No. 2300.

SATURDAY, APRIL 4, 1885.

ILLUSTRATIONS.

New Admiralty and War Offices: Whitehall and St. James's Park Fronts (Revised Design).....	482-487
Roof of Westminster Hall.—From a Drawing by Mr. F. T. Dollman.....	480-491
Design for a Municipal Mansion: Perspective View and Detail of Portion of Towers (East Front).—By Mr. A. A. Cox.....	494, 495

CONTENTS.

Harbours and Docks	471	Design for a Municipal Mansion (with Plan): Soane Medalion	497	Books: Miller's Glass Painting (Wyman)	496
Shovelworking Machinery. By M. Powis Bale	472	Competition	497	Variations	489
Notes	473	Architectural Association: Visits to Fishmongers' Hall and	497	Church-Building News	496
Street Paving	474	Mercantile and Middlesex Archaeological Society	497	The Student's Column: Descriptive Geoaetry.—IX.	500
Letter from Paris	476	The London and Middlesex Archaeological Society	497	Recent Exhibitions	501
Some Celebrated Timber Roofs (Illustrated)	476	A Suggested Site for the Re-erection of Temple Bar	497	Recent Sales of Property	503
On Dry Rot in Wood	480	Coloured Portland Cement	498	Meetings	502
New War and Admiralty Offices: Revised Design	480	"Street Architecture of London"	498	York Architectural Association	502
The Roof of Westminster Hall	480	"Arsenic and Architects"	498	Miscellaneous	502

Harbours and Docks.



R. VERNON HARCOURT has done some injustice to himself, as well as to his future readers, by giving to a useful book * a title which is not fairly descriptive of its contents.

Most readers of the title given above would expect something like a bird's-eye view of the harbours and docks of the world, or, at all events, of those of the United Kingdom. How far that is from being presented by the work may be judged from the simple statement that while 588 ports and harbours are enumerated, in a Parliamentary Return of 1874, as existing in the United Kingdom, of which seven are military ports, Mr. Vernon Harcourt only indexes sixty-nine harbours, of which twenty-four are on our own coasts. Of the above-mentioned ports, seven were under the authority of the Admiralty, three under that of the Board of Trade, one under the Woods and Forests, eight under the Irish Board of Public Works, forty-seven are held by railway companies, twenty-five by other companies, fifty-three are owned by private individuals, and the remainder are under the control of Commissioners or Local Boards. It is thus evident that a book containing descriptions of so small a number of harbours as we have above indicated has little claim to the ambitious title of "Harbours and Docks."

What the volume really is, however, as stated in the preface, is an attempt at the exposition of the principles and practice of hydraulic engineering, as applied to the construction of harbours and docks. Thus regarded, it is a compilation of merit and utility, and that all the more so because it is not limited in its facts (as was the case almost wholly in the book on rivers and canals by the same author) to published and accessible data, it contains the pith of communications made by the engineers of several of the principal works cited. Thus, M. Alexandre, engineer of the port of Dieppe; M. Guillaud, engineer of the ports of Calais and of Boulogne; M. Bertrand des Vergnes, engineer of the port of Dunkirk; Mr. W. D. Cay, harbour engineer of Aberdeen; Colonel Mansfield, engineer in charge of the Galveston jetties; the engineer-in-chief at Delaware; M. Prévès, one of the

engineers at Algiers; M. Barret, engineer at Marseilles; M. Pettit (we think it should be M. Petit), engineer in charge of the Artha breakwater; Mr. Messent, engineer of the works on the Tyne; Mr. Hayter, one of the consulting engineers to Murrnagoa harbour; Mr. Dmoe, engineer in charge of Dover harbour works; and Major Lydecker, engineer in charge of the harbour works at Chicago, have furnished plans and details with which Mr. Vernon Harcourt has enriched and illustrated his seventeen chapters on harbours; while his own experience, already given in a paper in vol. xxvii. of the Proceedings of the Institution of Civil Engineers, has furnished the author with the particulars that he gives as to the Alderney harbour. The chief value of a work of the kind lies in the authentic information thus collected from original sources.

After three chapters on winds, waves, and currents, Mr. Vernon-Harcourt divides harbours into estuary harbours, harbours with back-water, harbours partly sheltered by nature, harbours protected solely by breakwaters, and peculiar forms of harbours. Had the subject been approached on the side of the general importance of seaports, the first rank would have been assigned to those noble natural harbours, such as Milford Haven, Falmouth, Cork, and, we may add, the Thames, which distinguish the shores of the United Kingdom. Of these, however, we find but little,—a great defect in a general work, but consistent with the plan of a book that deals almost exclusively with the work of the engineer in those places where nature has not herself provided for the need of the navigator. Of Queenstown Harbour (Cork) there is indeed a partial plan on plate 12, but it shows only Haulbowline Island and a basin in progress, and not the magnificent expanse of sheltered water in the bay. In fact, Queenstown is mentioned, not as a harbour, but as a dockyard. Pembroke Dockyard, which, in the event of a naval war, would probably form our most important arsenal, we have not found referred to in the book.

After describing jetties and breakwaters, Mr. Vernon Harcourt gives two chapters on the different modes in which harbours are protected by the engineer, as matter of practice. He enters, at much detail, into the difference between rubble mound breakwaters, rubble and concrete-block mound breakwaters, harbours protected by sorted rubble and concrete-block mounds, with slight superstructures; harbours protected by a rubble mound and a superstructure founded at low water; harbours protected by sorted rubble and concrete-block mounds, with superstructure founded at low-water; harbours protected by a rubble mound and a superstructure founded below low water;

harbours sheltered by upright wall breakwaters; and harbours on sandy coasts. No doubt, minute as the differences thus indicated may seem to be, we have here indicated so many true species of one genus of harbours. But we think there can be little doubt that, as a general rule, the whole of these compound forms of breakwater are likely to be displaced by the use of the method adopted by Mr. Abernethy at Fraserburg, and the north pier at Aberdeen. The mode of construction there used is as follows:—Bags of liquid concrete of from 80 to 100 tons weight are dropped from hopper barges up to the level of low water. These bags form a solid mass of concrete or an artificial sub-marine ledge of rock. Rubble foundations are entirely dispensed with. Above low water temporary frames are placed for a length of 25 ft. or 30 ft., and the concrete is tipped into these frames *en masse*. In the course of five or six weeks the whole becomes a solid mass of concrete, upon which the sea has no effect. The pier at Aberdeen has been finished for nine or ten years, and has resisted very heavy seas during that period. A pier at Newhaven has been constructed on the same plan. The cost is very much less than that of any other method of construction, and the time necessary for completing a given length of breakwater is also greatly reduced.

The only hesitation which the engineer can feel as to the general adoption of this improved method of breakwater construction is owing to the low specific gravity of the artificial rock thus formed *in situ*. The ordinary weight of cement concrete is about 17 ft. to the ton, or not much more than double the specific gravity of water. This is a serious evil when violent seas have to be resisted, as mere multiplication of the bulk of the wall does not compensate for the low resisting power due to the small preponderance of weight. To this fact are due all the failures of concrete in harbours, according to our opinion. In the case of the Madras Harbour this source of danger was pointed out in the columns of the *Builder*, at the time of the serious damage effected by a storm. But the most remarkable case in point is that of the concrete monolith at Wick harbour. This enormous mass, of 800 tons in weight, bolted and bound to foundations, making a total weight of 1,350 tons, was washed away, under the eyes of the resident engineer, removed *en masse*, and found resting entire on the rubble at the end of the pier, having sustained no damage except a slight fracture at the edge. This event, to which Mr. Vernon Harcourt refers, took place on the 18th of December, 1872; and the particulars cited are taken from a report by Messrs. D. & T. Stevenson, the engineers to the work, dated 14th February,

* Harbours and Docks: their Physical Features, History, Construction, Equipment, and Maintenance, with Statistics of their Commercial Development. By L. F. Vernon Harcourt, M.A., M.Inst. C.E. Oxford: Clarendon Press, 1884.

1873. There can be no doubt that, although the fury of the sea in Wick harbour is exceptional, its effect on such a mass is calculated to raise grave doubts as to the absolute reliability of concrete for breakwaters.

The reply, however, is that there is concrete and concrete. We have cited the specific gravity of ordinary concrete, and it may be admitted that it is too low to be relied on in cases where the action of the sea is violent. But at Swansea Mr. Abernethy made concrete blocks of copper slag, an extremely heavy waste material. Of this concrete from 12 ft. to 13 ft. weighed a ton. This is about the specific gravity of magnesian limestone, of serpentine, or of grey granite. It is a little more than that of carboniferous limestone. Syenite, or red granite, weighs from 15.2 ft. to 12.1 ft. to the ton. Thus, by the use of a material obtainable very readily, and of which the cost will be little more than that of transport, the engineer is provided with the means of forming a monolithic mass of any size that he may require laid *in situ* under water, and endowed with a weight which, in that case, means a power of resistance equal to that of ordinary building stone, and is only exceeded by the rarer and more costly forms of marble or of granite. We think, therefore, that the days of mounds of rubble, sorted or otherwise, of concrete blocks, and of the various kinds of compound breakwater, ably and carefully described by Mr. Vernon Harcourt, may very possibly be regarded as numbered.

A separate volume contains sixteen folded plates, each comprising numerous figures. They are clearly drawn and beautifully printed, and afford ample illustration of the text. There are also twenty-seven woodcuts printed with the text. Of these we call attention to the curves showing the relative duration of winds from different quarters at Havre and at Marseilles; and to the diagram showing the tonnage of vessels entering eighteen of the principal ports of the United Kingdom in each year from 1873 to 1883. With regard to this diagram, however, it should be remarked that while the tonnage entering the Port of London with cargo is stated at 11,500,000 tons, that entering Liverpool being given as only a little over 8,000,000 tons, the "Statistical Abstract" for 1883 gives the following figures. Tonnage of vessels, British and foreign, sailing and steam, that entered with cargoes and in ballast in 1883:—London, 6,589,594; Liverpool, 5,467,274; ditto cleared, London, 4,810,680; Liverpool, 5,167,568. This agrees with the rank given to those two ports in the table on p. 630, but it seems to us quite irreconcilable with the diagram on p. 628. Even taking "Tonnage of vessels entering ports" to include both entrances and clearances, London is only 765,000 tons in excess of Liverpool, instead of nearly 3,500,000 tons, as shown on the diagram. This is a matter demanding explanation, in a book which we have found to be generally accurate. We suppose that Mr. Veron Harcourt has included coasting traffic, which is not given by the "Statistical Abstract"; but, even so, the proportions given in his diagram, and in Appendix V., differ so materially from the figures cited by Mr. Thomas Stevenson in his standard work on "The Design and Construction of Harbours," as to call for clear explanation, as well as for definite citation of authority. The form of diagram employed, if made to show both entrances and clearances, of both foreign and coasting trade, distinguishing each at each of the thirty-seven ports specified in the "Statistical Abstract," would afford interesting information; and might form a basis for a general comparison of the harbours and docks of the United Kingdom.

Pottery Exhibition at Delft.—The Delft Section of the Netherlands Society for the Promotion of Industry will open an International Exhibition at Delft, on the 1st of June, 1885, to be devoted to Ceramic Tiles and Stained Glass. The Exhibition will remain open until the 31st of July. Applications for space must be made to the secretary, at Delft, before the 15th of April, and exhibits must be delivered before May 15.—*Journal of the Society of Arts.*

STONEMWORKING MACHINERY.

BY M. POWIS DALE, M.I.M.E., A.M.I.C.E.

ALTHOUGH the conversion of stone is one of the most ancient of all the mechanical arts, its conversion by means of machinery, in an advanced form, is quite of modern origin. A few years since, owing to the high rates of wages in vogue, operative masons' strikes, and other causes, a very considerable impetus was given to the development of this branch of engineering; however, in consequence of the continued depression in everything relating to the building industries, the introduction into more general use of machinery for the conversion of stone has been very slow. This may be partly attributed to the fact that in one or two cases machinery was erected in which the principle of working was ill-adapted to the nature of the stone operated on, and partial failure was the result. There can, nevertheless, be but little doubt that, by judicious selection, machinery can be made to effect an immense saving over hand-labour.

In the first instance, it is important that the stone it is desired to work be suitable for machine conversion. Most kinds of stone can be sawn without much difficulty, but when they are required to be dressed to a fine surface, or moulded, difficulties varying with the character of the stone present themselves. Stones of the nature of Portland, Bath, York, and Caen, and most kinds of freestones, can be readily worked by machinery if they are tolerably free and even in texture and hardness. Hard grit stones or flag paving, magnesian limestones, and oolites may be dressed to a plane surface. Granite also can be dressed to a plane surface. Slate, unless it be rotten or shaly in its character, may be worked by machinery with facility.

Stones which contain much shelly fossil deposit, especially if this be hard and crystalline, are unsuitable, as also are very tender stones. From a casual inspection of a stone, however, it is impossible to say with certainty whether it will work or not; the best way is to try it practically. Within the scope of this article it will be impossible to do more than glance at one or two of the most advanced machines for sawing, dressing, and moulding purposes.

For rapid sawing of the softer stones used in building construction, the circular saw has quite out-paced the ordinary horizontal blade, as with a well-constructed machine of this class from 150 to 250 running feet can be cut in a day of ten hours; if two saws are mounted they can be used for squaring the faces of the blocks at the rate of from 3 in. to 9 in. run per minute, and for this purpose they are of very considerable value. The advantages in favour of the horizontal blade are lower first cost, and rather cleaner work. In connexion with circular saws for stone conversion the most important point is the construction of the teeth; these, which are usually "false," should be of simple form, and easily and cheaply renewed. After repeated trials we can recommend those with the head of the tooth forged into a cupped or trumpet form; they should be made from the best rod steel, turned at the cutting edge, and hardened. One of the advantages of this form of tooth or cutter is, that when its edge is dulled or chipped it can be turned in its socket so as to offer a fresh cutting margin, and as it wears away on the advancing side, the tool will offer several fresh cutting faces before it is entirely worn out. The tool should be made sufficiently long, so that it will allow of its head being softened, again set up, turned, and hardened. As regards the cutting speed of circular saws for stone, no arbitrary rule can be laid down, as this must depend on the nature of the stone operated on. A speed at the periphery of from 50 ft. to 200 ft. per minute, or with a cutting-speed varying from 3 in. per minute in hard stone up to 12 in. in soft stone, will be suitable. The cost of tools for cutting, say 200 ft. run of sandstone, should not exceed 5s.

In cutting very difficult stone, such as that containing pyrites, the cutting-tools should run very slowly indeed, say 40 ft. traverse at the

periphery per minute, or they will be found to heat red-hot, and will, of course, at once be rendered useless; the feed should not exceed 2 in. per minute. Some difference of opinion exists as to the advisability of sawing stone with circular saws, with or without water. Some stones can, without doubt, be readily sawn dry, but from our experience we prefer wet sawing, as it keeps the tools cool and prevents unnecessary dust. In cutting stone with circular-saws the strain on the saw spindle and bearings is considerable; they should, therefore, be strongly supported by massive side standards, and the bearing surfaces should be ample; the whole framework of the machine should be of massive construction, to overcome excessive vibration in working. Should there be a jag on the saw-teeth in working, they will be found to deteriorate much more rapidly, and the work turned out will be "galled," and not so true on the face. With a well-constructed circular-saw the stone should leave the machine sufficiently true to enable it to be bedded or jointed without further preparation either by hand or on the planing-machine, or rubbing-head. For rapidly squaring large blocks of stone for harbour and similar work circular-saws will be found especially valuable, as they become better known their use should be largely extended. For dividing up large blocks, two circular-saws, placed one above the other, but working in the same vertical line can be used. For joining flat stones, such as paving, all hand-labour may be saved by mounting two saws so as to trim two edges and make them parallel, and by reversing the stone and setting it square by these sides the other edges may be served in a similar way.

Although the advantage of machine conversion over hand-labour in stone-sawing is considerable, it is much greater in the case of stone-dressing and moulding-machinery. In the early machines it was attempted to imitate mechanically the action of the mason chisel or quarry axe, but the whole of the devices have been failures. The principle of working that has proved most successful in dressing plain surfaces on stone is that of circular rolling cutters, and for moulding stone, a combination of revolving cutters and stationary scraping tools.

For dressing plain surfaces the circular cutters are given a determinate rotation of their own axes at the same time that they are carried round in a circle. It is found that with a nicely-adjusted rolling action there is very little attrition between the stone and the cutter, and that this is chiefly due to the forward movement of the stone; at the same time little heat is produced, and the cutting edge wears away very slowly. The principle of working may be stated as a rolling pressure brought to bear at the base of a certain portion of stone with the intent to force it off. The cutters are made of chilled cast-iron, or, if working the harder kinds of stone, of chilled cast-steel; the cost of renewal is small. A variety of machines has been constructed in which a number of tools of various types, having a circular movement in a plane parallel to the face of the stone, are employed. To successfully work them mechanically over the face of a stone may not appear very difficult in theory, but in practice we invariably find, when a large number of tools are employed, that they vary in wear from difference in temper, material, &c. from the work they have to perform; and that, without doubt, one of the chief reasons for the failure of this class of machines, whether for working stone, wood, or other material.

The amount of stone that can be dressed on the best type of machine will depend largely on (1) the nature of the stone being worked, (2) the size of the blocks, and (3) the way in which the machine is kept constantly supplied with stone. With the ordinary stones used in building construction, of a moderate degree of hardness, a fair average would be about thirty superficial square feet per hour, premising, however, that only a moderate amount of stone had to be removed. The cost of this, allowing two men and one boy to supply stone and attend to the machine, would amount to about

, whilst an average price to dress the same hand would be about 6s., leaving a large profit and surplus for contingencies. These cases would, however, vary somewhat in different localities.

Passing to stone moulding machines, in the most advanced type the stone is subjected to the action of both revolving and scraping wheels. The mouldings are roughed out by all trumpet-shaped steel cutters, similar to those already mentioned as being used in circular sawing; these are mounted horizontally in flat tool-holders, arranged in position on vertical spindles, the sizes of the tool-holders being graduated according to the depth of the various members of the moulding. For scraping and finishing the cutters to the desired outline, flat profile steel cutters are used mounted in tool-holders, with vertical and horizontal adjustments, so as to bring the tool to act either on the side or upper surface of the stone, as may be required. For making under-cut mouldings the table carrying the stone is made to swivel, or the stone can be mounted in a cradle. For moulding and facing semicircular windows, and such like curved work, a revolving table is generally employed. For holding shafts and pillars in position whilst being moulded or dressed, suitable head-stocks are used.

For "checking" deep mouldings, a circular wheel may be used with advantage. This is fixed on the top of the other tool-holders, and penetrates into the stone before the cutters following it come into play. In moulding, all complex forms of cutters should be provided; and many members of the same moulding should not be formed on one cutter, except for scraping and finishing purposes, and the temper of the tool should be adjusted according to the hardness or nature of the stone being worked. In making bevelled mouldings, the stone should, if possible, be sawn in an angle before being put on the machine, the cutters, having thus less material to remove, are subjected to less strain and consequent wear. At the same time, the stone is less liable to "pluck" in the working, or break at the arrises. For moulding purposes it is in favour of using a combination of revolving cutters for roughing out, and stationary scraping cutters for finishing in preparation to two sets of stationary cutters. The direct contact of the roughing cutters with the stone being less, the friction in working and the power required to drive are reduced in proportion. The arrises, too, are less liable to break. In the successful application of stone-working machinery, in addition to the nature of the working being suited to the material, the speed, temper of the cutters, and the rate of feed must be adapted to the nature of the stone, as what may be right in one case may, owing to the varying character of the material operated on,—be entirely wrong in another. For example, some stones may be cut or forced off in large chips, whilst others have to be almost scraped or ground away.

With a suitable machine a large range of work may be turned out, such as architrave mouldings, cornices, ovolos, pilasters, astragals, eadings, scotias, string, and other straight, under-cut, and curved mouldings, and these are much superior to hand-work, both in the sharpness of the outlines and in accuracy of finish. The amount of work that can be performed will, of course, vary with the section of the moulding, the size and nature of the stone, and the number of changes of work. The following statement of work done by a duplex-barrel moulding machine was taken by the writer from the e-book of a machine working in Portland stone on a large contract:—String, 1 ft. deep, 1 in. projection, 50 ft. run per day of twelve men; window-jamb, 6 in. face, full of mouldings, worked both sides, 150 ft. run per day; moulded steps, twenty-four per day, worked both sides, with four steps on the machine at a time. As in different localities the conditions will vary,—owing to the varying nature of the work and the prices paid,—it is a somewhat difficult task to compare the cost of hand machine moulding work by absolute figures. Our practical readers will, however,

be able to form their own opinions in this matter. Let us take London prices, and say about 90 superficial feet of Portland moulding be worked on a machine in one day, at an outside cost of 30s.; at the ordinary price of London hand-labour, 90 ft. of Portland moulding, at 1s. 2d. per foot prime cost, would amount to 5l. 5s. 4d., which leaves a very large margin for profit and contingencies.

Another advantage that machine-moulding will be found to have over hand-moulding is that the work is better done, the lines being perfectly straight, and the edges beautifully sharp, and should a large number of pieces of one moulding have to be worked they will be found absolutely alike in section.

In concluding these notes, the successful operation of stone-working machinery as a financial investment may be said to depend on the following points:—(1) The suitability of the stone; (2) the suitability of the machine, the tools, and the principle of working; (3) the constant supply of material to be worked; and these points being secured, in these days of high wages, short hours, and extreme competition, few industrial operations can show a better return.

NOTES.

THE first trumpet-blast to herald the approaching Indian and Colonial Exhibition for 1886 was sounded on Monday last, when the Royal Commission to organise the Exhibition met for the first time at Marlborough House, under the presidency of the Prince of Wales. The Prince referred to the attractive display of Indian art at the Paris Exhibition of 1875, which could only be witnessed by a comparatively small number of the population of these islands; and there can be no doubt that the proposed Indian Exhibition on English ground will be a matter of the greatest interest not only in an artistic sense, but to some extent in a political and social sense also. The Government have not so far signified any intention of making a grant in aid of the Exhibition, though entirely approving of it. It seems desirable that some definite and substantial aid should be given by Government for an Exhibition of which, owing to the cost of transport, the expenses will certainly be abnormal, and which is of quite exceptional and national importance. A guarantee fund has been formed, to which the Indian and Colonial Governments have contributed 51,000l., and the Prince had to acknowledge the cordial response made by Corporations, firms, and individuals in the United Kingdom to invitations to participate in the guarantee. The buildings which have already been used for the Fisheries and Health Exhibitions have been placed at the disposal of the Commission on fair terms, and plans of them showing the available space have been sent to the Government of India, the High Commissioner for the Dominion of Canada, the various Agents-General of the Colonies, and, through the Colonial Office, to the Crown and other Colonies, and have met with their approval. An important variation from the usual conduct of such exhibitions is that no award by juries is to be given, but only a commemorative medal to each exhibitor. The object of this, as explained by the Prince, is that as some colonies, from their age and circumstances, were more advanced than others, those in their infancy should not be placed at a disadvantage in an exhibition from which all thought of trade rivalry will be excluded. This is, we think, an entirely desirable regulation; indeed, one may say that awards of juries in many large exhibitions of the same kind have been scattered so thickly as to lose their real value, and have been "worked" so hard by those who have obtained them as to give a most disagreeably advertising character to exhibitions promoted with no object of the kind. The details of the executive duties will devolve on Sir Philip Cunliffe-Owen, and a special Finance Committee has been appointed, consisting of Sir John Rose, Sir George Birdwood, Mr. Edward Birkbeck, Sir Barrow Ellis, and Sir William Sargeant.

PROFESSOR LEONE LEVI has published some important addenda to his report on the wages and earnings of the working classes, which was reproduced in the *Times* in January last. The estimates then given of the value of wages came down, at the latest, he now tells us, only to the middle of last year, and the Professor is of opinion that the reduction which has since taken place must amount to fully 15 per cent. on the rates of wages in the leading branches of the industry of the country. As the year 1867, from which the comparison starts, was one in which wages had fallen by at least 5 per cent. from the rate of 1865, the reduction intimated is very serious. Mr. Levi does not state how far the 10 or 15 per cent. reduction now under debate in so many parts of the country (as shown in our last number), is included in his estimate. But it is evident that his stated advance of 12·37 per cent. in the rate of wages per wage-receiver from 1867 to the middle of 1884 is altogether swallowed up by the admitted decline,—to say nothing of contingent reductions. And it must be borne in mind that rent, taxation, and almost all the expenses of life are steadily on the increase, and must do increase with the increase of population. Unless, therefore, the rate of wages increases in a corresponding manner, the working man is steadily getting worse off. And this ought to be regarded with due attention by those who would compare (without bearing expenditure in mind) the wages at any former period of our history with those now paid, when they are paid.

CORRESPONDENCE in *re* the Westminster Hall Restoration, resumed itself in the *Times* on Friday, last week, in the shape of two letters from Sir Edmund Beckett and Mr. Butterfield. The former is very much more to the point than he sometimes is, though it may be questioned whether the whole merit of the architectural models is his because he talked about them before, and we may reasonably feel perplexed at being told that "all the Gothic styles used straight parapets" and not battlemented ones. Has Sir E. Beckett, at one blow, dismissed the Perpendicular style with costs, or how? We quite agree in disliking battlemented parapets, because they are a weak and trivial survival of a form really belonging to military engineering, and unmeaning when used as an architectural ornament. Sir E. Beckett recognises the cogency of Mr. Brewer's evidence as to the former state of the site, and that the Hall never could have been outwardly seen from the westward.

MR. BUTTERFIELD thinks the small windows very mean in appearance, but considers this a secondary matter compared with the manner in which the effect of the flying buttresses has been interfered with. "They are cruelly treated by the high-shouldered walls which are made to abut upon them, and I trust that any member of the House of Commons who intends to give a vote upon the subject will first survey, from Poet's Corner, the one buttress of the Hall which has not yet been disguised. The faults which must be felt to belong to the Hall itself are aggravated by the model, while such good points as the peculiar character of these buttresses in their isolation are overlooked, misunderstood, and destroyed." Mr. Butterfield urges that we can only do justice to the buttresses by leaving them in their isolated condition, showing fully the fine outline of their arches. We should not object to a low cloister between the buttresses, which rather seem to want connexion in their lower portion, provided the upper portion and the flying buttresses are left free. The built-up models, the higher one at all events, if carried out, would simply involve the spoiling of the effect of the architecture (if it should remain permanently visible) for the sake of a piece of archaeological trifling. Mr. Butterfield, by the way, has the courage to suggest that both the value of the Norman masonry and the possible damage to it (by being left exposed) "have been perhaps a little exaggerated." We should be disposed to say so too. This is probably the only age

in architecture in which people would have gone on their knees in this way to an old remnant of wall, and worshipped it. Preserve it by all means; but do not make an idol of old stones,—even Norman ones. In reference to this point the "Society for the Protection of Ancient Buildings" circulate a pamphlet on the question, in which the solemn fetish-worship paid to this remnant of Norman walling really approaches the borders of lunacy.

RAVENNA is not usually accounted a lively place, but, in the matter of Byzantine archaeology, the local *savants* show a praiseworthy energy and zeal. A museum is in process of formation in which it is intended to gather together all the fragments of architecture, sculpture, metal-work, &c., which are constantly coming to light in the neighbourhood, and which have been hitherto so scattered as to be only available with great difficulty for scientific purposes. The collection is to find a home on the ground-floor of the Ravenna Library, and is to be under the directorship of the sculptor Henrico Pazzi. It is hoped that at the end of the present year it may be available to the public. At present all is in confusion, but even a passing glance shows that the material is valuable and abundant. Some generous owners have presented their discoveries to the museum; the possessions of others are only on loan, and are labelled with their owners' names. Noticeable among the scattered monuments massed together in disorder are a beautiful fragment of a cornice found in the courtyard of St. Vitale; two capitals, provenance unknown; one side of an altar of the sixth century with a delicate column and capital as support, found by a countryman while digging; and another capital of wonderful intricacy, found in the garden of the Archbishop and lent by him.

PHOTOGRAPHY has done wonders for the preservation of at least the memory of some monuments which cannot, as yet, be removed and placed in the museum. Part of a beautiful arch, originally belonging to the ciborium of the Church of San Pietro, in Bagnacavallo, a work of the fifth century, lay for a long time unnoticed and trodden upon in the pavement. It has been photographed, and is now, though in part defaced, rescued from further destruction by being placed in the wall of the church. Another fragment of a tympanum has been found, built in beneath a column in S. Francesco, and has been photographed, but from its position cannot be moved. Sometimes the Museum finds that its action comes in too late; for instance, a Byzantine capital, found in Ravenna, was sold to a dealer, and resold to the architect who was at the time restoring S. Stefano at Bologna, where it now stands. Owing to the marshy position of Ravenna, draining operations have constantly to be carried on, and it is in course of these works that monuments frequently come to light. Smaller objects of interest in the museum are two metal crosses adorned with extremely rude Byzantine work (both found in the Duomo behind a sarcophagus)—a beautiful necklet of pearls and gold work of the sixth century, found during excavations in the crypt of S. Francesco, and some coins and weights of coarse workmanship. Scarcely less valuable than this work of collecting scattered monuments in the museum is the systematic reproduction by photography of sculptured and architectural details either too remote for convenient personal inspection or exposed to decay from the action of the weather. Sig. Ricci has just recently made a series of photographs of the decorative details of the tomb of Theodorico. Casts of the original are taken, and the photographs are made from the casts, the result being that the student gets a clearer notion from a study of the photographs than from the actual monument itself, unless he be provided with scaling-ladders. The photographs, it is understood, are taken with a special view to the publication of this monument in a work shortly to appear in Berlin.

In a recent report on the condition of the sewers in the district of the Local Board of Health of Bromley (Kent) Mr. Rogers Field makes some special observations in regard to the causes of offensive smells from sewers. The sewerage in the district being on the separate system, and the population rather scattered, the flow of sewage is small; and though the sewers are generally well laid, there are slight irregularities in jointing, of little consequence where a good flow is passing down the sewers, but sufficient to arrest sewage matter when the flow is small, and lead to an increasing accumulation. With frequent flushing this accumulated matter would be washed away before it has time to putrify, and the smells would be only those due to fresh sewage; with infrequent flushing the evil would obviously be much greater. The smell from putrid sewage, Mr. Field observes, is undoubtedly dangerous, that from fresh sewage is not. Another defect which Mr. Field notices as exemplified in the Bromley district sewerage, and one to be guarded against, is bad construction of the open some cases these were rough in surface finish, channels at the bottoms of manholes. In thereby arresting solid matter; in some cases the channels have sunk so as to form small basins for the collection of sewage. No wonder in such a case a bad smell should find its way through the grid of the manhole. Another point noted in the report is that the sewers are all the same size,—12 in. diameter. The one which has the greatest duty to perform never runs more than one quarter full: consequently those which have less duty must be too large, to the peril of the proper flow of the sewage.

THE annual loan exhibition of pictures at St. Jude's Schools, Whitechapel, is open this week and next, and is attracting large attendances in the neighbourhood. Visitors from the West may find an opportunity of renewing their acquaintance with some notable works. There is Sir F. Leighton's large "Alcestis," the struggle of Hercules with Death, and Mr. Watts's "Britomart" and "Esau," and the "Meeting of Jacob and Esau"; Mr. Crane's "Allegory of Human Life," which may be remembered in the Grosvenor Gallery; a very fine selection of the works of Israel; Mr. Poynter's "Zenobia" and "Helen"; a considerable number of small but beautiful sea pieces by Mr. Brett, and many other works by eminent painters. There is one remarkable picture by Mr. G. F. Watts, which has never before been exhibited,—"Godiva,"—not the ordinary "nude study" affair to which that title generally introduces us, but Godiva fainting and helped off her horse by her women at the close of her ordeal, with a countenance almost painfully expressive of mental strain and suffering. Mr. Watts never takes an old subject of this kind in hand without giving a new and deeper reading to it.

THE annual exhibition at Mr. Wallis's Gallery, which opened to the public this week, is rather above than below the average of the exhibitions at this gallery. There is a fine Meissonier (10), which in itself is something to say, for Meissonier has not been frequent of late in English exhibitions. There is a very fine Gérôme, "Botzaris" (33), a single figure enthroned amid beautiful decorative surroundings; there is a fine example of Corot also. To name these three (though none of them are new works) is enough to make the exhibition, if the rest of the walls were bare. Professor Müller sends "Bazaar Street, Cairo" (15); Herr Heffner has some fine works in his last manner, but it is becoming more and more evident what a decided mannerist he is. The two other large pictures are not highly successful; one by Révész (a new contributor) represents "Sandor Petöfi" (108), a poet, who is called the Burns of Hungary, and is a very Hungarian Burns indeed, reciting in a theatrical manner to a theatrical audience; and of the other, "The Genius of Pity staying the Vivisector's Hand" (88), surely the title of the picture and the name of the painter (Gabriel Max) are enough. If Mr. Wallis is to keep up the aesthetic standard of

his gallery he should not let that sort of thing in. There are numerous good works by Chevallier, Laugée, Van Marcke, A. Holmberg, Allan Schmidt, Seiler, E. Frere, and others.

THE exhibition of the works of deceased water-colour artists collected by the Royal Society of Water-Colours Art Club, which was open for a few days at the rooms in Pall Mall East, contained a great deal of highly interesting work. In the collection were included several examples from Sir R. Wallace's fine collection of works of Decamps; a fair proportion of Turners, including the two little masterpieces "Grouse Shooting" and "Woodcock Shooting" from the same owner; sundry Cotmans; Mr. J. P. Seddon's Rossetti, "Giotto painting the Portrait of Dante"; a good many of Mr. Angell's exquisite bird pictures, &c. There was a considerable proportion of architecture work in the collection, some of it of remarkable character. We noticed especially some of De Witte's drawings, notably an interior at Haarlem, which is not indeed artistically effective, but which, as a clean, hard, precise, and realistic representation of architecture, is unsurpassable. Prout was well represented, and there was a fine row of great blotted (rather than painted) landscapes by David Cox at the upper end of the room.

UNDER the title "Echoes from Hellas" there is to be brought out, by Messrs. Marcus Ward & Co., the letter-press of a "Tale of Troy," as performed some little time since at Cronwell House, and that of the story of Orestes (from Æschylus), which is to be produced during the season at King's College. The text in both cases is by Professor War and Mr. Walter Crane has undertaken to supervise and arrange the illustrations of the book as a whole, which will also include designs by Sir F. Leighton, Messrs. Poynter, G. F. Watts, F. Sandys, and Professor de la Motte. We have no doubt the volume will prove a very charming one; though we have the impression that Mr. Walter Crane's Greek may be a little too much tinged with Mediævalist for the occasion in hand.

STREET PAVING.

ONE of the weakest points in the growth and development of American cities is the condition of the streets and roadways, which are usually the last things to be thought of. Streets, both in the older towns and cities of the East, as well as in the newer communities of the Far West, are laid out and planned of magnificent distance and noble breadth; but while the buildings that spring up with such rapidity on either side are costly, and often palatial in character, nobody ever seems to think of the roadway between which is frequently so neglected that it is not only an eyesore, but a serious danger to the health of the inhabitants. Of course, in the large cities, such as New York, Philadelphia, Boston, Chicago, &c., the thoroughfares through which the main traffic of the cities passes have more or less care taken of them, as are also those of the most artistic and expensive suburbs; but once we step aside from these, we find an unkempt and filthy roadway which would disgrace the very lowest mining village in Great Britain. The very first thing that strikes the traveller on his first visit to New York is the magnificence and solidity of the Broadway and the squalor and neglected condition of the streets that open out of it on each side. A drive (not by tram-car) from the dock to his hotel will set the new arrival in a state of acute alarm at the holes and the ruts over which he is jolted, and he will probably have suffered more during the two or three miles ride than during all the three thousand miles by steamer from Liverpool; indeed, a short investigation will convince him that New York in this respect is a white sepulchre, though, unfortunately, its bad example is copied by seven-tenths of the other towns in the States. One reason, perhaps, why the American town dwellers have come to regard the condition of things with equanimity is the fact that the tramway system is so enormously and universally developed that, as a rule, other public vehicles are in no demand, and when they are employed an unconscionable and prohibitory

tariff is asked. The consequence is that not one in a hundred thousand ever travels otherwise than by tram-car, which, indeed, has become a necessity from the extreme length of the journeys; and as the pitfalls on either side of the rails are not felt by the inmates of the car they are supremely indifferent to the discomforts of those on foot.

It is not so much to be wondered at, in the case of a Far West city, like Omaha or Cheyenne, that the streets are looked upon as improvements that can wait, but the inhabitants seem to forget that the very breadth of the roadway may be a serious sanitary drawback, inasmuch as it offers harborage for many inches of mud and sewage, the liquid portion of which naturally gravitates to stagnate at the sides. Crossings are only possible at long intervals, and then by a rickety plank-way, which, in wet weather, generally secures a ducking to the wayfarer. These remarks, which occurred to the writer after an acquaintance with a great number of American cities, will serve to introduce a more intimate knowledge of the Philadelphia paving, which has recently been the subject of a special report, containing some interesting and valuable information on street paving in general. Philadelphia has 1,060 miles of streetway, of which 573 consist of paved street, 447 macadamised, and 443 of unpaved. The former category possesses the following characters:—

Cobble.....	6,118,925 sq. yds.,	or 93 pr. cnt. of the whole
Granite blocks	634,183 "	6 1/2 "
Asphalte.....	25,398 "	3 "
Total.....	8,793,466	100

Practically, therefore, what is paved in Philadelphia is of cobble, which is laid upon a bed of loamy gravel without any sand, the size of the stones being very irregular and varying from 3 in. to 15 in. in size. The granite blocks do not appear to be laid very carefully, as they are not cemented, while the granite itself is of different qualities; and, as the system of repairs is that of letting out a district to the lowest bidder for a year's superintendence, the condition of the pavement generally leaves a good deal to be desired. Philadelphia specially needs good and enduring street pavements, because the streets themselves are unusually narrow (from 50 ft. to 50 ft.), leaving only 26 ft. and 34 ft. respectively for the roadway between the curbs, and even this space is so taken up by the tramway that the carriage-way on each side is reduced to 10 ft. or 12 ft. in width. Macadam is principally used in the suburban portions of the city, being usually 10 in. deep, and composed of blue gneiss rock.

It is scarcely to be wondered at, that, under the circumstances, the cobble pavement should be condemned in the report, as entirely unfit or use in so large a city. It is next to impossible to keep the stones in an even position, owing to their irregular shapes, while the numerous rifts and crannies afford access to immense quantities of street filth, which cannot be got away, and continually give forth insidious odours. The committee, therefore, recommends that no more cobble pavements should be ever laid down, but as it is impossible to deal with the existing pavements as to be able to do away with them altogether, it also recommends that very stringent reforms be made, wherever repairs are wanted, as to the laying down of the materials. The main points are, that the stones should be broken of a uniform size, and none should be less than 3 in. or more than 7 in. in size, while they should also be laid with the greatest dimension vertical. The red gravel upon which the stones are now placed contains about 16 per cent. of clay, and this, it is advised, should be used only as a sub-foundation, spread to the depth of 4 in., and well rammed or rolled. On it should be spread a layer of clean, sharp, river sand, of less than 1/2 in. in size, and quite free from impurities; and when all this has been properly set, washed pebble should be raked over the surface to fill up the joints, and the whole rammed with a heavy rammer. The most important part of the inquiry is, of course, the best kind of pavement to be put down where none exists, or where the cobble can be superseded with advantage; and here the opinion of experts runs in favour of granite blocks and asphalt, either as sheet asphalt or as blocks. The wood pavement, although possessing many advantages, has been well considered, but rejected on the score of

cost of maintenance and construction. The wood pavement of Paris has a first cost of 16s. per yard, while the contract price for repairs (to run for eighteen years) is 2s. (all but one halfpenny) per yard per annum, making the total expense during the eighteen years, 27. 11s. 4d. per yard,—undoubtedly a much heavier undertaking than either granite or asphalt. It has been determined, therefore, to use the granite blocks where the distance between rail and curb (or curb and curb) is less than 20 ft., or, indeed, in any situation where the travel is heavy and continuous. It is to be used also in all streets, whatever the width, where the grade is steeper than 3 in 100. In open spaces, where the travel is slight, and the area wide, sheet asphalt is to be laid down, as also in streets where there are no tramways, and which mainly consist of dwelling-houses. Block asphalt is, however, cheaper, and more readily dealt with, though it has not such good wearing qualities as the other kind. The granite blocks should be laid upon a bed of strong, clean gravel, formed to the cross-section of the street; but if the travel is heavy, it is quite worth the expense of having a 6-in. foundation of concrete, which will make the pavement safe under all contingencies, and does not add to the cost more than 3s. 4d. per square yard. It is not every kind of granite that is suitable for pavement blocks, hard basaltic stone, that takes a polish under wear, being quite as objectionable as a softer quality, as well as gneiss and all rocks that are laminated in texture. The blocks must necessarily vary from 4 1/2 in. to 8 in. in thickness, according to the estimate of travel, but, as a rule, narrow blocks give firmer footing to a horse and cause less noise; while, on the other hand, this must not be carried too far, on pain of injuring the strength of the block. Each block should be regular in shape, with rectangular edges and smooth faces, and they should invariably be laid with tar-cemented joints, so as to make the surface waterproof. Nothing is more destructive to a pavement than open joints, for access is given to all kinds of moisture and stable urine, which ferment, thereby loosening the joint, making the atmosphere of the street extremely unwholesome, and even penetrating into the drainage system of the houses. The expense of this most necessary precaution is very trifling, only 3 1/2 gallons of tar being needed to every square yard at a cost of 1s. The general cost of laying down granite blocks tar-coated as above may be taken per square yard as follows:—

	6 in. deep.	7 in. deep.	8 in. deep.
Cost of blocks.....	7s. 2 1/2 d.	8s. 0 d.	8s. 0 d.
Cost of laying.....	3 1/2 "	3 5 "	3 7 "
Total.....	10 5 "	11 5 "	12 7 "

Asphalte is of various kinds and preparations, but the most valuable may be soon summed up. That which is most in favour in Paris and other Continental cities is the asphalt *comprime*, made from an amorphous limestone, naturally impregnated with bitumen. This material has its habitat in the Vosges Mountains, as well as in Hanover and Sicily. Its after-treatment is simple, consisting of powdering, placing on a concrete foundation, and thoroughly compressing by ramming and rolling. The American asphalt mastic, with which the city of Washington is almost entirely paved, is an artificial compound, made of Trinidad bitumen, powdered stones, and sharp sand. Then there is the coal-tar concrete, which is much used, but is not really an asphalt at all, though improperly called so. It has a foundation of broken stone and coal tar, with a top surface of sand or fine pebbles and tar, made into a mastic, spread and rolled like the others. But this latter, though cheap and easily manipulated, has a serious drawback, and that is, its being a product of gas tar, obtained by intercepting the destructive distillation, when it has reached a certain point. The atmospheric influence to which it is exposed when laid down, causes gradual oxidation, so that the tar loses its cementing qualities, with the result of the sand losing its cohesion, and the pavement pretty quickly disintegrating. The American asphalt mastic can be laid down for 9s. per square yard; and as it is cheaper and less slippery than the *comprime*, it is to be principally used in Philadelphia. All asphalts require an absolutely rigid and unyielding foundation, the best being a concrete of hydraulic cement of at least 6 in. in thickness; and not only must the materials be essentially good and pure of their kind if the

pavement is to have any wearing character, but the contract for maintenance should be carefully specified as to the amount of subsidence or dilapidation needing repair, for otherwise there is no class of work so open to scamping and dispute as this. Asphalt blocks are made of Trinidad asphalt and small particles of limestone moulded under heavy pressure. The best size is about 12 in. in length by 4 in. wide and 5 in. deep, and being uniform, the joints are extremely narrow and soon unite so as to make the pavement compact and waterproof. The cost, including a foundation of gravel and sand, is about 8s. 6d. per square yard.

The commissioners for reporting on the Philadelphia city re-paving, wind up with some excellent suggestions which are applicable to any town or city, no matter where it is. They are to the following effect. The crown or transverse section of the pavement should be the arc of a circle, with versine about 1/10 of the chord, or, say, for

Streets, 26 ft. wide, crown 4 in.	
" 34 ft. "	5 in.
" 50 ft. "	7 in.
" 70 ft. "	10 in.

In wider streets these may be slightly reduced, when the horizontal slope exceeds three 1/100. The distance from the top of the curb to the surface of the pavement at the curb should be between 5 in. and 7 in., depending on the width of the street. Wherever the ground is soft and full of springs, "blind" or broken stone drains should be laid under the foundation, connected at their lower ends with drain-pipes leading into the nearest sewer. No sewer pipe intended to carry house drainage should be laid with open joint for the purpose of draining the soil, as in such a case the soil is sure to become polluted, and insanitary results follow.

The cost of this undoubtedly heavy undertaking of paving so extensive a city as Philadelphia, or rather as much of it as is to be repaved, is thus estimated approximately:—

1,000,000 sq. yds. of granite block at 14s. 7 1/2 d.	£730,000
6,000,000 "	3,120,000
1,100,000 " sheet asphalt, @ 0	435,000
300,000 " asphalt block, @ 8 5	125,000
8,400,000 "	Total..... £4,410,000

From this has to be deducted 252,000l. for the value of 8,400,000 yards of cobble, leaving the net cost as 4,210,000l. It is also advised that an expenditure should be made each year of 400,000l. in laying fifty miles of improved pavement, at which rate all the old cobble streets would be entirely replaced in ten or eleven years.

LETTER FROM PARIS.

As our last letter predicted, the French Government will entrust to M. Alfred Darcel the direction of the Musée de Cluny. The successor of M. Dn Sommerard, who was born at Rouen in 1818, has long enjoyed in artistic and more especially in archaeological circles a reputation which seemed to point him out especially for a post which is also of a very special character. M. Darcel, among whose numerous works we may mention "Les Arts Industriels du Moyen Age et de la Renaissance," "Un Recueil des Faience Italiennes," and "Excursions artistiques en Angleterre," has also distinguished himself by some articles of great erudition on the *mise-en-scène* of the theatre. His successor in the "Direction des Beaux Arts" is far from occupying any such important artistic position. M. Gerspach, who owes his administrative good fortune to M. Maurice Richard, the last Minister of Fine Arts under the Empire, has arrived rather late at his artistic apprenticeship, and the administration of our great national manufactures demands rather more obvious and definite capabilities.

The decision taken by the Municipal Council, on the other hand, in regard to the popular opera, has completely deceived our expectations. The question, as we before said, was that of arranging for first-class popular representations, at reduced prices, assisted by an annual subvention of 300,000 francs. In principle it was approved, but, at the last moment, the Council drew back. It was found, apparently, that "Spartan black bread" was better fitted for Parisian electors than the regal fare of the Athenian Republic; and the Opera, deprived of its subvention, continues to reserve for the children of fortune the *chefs d'œuvre* of its

ft. apart from centre to centre. The principal rafter is 12 in. by 9 in., and the tie-beam in. by 9 in.; in each truss there are five iron rods doing duty as queen-rods and intermediate rods, and the heads of the principal rafters and king-piece are received into a cast-iron hen-head. The pitch, i.e., the slope or angle to the horizon, is 21° only.

The failure of this roof may probably be traced to a series of causes rather than to any prominent defect. The deficiencies of the roof have been already pointed out, and here elsewhere a close examination would not only show that the joints have compressed slightly, and that the timbers have bent. The truss apart of the principals is rather great, which throws a greater load on each truss than ought to have. The pitch is too flat, which greatly increases the strain upon every part of the structure. The braces under the principal truss are too few, and both the principal rafter and the collar beam are loaded not at the strong points, namely, those stiffened by the braces, but at points away from them, so as to be subjected to some cross strain. The scantlings are light, considering the work the timbers have to perform; and the large amount of flat space in the middle, and the small angle of the slope on the sides, would favour the lodgment of snow, that a heavy fall of snow would throw a tremendous burden on to the frame-work of this truss in addition to what it has ordinarily to carry. Putting all these causes together, there is no reason to be surprised at the failure of the roof; and yet its appearance is striking, and as the idea of its being both elegant, skilful, and boldly designed. Boldness has, however, been pushed too far.

It is believed that the widest timber roof in the world, with or without a tie-beam, ever erected is one that was erected over a riding-house at Moscow in the year 1700, of the enormous span of 235 ft. The principal rafters in the truss of this roof were replaced, or rather strengthened, by a vast curved rib made of three thicknesses of timber indented together, and bolted. The design was ingenious, and after a time this roof partly sank, and I believe it is not now standing. The material used, but it is not improbable that it is fir, and if so the use of that material may partly account for the failure of this great structure. Those roofs of considerable span which have been most successful have, in the majority of cases, been framed either in oak or chestnut.

In the roofs with tie-beams which we have been discussing, nothing more is attempted than to roof over a space requiring to be covered, and, in most cases, to carry a ceiling. Sometimes also it has been desired to form a loft or a sort in the hollow space in the roof; and the framing employed for these purposes has been designed to secure only those ends, it has not been possible to use all the timbers in the situation where the very most could be made of them.

In making a roof, however, we enclose and cover in a large space above the top of our walls, and, in many cases, it is desirable to use the space, not by constructing a loft in it, but by adding it on to the space below. This is usually done by putting such a roof as has been described on side walls, and leaving the ceiling; but the tie-beams and framing often have an appearance not in accordance with the architectural design of the building, and in many cases, as, for example, in the case of a church, where the gable is occupied by a large window, the line of them will cut across and destroy the effect of an architectural feature. Accordingly roofs without tie-beams are more readily found requisite, and these form by far the most important and most interesting part of our subject. Roofs of this class were generally employed throughout the period which we have seen progress of Gothic architecture, as well as in modern times.

My friend Professor Kerr, in his opening paper,* was necessarily restricted by his subject to tie-beam roofs, so that this class of structures was not touched upon by him; but I regret that in alluding to an unscientific form of roof occasionally to be met with in churches of small size, he did not do our forefathers the justice to list that innumerable specimens of their skill as carpenters, accompanied by the greatest feat, have come down to us from the past. He is (unintentionally, I am sure) have left on

the minds of some here the impression that the Gothic idea of a roof was only to throw a beam from wall to wall, to stand a post on the middle of it, and then to carry rafters from the top of the post to the wall. I am quite aware that this sort of roof is to be met with, yet I hope to succeed in showing you that in the centuries we call the Middle Ages carpentry was carried to great perfection; and I am the more anxious to do this because there is no country in Europe where carpenters were more skilful than in England, and because the acknowledged masterpiece of ancient carpentry is to be found in this metropolis, the work of English hands and the contrivance of English designers.

We have seen that where a timber is short it may be able to sustain a considerable amount of cross-strain, such as would break it were it long, and the earliest attempts at throwing the roof more into the body of the building than is possible with a tie-beam were made by putting the tie part of the way up the rafters, so that there was a short piece of rafter between it and the wall exposed to a strain which is partly transverse. A second step was taken when, in order to get rid of the straight line of the tie, two oblique timbers, each starting from the foot of one rafter and getting hold of the other some way up, were employed. Sometimes these two methods were combined, as in the timber roof over the vaulting of Westminster Abbey. In this manner, but with all kinds of variations, sundry very picturesque church roofs have been framed. Some of them carry polygonal ceilings, others show their timbers; but in either case the eye is carried upwards, and the space in the roof is virtually added to the building.

One remarkable example of this kind of roof is to be seen at the Hall of the Palace of Justice at Ronen, and those of you who have taken one of the opportunities now open of spending a short holiday in the very pleasant and instructive change of a trip to Paris, will, I have no doubt, have remained for a few hours in that interesting city on the road, and may have seen this Hall. The building of which it forms part is a fine Gothic structure of the end of the fifteenth century, the date being 1493. This hall is 150 ft. long and about 54 ft. wide, and is roofed, in a single span, by a roof without tie-beams. A timber ceiling, of an arched outline, conceals the framing of the roof, but a published engraving of the construction shows that there is a collar three-fifths of the height up the roof, and a second higher still, with a moderate amount of bracing to the upper part of the rafter, but nothing below the collar but oblique ties, and those very long ones. One authority says that the roof had tie-beams at one time, and that they have been cut away. However this may be, it keeps its form without them; there are no tie-beams or rods now, and the roof stands excellently well.

In many of these roofs there are no trusses or rafters stronger than the others, but every pair of rafters is tied in the same manner. It is also worth remark that the material employed in these roofs was, generally speaking, either oak or chestnut. Both these woods combine great strength with great hardness, and the latter quality prevents the danger of joints giving way, as they do in roofs framed of fir timber. Having, therefore, materials which permitted it, the designers of these roofs were quite right to use oblique ties or ties highly placed, and to subject part of their rafters to cross strain, because they could by these means attain objects not otherwise within reach, and could do so without sacrificing the stability of their structures.

A distinct class of roofs of large span, framed without tie-beams, next claims notice. I refer to roofs with ribs. Many of these are mostly of later date and wider span than the greater part of those already considered. The truss of Westminster Hall, it is true, displays, as we shall find, a large rib used for the structural purpose of steadying and stiffening the whole combination, and for the architectural purpose of adding to the framework a powerfully-marked line of an arched form; but such rib is only an auxiliary, as, for example, in the Moscow Riding School already mentioned. In some other examples a rib more or less similar to this forms the chief feature of the roof. The oldest specimens of the class, where the rib does the main part of the work known to me, are two Italian examples, of which Professor Lewis has kindly sent particulars. A great hall at Vicenza, known as the Basilica,—built in 1314, though since modernised,—no less than 70 ft.

wide, is covered with a curved roof in the form of a pointed arch, in a single span from wall to wall, curved outside as well as in, and so resembling very much the hull of a ship turned upside down. The supports of this roof consist of ribs of timber about 12 in. by 12 in. Each rib is tied by two iron tie-rods, the first about one-third of the height up from the springing; the second about two-thirds up. A still larger hall of about the same date exists at Padua. It is 261 ft. long by about 85 ft. wide, and has a similar roof, of which the ribs are about 13 in. by 13 in., and about 6 ft. apart. They (like those at Vicenza) are secured by iron rods; but in this case the rods are introduced differently in alternate ribs, the first at the springing, and the second part of the way up, and so on.

Roofs with ribs did not, however, become common till a much later date. The next example that I have to quote is a roof which was erected over the Corn Market in Paris in the year 1662. This building is circular, and about 130 ft. in diameter. The present roof is a dome-shaped one on iron ribs, interesting as an early example of the application of iron to roofing, but the original timber roof, which was also dome-shaped, is the one with which we are at present concerned. It was destroyed by fire in 1802. A good account of its construction is given by Mr. Tarn in his excellent little treatise on roofs of wood and iron:—"The circular ribs consisted of planks 9 ft. long, 13 in. broad, and 3 in. thick; each rib consisted of three of these planks bolted together in such a manner that no two joints met. A rib was begun, for instance, with a plank 3 ft. long, standing between one of 6 ft. and another of 9 ft., and that was continued to the head. No machinery was needed for hoisting such small pieces, and the whole went up like a piece of brickwork. At various distances these ribs were connected horizontally by pulleys and iron straps, which made so many hoops to the whole dome. Some of the ribs were discontinued part of the way up. Near the top those that were continued were framed into a circular ring of timber which formed a large eye in the middle, over which was an umbrella-shaped glass roof."

French architects and engineers in the sixteenth, seventeenth, and eighteenth centuries occupied themselves a good deal with roofs with curved ribs, and two systems of constructing the ribs were worked out. In the most modern of them, that invented by Colonel Emy, the ribs were constructed of a series of thicknesses of bent timber, one on the back of another, and held together by bolts. In the older system, that of Philibert de l'Orme, the ribs were also built up, but the pieces composing them are placed side by side, and either form a polygon approaching a semicircle, or are cut to bring them to a curve. In fact, the ribs are very much such as have been already described as used for the great dome of the French Corn Market.

There is, however, a great difference between a dome,—the strongest of all forms, and one permitting the introduction of as many rings of ties as may be desired,—and a roof over an ordinary oblong space, where no such binding together is admissible, and where straight rafters may have to be used, which loads the rib at certain points only. In the latter case, a good many precautions have, generally speaking, to be taken to prevent the rib from being unequally loaded, and so either spreading or losing its shape in some other way. The rib made of unbent timbers, side by side, on De l'Orme's plan, is admitted to be stronger than the one made of bent timbers laid one on the back of the other; but both have been largely used, and good examples of both may be met with, even if we confine ourselves to English ones alone, and leave the French ones unnoticed.

A very fine roof with ribs, one on which the load (though light) is borne without a rafter solely by the ribs, covers the great conservatory built by the Duke of Devonshire at Chatsworth. This building was rather notorious at the time of its erection, but has probably now passed out of the recollection of most people not familiar with Derbyshire. It consists of a wide and lofty central portion, with a kind of broad aisle at the sides, roofed at a lower level. The central roof here is of the section of a pointed arch and hipped at both ends, and is entirely covered with glass. It is carried by timber ribs, and the glazing is on the ridge-and-furrow principle. The low aisle referred to forms to some extent an abutment for the ribs, and the ridge-

* See *Builder*, p. 284, ante.

and-furrow glazing helps no doubt to fortify them, but still the greater part of the strength is derived from the ribs themselves. I had recently an opportunity of examining this building carefully, and though it does not appear to have been as well taken care of as one could wish, still the roof remains sound, and the ribs appear true to their curve and in line with one another.

Another rib roof, and one which obtained a world-wide celebrity, was the roof over the nave of the Great Exhibition of 1851, reproduced in its main features in that of the nave and transepts of the Crystal Palace at Sydenham. Here, again, the load is a continuous one, the roof covering being the same shape as the rib.

It was intended that the '51 Exhibition should have a flat roof over the nave, carried by long lattice girders, and it is understood that the matter of suggesting a semicircular roof instead belongs to Sir Charles Barry. The construction was, no doubt, designed by Sir Charles Fox, who made the working drawings of the entire building with his own hands. The span of this roof was 72 ft.; the principals were 24 ft. apart from centre to centre; they consisted of timber ribs measuring 17½ in. deep and 11 in. wide at the back, and 8 in. in width in the main part of the rib, and formed of no fewer than eleven pieces of timber bolted together. This construction combined the two systems of rib-building described. These ribs appear to have stood well, as have the ribs of the Crystal Palace roof.

For the Exhibition of 1862 at South Kensington a somewhat more solid building was designed by Capt. Powke. It had a nave with a semicircular rib, but had also a rafter, so that the covering did not follow the outline of the rib. The span was greater than at the Crystal Palace, being 85 ft. against 72 ft.; the depth of the rib was ½ in. more, being increased to 18 in., and the width of it was 10 in. It was made of six pieces only, and was entirely on the older or De L'Orme's construction. The distance apart was increased to 25 ft. This roof was, I believe, re-created at the Alexandra Palace, and was destroyed in the great fire at that building. In the '62 Exhibition many annexes were built, with ribs having a span of 50 ft., and a distance apart of 15 ft. The ribs were 3 in. by 9 in., and these roofs failed seriously by spreading.

In the great buildings occupying the same site, and covering many acres of ground, which were erected for the Fisheries Exhibition and added to for the Health Exhibition, many acres of roofing were put up by the late General Scott, of which the wider spans recalled to some extent the annexes already alluded to. These are, however, a little stronger in various respects, and they appear to have answered the expectations of those who designed them. The span of these roofs is a little less, and the principals are considerably nearer together, than in the roofs which failed in 1862. The span is 48 ft. The polygonal rib (which is virtually semicircular) springs 10 ft. from the floor. The sides of the building continue to a height of 27 ft. 6 in. from the floor, or 28 ft. from the ground, and the ridge is 40 ft. from the ground. This rib is 2½ in. thick by about 10 in. average depth, and is in three thicknesses, made up of deals,—a middle 1½ in. thick by 9 in., and two ¾ in. by 9 in. at the sides. The pieces of which the rib is composed are 6 ft. long. At every 6 ft. there occurs a radiating brace, 9 in. by 1½ in., pointing to the centre of the arch. Each brace is worked into the substance of the rib, and seems to connect it to the uprights of the side framing or the rafters, as the case may be. The ribs are 10 ft. apart, and the boarding is carried by small rafters, 6 in. by 2 in., laid parallelwise on the back of the principal rafter belonging to the truss. This is probably a slight construction as has ever been successfully employed.

This series of roofs may be closed by a reference to a roof with timber ribs on Colonel Emy's plan that has failed. I refer to the roof put up at the terminus of the Great Northern Railway, King's-cross, in 1852. This was a roof where a semicircular rib was combined with rafters, and the covering did not follow the outline of the rib. The spans were each 105 ft., the ribs were 20 ft. apart, and each rib is stated to have consisted partly of eight and partly of sixteen 1½ in. bent boards, acrowed and bolted together. The trusses soon after being fixed showed signs of spreading, and were buttressed at the feet. The ribs became distorted in shape, being per-

ceptibly flattened at the top, and after remaining in that condition for a good while (probably about twenty years) the ribs of one of the two spans have been replaced by trusses with a wrought-iron semi-circular rib. This experience seems to tell decisively against the use of ribs made on Colonel Emy's plan of bent timber, for they were employed here under conditions on the whole very favourable.

The roofs with oblique ties, like Westminster Abbey or the Ronca Hall, and those with curved ribs, like the Crystal Palace or the Health Exhibition, by no means exhaust the list of roofs without tie-beams. Another method of dealing with the same problem was worked out towards the close of the period which we call the Middle Ages, and, as it resulted in the most splendid and most thoroughly architectural roofs that we have to consider, I have left it to the last.

The earlier stages of the growth I am about to describe may be illustrated from church roofs; the concluding and most complete was employed chiefly for the roofs of halls much wider than the nave of an ordinary church, and it is from such halls that we shall get our best examples. Let us go back to church roofs as they were executed at the middle of the fourteenth century.

The walls in common use were very thick, and, as the gutter was usually an eaves gutter, it became customary to carry the rafters to the exterior, and to frame them into a short horizontal timber, which lay across the wall, and from that timber to carry up a little post or prop flush with the inner face of the wall, to support the rafter near its foot (see fig. 1). The idea suggests itself that by prolonging this short horizontal timber, usually called the wall-piece, the prop assisting the principal rafter might reach it more nearly at the point where its aid was needed (see fig. 2). It will be seen at

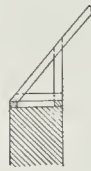


Fig 1

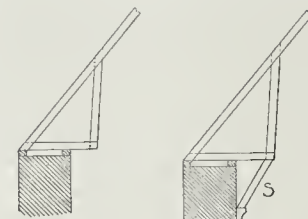


Fig 2

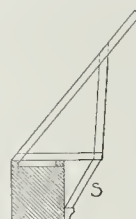


Fig 3

a glance that the wall-piece here acts as a lever, of which the inner edge of the wall is the fulcrum. The weight of the rafter presses on the long arm, and the short one is accordingly extremely strong, and affords nearly as good a support for the upright post as though it rested on the wall itself. By degrees this wall-piece was pushed out more boldly, and it soon was felt that a strut, S, from the wall below (see fig. 3)

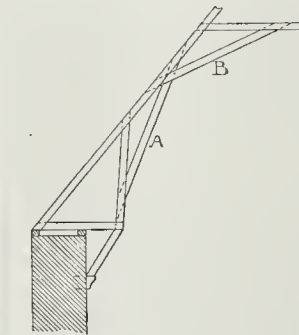


Fig 4

would give some additional strength, and would also satisfy the eye by preventing the rafter

unsightly overhanging horizontal piece from appearing to have nothing to carry it. So: strut was introduced, and in church roofs became usual to curve or mould it, so as to make it a better architectural feature. The next step was to carry up from this same point a second strut, A (see fig. 4), to a point far up the rafter, and afterwards a tie was sometimes added at B to give a hold on the collar-beam or tie-beam, whichever we call it, above. In roofs having any pretension to artistic treatment the inner faces of these struts and were cut to curves (see fig. 5).

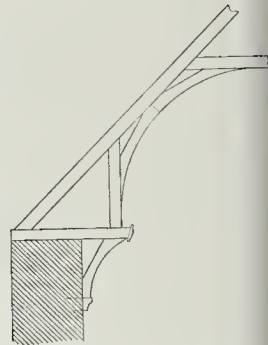


Fig 5

This combination of struts, horizontal posts and tie-beams to be met with in many of the roofs which were successfully framed in England, and a system somewhat similar though not identical, was pursued in France. In the English examples the elongated piece is called a hammer-beam. The horizontal tie or collar-beam is generally about a way up the rafter, and the lower half of the rafter is fortified by support derived from the hammer-beam, through the post and arising from it; the hammer-beam itself is in turn supported by a strut from a corbel into the wall.

The finest and almost the earliest example of a hammer-beam roof, and, no doubt, the finest timber roof in the world, is the roof over Westminster Hall, which I will now proceed to describe.

Westminster Hall is 68 ft. wide between walls, and 238 ft. long. It is 42 ft. high to top of the walls, and 90 ft. to the ridge of the roof. It is divided into twelve bays, with will accordingly average 10 ft. 10 in. Consequently each truss has to span 68 ft., to carry, in addition to its own weight, weight of slates, timber, &c., necessary to cover 1,350 ft. of floor. The pitch or angle with the slope of the roof makes with the horizontal 52°. The material employed was at one time believed to be chestnut, but is really English oak. The appearance of the two woods is much alike that some uncertainty may be pardoned. The date of the roof is A.D. 1180, so that if it escape accidents, in twelve years more it will have been standing 500 years. The timber is in good preservation and large scantling; that is to say, large section-area. The workmanship throughout is of great beauty and accuracy, and no extensive repairs so far as I can find out, has ever been necessary.

The principal rafter of each truss is considerable strength. The collar is placed just half way up the rafter. The hammer beams receive the foot of the rafter at its extremity, and each projects rather more than a quarter of the span from the wall, and has its end beautifully carved with the figure of an angel carrying a crown. A strong post is carried up from the end of the hammer-beam to the point where the collar and the principal rafters join. A timber, which may be called wall-post, rises from a corbel far down the wall and supports the underside of the hammer-beam at the point where it leaves the wall, and a second post vertically above this supports the principal rafter. There is a strong and rigid moulded rib, which acts as a bracket or tie, springing from the corbel just referred to,

* See large photolithographic illustration which will appear in this week, from a drawing by Mr. F. T. Dollman.

ended into the hammer-beam near its free end. A second similar rib, rising from the hammer-beam, supports the middle of the collar. All these pieces, except the principal rafters, are put together by a magnificent arched rib rising from the corbel from which the vest carved rib starts, and framed to the hammer-beam, the post on the back of that beam, the collar, and both the curved ribs. Above the collar a second collar is introduced, and a post connecting the two is added, while the middle of the truss a central post, something like a short king-post, occurs. Between these timbers there is a kind of filling in of pillars or small posts, the spaces between being ornamented at the heads. These, no doubt, perform quite as much the important structural duty of connecting every member of its great framework together as they do the specific duty of filling up the great outline with subordinate features which give scale to it, while its vastness to be appreciated, and bring the variety of its lines by their contrast to the uniformity of the filling in.

The usual longitudinal timbers, called purlins, rising from truss to truss, are employed here, to furnish support to the roof rafters. The purlins are themselves supported lengthways in the great trusses by braces. The middle purlin is supported by a beautiful arched rib rising from the post on the hammer-beam. An upper purlin has a curved brace springing from the principal rafter. The lower purlin has a curved brace springing from the back of a great curved rib. Below this purlin occur openings in the roof covering, which correspond with the great dormer windows, from which the hall receives a considerable portion of its light, but which are said not to have been part of the original design.

I have already mentioned the fitness of the kennship; I need only add that every ornamental part is equally well wrought, and is signed with the greatest skill, so that whether scrutinise a small portion or endeavour to be in the impression to be produced by the whole, we are equally convinced that this is a masterpiece of architectural art as well as of carpenter's skill.

For about 200 years,—that is to say, during the fifteenth and sixteenth centuries,—hammer-beam roofs were in use, and as many considerable halls were built during those two centuries, various examples remain, none of them equal to Westminster Hall, though many of them reaching it in beauty, if not in extent. A few of these I will name to you.

The roof of the hall of Eltham Palace, dating, I believe, early in the fifteenth century, was a fine one. The hall was 101 ft. long by 36 ft. 3 in. wide, and 54 ft. high, and had a hammer-beam roof very much like that at Westminster in general, but without the great ribs, and rather less deep. This roof was of oak, and remarkable for the beauty of the workmanship and goodness of material. This building has been allowed to fall into decay. Fifty-nine years ago Mr. Mage found that water had soaked the walls, and they had decayed, and given way, causing the failure of the roof. Part of it, however, still standing, but soon the whole has disappeared.

At Oxford, timber roofs of various degrees of beauty, but all belonging to this class of construction, occur in the halls of at least half a dozen colleges, namely, Corpus, University, Balliol, Jesus, Oriel, and Christ's Colleges; in Cambridge in two or three such halls, St. John's and Jesus Colleges. There is a fine roof of this sort at Westminster School, more ornamented at Gray's Inn Hall, and other at the Library at Lambeth Palace, an ornament of much dignity and beauty, 93 ft. by 38 ft. wide, and 50 ft. high.

Perhaps, however, the finest specimens after Westminster, certainly among the most ornate, are two that date from the sixteenth century, the roof of Wolsley's Hall at Hampton Court, completed about the year 1526, and that of the Middle Temple Hall, London, erected 1572.

The hall at Hampton Court is 106 ft. long by 47 ft. wide, and 45 ft. high to the top of the ribs, and 60 ft. high to the ridge. The framework is extremely florid, heavily timbered, and remarkably rich in its mouldings and carving, and is adorned with some finely-carved pendants, and red corbels running lengthways of the building as well as across it, serving to add to the richness of its appearance as well as to its strength. The ribs or brackets which sup-

port the end of the hammer-beam spring from corbels unusually far down below the top of the walls, so as to increase the strength of the truss. A peculiarity of this roof is that it is not open right up to the rafters through its entire height, but a wooden ceiling of curved outline is carried so as to cut off portions of the upper part. The outline of this roof is also peculiar externally.

The roof of Middle Temple Hall displays a peculiarity which is rare in hammer-beam roofs of large span, though not infrequent in the timber roofs of moderate span to be found in the churches of Suffolk and Norfolk. I allude to a double hammer-beam. Suppose the collar-beam of one of these roofs to be cut, the middle of it to be taken away, and each of its ends to be treated just like a hammer-beam, that is to say, supported by a curved rib and made to carry a second post, which is carried up to meet the principal rafter high up, and above which there may, perhaps, occur a short collar-beam, we now arrive at a piece of framing to be found frequently in the churches in such towns as Ipswich. This outline forms the basis of the fine roof of the Middle Temple Hall. In addition to its double hammer-beams this roof has a series of very conspicuous curved ribs, placed lengthways of the Hall, carrying the purlins and springing from the posts of the truss near the point whence the curved ribs of the truss itself rise. The foot of the posts is formed with rich bosses, from which the ribs spring, and the whole produces a singularly rich and well-combined effect, which harmonises well with the panelled woodwork that lines the walls, and with a rich screen at the lower end of the Hall.

There is an interesting record in connexion with this Hall,—Shakspeare's play "Twelfth Night" was performed here in the year 1601; that is to say, during his lifetime, and during the time that his theatre, the Globe Theatre at Bankside, was standing and in use. In all probability, therefore, the play was represented by his company, under his direction, and it is even possible that he may have taken part in it.

One other observation not strictly belonging to carpentry arises out of the comparison of the earliest and the latest of the great hammer-beam roofs that have come under our notice, Westminster, dating from 1397 and the Middle Temple from 1572, the first in the reign of Richard II. and the second in that of Elizabeth I. In the interval a great revolution of taste as well as in literature and religion had taken place. Modern Europe, as distinguished from the Europe of the Middle Ages, began in the sixteenth century, and the reformation of religion, the revival of Greek and Roman learning, the birth of the modern literature and fine art, and the return to Classical architecture, are all parts of the great change which took place at this time. The reign of Elizabeth is marked by an architecture of change. You all must have heard something about Elizabethan buildings. Their great interest lies in the fact that in them we can see the old Gothic architecture disappearing and the revived Classic advancing. The two are, indeed, blended in a manner which is at times most picturesque. The Middle Temple Hall is an example, and a very good one, of this style. The roof is still in its main lines allied to the Gothic roofs which went before it, but its ornaments and its mouldings are both of them different, and follow Italian models. Just the same thing may be traced in the roof of Lambeth Palace Library, and it is worth notice,—if for nothing else,—as an example of how the architecture of old buildings properly understood preserves to us visible and tangible records of the political and social history of our country. Such buildings continue to illustrate the past for centuries after the men who erected them, with their manners and customs, have passed away from the face of the earth.

I propose, in conclusion, to mention a few important modern English roofs belonging to recent buildings of Gothic design. I shall first refer to a tie-beam roof of fir, but one in which the general principles adhered to by the carpenters of the Middle Ages are followed,—I mean the roof on the great hall of the Law Courts. This roof is not what is commonly called an open roof,—that is to say, not a visible roof like that of Westminster Hall, as it covers a vault of masonry which forms the ceiling to the hall.

The span of this roof is considerable. The pitch, as will be apparent to any one who notices the

gable of the Hall in passing up the Strand, is comparatively steep, and would have permitted the use of tiles. The truss is a king-post truss, but the principal rafters are each of them double, that is to say, the two usual principal rafters are framed, in the usual manner, into the beam and king-post, but, in addition, immediately within them, a kind of inner and additional principal rafter is employed. This method adds a good deal to the strength of the roof, and was not unfrequently resorted to by Mediaeval carpenters.

Another peculiarity, which was my chief inducement to include the roof over the Law Courts, is the employment of a *flèche* or timber spire to ornament the building. This spire is carried on the ridge of the main roof. These timber spires are among the most difficult and intricate pieces of carpentry known, and, owing to the great height at which they commonly start, few persons recognise their great size and consequent weight. Nor is the weight of a roof spire the only, or even the most serious, strain that has to be provided for. Such a feature rises in the unsheltered region where the full force of every hurricane that blows is felt, with nothing to break the shock; and although such a spire is usually circular or octagonal, so that the wind has less purchase against it than if it were square, we must not forget that it is very tall, so that such pressure as is sustained is intensified at the foot of the structure where the roof has to support it. And this weight and wind-pressure has to be supported, not on any solid basis like the masonry of a church tower, but on the framework of a roof spanning a vacant space. A famous example of such a structure is the *flèche* at Amiens Cathedral, which was measured and drawn by the late William Burgess, and was shown, by the courtesy of the Architectural Museum, in our recent Exhibition. Another well-known example is the timber spire in the Cathedral of Notre Dame, in Paris, reconstructed by M. Viollet-le-Duc, and fully described and illustrated in his "Dictionary of Architecture." Another, but smaller, example surmounts the roof of the Guildhall.

The details of the construction are hardly fit for a lecture like this, and can be best unravelled by a patient study on the spot; but the general principles involved may be said to be, first, the distribution of the weight over as wide a space as possible. This is effected by carrying part of the load on to trusses right and left of the one immediately under the spire itself, by the help of sundry oblique bearers, as strongly framed as possible; and secondly, the *stiffness* of the actual spire. This is sought to be obtained by a central post running from base to top, a large number of sloping rafters, with many diagonal braces, introduced in every possible way, and a large series of horizontal ties or purlins at various heights; thirdly, by as strong a connexion as possible between the spire and the base established on the trusses of the roof. A great many timbers are employed, put in various positions, so as to stay every point as much as possible, and the result seems to be that this lofty structure is perfectly secure.

The roof of Lincoln's Inn Hall, part of the new buildings erected by Mr. Hardwick in 1845, is a fine hammer-beam open roof. The hall is 120 ft. long by 45 ft. wide, and 64 ft. high. The roof is framed of oak. Unfortunately I am not able to produce an illustration of it.

The great hall of the Manchester Assize Courts, a building erected from the designs of Mr. Waterhouse, has a fine open roof, of a construction which presents a somewhat unusual combination. The hall is 100 ft. long, 48 ft. 6 in. wide, and 75 ft. high; it has seven timber hammer-beam trusses dividing the length into eight bays of the somewhat unusual extent of 25 ft. each. The hammer-beam trusses do not, however, carry the whole weight of the superstructure, as is the case with every other roof with which we have dealt; two trussed purlins, or, more properly, latticed timber trusses, 16 ft. 6 in. deep, run, in lieu of two of the purlins, from end to end of the hall and bear on the gable walls. These, of course, framed to each hammer-beam truss, but, being themselves of considerable strength, they do a large part of the work; and, indeed, I gather from the architect's own published account of this roof that, in his opinion, the chief duty is thrown upon them. They, he says, support the upper part of the roof, while the wall-brackets, which form the lower part of each

hammer-beam truss, are needed chiefly to steady them. The architectural effect of this roof is excellent, and I dare say some of those present have seen it.

The last modern timber roof which I shall refer to is the roof over the Guildhall, London, erected a few years ago from the designs of the City Architect, Mr. Horace Jones, whose fine roof over the new Council Chamber, in which, however, the main framework is iron carrying a timber ceiling, is also illustrated by some of the drawings on the walls. Guildhall is 150 ft. long. Its width is not perfectly uniform, but the average is 49 ft. 6 in.; it is 80 ft. high. The roof is constructed, as every roof which is to form part of a public building of the first importance should be, of oak. Practical carpenters will be the first to appreciate the increased strength and solidity and the greater tenacity of the joints, and the freedom from the risk of their crushing in, which the use of oak secures, as compared with deal, or even pitch pine.

In the Guildhall roof there are seven principals, and therefore eight bays of about 19 ft. each. The collar of this roof is 20 ft. long, and it was cut out of timber about 2 ft. 8 in. square. In this roof each principal springs from a cluster of strong shafts carried up within the walls for the purpose of receiving it. Both structurally and as a means of procuring architectural effect this is very advantageous. There might have been some risk in putting the heavy weight of this roof on parts of the very ancient walls of this venerable hall which had not been so weighted before, and these lines of support divide up the length of the hall, and so make its extent perceptible. They also carry up the apparent (and, in fact, the real) support of each principal from the solid floor, and so aid the architectural treatment in more ways than one. The curved ribs are made very prominent in this truss, and the hammer-beam is kept rather modest than otherwise; it is neither carved at the end, nor marked out by a pendant, so that the line which catches the eye is that of the cusped arch of the moulded rib. This is an original treatment, but the success of the roof fully justifies the architect in the course which he adopted.

With these modern examples we leave our subject. I trust that the accounts of great roofs which I have been able to give you, and the illustrations which, in addition to diagrams made specially for to-night, I have been enabled to show you, by the courtesy of the City Architect, Mr. Waterhouse, Mr. St. Aubyn, and others, have been sufficient to prove that a great timber roof requires no small amount of skill to be brought to bear upon its design. I hope we have also seen that it, above most things, calls for very careful selection of good material, and, perhaps, most of all for honest, painstaking care in the workmanship of every part. No single joint should be defective, and every part should bear truly on those into which it is framed. I think, also, we have seen abundant cause for ranking timber roofs as among the important architectural features of a large class of ancient buildings, and especially let me add, of ancient English buildings; but I cannot, lastly, help adding that I think we have seen reason also to be proud of our modern works in this line, as well as of the ancient ones. Neither in the architectural design of these structures, nor in the mechanical skill with which they are framed, need the architects and the carpenters of the nineteenth century fear a comparison with their forefathers of the fifteenth and sixteenth.

ON DRY ROT IN WOOD.

In the Public Health Section of the late meeting of German Naturalists and Physicians at Magdeburg, Dr. Poleck, professor at the University of Prague, read an interesting paper on the life history of the fungus known in this country as "dry rot," and by botanists as *Merulius larrymans*, the ravages of which have of late years assumed alarming proportions wherever the building of new houses has been extensively carried on, but in Germany especially have become a question of almost national importance. For its prevention a knowledge of its life-history and habits is absolutely necessary, and these researches may also serve to explain the curious fact that, while it rarely attacks the timbers of the oldest buildings, it has seriously endangered the

stability of many erected within the last few years.

Its original habitat is not known, for it does not attack living trees, nor is it ever seen in decaying wood in forests. It is found, so far as we are aware, only in the timbers of houses, chiefly, if not exclusively, in deal and pine. The name "dry rot" is not quite appropriate, for a certain dampness and darkness are necessary for the development of the spores. These give origin to a mycelium of elongated cells, which spreads with surprising rapidity, covering the surfaces of the timbers and walls with fan-shaped expansions, and, penetrating the cylindrical fibres and cells of the wood, break it down by a chemical action into a light brittle mass. Complete desiccation of the mycelium permanently destroys its vitality. Though at first developing only in the dark, it seeks the light for the purpose of sporification. The sporangia, which have a reticular structure, vary in size from that of a lentil to that of a sipping, and exhibit a somewhat concentric arrangement of cushiony folds, at first of a wine red, and lastly of a dirty brown colour, when they exude drops of a clear fluid, whence the specific name of *larrymans*. After emitting vast numbers of cinnamon brown spores, not more than 0.1 mm. in diameter, the sporangia become black, dry up, and die.

In the art schools attached to the Breslau Museum the mycelium has spread from the foundations to the wall plates, and the casts and models are covered with the dustlike spores. Some of the threads have been found to measure as much as 5 or 6 yards in length. Dr. Poleck has not succeeded in cultivating it artificially, but another investigator, who has not yet published the result of his experiments, is said to have been more fortunate.

The chemical composition of the *merulius* does not differ much from that of similar fungi. The water varies from 50 to 70 per cent., while of the dry substances 5 per cent. is nitrogen and 15 fat. There are, besides acids, a bitter substance, and indications of an alkaloid. The mineral constituents, among which potassium and phosphoric acid are the most important, throw more light on the action of the fungus on the wood, which, as we have said, is not properly decay, but a chemical disintegration in consequence of the abstraction of these elements of its composition. As these are exhausted, the mycelium spreads outwards, much in the same way as the so-called "fairyrings" are formed.


A clue is thus afforded to the increased prevalence of dry-rot of late years. It is well known that to facilitate the removal of the bark the practice of felling timber during the spring and early summer has become very general, and analysis has shown that the wood of coniferous trees at that season, besides being more watery and difficult to dry, contains five times as much potash and eight times as much phosphoric acid as in winter, conditions highly favourable to the development of the fungus.

If the use of such wood cannot be avoided it should be thoroughly seasoned and dried, if need be, by artificial heat. The use of old building materials should be shunned, and infected or suspected wood be burned. In the absence of experiments on the artificial cultivation of the *merulius* we are without any exact knowledge of the relative value of the several reputed preservatives, but since dampness is an essential condition of its growth, the importance of maintaining the utmost possible dryness of foundations, joists, and floorings by means of concrete or asphalt, efficient damp-proof courses, and thorough ventilation, is obvious. It is scarcely necessary to observe that the treatment of woodwork with arsenical or mercurial solutions is fraught with the gravest dangers to health, however successful in their immediate object. If chemical preservatives must be used they should be restricted to one or another of the products of the distillation of tar, though in this, as in other things, prevention is better than cure.

Proposed New Theatre for Exeter.—An Exeter paper states that a company will be forthwith formed to purchase a site in Longbrook-street, and erect thereon a theatre with every modern appliance. Mr. C. J. Philippe, F.S.A., was in Exeter last week, and surveyed the site, which he considers admirably suited for the purpose, as it affords ample space for double exits from the stage and every part of the house.

Illustrations.

NEW WAR AND ADMIRALTY OFFICE REVISED DESIGN.

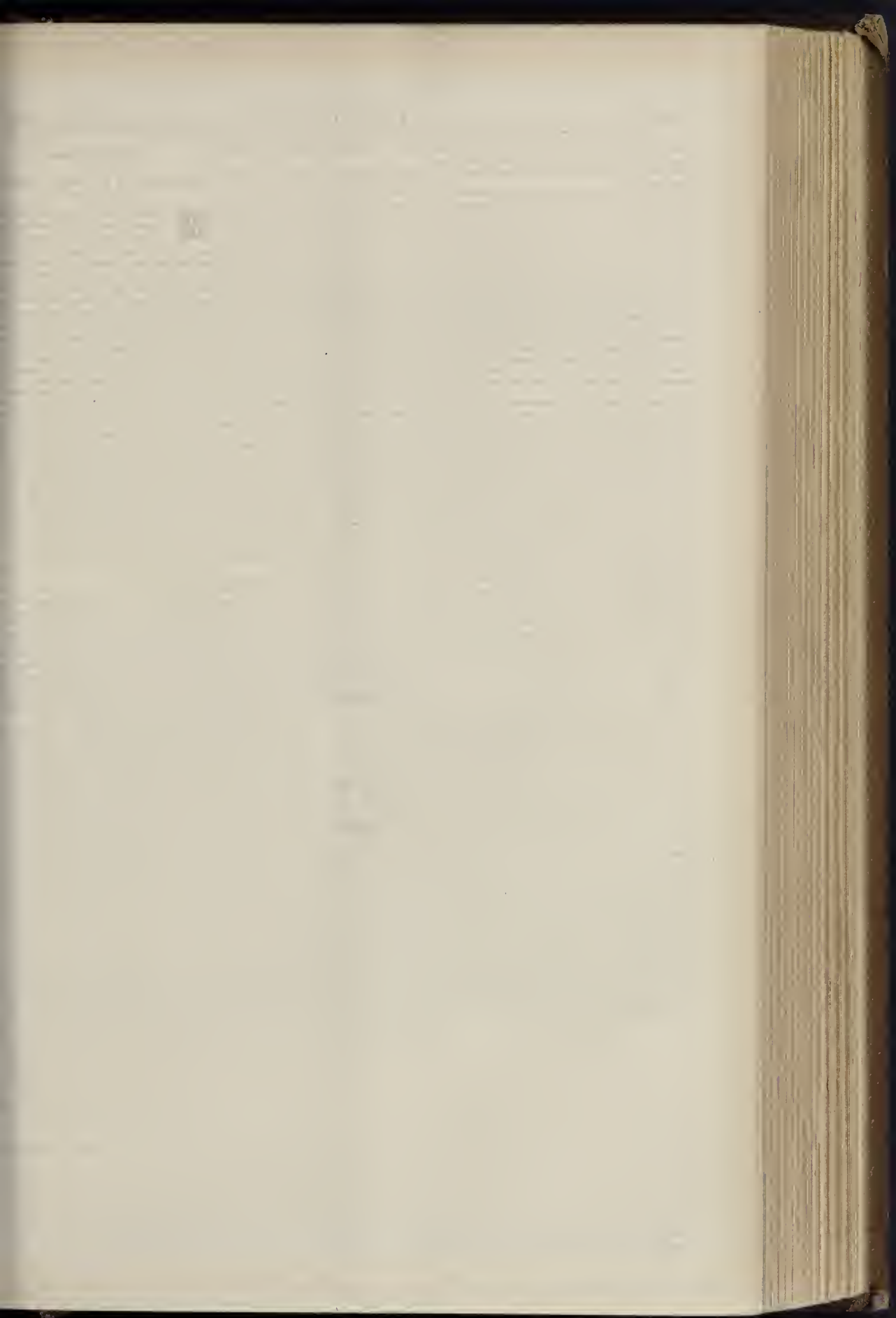
E publish this week the design by Messrs. Leeming & Leeming for the proposed War and Admiralty Office, as modified, we presume, according to suggestions or wishes of the Office Works; though the modification does not seem so great as we were led to expect was taking place. The most important change is the shifting of the tower from the angle of the Horse Guards to the re-entering angle of the St. James's Park front. This is an improvement as far as the junction of the building with the Horse Guards is concerned, though the position of the tower in itself is certainly effective, nor does it mean anything in relation to the general design. The exaggerated projections of columns and stylobates, carrying nothing but small statues, appear to be *in statu quo*,—on the Park front, as in the events; and the Whitehall front still retains its curious anomaly (or what ought to be an anomaly) of two symmetrical pavilions, one of which leads into the courtyard and marks the main entrance, the other marks nothing in particular; the having, in fact, little relation to what is behind it. This has been so often the case in Civil buildings for official purposes on a large scale that perhaps one ought not to be too over it, only one desires to see some improvement in these aesthetics of architecture, a repetition of old faults which have the responsibility of precedent.

The plan is in many respects a good one, the objection to the enclosed quadrangle has been partially met by widening the quadrangle in the revised plan (which is not yet available for publication). Other improvements have been made, especially in the position and arrangement of the lavatory accommodation, some of which was very badly placed in the original plans, leaving little possibility of proper ventilation for the closets. The Whitehall front has been set back 30 ft. (except two end blocks), with manifest improvement and the entrance widened.

We are indebted to Messrs. Leeming for permission given, pursuant to that of the Office Works, to publish the altered design, should be glad if we could express our thanks in sympathy with it in regard to its architectural character. Considering the urgency of the occasion, we cannot honestly say, or say that we regard it as a design adapted to the situation. But any shortcomings of the design itself are as nothing compared with the tremendous architectural blunders made in the choice of the site, and we protested against from the very first; that, namely, of leaving the two Banks of the smaller buildings between them, and of Charing-cross, and carrying a wing of the building round in their rear. The perspective drawing of the Whitehall front here seems as if made on purpose to show a compromise this mistake. Let those who will be called upon in a few days to report upon the subject just look at that—upon the mean and piecemeal effect of new building half hidden behind the old buildings on its front; and let those who have any architectural sense and any national pride (and we have generally found the two qualities go together a good deal) say if that is a way for a great and wealthy nation to erect a building of the first importance for the palace of its military and naval administration. This defect is no fault of the architects, but had the site given them; but it is no less utterly deplorable one, sufficiently so to justify a reconsideration of the whole arrangement of the site before any money is voted.

THE ROOF OF WESTMINSTER HALL

In illustration of Professor Rogers' *Structural Architecture at Carpenters' Hall* on "Celestial Timber Roofs," we are enabled to reproduce a drawing by Mr. F. T. Dollman of that splendid specimen of the hammer-beam type of roof which spans Westminster Hall, and of which special mention and description are made in our lecture (see p. 476).





Wyman & sons Photo Litho.

NEW ADMIRALTY

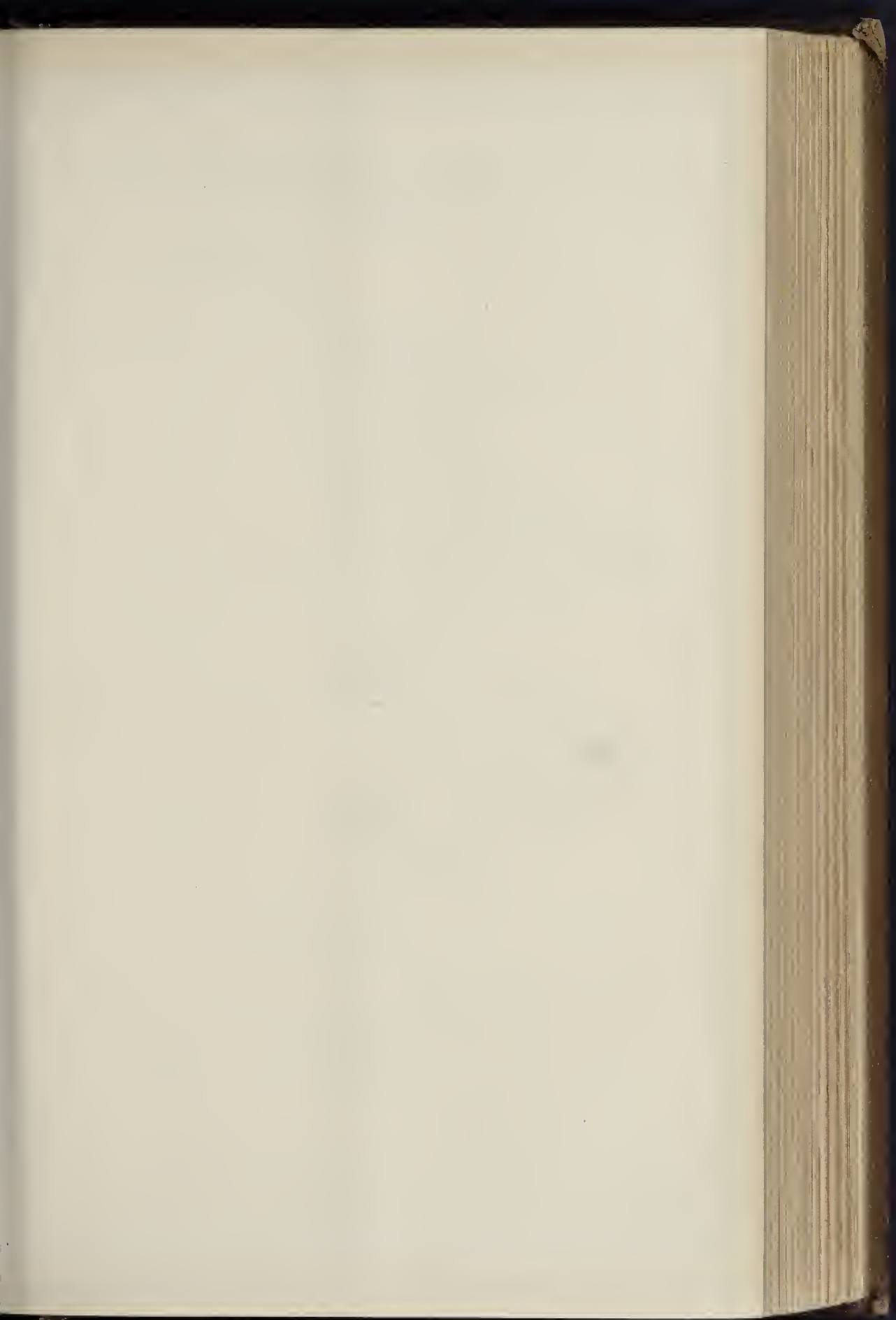
ST JAMES'S PLACE



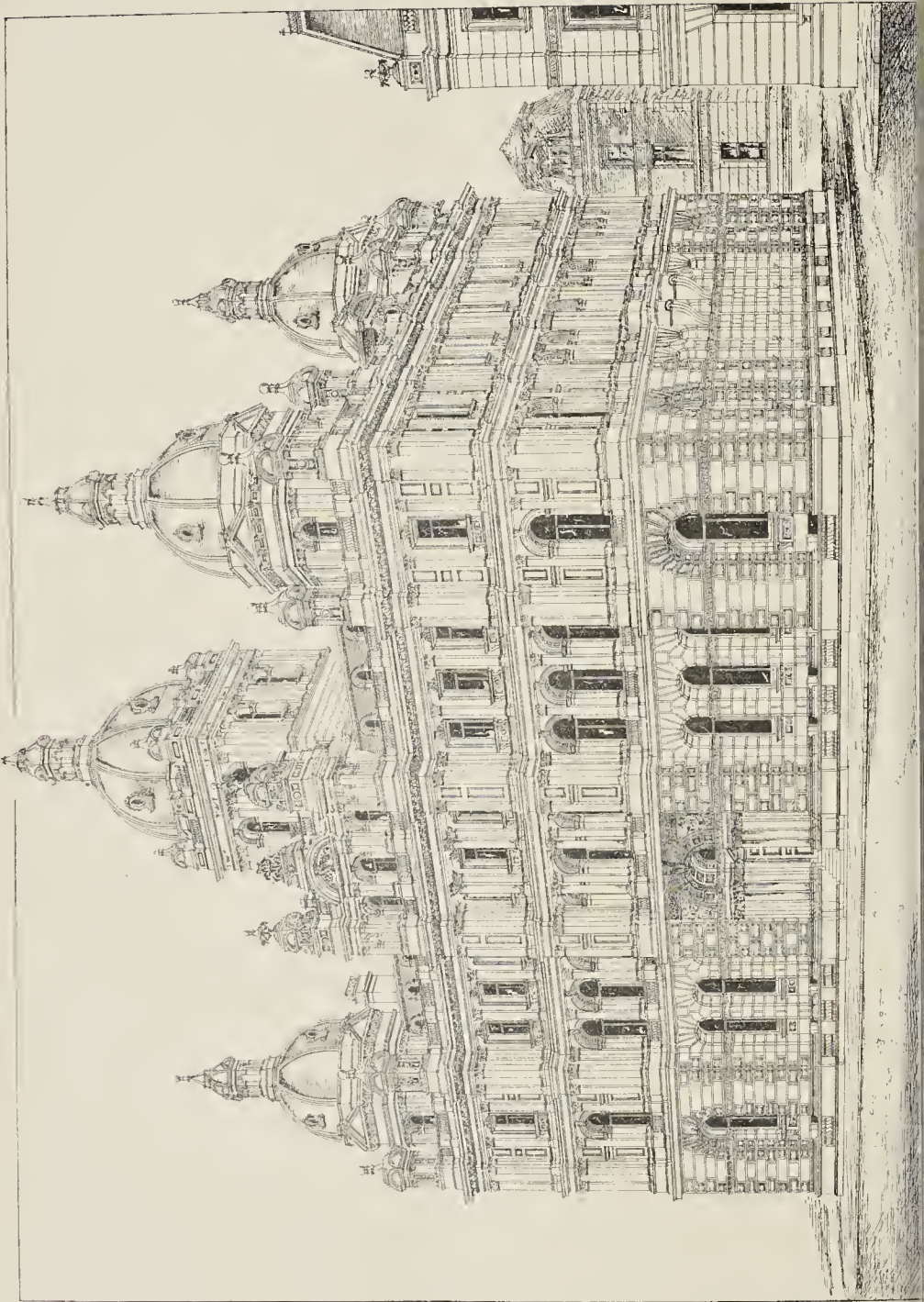
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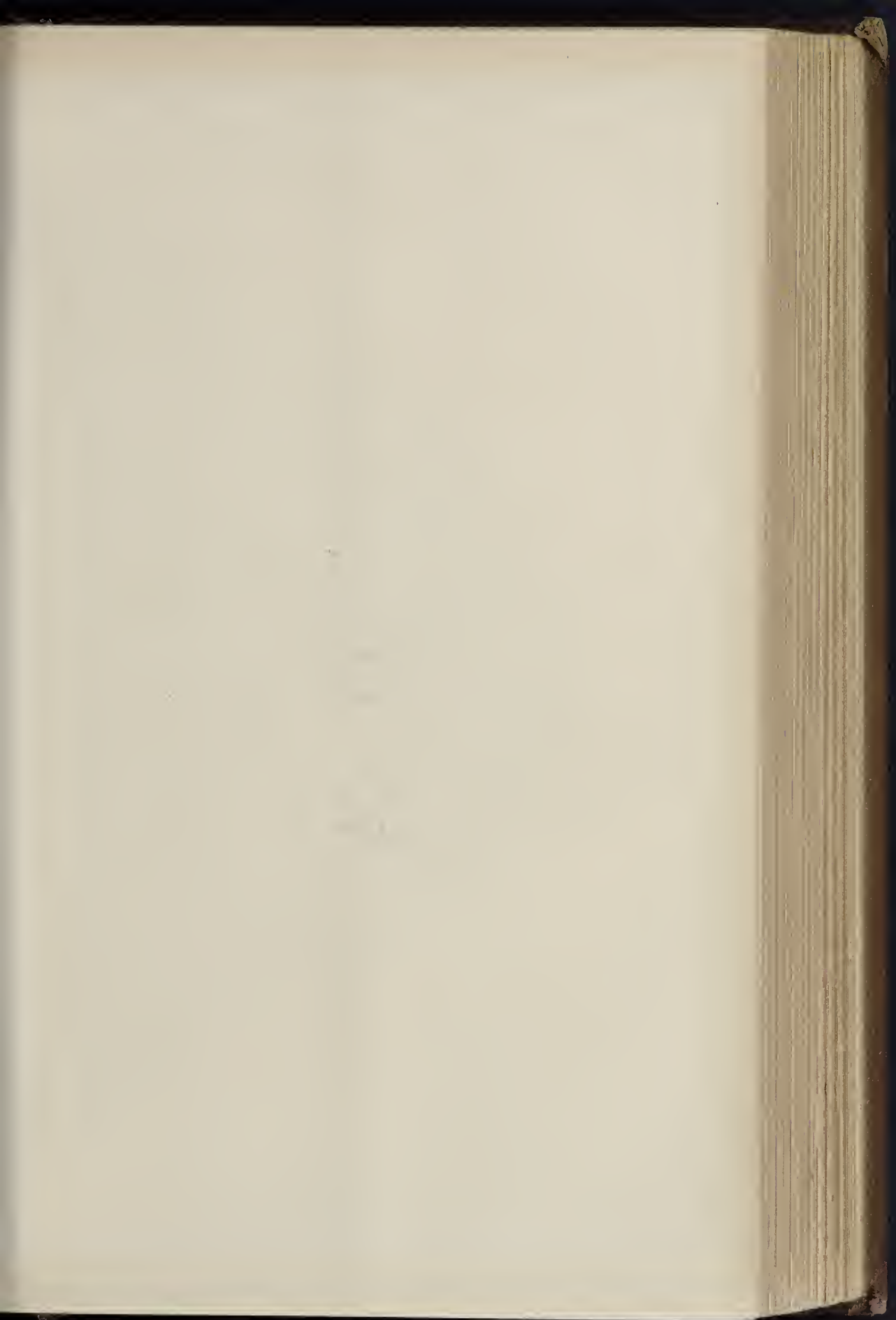
WAR OFFICES.

FRONT.

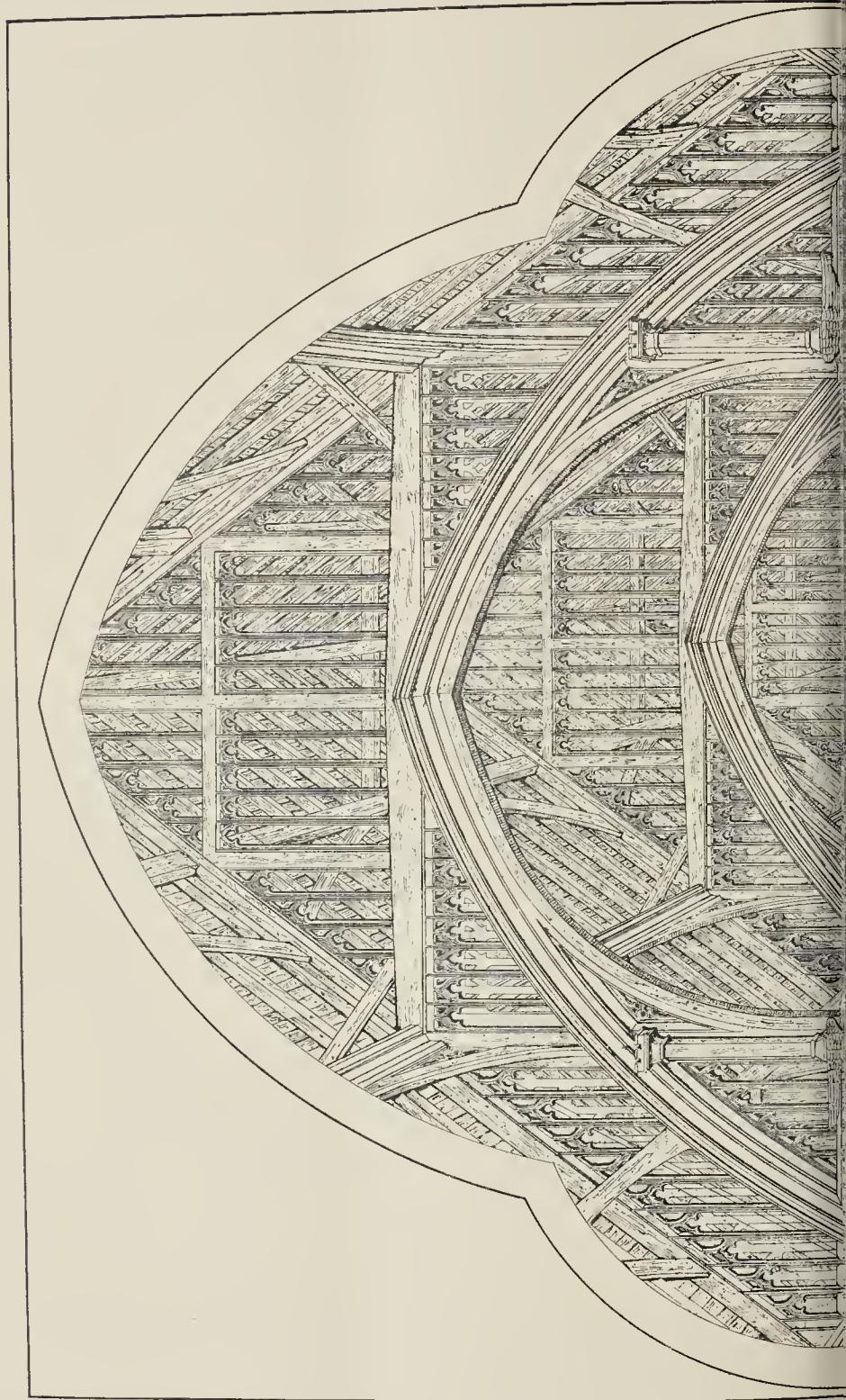


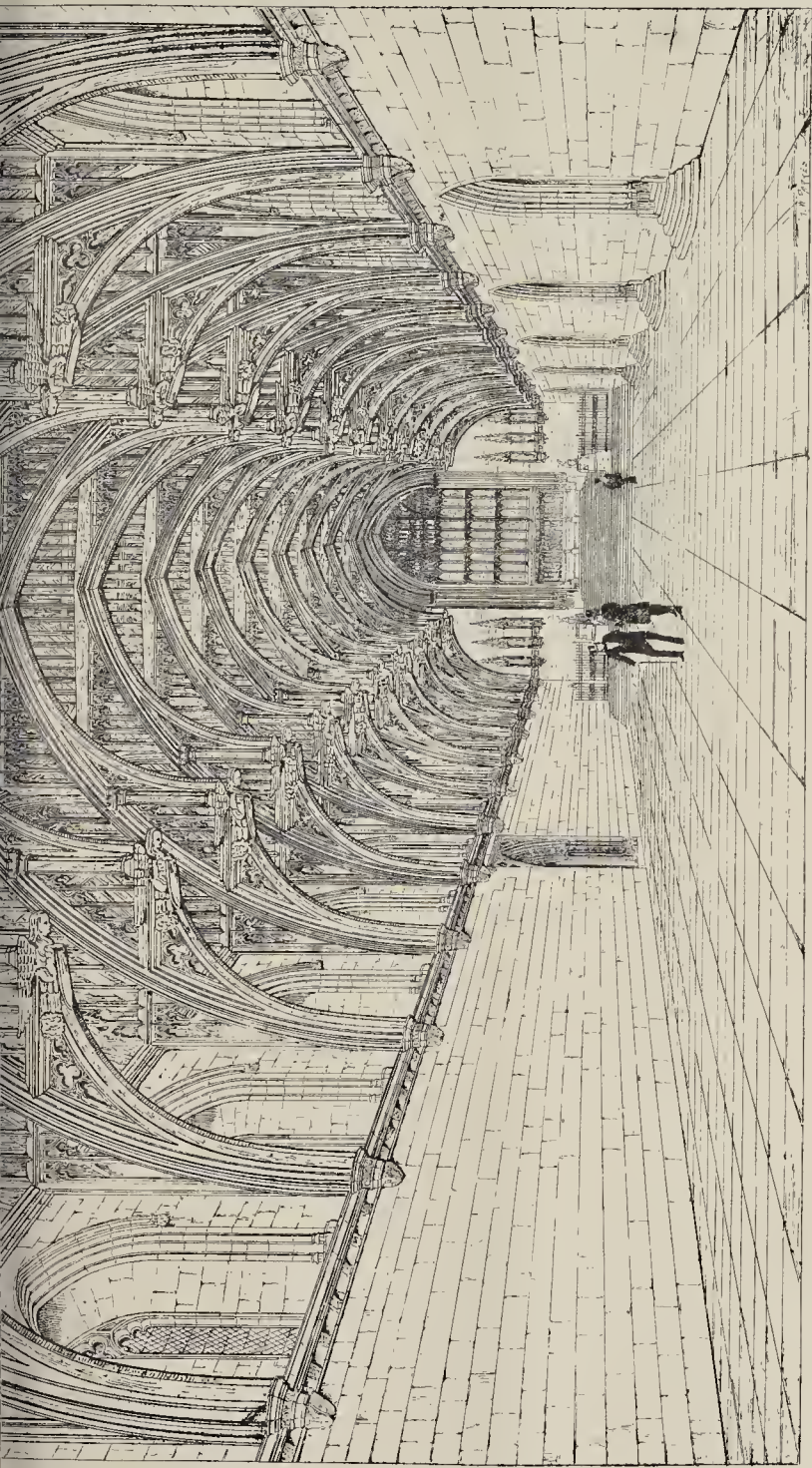
THE BUILDER, APRIL 4, 1886.





THE BUILDER, APRIL 4, 1885.

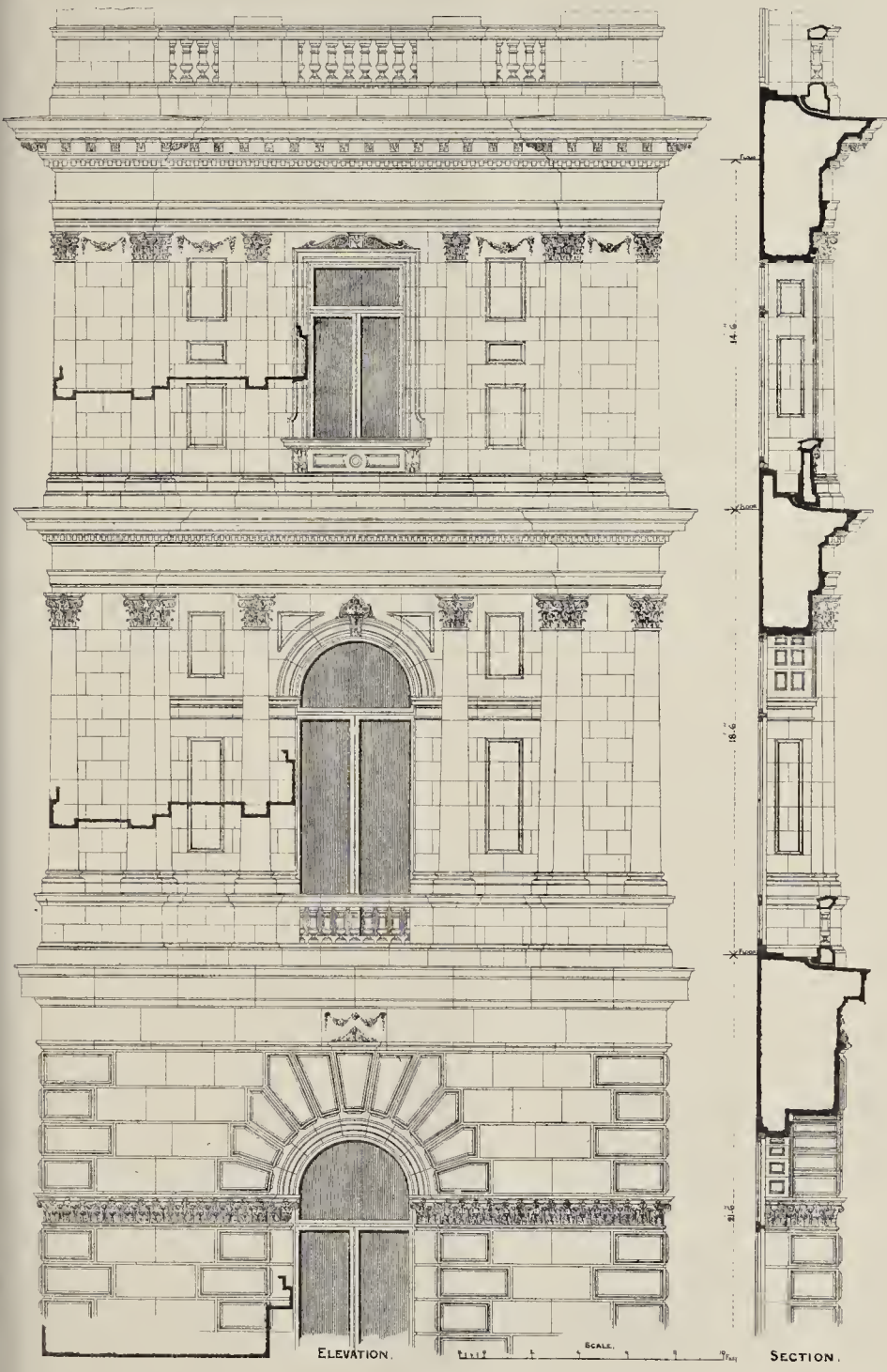




Wynand's Photo Latho

Queen St London WC

ROOF OF WESTMINSTER HALL.—FROM A DRAWING BY MR. F. T. DOLLMAN.
(Given in Illustration of Prof. Roger Smith's Lecture on "Roofs.")



ELEVATION.

SECTION.

SCALE

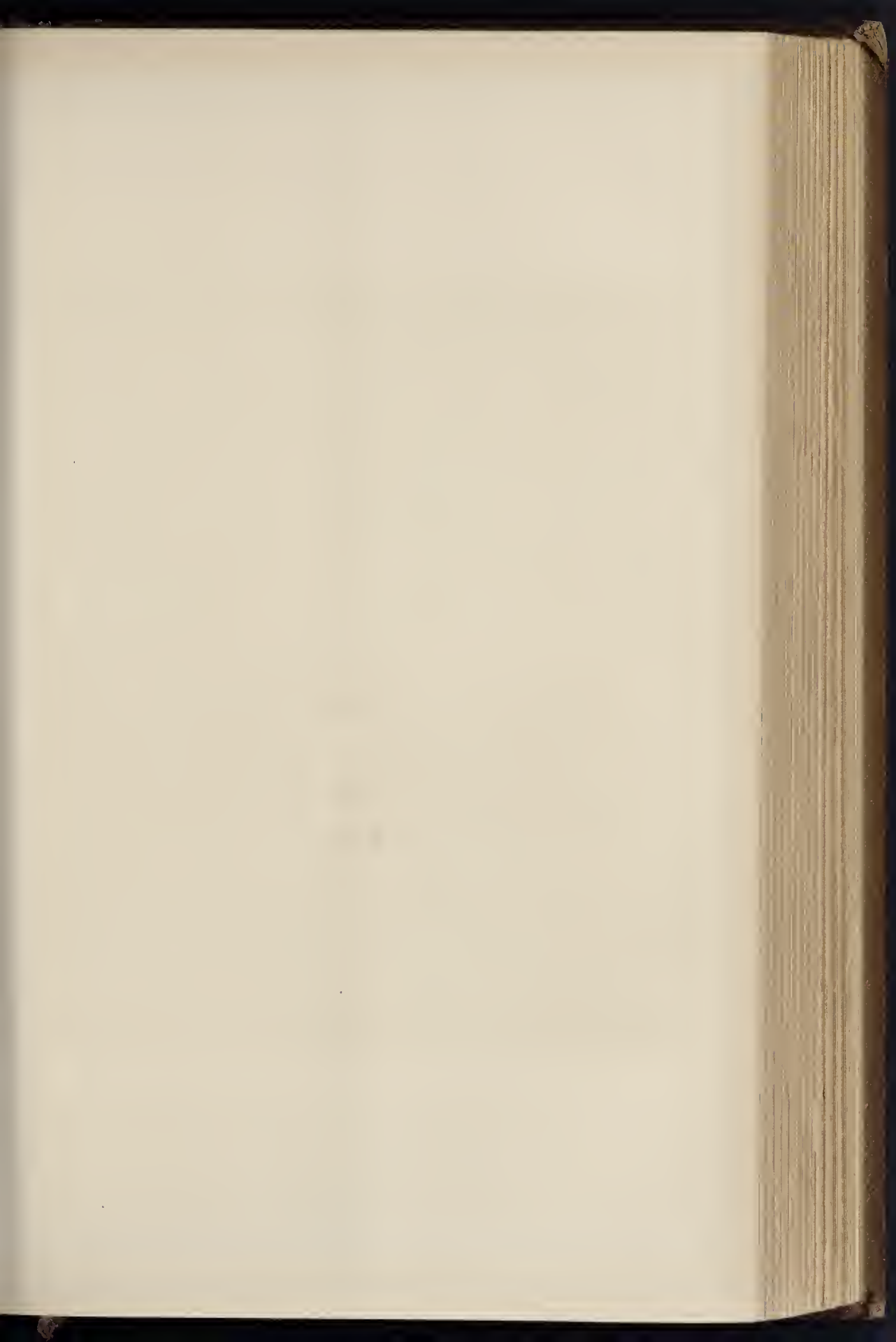
Wyman & Sons, Photo-litho

DESIGN FOR A MUNICIPAL MANSION.—By MR. A. A. COX.

Medal of Merit,

the Medallion Competition, 1885.

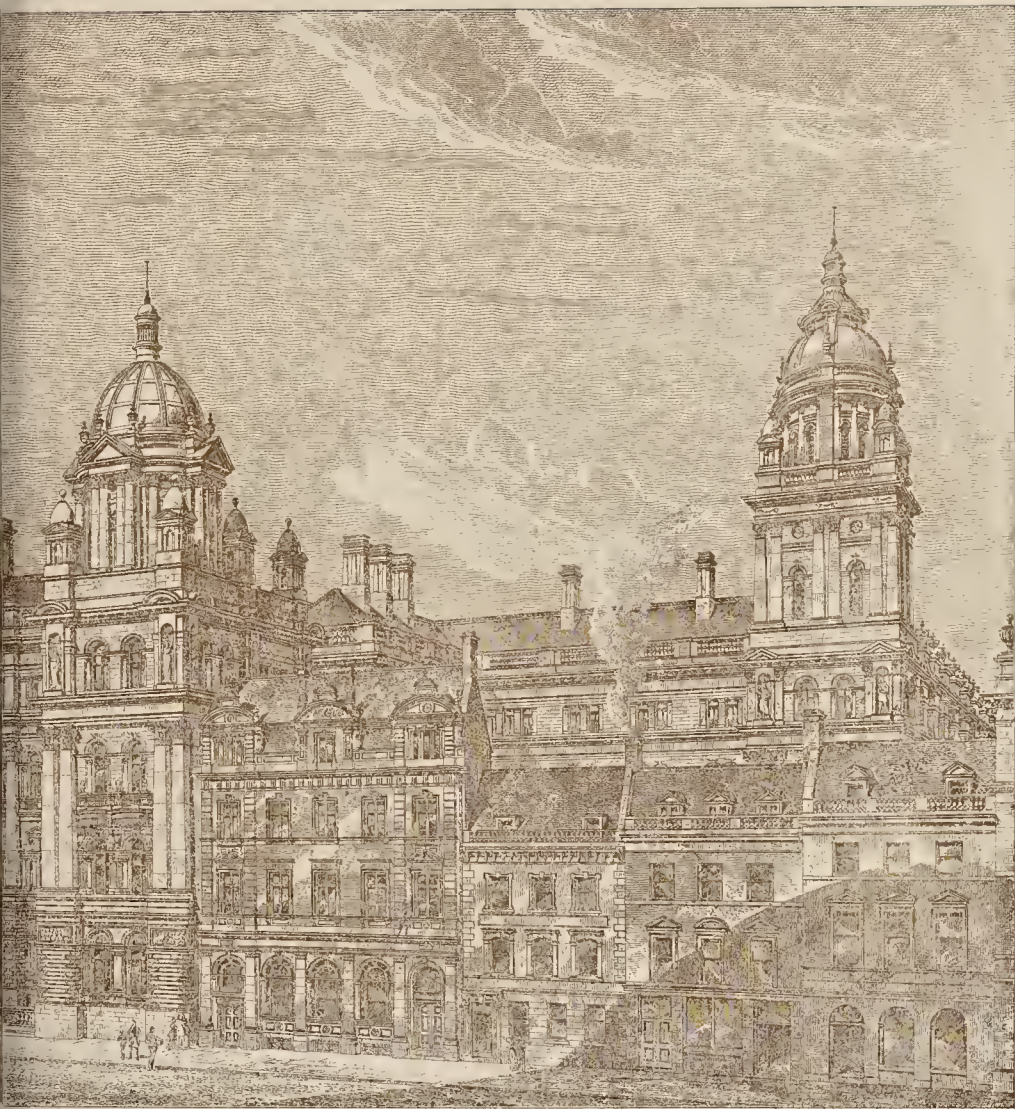
DETAIL OF PORTION OF TOWERS (EAST FRONT).





Wyman & Sons Photo-litho

NEW ADMIRALTY
WHITE

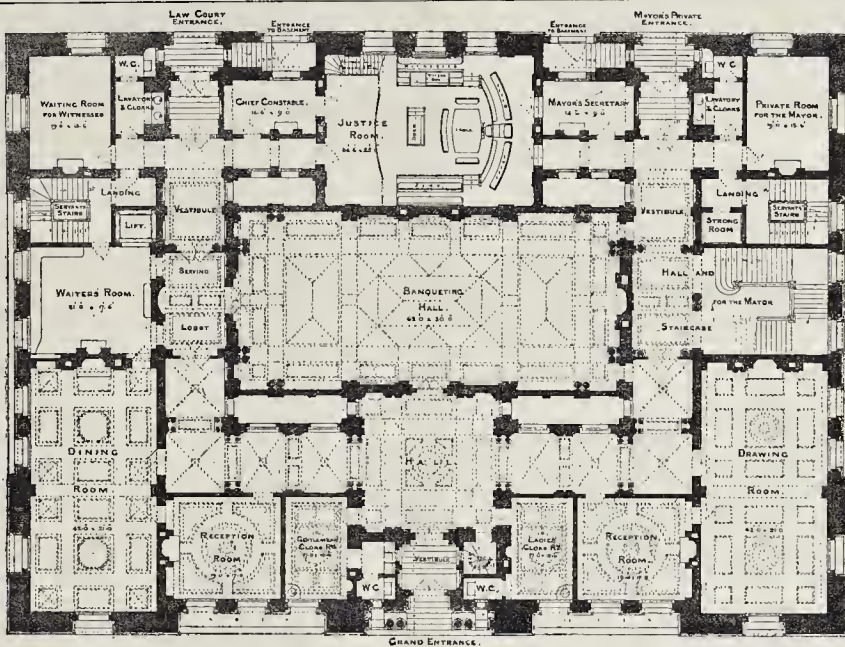


Queen St. London, W.C.

WAR OFFICES.

FRONT.

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Mr. A. A. Cox's Design for a Municipal Mansion.—Ground Plan.

DESIGN FOR A MUNICIPAL MANSION.
SOANE MEDALLION COMPETITION.

The perspective view and detail which we give present the design for the Soane Medallion. Mr. A. A. Cox, which obtained a medal of merit. The ground plan is appended. The design has more of the mansion and less of town-hall about it than some of the others, and is a pleasing and dignified structure in general aspect; and the details, though giving nothing original, are carried out with refinement.

ARCHITECTURAL ASSOCIATION.
VISITS TO FISHMONGERS' HALL AND MERCHANT TAYLORS' HALL.

The fifth Saturday afternoon visit for the present session took place on Saturday last, the 1st ult., to the Fishmongers' Hall, where a large number of members were received by Mr. J. G. Dowse, the Clerk of the Company, at two p.m., escorted by him through the different apartments. Mr. Dowse described the various objects of interest belonging to the Company. The Fishmongers are the fourth on the list of the five great City Companies, and their hall erected in 1831, on the site of the old hall, built by Mr. Jarman, the City Surveyor. The oldest extant charter of the Company is a grant of the 37th Edward III. Having inspected the several rooms, the members proceeded to the

Merchant Taylors' Hall.—This hall is situated in Threadneedle-street, and here a paper was read by Mr. W. Hilton Nash, giving a short description and history of it. This Company was incorporated in 1466. The hall is the best of the Companies' halls, and was, like the Fishmongers' and Drapers' halls, rebuilt after the Great Fire, by Mr. Edward Jarman, City Architect, who was also architect of the second Royal Exchange. The Association had a former visit to the hall, March 6th, 1880, which time very extensive additions were made from the designs of Messrs. E. Pearson & Son, architects, estimated to cost at £23,000. The members having inspected the premises, from the very interesting visit to the several chambers of the new buildings, including the strong room, containing ancient silver "yard stick," formerly used by the Company, and the several "loving cups," soon after took their departure.

* See Builder, March 13, 1880.

THE LONDON AND MIDDLESEX
ARCHÆOLOGICAL SOCIETY.

At a meeting of this Society held on the 24th ult., at King's College, Strand (Mr. J. G. Waller in the chair), Mr. G. L. Gomme, F.S.A., read "Some Notes on the Westminster 'Polk Moot,'" which was followed by some observations by the Chairman and Mr. Alfred White, F.S.A.

Mr. John E. Price, F.S.A., hon. secretary, next described some Roman and other pottery, coins, and various other objects of interest found during the recent City excavations. There was also exhibited the skull of a wolf of prehistoric times recently dug out of a depth of 14 ft. of gravel on the Albany Estate, Albany-road, Old Kent-road, in excavating for a sewer. The gravel commenced 2 ft. or 3 ft. from the surface. The skull was in a very remarkable state of preservation, and was evidently that of a young animal, the teeth being firm and white.

Mr. Price referred to the proposed restoration of the Church of St. Bartholomew the Great, West Smithfield, which was spoken of and illustrated by us last week. A discussion ensued, in which the Rev. W. Panckridge, the rector of the parish, Mr. Alfred White, F.S.A., and others, took part. Mr. A. White strongly dissenting from an opinion expressed by the late Mr. Parker that the fringe manufactory occupies the site of a Lady chapel, his view being that this building was used for some other purpose. The general feeling was to waive any expression of opinion until the ground could be opened and more carefully examined, so as to ascertain what the building actually had been.

Mr. J. E. Price further announced that the Society had been in correspondence with the Chief Commissioner of Works in reference to the proposed restoration of Westminster Hall, and read a letter which they had addressed to him, stating that they had appointed a committee, consisting of Mr. C. B. Thurston, F.S.A., Mr. A. White, F.S.A., Mr. E. W. Brahrook, F.S.A., the President, Treasurer, and Secretary, to represent its views to the Parliamentary Committee if such were desired. The conclusion they had formed was in the main in support of the conservative restoration which Mr. Pearson proposed, but they preferred the lower proposed form of cloister to the

* We understand that the Westminster Hall Committee has completed its public sittings, and is not to meet again until after the Easter holidays, when it will meet with closed doors to consider its report.

higher one. They also desired that no new building should be erected on the space set free by the demolition of the Law Courts, but that the wall and its buttresses might be left clearly visible. They thought it an additional objection to the higher cloister that it would render necessary the intrusion into the interior of the hall of a large and unsightly staircase. The majority of them objected to the raising of the north turrets, as merging the hall in the modern buildings around it. They thought it greatly preferable that its present outline should be preserved and be visible.

The view taken appears to be (as we might have expected) rather that of archaeologists than architects.

A SUGGESTED SITE FOR THE
RE-ERECTION OF TEMPLE BAR.

SIR,—As a citizen of London, I take considerable interest in all that concerns the architectural monuments of the City, and I was, therefore, very pleased to see your protest (p. 441) in favour of the re-edification of Temple Bar,—the numbered stones of which are, I believe, still stowed away on some vacant land in the immediate vicinity of Farringdon Market, and not in Epping Forest, as seems to have been the impression at the Institute meeting. I sincerely trust that you will exert your influence to prevent so stupid a proceeding as the re-erection of the "Bar" in Epping Forest, where it would be an incongruity, severed from all its local and historical associations. Surely, rather than this, it would be possible to find some nook or corner for it within the precincts of those congeries of buildings which go to make up the Inner and Middle Temple? But better still would it be if it could be utilised as a gateway to the Temple, and I venture to point out what would seem to be a favourable opportunity for its utilisation in this capacity. As will be known to many of your readers, the easternmost entrance to the Temple is by a wretchedly-mean pair of wooden gates giving on to the open space in front of King's Bench-walk. My suggestion is that Temple Bar be re-erected on this spot, as it very easily could be by co-operation between two wealthy bodies like the Corporation of London and the Benchers of the Temple. The advantages of this site are—(1) that the "Bar" could be re-erected with its old façades facing east and west respectively, as in its former position; (2) that this historic monu-

ment would still remain in the City; (3) that it would be well and effectively seen terminating the long vista westwards along Tudor-street and Temple-street from New Bridge-street,—the two first-named streets (which form one continuous line of communication) having been considerably widened by the Corporation, although at present a public-house partially blocks the way (only temporarily, as Mr. Wyke Bayliss will be glad to hear); the western face of the Bar would also show admirably from the south front of the Inner Temple Library, from Paper-buildings, and from other points of the large open and tree-shaded place to which it would give admission from the east; and (4) the historical and literary associations of the monument would be preserved, for, if re-erected in the position I suggest, the monument would still be "The Bar by the Temple,—by the Church that is founded in honour of God and of his Temple of Jerusalem."* It would, of course, be necessary that some portions of the two old houses flanking the present mean timber gateway should be demolished, but, as compensation for this sacrifice, the Benchers would get an architecturally-effective and historically interesting entrance, admitting of the passage of two lines of carriages, instead of one line as at present. I am not aware that these houses are particularly worth preserving on historical or other grounds. That some better entrance to the Temple from the eastward will be necessary before long must be apparent to all who are familiar with this improved and improving quarter of the City. Large blocks of buildings adjoining the Temple, and facing towards Temple-street and the new streets which run southwards from Temple-street to the Embankment, are already in progress, and it is therefore sincerely to be hoped that the benchers of the Inner Temple and the Corporation of London will combine to effect an improvement which will not only be architecturally effective, but which will restore to London,—and to that part of London, moreover, where it will be most appropriate,—a most interesting historical monument.

I trust, sir, that you will give early insertion to this letter, and that it may be thought worthy of attention by the authorities concerned.

London, March 30. D.

COLOURED PORTLAND CEMENT.

SIR,—Can you inform me of any means by which the Portland cement with which a brick house is to be coated can be made a permanent red-brick colour, so that the plasterer may lay on a coat of cement instead of cement of the usual grey colour? Perhaps the same means might be used which are employed to colour the red concrete slabs now in use, if any of your readers could enlighten me as to the process? "PORTLAND."

"STREET ARCHITECTURE OF LONDON."

SIR.—A letter appeared in your last issue [p. 465] from Mr. Wyke Bayliss on the above subject, in connexion with the new street which is being constructed between Bloomsbury and the Haymarket by the Metropolitan Board of Works. The writer does not express himself one whit too strongly on the point, and there can be no doubt whatever that by the course the Board has adopted the approach to the new street in question will be entirely spoiled, so that the plasterer may lay on a coat of cement instead of cement of the usual grey colour? Perhaps the same means might be used which are employed to colour the red concrete slabs now in use, if any of your readers could enlighten me as to the process? "PORTLAND."

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Now, it is well known that the Duke of Bedford is the freeholder of nearly all the land in this quarter, and I am in a position to state positively that his Grace has not thrown any obstacle whatever in the way, but was willing to meet the Board in a satisfactory manner. As to other local facts, I may add that the lease of the public-house has but about twelve years to run, so that the cost of purchase could not be very extravagant. There are besides sixteen public-houses within the radius of about 150 yards. The "Black Lion," therefore, would not be particularly missed. The only other parties concerned, the owners of the adjoining building, of which a small portion would be required, and of which the Board has already

* "Temple Bar,"—A Monograph by E. W. Godwin, F.S.A. London: 1877.

taken a part, actually signed the requisition above named.

Last of all, the Board still have power in their original Act of Parliament to carry out this great improvement, the cost of which compared with the 110,000*l.* paid for the Pavilion Music Hall, at the other end of the street, would be absolutely trifling. The enclosed card will show you that I am an old parishioner and A LARGE RATEPAYER. Bloomsbury, 30th March, 1885.

"ARSENIC AND ARCHITECTS."

SIR.—A letter from Sir E. Beckett has been widely quoted upon the danger of my poisoning congregations with arsenic when I apply it beneath the floors of a church for preserving the timbers from dry rot. I never specified or recommended its use, nor ever should use it, and I should much regret that an incautious reply to a clever man's "chaff" should give any ground for the idea that after all it might be used without great danger. I have, indeed, had to answer inquiries made to this effect in consequence of his letter. Sir Edmund is equally deluded in supposing that architects hate his useful little book, when they venture to smile at the idea of its ever superseding their office or their art, or at the probable result of a man becoming his own architect. WILLIAM WHITE, F.S.A.

30A, Wimpole-street, W.

. It would have been better if Mr. White had stated more exactly what was the part he took in the matter, and what he did recommend, and why. We confess that we cannot quite reconcile his note with another which we read in the *Times*. He does injustice to Sir E. Beckett's sincerity in accusing him of "chaff."

Books.

Glass Painting: a Course of Instruction in the various Methods of Painting on Glass, and the Principles of Design. By FRED. MILLER. With numerous illustrations. Wyman & Sons, London (Wyman's Technical Series).

UNDER this title is presented to our notice a small work on "Glass Painting" purporting to be the result of the author's experience. The aim of the author has been, we presume, to compile a work which should treat of the historical technology of glass-painting; at least, we would infer so much from the title. On an examination, however, we find the *matériel* of the work does not fulfil this liberal promise. The art of glass-painting described is an art entirely that of an artist, and not the art *par excellence*. We fail to see how it could be otherwise, as glass-painting (synonymous with glass-staining) is a most elaborate art, and one which, considered technically, apart from any theory of design, would occupy a work of much greater magnitude than that before us. This work is a collection of "hints" rather than principles. Generally, the work is not historical, the practical instruction in glass-painting is merely the method of the author, and as to the principles of design, we have illustrations of the author's and others; as to any theories or rules partaking of the nature of "principles," they are entirely absent. "Tools and Materials" are somewhat briefly described. A short chapter has been devoted to "Tracing and Staining"—staining, of a necessity, to be thoroughly treated would require a chapter to itself. Under the heading of "Enamels" we have a very slight notice of some English colours, &c. The information given could be obtained from any liberal trade catalogue. The ordinary division of an enamel colour into "flux" and "metallic oxide" is not noticed. The information given is of the slightest.

In order to make this work "reasonable," the scientific principles of the art should be gone into. For instance, "In the case of blue, green, and yellow ruby, a thin film of one of these colours is put on the other side. . . . In adding stain to ruby, always do it on the side that is not flashed." This last is the only instruction as to staining "ruby" glass. Now, in point of fact, we have "streaked" ruby, which becomes darker in the kiln, and which is stained by water tintured with the "silver" stain only. Again, ruby never improves in the heat. Some "antique" ruby becomes darker, and cheap flashed ruby usually becomes lighter, while being fired. Why is all this? Copper oxide is the colouring matter of these "rubies." Copper in its higher state of oxidation colours glass blue to bluish green; in the lowest oxide form (Cu₂O) it colours glass a dark "ruby." And as heat alone is sometimes sufficient to

alter the character of the colouring matter,—a piece of glass almost colourless may after firing be almost opaque. The colouring power of copper begins at dark brown, becomes lighter as the higher oxides are being reached, till it is ruby, then salmon tint, next colourless, grey and so on, to blue. When the artist has a good piece of ruby glass which he does not wish changed by the heat of the kiln, he mixes "flux" with his enamel colour in order that the said colour may fuse at a lower heat than will spoil the ruby. Now, the author has said almost nothing about the staining of ruby, and certainly has not described the character of a "flux." Again, no theory or principle of "fluxing" is apparent in this work.

We join with the author in his admiration of the writings of Pugin and Wyatt, whose efforts have conduced so much to revive the artistic feeling of industrial art and architecture. The author, in his introduction, evidently thoroughly appreciates the beauty of the early examples and he is further to be congratulated on his perception of the true value of Munich glass. The argument is most apposite, and has been treated with some skill. The art is shown to have originated in the cloister, and the monk to have been the first glass-painter. In the early days of the art the clergy undoubtedly would perceive its influence on the mind and the invaluable aid it was likely to offer, as an important factor in captivating a mind rude and untutored. The great beauty of the art is shown to exist in the work being an expression of the devotional love of the artist, and never a mere example of skill. The first glass-painters had no precedent to guide them, and much labour must have been expended ere they could produce such effects as we may see existing yet. The motive of the earliest stained glass was to admit light; that is light modified,—not the dazzling brilliancy of the sun, but a quiet, mellow radiance. Beauty of colour was the only merit of this early glass. To the primitive manner in which the work was carried on, we may ascribe the reason of its beauty. The author of the work in question has in no way entered into any consideration of the primary laws of form, colour, and composition of form. There are several minor details which would bear to be more fully considered, merely technical; these we may pass over. Several phrases, however, we may be pardoned for calling attention to. "The painting of every other square only never commends itself to me, as it suggests cheapness, and looks poor and thin." We cannot agree with this opinion. Alternate quarries in domestic stained-glass are so many points of interest, and when delicately treated, finely traced, and merely tinted with "yellow stain," form a very beautiful glass-effect. Again, "A method frequently resorted to in church windows to give tone and softness to white glass is to mat each square, when traced, with amber or ancient brown. . . . When dry, some of it is either rubbed off with the finger or with a stiff hog-hair brush. This plan is sometimes termed *antiquing* the glass, and is supposed to give the appearance of age. . . . If this matting is done to deceive, it is certainly false, and should not be practised; but there is nothing illegitimate in the method itself." We consider this practice most reprehensible, and one which should not be tolerated.

In many of the designs shown in this work there is a certain super-elaborateness, not entirely in consonance with the character of the glass. Simplicity is a quality that cannot well be dispensed with. Glass-staining is entirely a conventional art, and "naturalism" is seldom in place. It is better to suggest merely some incident of plant life, than design a botanically correct adaptation of foliage, &c., trained by force into the regularity of glass and lead. Enamel colours never improve with age; their best period is when they are new. Stained glass is never started at,—the light comes to us; the glass is a window, not a picture; the harmony of colour and beauty of form, with the train of thought excited in our minds by a mere suggestion, give us a pleasure which cannot easily be described. The chapter on ecclesiastical glass-painting enters concisely into the subject.

The illustrations, which are examples of old glass, for the most part, are bold and vigorous. As the work purports to be practical, all historical notices could have been dispensed with, and a chapter or two added on the subject of theory and composition of "enamels" and "fluxes." This knowledge is, to a great extent, the basis of the practice of the art. The

omical formulae of the various glasses should occupy a prominent position in a work of this description.

VARIORUM.

"The Architects' and Contractors' Handbook and Illustrated Catalogue of Materials and Manufactures," edited by J. Douglass Matthews (London: B. T. Batsford, 52, High Holborn. Liverpool: Harris & Co., Drury-street), has reached its third annual issue. We reviewed the first issue at some length in the *Builder* on December 15, 1883, and we note at the editor has acted upon some of the suggestions which we made at that time. There is still a great many things not included in the book in a compilation of this kind it takes time to get all the materials together. The work will be found exceedingly handy for reference, and is provided with two indices,—one to the materials and appliances themselves, and one to the manufacturers and merchants to supply them.—"A Walk Through Lincoln Minster," by the Rev. Edmund Venables, A., Precentor of Lincoln (Lincoln: Ackrill, Ludcock, & Keyworth, printers), is a lecture delivered by the author to a local association. It gives an historical account and architectural description of the Minster, and will be found useful by visitors, although in saying this we do not mean give our endorsement to all the author's views.—"That the Electrician and the Electrical Engineer are finding increasing scope for activity and usefulness would be made evident (even if it were not otherwise apparent) by the 'Electricians' Directory and Handbook for 1885' (London: *Electrician*, 1, Salisbury-court, Fleet-street), which rhymes one or two improvements upon previous issues. A new and interesting feature, first introduced into the work for the first time, consists in a biographical section, in which brief biographies are given of those whose names are best known in connection with electrical pursuits, in some cases illustrated by portraits. The work contains a great deal of useful information relating to dynamos, arc, and incandescent lamps, electrical formulae, as well as a directory of electricians and electric-light engineers.—"The Tenth Annual Report of the Chamber's Shelter Fund" (London: Waterlow & Sons, London-wall), is a summary of the progress made in the useful work in which it is engaged. Thirty-two shelters have now been placed in various parts of the metropolis, and they are used by 1000 cabmen daily. It is stated that until these shelters were established the drivers had means of obtaining refreshment or protection from the weather when on a cab rank, and police regulations prohibiting them from leaving the rank. Those of our readers who may be able to help the work of the fund should address the Hon. Sec., Mr. Walter H. Macnamara, 15, Soho-square, W.—A very useful Illustrated Catalogue has just been issued by Messrs. Treggon & Co., of Jewin-street, E.C., and Brewery-road, King's-cross. Besides being a catalogue of the multifarious articles and materials which are supplied by the firm, it contains some very handy trade memoranda, such, for instance, as the approximate weights per square foot and per sheet of zinc, copper, and black and galvanized iron.—Mr. Edward Stanford, of 55, Charing-cross, sends us his "Catalogue of Maps and other Geographical Publications," published or sold by him, as well as "A Résumé of the Publications of the Ordnance Survey of England and Wales." Those who want maps of any part of the world will be sure to find what they need in these catalogues, while the information as to the publications of the Ordnance Survey shows the progress that has been made in that important work.—"Self's Dictionary of the World's Press for 1885" (London: H. Soll, 167, Fleet-street) brings together in a convenient form a great deal of interesting and useful information to the newspaper press of the world. It is illustrated with a large number of maps, added with red dots at all points where newspapers or periodicals are published. We will, however, to find any information in the work about the newspapers of Malta, although one of the maps the island is almost overlooked by one of the red dots in question. Nevertheless, the work appears, on the whole, to have been carefully compiled, and will be a welcome addition to the reference books of the printing-house or library.

CHURCH-BUILDING NEWS.

Stone (Staffordshire).—Christ Church, Stone, has been re-opened, after extensive additions and alterations. The church, which is a plain brick structure, was built about forty years ago. The old chancel, which was but 20 ft. by 13 ft. 9 in., has been removed, as also the former vestry. A great portion of the east wall of the nave has also been taken down. All the old pews have been cleared out, and the organ has been removed from the gallery. A new chancel, 30 ft. long by 20 ft. wide, has now been built. This is 25 ft. 6 in. high internally, and some 33 ft. to the ridge of the roof externally. It has a polygonal apse, five of the sides having windows the heads of which are filled with tracery. The chancel roof is composed of strongly-framed principals with curved ribs rising from the walls some feet below the cornice. The organ is to be re-erected in a spacious organ-chamber, which has been built on the north side of the chancel, into which, and the nave, there are wide and lofty arches for the double front with which the organ is to be re-arranged. The new vestry is upon the south side of the chancel, and is commodious and lofty. The nave and western gallery have been entirely re-seated with substantial seats of pitch-pine. In the chancel are oak choir-benches, with panelled fronts, an oak prayer-desk, and, on both the north and south sides, stalls for the clergy. The pulpit is placed so as to form the termination of the low screen wall by which the chancel has been extended into the nave somewhat beyond the line of the chancel arch above; the base is of Croxdon Abbey and Hazelstrine red stone, similar to that used for all the other internal masonry; above this base the pulpit is of the finest Painswick stone and veined alabaster. All the external masonry is of Hollington stone. The general works have been executed by Messrs. Lowe & Sons, of Burton-on-Trent, who also have supplied the pulpit and all the joinery, including the chancel seats and prayer-desk. The gas-fittings have been manufactured by Messrs. Brawn & Co.; the brass chancel-rails, a new altar-dish, the frontal and cover of the Communion-table, and other furniture, are supplied by Messrs. Jones & Willis; and the heating apparatus has been remodelled and extended by Mr. Parkes, all of Birmingham. The chancel has been laid with encaustic tiles by Messrs. Minton Hollins & Co., of Stoke-on-Trent. The whole has been carried out under the direction and from the designs of Mr. W. Hawley Lloyd, architect, of Birmingham.

Waterloo (Liverpool).—A new set of choir-stalls in pitch pine, replacing the old and inconvenient fittings which before existed in the chancel of St. John's, Waterloo, a suburb of Liverpool, has just been erected by Messrs. Jones & Willis, of Birmingham and London, under the supervision of the architects.

Brierfield.—There has just been placed in St. Luke's Church, Brierfield, a new steam heating apparatus. The apparatus is fitted up on the gravitation principle, and is easily worked with a pressure of 15 lb. The boiler is in a cellar immediately below one of the vestries. The main pipe, which is 1½ in. in diameter, leaves the boiler, and is conducted in a flue at one time used for a hot-air apparatus (which was formerly the mode adopted for heating the church) into the body of the edifice, from which branches are taken of 1-in. pipes round and the body of the pews in the centre aisle, and the east and west aisles. The steam is taken round in these pipes, and the condensed steam caused by circulation returned to the boiler. The apparatus has been provided by Messrs. Thos. Birtwistle & Co. (Limited), of Burnley. It is stated that this is the first church in the United Kingdom which has been heated by steam.

Hagbourne.—Some time ago it was decided to apply for a faculty to erect a plain oak reredos in place of the faded and dilapidated screen standing before the east window of the parish church. While the negotiations were pending, Sir Robert Loyd Lindsay came forward and proposed to erect a reredos at his expense. The offer was accepted, and the work is now completed. According to a local paper, the east window, though a very fine one, has, when entirely uncovered, quite spoiled the general beauty of the church, as it stretches the whole width of the chancel, and comes down very low indeed. It has been the object of the architect

(Mr. Woodyear) to correct this. The wall, from the ground to the bottom of the window, has been faced with Bath stone, and the reredos proper has been built on to what was hitherto the thickness of wall inside the window-sill. On each of the outsides, north and south, is a narrow canopy divided in the centre, and having panels at the back divided into squares,—these are perforated, and display open work, through which the light can be seen. Next to these, on either side, are two wider canopies, divided from the others by columns projecting far out, and ornamented by a pinnacle and finial. The panels of these are also perforated. In the centre a much deeper and higher canopy, having on either side projecting columns with pinnacles, and at the back a diaper panel not perforated. Standing boldly out under this centre canopy is a white marble cross, and in the front of the whole is the super-altar, projecting some distance from the reredos, and 6 in. above the altar. All the work above the super-altar is done in Caen stone.

Poynton (Cheshire).—The church on Lord Vernon's estate at Poynton has now been completed by the erection of a tower and spire of simple Early Decorated character, corresponding with the rest of the church. The stone for the most part has come from Lord Vernon's quarries. The steeple has been built by Messrs. Ellis & Hinchcliffe, from the designs and under the superintendence of Messrs. Medland & Henry Taylor, architects, Manchester.

Queenstown (South Africa).—The opening and dedication of the nave of the Church of St. Michael and All Angels took place on Sunday, February 15th. The foundation stone was laid on the 14th of November, 1882, by Sir T. C. Scanlan (then Premier of the Colony). The design is Early English, and the work of Mr. W. H. Reid, architect, Cape Town. The only portion opened at present is the nave, north and south aisles, and baptistry, covering a space of 85 ft. long and 45 ft. wide. The walls of the nave are supported by polished marble columns given by members of the congregation. With the object of making a temporary chancel a screen has been erected across the church,—thus forming a choir and sanctuary in the centre, an organ-chamber on the north, and a vestry on the south aisle,—which will all be removed on the completion of the chancel and transepts. The roof is 50 ft. from the floor, and has substantial principal rafters covered with diagonal boarding, all in pitch-pine, well oiled.

Kensington.—A richly-sculptured reredos has just been erected in St. George's Church, Campden Hill, as a memorial to the late Lieut.-Colonel D. W. Lawrell, R.A., by his wife. It rises to a height in the centre of about 13 ft., and occupies three sides of the apse, which has been newly decorated. The main features of the reredos are a sculptured representation of the Crucifixion and statues of St. Michael and St. George. The decoration of the arch was by Mr. Pullen, of Gray's Inn-road, and the reredos is by Mr. James Forsyth, of Finchley-road.

Headon (Notts).—The Church of St. Peter, Headon, near Tuxford, Notts, is about to be repaired under the superintendence of Messrs. Somers Clarke and J. T. Micklethwaite, of Dean's Yard, Westminster. The chancel was roofed, a new east window inserted, and the stonework throughout the church mercilessly scraped in 1858. The plaster then put upon the walls is in a worse condition than the old plaster still remaining on part of the nave walls. A flat plaster ceiling and new roof was put up over the nave some eighty years ago. This ceiling, much decayed, will be lined with boarding and panelled by ribs, the old bosses, many of which remain, being placed at the intersections. The pews, which are of the same date as the nave roof, and are arranged without a central alley, will be used for wall linings. The church is ultimately to be re-seated with oak pews. The Jacobean pulpit retains its back-board and canopy; with this exception, there is not any old wood-work in the church. The repairs are to be executed by Mr. William Johnson, of Doncaster.

Sub-River Tunnel at New York.—At New York preparations are being made for the construction of a tunnel under the river East and Blackwell's Island, which, it is estimated, will be nearly one-fourth of a mile in length. The total cost of the tunnel will be, it is calculated, nearly seven per cent. less than that of a bridge.

The Student's Column.

DESCRIPTIVE GEOMETRY.—IX.

WE have already solved some problems by employing the method of Rotations. In this method the original projection planes are kept, and the object itself is made to rotate round an axis. It is an operation very much easier to conceive than that of changing the projection planes, but in practice, except for a class of surfaces which we shall study hereafter, it leads to very much more complicated operations in drawing. In architecture many of the surfaces we shall have to deal with both in the delineating of shadows and in solving cases of masonry, belong to those where the method of rotations is the most convenient to use; therefore we must thoroughly master it by solving, through its means, simple problems on points, line, and plane.

Draw the new position occupied by the point *a* after rotating round the vertical axis *O*, an angle measured by the arc α .

In rotations the object rotated is supposed to be connected by a radius with the axis of rotation, just like the circumference of a wheel is connected by spokes with its axle. The amount of a rotation is given by the angle formed by the new and the old position of the radius of any point of the object rotated. The arc α , which measures the angle of rotation, has been given us on some definite circle round *O*, which we begin by drawing; this is the measuring circle.

We join a^v to O^v , and, as the radius a^v , O^v will move with the point *a* in the rotation of the latter we have only to mark the point γ where a^v cuts the measuring circle; then carry the distance α from γ to δ , and we have the new radius a^h , O^h , which gives us the new position of the point *A*. The student should note that in rotations the dash which indicates the second position of a point is put directly after the latter, whereas the signs h and v , which indicate the horizontal or vertical projections of the points, remain unchanged, as in a^h or a^v ; if, on the contrary, the point does not

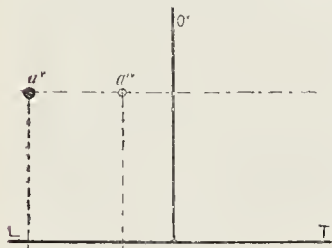


Fig. 47.

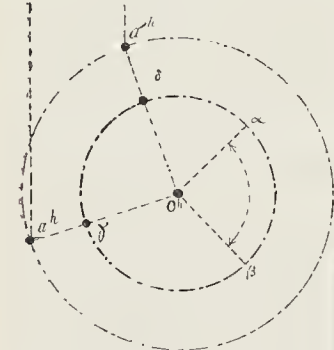


Fig. 48.

facilities than any other to the reader in following out the explanations; but, when working drawings are made, those signs are in general dispensed with, or a shorter system of notation, such as a plain letter for the plan of the point, and the letter followed by a dash for its elevation, may be adopted. The lines should be drawn fine, our thick lines are only made to distinguish the various lines according to their importance. (See fig. 47.)

Draw the new position of the line *D* after rotating round the vertical axis *O*, a given angle measured by the arc β .

In the fig. 48 we have marked only a^h , the elevation of *a* being quite useless for our purpose. We could draw the rotation of any two points of *D*, and thereby get *D* in its new position D^h ; but we spare ourselves drawing many lines by selecting for rotation the points *a* and *b* where D^v cuts the measuring circle; we then have only to carry the distances a^h , a^h , b^h , b^h equal to β , and draw the new elevations a^h , b^h to get the new projections D^h , D^h required.

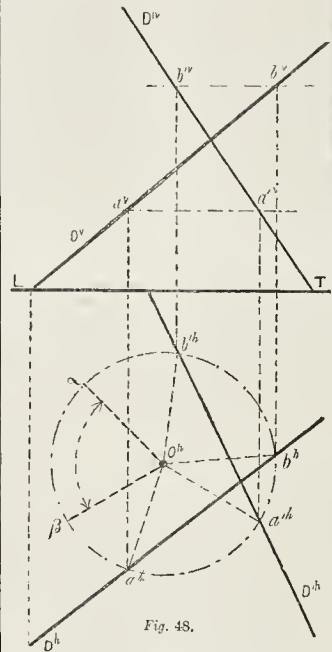


Fig. 49.

projection we may wish of an object, two rotations are required, the axes of which are at right angles with one another; the one axis is vertical, the other is perpendicular to the elevation plane, for they are the only rotation

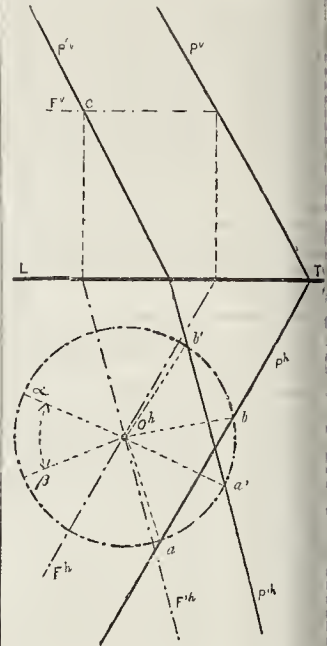
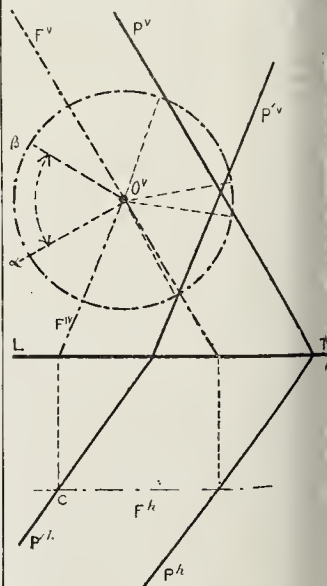


Fig. 50.

we can draw readily. The student must therefore, exercise himself in drawing horizontal rotations as well as vertical ones. There is no difficulty in doing so; we have only to turn the



Draw the new position of the plane *P* after rotating round the vertical axis *O*, a given angle measured by the arc α .

As for the horizontal trace P^h of the plane *P*, it rotates like a straight line; you will draw it most easily by the means of the points *a* and *b* where it cuts the measuring circle. Where P^h cuts *L*, *T* we have, of course, a point of P^v ; to get another point thereof, we take a horizontal line, *F*, belonging to the plane *P*, we rotate *F* also according to the same angle α , and the point *c* where F^h penetrates the elevation plane is also a point of P^v . A notable simplification to the drawing is obtained by so selecting the horizontal line *F* that F^h pass over O^h , for after rotation the plan F^h of *F* will, of course, still pass through O^h , which is the centre of rotation. Please note in fig. 49 that the points *a* and *b*, as well as *c*, have no signs h or v tacked on to them, because they are not the projections of *a*, *b*, and *c*, but the points themselves. (See fig. 49.)

For the sake of clearness we have made separate diagrams for each operation of rotating a point, a line, and a plane, but in practice we will probably have to carry out the three operations simultaneously on the same drawing.

Draw the new position of an object after rotating round a horizontal axis, *O*, a given angle measured by the arc β .

We have already seen that to obtain any new

drawing upside down to find that the operation is identical with the preceding one. We will limit ourselves to drawing in fig. 50, the rotation of a plane, *P*, round a horizontal axis without giving any further explanations.

move, but new projections are made, we then put the dash to the signs themselves, h or v , as in a^h and a^v , thus clearly denoting the character of the transformation the point has undergone. This method of notation has been adopted in the Builder, as it offers greater

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

Water Waste Preventer for Water-... F. C. Biddiscombe.
System is divided into two parts, upper and lower. The upper one is filled with the usual ball float. The second or lower one is held by a hole in the partition plate. The system has two cylindrical chambers, one above the other, and is worked by a plunger. The lower works the plunger, which, on its descent, forces the water up the other chamber and starts a syphon which empties the lower.

Pavements, Wall Surfaces, &c. J. H. ...

Invention consists in constructing surfaces of tiles, bricks, or blocks, the whole or the edges of which are curved. Borders and made up of tiles of simple shape, having one, or three curved edges, may be combined with a pavement.

Steam Boilers. J. Calverley.

Additional furnace flue is provided in the lower part of a Lancashire boiler to displace water and for more uniform heating.

Cistern Ball Valves. E. Brock.

Outlet is turned downward, and the valve upwards, against an inverted seat. A bent tube fits into the upper end, has its longer arm vertically by legs on the outside of the valve, so that the ball lever passes through it. The valve is attached to the shorter arm, in the form of a truncated cone, with a plug of indiarubber stretched over it.

Brushes. S. Morley.

Washing-brushes for railway cattle-trucks or other purposes are made with a hollow through which passes a tube terminating at the end of the brush in a small T-piece, from which tubes pass through the brush to the bristles. Air or fluid is supplied from an elevated tank and a tube runs either through a hollow in the brush, or on the outside of a solid handle, to the brushes.

Door Letter-box. G. W. Potter.

Sides and top and bottom of the letter-box are of flexible material, so as to allow the door to be opened. The back is rigid, and contains an iron through which the letters are removed.

Nails. J. J. James.

Improvement consists of a shoulder turned down the shank, and which supports the head of it squarely. The shoulder is formed by a rest-stand operating upon the end when the shank is by countersunk gripping dies.

APPLICATIONS FOR LETTERS PATENT.

Electric Bell, Improvements in Electric Bells, &c. - 3,592, J. ...
Self-regulating Water Waste Preventer. - 3,593, G. ...
Improvements in Ventilators for ... - 3,650, B. and D. ...
Waste Pre-g Cisterns. - 3,651, W. ...
Noiseless Chimney Cow. - 3,656, F. ...
Indicator. - 3,660, J. ...
Improvements in Fire Grates and Stoves. - 3,671, A. ...
Apparatus for Supplying Water to Water-closets, Urinals, &c. - 3,692, T. ...
Smoke-consuming Stoves. - 3,707, G. ...
Water-closet Valves. - 3,714, C. ...
Fences, Dividing Walls, and such Structures. - 3,723, A. ...
Electric Bell, Improvements in Electric Bells, &c. - 3,723, J. ...
Apparatus for Opening and Closing in connection with Hoists. - 3,749, R. ...
Safety Door Fastener for internal use. - 3,751, C. ...
Hardman, Chimney Pots or Tall. - 3,757, W. ...
Washer, Wash-basin Basins or Bases. - 3,773, C. ...
Improvements in Shaping and Cutting Stoves. - 3,780, H. ...
Fasteners, Washers, Gaskets, and Doors. - 3,787, G. ...
Improvements in Trusses for Bridges, &c. - 3,791, W. ...
Improvements in Walls, Partition Walls, and other similar Structures. - 3,823, J. ...
Apparatus for Printing on Walls, Ceilings, &c. - 3,823, B. ...
Machinery for Forging or Shaping Bars, Rods, Wires, and H. ...
Construction of Sinks and Traps. - 3,839, E. ...
Manufacture of White Lead. - 3,840, H. ...
Ventilator, Closet, Soil Pit, or Privy, applicable also to Bins. - 3,875, H. ...
Opening and Closing Sash Windows. - 3,884, H. ...
Manufacture of Artificial Stones. - 3,897, J. ...

PROVISIONAL SPECIFICATIONS ACCEPTED.

1,185, H. and T. Sanders, Improvements in Locks. - 1,340, W. Godge, Machine for Cutting, Planing, or Shaping Wood. - 2,038, W. Ellis, Machine for Cutting Laths, Veneers, &c. - 2,108, C. Harvey, Ventilating Sewers, Drains, Cesspools, &c. - 2,810, J. Waterworth, Improved Ornamental Panel Work. - 2,917, L. Groth, Heating and Disinfecting Apparatus for Urinals or Privies. - 2,933, W. Hayward and W. Eckstein, Gas Covers and Gas Plates. - 3,065, P. Simons, Improved Tile. - 3,130, J. E. and F. B. Ran lie, Improvements in Glazed Structures. - 3,248, D. Sugg, Inverted Gas Burner. - 1,476, W. Walton, Apparatus for obtaining quick and easy Access to the Summits of Tall Chimneys and Shafts, Spires, lofty Buildings, &c. - 3,270, G. Losenkann, Mixing Apparatus for Colours. - 2,773, W. D. and I. Manufacture of Refractory Materials and Bricks. - 2,977, A. Kohlhofer and J. Haller, Construction of Domestic Stoves. - 3,334, J. Humphrys, Automatic Gas Heating Apparatus.

COMPLETE SPECIFICATIONS ACCEPTED.

Open for opposition for two months.
8,372, J. Gill, Chisels and Gouges. - 8,747, A. McLean, Moulds for Moulding Decorative or other Sinks and Bocks. - 9,936, W. Lake, Improvements in Bridges, Piers, and similar Structures. - 2,304, J. Turner, Material for Covering and Decorating Walls, &c. - 2,365, F. Podany, Adjustable Planches for producing Parquet Flooring in various kinds of curving lines. - 2,424, T. D. and I. Improvements in Girders. - 2,457, J. Campbell, Improvements in Ladders or Seps. - 2,492, F. Humpherson, Waste Water Preventer. - 2,562, F. B. Wiles, Stove for Warming and Ventilating. - 2,748, G. Nebeling, Metallic Coverings for Roofs and Walls. - 3,212, E. and A. A-bby, Apparatus for Deodorising the Fumes of Cement and other Kilns. - 3,214, G. Cornelius, Improved Churn. - 2,638, P. Heidt-wick, Appliance for using a Closing Cooking Range as an open Fire. - 2,687, J. A. and J. Hopkinson, Hot-Water Apparatus.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MARCH 18.
By HARDS, VAUGHAN, & JEMINSON.
Greenwich - 44, Ashburham-grove, 84 years, ground-rent 5s. £375
Nos. 1 and 2, High Bridge, and 1 to 4, Crown-court, 74 years, ground-rent 15s. 295
By W. HULCOMBE.
Stockwell - 268, South Lambeth-road, 31 years, ground-rent 11s. 615
By L. FAIRBairn.
Kensish Town - 73, Wedington-road, 72 years, ground-rent 7s. 390
By J. K. COLMAN.
Stepney - 316 to 324 ave, Gtord-street, 62 years, ground-rent 20s. 1,680
By E. E. CROUCHER & Co.
Elstree - Two enclosures of freehold land, 11s. 3s. 3p. 1,940
Thatched cottage farm, 39a, 1s. 21s., freehold, 2,690
MARCH 24.
By G. GOULDING, SOV, & Co.
Belgrave-square - 17, Chesham-street, 38 years, ground-rent 30s. 4,300
Regent-street - No. 201, term 34 years, ground-rent 6s. 1,830
No. 273, 37 years, ground-rent 63s. 2s. 1,410
Maylebone-road - 27, Nottingham-place, 6 years, ground-rent 13s. 450
By DEVENHAM, TOWNSON, PALMER, & BROADWATER.
St. Giles's, Queen-street - Ground-rent of 67l. 10s. a year, reversion in 78 years. 1,400
By A. WALTON.
Hammersmith - 3 and 5, St. Peter's-grove, 41 years, ground-rent 6s. 375
No. 7 to 13 odd, St. Peter's-grove, 41 years, ground-rent 6s. 720
Forest-gate - 112, Sebert-road, freehold 415
By F. JOY & Co.
Pinlipo - 11 to 14, Gregory-street, 36 years, ground-rent 16s. 740
Gray's Inn-road - 49, Acton street, 53 years, ground-rent 6s. 505
Homerton - 82 and 84, High-street, 60 years, ground-rent 12s. 600
Islington - 1 5, 1 7, and 109, St. Peter's-street, 60 years, ground-rent 6s. 845
Hoxton - 385, Hemsworth street, 43 years, ground-rent 5s. 320
By A. VAYSON.
Portland-place - 20, Devonshire-place, 3 years at 42l., and 32 years at 15 l. a year. 3,000
Oxford street - A profit rent of 200 l. a year, term 18 years. 1,950
Regent's Park - 19, Primrose Hill-road, 80 years, ground-rent 7l. 2,000
Kilburn - 2, 4 to 19 even, and 5, Garding-road, 84 years, ground-rent 46s. 3,580
Nos. 12, 14, and 16, Gallings-road, 97 years, ground-rent 24s. 1,090
By WONSFOLD & RAYBURN.
Dover - 3, Chalon-crescent, 34 years, ground-rent 10s. 1,060
No. 9, Norman-street, leasehold. 325
Buckland, 204, London-road, freehold. 945
Buckland, 202, London-road, freehold. 320
Buckland, two plots of freehold land. 175
Nos. 22 and 23, Waterloo-crescent, 50 years, ground-rent 24s. 3,025
Nos. 3 and 9, Esplanade, 33 years, ground-rent, 2l. 9s. 6d. 1,045

MARCH 25.

By J. BARR & WINTERTON.
Camberwell - Ground-rents of 1,925, 15s. a year, reversion in 77 years. £8,400
Kennington - Ground-rents of 57l. 8s. a year, reversion in 38 years. 1,430
Ground-rents of 25s. a year, reversion in 38 years. 1,060
Ground-rents of 15s. a year, reversion in 39 years. 490
Ground-rents of 26s. a year, reversion in 4 years. 860
Shepherd's-bush - Improved ground-rents of 89s. a year, term 78 years. 1,920
Paddington - Improved ground-rents of 17s. a year, term 78 years. 3,430

MARCH 26.

By A. FAIRBairn.
Croydon - 4 to 11, Bridge-terrace, 1 to 5, Colehill-terrace, and "Bridge House," freehold. 3,040
By A. YOUNG.
Shepherd's-bush, Malpas-road - A plot of freehold land. 760
Southgate, Avenue-road - The freehold residence, "Chase Bank." 1,350
By WOODS & SIBLING.
Stepney - 13, Devonport-street, 67 years, ground-rent 2s. 430
Chelsea - 31, Gertrude street, 75 years, ground-rent 6s. 415
By BRAN, BURNETT, & ELDREDGE.
Battersea - 6, Northwick-road, and 19 to 24 odd, Abyssinia-road, freehold. 2,240
Shortlands, Beckenham-grove - The freehold residence, "Fairlie." 1,825
By NEWSON & HANCOCK.
Islington - 13, Morten-road; and 1 to 8, Lindsay-cottage, 55 years, ground-rent 50s. 300
Linehouse - 76 and 28, Roper-makers'-Bells, freehold. 330
Hoxton - 20 and 21, Pars-street, 24 years, ground-rent 10s. 1 s. 6d. 510
Nos. 41 and 45, Shaftesbury-street, 18 years, ground-rent 8s. 280
Nos. 108 and 116, St. John's-road, 25 years, ground-rent 14s. 725
Sydenham - 31, Kent House-road, 62 years, 10s. 90
By E. STRIMON.
Peckham - 6, Maria-terrace, freehold. 300
Ground-rents of 48s. a year, term 78 years. 820
Gd Ford - Ground-rents of 30s. 2s. a year, term 78 years. 430
Brixton - 51 and 53, Bishop's-road, 73 years, ground-rent 8s. 10s. 505
Hackney - 5 and 6, Queen Caroline-place, 32 years, ground-rent 4s. 250
Islington - 41, Ellington-street, 47 years, ground-rent 8s. 410
Camberwell - 1 to 7, Rust-square, 73 years, ground-rent 44s. 2s. 2,170
New Cross - 13 and 15, Somerville-road; and a ground-rent of 34l. 10s. a year, 65 years, ground-rent 10s. 1 s. 580
By C. C. & T. MOORE.
St. George's-in-the-East - 355, Cabot-street; and 1 and 2, Cowley-street, 29 years, ground-rent 1 l. 4. 605
Hackney - 89 and 91, Weymouth-terrace, 29 years, ground-rent 3s. 10s. 410

MARCH 27.

By BLAIR, HADDOCK, & CARPENTER.
Mitcham, High-street - The King's Arms, and 2, High-street, freehold. 1,500
Freehold house adjoining. 830
Greenhill, Harrow - Freehold land, 17s. 3s. 6p. 1,170
Epsom, Pitt-place - Freehold land, 1s. 2s. 3sp. 1,000
Marylebone-road - 118, term 35 years, ground-rent 3s. 630
By R. BAIRN.
Piccadilly - 12, term 33 years, ground-rent 56l. 3s., land-tax 4s. 10s. 3,810
King-st-on-Thames - House and shop, 77 years, ground-rent 2s. 1,110
Camden-square - 28, South-villias, 78 years, ground-rent 1s. 690
No. 27, North-villias, 78 years, ground-rent 11s. 640
Tufnell Park - 15 and 17, Anson-road, 81 years, ground-rent 12s. 14s. 870
By RUSHWORTH & STEVENS.
Islington - 357, Liverpool-st, 24 years, ground-rent 2s. 310
Camden-road - 5, Wellington-street, 26 years, ground-rent 4s. 275
Dorset-square - 6 and 7, Little Park-street, 18 years, ground-rent 10s. 240

MARCH 27.

By FRANK LEWIS & Co.
Pinlipo, Ponsoby-pace - The lease of the Ponsoby Arms. 450
Regency-street - The lease of the Star Beer-house. 350
Peckham - 27 to 37 odd, Asylum-road, 24 years, ground-rent 18s. 670

MARCH 27.

By FRANK LEWIS & Co.
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Regency-street - The lease of the Star Beer-house. 350
Peckham - 27 to 37 odd, Asylum-road, 24 years, ground-rent 18s. 670

MEETINGS.

SATURDAY, APRIL 4.
Edinburgh Architectural Association. - Visit to Rosslyn Castle and Chapel.
MONDAY, APRIL 6.
Leeds and Yorkshire Architectural Society. - Election of Officers and Presentation of Report and Balance Sheet.
Edinburgh Architectural Association. - Mr. D. Purves on "House Drainage and the Sanitary Arrangements Connected therewith." 8.30 p.m.
Inventors' Institute. - 8 p.m.
TUESDAY, APRIL 7.
Northern Architectural Association (Newcastle-on-Tyne). - Quarterly Meeting.
WEDNESDAY, APRIL 8.
Civil and Mechanical Engineers' Society. - Mr. David Gravell on "The Markets of the Metropolis." 7.30 p.m.
THURSDAY, APRIL 9.
Architectural Association. - Members' Soiree. 7.30 p.m.
FRIDAY, APRIL 10.
Institution of Civil Engineers (Students' Meeting). - "On advances for Crushing Stone and other Hard Materials." 7.30 p.m.
SATURDAY, APRIL 11.
Architectural Association. - Visit to the Northumberland Avenue Hotel. 3 p.m.

Miscellanea.

The Farringdon Vegetable Market.—The *City Press* states that the Markets Committee have recently viewed the site of the fruit and vegetable market in Farringdon-street. It is proposed either to re-model the market, or to entirely re-build it. One thing is certain, the time has arrived when something must be done. The general opinion of those connected with the market is, that nothing short of an entire new building will be of any permanent service. Those who know the dilapidated and forlorn condition of the buildings will be disposed to coincide in this opinion. We notice that Mr. Thomas Rudkin, who is especially conversant with the requirements of the City in regard to market accommodation, proposes that the whole of the area available for market purposes should be excavated to 20 ft. below the level of Farringdon-street; that the basement should be so constructed as to be adaptable for stabling for at least 200 horses,—a requirement much needed by market-gardeners and others bringing their produce to the market; and the remainder to be used as stores for the tenants. The entrance to the basement would be (according to Mr. Rudkin) from Farringdon-street. The market itself would be on a level with Farringdon-street, and would be, practically, the same shape, and its carriage entrances and exits in the same form, shape, and position, as the new Central Fish Market, Farringdon-road. The whole of the market area could be covered with a light iron and glass roof. Wagons and other vehicles would be able to pass in and out of the market at either of the three entrances, namely, Soucenier-street, the present entrance in Farringdon-street, and at a third entrance to be provided. In addition to this, Mr. Rudkin thinks that the market scheme should, in the interest of the public, as also in that of the Corporation, as handloras, be supplemented by constructing on three sides of the site, over the market, viz., the south, north, and east, a range of buildings as dwellings for the working classes, and on the western, or Shoe-lane side, a row of shops or warehouses. This part of the scheme would, of course, be distinct from the expenditure on or construction of the market.

Water Supply in the West of England. Mr. Arnold Taylor, Local Government Board inspector, has been holding an inquiry at Tiverton Town Hall with reference to the application of the Council for sanction to borrow £2,000, to enable them to carry out the scheme prepared by Mr. Robert Ellis, water bailiff, for improving the water supply of the town. Mr. Ellis described his plan, explaining that it was proposed to construct new works near the site of the present, on a piece of ground named "Allers Copse," belonging to Sir John Heathcote-Amory, Bart., and situated about two miles and a half from the town. The supply would be taken from the main stream at a point just under How Farm, and about 400 yards above the settling-tanks. Filtering beds would be provided, and he proposed to utilise the present works as a service reservoir.—We learn that Torquay, Newton Abbot, St. Mary Church, and Cockington are just now in an exceedingly satisfactory condition as regards their water supply. The new reservoir constructed by the Torquay Local Board, at a cost of about 30,000*l.*, is now filled to a height of 24 ft. 6 in., and contains 120 million gallons. The old reservoir, a short distance below, is quite full, and holds 103 million gallons, so that at the present moment there is an available supply of water stored in the two reservoirs of no less than 223 million gallons. It is anticipated that the new reservoir will be quite full in six weeks, and that soon after that time the deferred celebration of its construction will in all probability be held. The work of duplicating another section of the water main, at a cost of 5,000*l.*, is now so far laid and in working order by the middle of April. This further extension of the mains will increase the supply by 200,000 gallons a day, making the total daily supply 1,200,000 gallons, which is equal to about 30 gallons per head of the population.

Partnership.—Mr. Henry H. Leonard, Quantity Surveyor, of 202, Bishopsgate-street, Without, announces that he has from Lady-day taken Mr. Stanley Clarke into partnership, and that the style of the firm will be "Leonard & Clarke."

York Architectural Association.—At the fifth meeting of this Association for the present session, Mr. R. A. Parkin, of York, gave a lecture on "Building Construction," in the course of which he referred to the varying solidity of the earth which formed the foundation for the building, and showed how to overcome inequalities in the foundations. Referring to the construction of walls, he remarked that brickwork could never be crushed by fair means. If the foundation was good, and the areas were all gone into, it was almost impossible to build a building high enough to crush brickwork. There were three classes of walls,—the massive, the substantial (3 ft. to 4 ft. thick), and the walls built to the precision required by the science of to-day. He would only deal with the third class of walls, as the other two were wasteful. A straight wall would give way at the bottom, a wall arched at one end and supported at one end would turn and fall inwards, while a wall with a binding piece at each end would have the greatest pressure in the centre. While speaking of the thickness of walls, he remarked that the scientific construction of the walls was never considered at all by some people building them; they generally built them thick enough to stand, and, of course, the builder had to pay the cost.

An Auger to Bore a Square Hole.—An American paper states that the first and only auger ever manufactured that will bore a square hole is now in the shops of the Cleveland Machine Company. This auger bores a 2-in. square hole, the size used in ordinary frame buildings and barns, but it can be made on the same principle to bore square holes any size. Its application is the ordinary one, and it works on the same principle as round-hole augers. Its end, instead of having a screw or bit, has a cam motion which oscillates a cutter mounted on a steel rocking-knife which cuts on both sides. In order to prevent the splintering of the wood, the ends of the cutter are provided with small semi-circular shaped saws, which help in cutting out perfectly square corners. It is estimated that this new process will save the labour of three men who work with chisels, as one man can conveniently cut a 2-in. hole in the same length of time he can bore a round hole.—*Iron.*

The Preservation of the Thames.—On Tuesday a Bill prepared by the members of the Committee who took evidence as to the "operation of the Acts for the preservation of the Thames, and the steps necessary to secure the enjoyment of the river as a place of recreation," was issued. The object of the Bill is to preserve the Thames above Teddington Lock for purposes of public recreation, and for regulating the pleasure traffic thereon. It asserts a public right of navigation, but private artificial cuts are not to be deemed parts of the river. The Conservators may exclude the public. The right of navigation is to include anchoring and mooring, and the riparian owner is to remove obstructions unless maintained for twenty years. There is a provision for preventing annoyance to riparian owners, and also against shooting or the use of firearms on the river. All pleasure-boats are to be registered. Jurisdiction for offences against the Act will be exercised by the Justices.

Spring-bank Presbyterian Church, Hull. This church, which has been closed for alterations about two months, was re-opened on Sunday last. The works have been carried out under the superintendence of Mr. Samuel Musgrave, architect, Hull. To remedy acoustic defects, Mr. Musgrave recommended the formation of a false roof, commencing a few feet above the wall-plates, and formed into panels, and boarded with narrow boarding; also the erection of a semicircular platform behind, on which an organ might be advantageously placed. These recommendations have now been faithfully carried out.

Furness Abbey.—A provincial paper states that the ruins of Furness Abbey were recently in danger of suffering severe damage through the running of heavy mineral trains on the Furness Railway, which skirts the ruins. To avert the danger the Duke of Devonshire, on whose North Lonsdale estate the remains of the abbey are situated, has had the walls of the north transept, the refectory, chancel, and sacristy supported and strengthened by means of strong stays and tie-rods, and the ruins are now believed capable of resisting the vibration caused by the trains.

The Proposed Woolwich Steam Ferry. The Secretary of State for War has informed the Woolwich Local Board of Health that he has recommended to her Majesty's Treasury the proposal of the Metropolitan Board of Works to provide a steam ferry at Woolwich, a scheme which ought to receive the support of the Government. To say nothing of the convenience, the advantages of the steam ferry to the garrison and military stores at Woolwich in the facilities which it will afford for communication with the docks and railway on the opposite side of the Thames are very considerable. The mounted troops and vessels which have hitherto had a march of eight miles from Woolwich, by way of Lambeth Bridge, to the Albert Docks, will, when the ferry is at work, have a journey of less than five miles.

The Painters' Company.—Mr. G. N. Smith has presented a headle's solid staff to the staff of the company's arms, enamel, proper heraldic colours, supported by leopards rampant, above which is the crest of the company; and surmounting the whole the figure of St. Luke, the patron saint of the company. Round the ferrule at the top of the staff is the following inscription:—"This was presented to the Painters' Company, George Mence Smith, A.D. 1855. John Di Crace (master)." This staff was designed by Mr. J. G. Crace, and manufactured by Mr. G. Edward & Sons, 1, Poultry. The staff was presented at a banquet given on Wednesday evening last, at the Hall of the Company, 1, Trinity-lane.

Val de Travers Asphaltic Paving Company.—The fifteenth ordinary general meeting of this company was held on the 25th ult. H. C. Scott presiding. In their report the directors recommended a dividend of 7*½* per share, making, with the interim payment of 12*½* 6d. for the year, and the carrying forward of 2,061*l.* 10*½* 3d. to the next account. The Chairman moved the adoption of the report, and in doing so said there had been a considerable improvement on the previous year, and the directors were able to pay an increased dividend. The gross profit of the year was 16,886*l.* 8*½* 3d. as against 15,103*l.* 4*½* 2d. in 1887, the increase having been gained at the same rate of expenditure. Mr. James Edmeston seconded the motion, the report was adopted.

Proposed Extension of Aske's, Hatch School.—In connexion with these schools, which the Haberdashers' Company, the governors, it has been provisionally agreed, the managers shall be empowered to borrow a sum not exceeding 25,000*l.*, to be gradually repaid out of income, with a view to the buildings, at present used as a girls' school, for the purposes of a lower department of boys' school, and to purchase land upon which to erect commodious new buildings in which to educate the girls. Upon the completion of enlargement of the schools there will be accommodation for 500 boys and 400 girls, instead of 300 and 200 respectively under existing conditions.

Salford.—The trustees of the Manchester and Salford Savings Bank have purchased as the chief thoroughfare of Salford, where they have hitherto rented premises. The design for the new bank have been prepared by Messrs. Medland & Henry Taylor, architects, and the work has been let to Mr. Thomas S. The architectural character of the proposed work is Italian. The chief front will be built in Ruahon red bricks, with dressings of stone and terra cotta. The interior of the bank proper will be of Cliff's glazed bricks. Beside the bank there is to be extensive cellaring, much of it fireproof,—and five good rooms, fronting the main street.

Obituary.—The death is announced of Henry C. Harris, A.R.I.B.A., which took place after a painful and protracted illness, at residence, "Kingscote," Penarth, on the 1st ult. The deceased was in this thirty-fourth year. He designed and carried out several buildings in Cardiff, Penarth, Bridgend, Maestry, Pontypridd, and other places, most of which were won in open competition. At Penarth he held the office of Surveyor to the Board of Health from its commencement.

Winchester Cathedral.—At a meeting of the Dean and Chapter of Winchester last week Mr. Sadding was appointed the architect for the restoration of the great screen in Winchester Cathedral.

broath.—A four-light Munich stained-glass window has just been erected in St. Mary's Church, Abchurch, the gift of Mr. and Mrs. of Abbey Bank. It occupies the west of the church, and consists of four lights elaborate tracery. The leading features of the window are large-sized figures of St. Paul, Peter, St. Andrew, and St. John, while each apostle is a small subject description of a scene in his life. The artists are Messrs. Mayor & Co.

ventilation at the Law Courts.—It is a difficult task to please every one, and the question of ventilation appealing to various capabilities is rendered none the less easy to the occupants of a room are removed from time to time, as is the case at the New Courts, where much remonstrance has lately been occasioned by more than one.

It appears that the ideas in the judicial as to what constitutes a pleasant temporary some ten degrees, and the officials of the Office of Works, who have charge of the ventilating arrangements, are frequently called to short notice to raise or lower the temperature accordingly. The rule adopted regulating the work is to know in the winter which (particular!) judge will sit on such a court on the following day, and to arrange the necessary alterations to suit, but as the judges change during the day, a further alteration has to be made, and the individual dissatisfaction is a nineteen cents to be thus attended to the rapid displacement of air is expected brought about without draught or inconvenience, and accordingly the principle of the system is condemned, one judge going so far as to enjoin that the apertures should be kept up, in the hope that it would disturb the entire scheme, and that no attempt should be made to ventilate his court at all. This is an unfair tax upon science, or rather a hopeless attempt to make natural

canases immediately subservient to several conditions at one time.—Sanitary Record.

Excavations in the Roman Forum.—A telegram to the Times, dated Rome, March 31, announces that a very important discovery has been made in connexion with the topography of the Forum. In dressing and carrying back as far as possible the escarpment of the accumulation on the unexcavated portion of the north-east side, on which stands, between the Temple of Antoninus and Faustina and the Church of St. Adriano, that row of modern buildings which is ultimately to be removed for the completion of the excavations, a part of the pavement of the ancient street connecting the Forum with the Subura has been uncovered. It lies at a level of some 18 in. below the flagged area of the Forum, which, it must be remembered, is that of the seventh century at the earliest. The street extends along the south-east side of that part of the Curia which is now the Church of S. Adriano. The pavement is in a fine state of preservation, and on one side of the street stands a large pedestal, probably of a statue dedicated, as the inscription shows, to the Emperor Constantinus the Second by Memmius Vitrasius Orfitus, who was Prefectus Urbis from 355 to 359. The point at which the end of this street touches the area of the Forum is still covered with debris and an extraordinary quantity of masses of marble, such as pedestals of columns, pieces of cornice, and other fragments, found lying heaped upon one another beneath the accumulation removed on the carrying back of the escarpment some 10 ft. or 12 ft.

London Bridge.—The Comptroller of the Bridge-house Estates announces that, on and after Monday, the 13th inst., London Bridge will be partially closed for the purpose of repaving. During the execution of the work provision will be made for keeping open two lines of traffic, one leading to the City and the other to Southwark.

For the completion of five houses at Orford-road, Wallington, Surrey. Mr. Thomas Spearling, surveyor. Beconsfield-terrace, St. John's-road, Clapham-junction.—

H. Brown, Wandsworth	2,265 0 0
Wm. Ellis, Clapham	859 0 0
J. Dickeson, Battersea	875 0 0
A. H. Harris, Sutton	849 0 0
G. Collis, Wandsworth	775 0 0
F. Warr, Croydon	683 0 0
J. Myring, Wandsworth	600 0 0
J. Stapleton, Wandsworth	589 10 0
Chas. Matkin, Kennington	582 0 0
Horns, Penn, & Co., Guildford	567 0 0
Cousins & Co., Camberwell	537 11 0

For two shops, dwelling-houses, and outbuildings, at Crossbrook-street, Chesham.—

Sanders	£1,631 0 0
White	1,365 0 0
Banco	1,460 0 0
Archer	1,455 0 0
Hart	1,332 0 0
Lawrence	1,331 0 0
Hoswell (street accepted)	1,235 1 0
Holding	1,010 0 0

For erection of two houses at Gray's Inn-road. Mr. W. Ansell, architect.—

Patman & Fotheringham	£3,352 0 0
Wm. Brass & Son	3,238 0 0
J. Anley	3,200 0 0
Lawrence & Son	3,228 0 0
Macey & Son	3,131 0 0
Spryner & Co.	3,109 0 0
Wm. Downs	3,037 0 0
W. Shurmur	2,988 0 0
S. Godden	2,988 0 0

Accepted for works at Bermondsey, for Mr. Davies. Mr. H. G. Bailey, surveyor.—

Bulford, Kingsland	£180 0 0
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[No competition.]

For stabling, &c., situated at Hurlingham-lane, Fulham, for the London General Omnibus Company, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. Bolton.—

Jackson & Todd	£1,100 0 0
Haynes	1,025 0 0
Hickens & Mount	965 0 0
Aldridge & Jenvey	965 0 0
Garrud	951 17 0
Evans	939 0 0
Howell & Son	937 0 0
Parker	935 0 0
Knight	912 0 0
Hunt (accepted)	885 0 0
Deering & Son	871 9 0

For new stables, abed, and alterations to Gateway House, situated at Estcourt-road, Fulham, for the London General Omnibus Company, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. Bolton.—

	Stables.			Houses.			Totals.
	£	s.	d.	£	s.	d.	
Hack	1,093 0 0	205 0 0	1,298 0 0				
Jackson & Todd	975 0 0	183 0 0	1,158 0 0				
North Bros.	997 0 0	155 0 0	1,152 0 0				
Evans	954 0 0	144 0 0	1,098 0 0				
Richens & Mount	932 0 0	153 0 0	1,085 0 0				
Garrud	879 15 6	197 17 0	1,077 12 6				
Hunt	896 0 0	177 0 0	1,073 0 0				
Haynes	970 0 0	103 0 0	1,070 0 0				
Howell & Son	890 0 0	175 0 0	1,065 0 0				
Parker	888 0 0	138 0 0	1,026 0 0				
Knight	870 0 0	154 0 0	1,024 0 0				
Deering & Son	814 0 0	158 10 0	972 10 0				
Aldridge & Jenvey	815 0 0	118 5 0	933 5 0				

For partially rebuilding No. 204, Upper-street, Islington. Mr. Richard J. Lovell, architect. Quantities by Mr. O. Stanger.—

Colls	£732 0 0
Greenwood	670 16 0
L. H. & H. Roberts	645 0 0
Crover	620 0 0
Dove Bros.	611 10 0
Combes & Son	569 0 0

For the erection of new Board Schools at Claygate, Surrey, for the Thames Ditton School Board. Mr. Richard J. Lovell, architect, 63, Finsbury-pavement. Quantities by Mr. James Keenlydy, Guildford-street.—

Martin, Addlestone, Surrey	£4,810 0 0
Home, Clapton	4,646 0 0
Oldridge, Northon, Surrey	4,441 0 0
Clark, Esher	4,418 12 6
Staines & Son, London	4,376 0 0
Woodbridge, Maidenhead	4,300 0 0
Parker, Fitcham	4,290 0 0
Croaker, Borough	4,170 0 0
Jarvis, Surbiton-hill	4,065 0 0
Holt, Croydon	4,010 0 0
Holloway, Lavender-hill	3,999 0 0
Bonell, Teddington	3,975 0 0
Carlson, Richmond	3,967 0 0
E. Peters, Harsham	3,859 0 0
Stephenson, Hampton	3,857 0 0
Wells, Kingston-on-Thames	3,850 0 0
Wheatley, East Moulsey	3,849 10 0
London, Upper Tooting	3,839 0 0
Collinson, Teddington	3,795 0 0
Hann & Co., Windsor	3,789 0 0
J. Piller, Taddington	3,579 0 0
E. Peters, jun., Otlands Park	3,578 10 0
Babbs Bros., Surbiton-hill	3,490 0 0

For the erection of two villa residences at Hadley-road, Barret. Mr. H. F. Brown, architect.—

Daniels, Barnet	£1,368 14 6
Knight & Son, Tottenham	1,148 0 0
Reed, Walthamstow	940 0 0

CONTRACTS AND PUBLIC APPOINTMENTS.

Extrane of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
aving, &c.	Vestry Mile End	J. M. Knight	April 7th	xix.
g Sewers Work	do.	do.	do.	xix.
in of Shops, Hastings	do.	A. Wills	April 9th	ii.
sh (Navy Contracts)	Admiralty	Official	April 10th, &c.	ii.
on of Engine-Houses, &c.	Atherstone Rural Sanitary Authority	Baldwin Latham, M.Inst.C.E.	April 11th	ii.
on Pipes, &c.	Lowestoft Imp. Com.	R. H. Inch.	do.	ii.
te and Pavement	Met. Board of Works	Official	April 13th	ii.
al of Human Remains, &c.	S.W. Sub. Works Co.	Official	do.	ii.
up and Sewing, Factory road	West Ham Local Bd.	Lewis Angell	April 14th	xix.
oots	do.	do.	do.	xix.
rup and Paving Roadways, &c.	Willesden Local Board	O. Claude Robson	do.	ii.
g, Engines, and Sludge Presses	do.	do.	do.	ii.
and Sewers, Chatto's Estate, Clapham	do.	do.	do.	ii.
mon	do.	W. N. Dunn	do.	ii.
on of Public Mortuary	Vestry of St. Giles, Camberwell	Official	April 15th	ii.
ions, Huddersfield County Court	Com. of H.M. Works	do.	do.	ii.
on of Water-Closets, Lavatories, &c.	Grdu. St. Olive's U.P. Compton Gifford Lcl. B.	H. Saxon Small & Son	April 16th	ii.
Drainage Works	Birmingham Public Works Committee	Official	do.	xix.
orks to Parish Church, Eastington	The Committee	W. S. TH	April 20th	xix.
urch, London, Lancashire	do.	Waller, Son, & Wood.	April 22nd	xix.
u, &c., of Small Houses	do.	J. E. K. Cuts	Not stated	ii.
on of Corn Exchange	Abingdon Corporation	E. S. & H. Boyer	do.	ii.
do.	do.	Chas. Bell	do.	ii.

* Time for receiving Tenders has been altered from THREE p.m. to TEN a.m.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
ant. Borough Surveyor's Office	Reading Corporation	Not stated	April 14th	xvi.
of Works	Wallington (Somerset) L.B.	do.	April 21st	xvi.

TENDERS.

sewage on all works at Silvertown, Essex, for the San Local Board. Mr. Lewis Angell, C.E., engineer. Quantities by Messrs. R. L. Curtis & Son.—

Greenwood & Co.	£14,314 0 0
Greenwood	13,590 0 0
J. Bottrell	12,958 0 0
andry & Son	12,675 0 0
owlem & Co.	12,485 0 0
Bell	12,280 0 0
Grogar	11,976 0 0
Webster	11,924 0 0
J. Robson	11,395 0 0
Adams	10,988 0 0
W. G. G. & Co.	10,859 0 0
Chafen	10,958 0 0
Cooke & Co., Phoenix Wharf, Church-road, Battersea	10,464 0 0

For additions to the Trossachs public-house, with two shops adjoining, in the Barking-road, for Mr. G. W. Kidd. Mr. G. More, architect. Quantities by Messrs. Curtis & Son.—

	Main Building.	Repairs.	Old Materials.
Nye	£3,314	2194	255
Greep	3,137	22	33
Hewitt	3,023	198	19
Morter	3,075	230	30
Lambie	2,858	163	50
Jackson & Todd*	2,709	175	25

* Accepted.

For works at High-street, Epping, for Mr. Harrison. Mr. E. Boyce, surveyor.—

Davis, Epping	£173 10 0
Palmer Bros. & Wiffin, Epping	143 17 0
G. Bulford, Kingsland	139 16 0

For new business premises at 23, Bermondsey New-road.

Caring & Mullins	£2,317 0 0
Lidstone & Son	2,080 0 0
Shepherd	1,850 0 0
Batley	1,549 0 0

For repairs at the Licensed Victuallers' Asylum, Asylum-road, Old Kent-road. Mr. W. F. Potter, architect.

R. Maskell, Hoxton	£302 10 0
E. F. Waleby, Hoxton	254 0 0
W. Buckle, Stratford	240 0 0
B. Cook, Stonecutter-street	188 0 0
S. Hayworth & Sons, Kingsland	175 0 0
C. Dearing & Son, Islington	167 0 0
F. & C. Hersee, Peckham	154 0 0
W. Wythe, Dalston (accepted)	115 0 0

Accepted for the third section of the Colne Valley sewer, for the Birmingham Town Council:—

Bottoms Bros., Battersea	£5,327 0 0
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Accepted for a pair of houses, Brunswick-road, Sutton, Surrey. Mr. Herbert D. Appleton, architect, Wool Exchange, E.C. 1.

W. Robinson	£1,085 0 0
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For the erection of Turkish baths, Earl's Court-gardens, Earl's-court, London, for Mrs. Thomas. Messrs. T. L. Banks & Townsend, architects. Quantities by Mr. J. Sargeant:—

T. Richards	£1,364 0 0
Lucas & Son	1,934 0 0
J. Beale & Son	1,632 0 0
C. Mason	993 0 0
H. Smith & Son	979 0 0
Turtle & Appleton	885 0 0
A. Doughty	934 0 0
W. H. Smith	925 0 0

For building first section of Cowleigh Schools, near Maitern. Mr. Henry Hadson, architect:—

Thomas Broad	£915 0 0
William Porter	911 0 0
John Everal	891 19 0
John Inwood (accepted)	870 0 0

[All of Maitern.]

For erecting business premises, Nos. 8, 9, 10, 11, and 12, Lovell's-court, Paternoster-row. Mr. W. H. Scrymgeour, architect, 54, Lincoln's Inn-fields:—

W. Shepherd	£2,844 0 0
Turtle & Appleton	6,750 0 0
Barrie Bros.	6,697 0 0
Nightingale	6,683 0 0
Anley	6,550 0 0

For new offices and additions to factory at Vauxhall, for Messrs. Barrett & Co. (Limited). Contract No. 3. Mr. Edward Rawlings, architect, 3, Victoria-street, Westminster. Quantities by Mr. Morris Evans, 7, John-street, Adelphi:—

C. Dickinson, Loughboro'-junction	£970 0 0
Fish, Prestige, & Co., Pimlico	795 0 0
H. & E. Lee, Warwick-street	780 0 0
G. Stephenson, Hampstead	774 0 0
F. Higgs, Loughboro'-junction	723 0 0

For new schools, class-rooms, and other buildings adjoining Congregational Church, Leytonstone, Essex. Mr. James Cobby, architect:—

Egan	£2,886 0 0
Dobson	2,748 0 0
Cook	2,451 0 0
Johnson	2,430 0 0
Moster	2,377 0 0
Reed	2,332 0 0
Great	2,231 0 0
J. Cadley (accepted)	2,246 0 0

For erection of additional vestry, &c., at Christ's Church, Enfield. Mr. W. D. Church, architect:—

Fatman	£1,319 0 0
Thompson	1,245 0 0
Steel Bros.	1,169 0 0
Richardson	1,109 0 0
W. Shurmer	1,188 0 0
Staines & Son	1,168 0 0
Fairhead	1,079 0 0
Mills	1,067 0 0
Tinson	968 0 0

For the erection of a vicarage-house at Woldstone Harrow, Middlesex. Mr. H. Roumeau Gough, architect, No. 12, Carlton-chambers, Regent-street. Quantities by Mr. Charles H. Gough:—

G. Kirby & Co.	£2,219 0 0
S. Odell & Lett	2,127 16 10
J. Brown, Son, & Blomfield	2,050 0 0
J. Larter	1,970 0 0
Gregory & Bence	1,960 0 0
C. F. Mills	1,793 0 0
Chamberlain Bros.	1,793 0 0
J. Lister	1,765 0 0
D. Bellam & Co.	1,883 0 0
Thos. Westnor Smith & Son	1,670 0 0

For the erection of a cottage, Mersea-road, Colchester, for Mr. R. Salmon. Mr. G. H. Page, architect, Colchester:—

Eade	£168 0 0
Harden	167 10 0
Ambross	164 0 0
Howies	149 18 6
Chambers	139 0 0
Pitt	147 0 0
Gladwell (accepted)	137 0 0

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J. E. (Stuttard).—J. F. (Madrill).—W. S. (shall have attention).—E. F. (Havist).—A. S. G.—M. E.—E. J. E.—W. H. S.—A. C. (we can only discuss the question in general principle; if we were to begin to go into special cases in that way we should get into a complicated correspondence which would not be worth the trouble).—H. D. (cannot go into so old a matter now).—J. L. P. (amounts of tenders must be given).—An Amateur (no name and address given. We entirely agree with the opinion you express, but it would be hopeless to attempt to reopen the matter).—E. K. (too late, so we have to go to press a day earlier than usual this week).—A Surfer (letters cannot be published unless authenticated with name and address).
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The Builder.

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SATURDAY, APRIL 11, 1885.

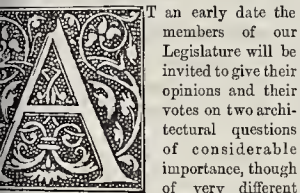
ILLUSTRATIONS.

Portion of the Law Courts Buildings, Brussels.—The Late Herr Poelaert, Architect.....	514-515
The Church of St. Hippolyte at Delft.—Herr P. J. H. Cuyper, Architect.....	518-519
Churches by the Late Mr. M. R. Hadfield, Architect.....	522, 523
Design for a Sea-Side Pavilion: Details of Exterior and of Principal Room. Tite Prize, R.I.B.A.—By Mr. J. A. Campbell.....	526, 527

CONTENTS.

Architectural Problems for Parliament.....	505	Details of the "Tite Prize" Design.....	529	Chelsea Vestry-Hall Competition.....	530
Restoration of the Parthenon at Paris. By Charles Fyfe.....	506	Competitions.....	529	"Street Architecture of London".....	530
Restoration of the Parthenon.....	507	Architectural Societies.....	529	Architects & Corporation.....	531
Restoration of the Parthenon.....	508	Presentation to Mr. Thomas Seward.....	529	Provincial News.....	531
Restoration of the Parthenon.....	509	Rears of Houses.....	530	Church-Building News.....	531
Restoration of the Parthenon.....	510	The Proposed "Gordon" Hospital at Port Said.....	530	Dissenting Church-Building News.....	532
Restoration of the Parthenon.....	511	The Lowest Tender.....	530	Recent Sales of Property.....	532
Restoration of the Parthenon.....	512	Fireproof Floors.....	530	The Student's Column: Descriptive Geometry.—X.....	533
Restoration of the Parthenon.....	512	Collapse of a large-sized Sewer.....	530	Recent Patents.....	534
Restoration of the Parthenon.....	512	Temple Bar.....	530	Meetings.....	534
Restoration of the Parthenon.....	512	Lime-Mortar gauged with Portland Cement.....	530	Miscellaneous.....	534

Architectural Problems for Parliament.



At an early date the members of our Legislature will be invited to give their opinions and their votes on two architectural questions of considerable importance, though of very different nature; the new building for the Admiralty War Offices, and the so-called "restoration" of Westminster Hall. Indeed, the continuation of the first-mentioned subject was raised, or threatened (whichever way honourable members like to take it), for the actual act of re-assembling, on the 9th; but we were in the expectation that no definite decision will have been come to when these matters appear. To a considerable proportion of the House of Commons as at present constituted we fear that such questions are not more than those of pounds, shillings, and pence; at the time when the subject of the present building for the War Offices was first discussed in the House we took occasion to comment * on the mercantile and Philistine spirit displayed apparently gloried in by some honourable members, one of whom did not scruple to express his "horror of artistic buildings and artistic sites." To preach to these gentlemen a course, useless. But among the minority are not so enthusiastic in waving what Wilfrid Lawson once called "the glorious error of peace, retrenchment, and reform" may be some to whom the treatment of a building for an important public service is something more than a mere matter of expenditure; and to such liberal-minded members of the Legislature we would address a few words of exhortation in season.

Our first text in regard to the War Offices is on which we have preached over and over to deaf ears, and on the main point of which it has for some time back been too late to reach. That is, the question of site. A magnificent site for concentration of the whole Government Offices about the Great George-street and Parliament-street neighbourhood at once have been had at no exorbitant rate; it was neglected till it became, or was thought to become, too expensive to purchase as a whole, though in the meantime it had been piecemeal purchases to the extent of making a good deal of money in property which by itself was of no use for any great Government scheme. That is an old story, and we presume it is useless to revive it,

and that the vicinity of Spring-gardens must now be taken as the accepted site for the War and Admiralty Offices. But it is at least possible to avoid making an absolute and deplorable mistake with that site; and yet this will be done unless the Government pause before it is too late, and unless those who have some sense of the value of dignified architectural *emplacement* will exert themselves to stop the vote for the new building until a re-adjustment of the site, and, as far as necessary, of the plan of the building has been obtained.

The particular defect in the manner of arranging the site which we pointed out and protested against from the first lies in the false economy of neglecting to acquire the two banks, Drummond's and Biddulph's, and the buildings between them facing Charing-cross, and sending this portion of the new building skulking behind them, thus throwing away all chance of producing a grand and dignified facade towards Whitehall. The detachment of a small block or wing of the new plan running southward to meet the Horse Guards we do not object to; it offers a means of connecting the new building with the old one; which, however, has hardly been made the most of in the accepted design. But the cutting up of the northern end of the site, in order to leave the two banks and their surroundings intact, is a fatal mistake. We pointed out that it would prove so as soon as the Government plan of the site was published. Non-professional readers, of course, do not always understand or realise what the effect of such a feature in a building site will be until they see the building on it. But the new perspective views of the revised form of the design which have been got out, and which we published last week, seem as if specially prepared to give to the lay mind absolute and obvious proof of the validity of our objection. We know not whether the particular point of view selected for the drawing of the Whitehall front was chosen by the architects themselves, or directed by the Office of Works; but it could not have been more significant if it had been made on purpose to support our views. Copies of these drawings will be in the hands of members of Parliament, and we ask those who will have to vote upon the subject, before they do so, to look at that Whitehall view,—at the mean and incongruous effect produced by the irregular collection of buildings left in the north-east angle of the site, and the new building turned round into their rear, and we ask again, as we asked last week (and we are glad to see that our question has found an echo in the pages of many of our daily contemporaries) "whether that is a worthy way for a great and wealthy nation to carry out a building of the first im-

portance for the palace of its military and naval administration?"

"Great and wealthy." The latter adjective is still true, though one would hardly think it sometimes, to see the cheeseparing way in which we potter about great works of architecture, civil and naval. But is it possible that the first one is ceasing to be applicable to us as a nation? Indifference to great public works, which might be part of the glory of a nation,—which have been regarded as such by nations of the highest intelligence and aspiration,—is a bad sign. "Architecture," said Sir Henry Wotton, in words which have long stood as a text on our title-page, "can never want commendation where there are noble men and noble minds." Is it not a sign that such men and such minds are becoming scarcer and of less influence among us, when we find such an unwillingness to do any good architectural work in a manner worthy of a great nation? In another column we have occasion this week to comment on the noble liberality with which the small kingdom of Belgium has carried out its Palais de Justice, giving to the world a building faulty indeed in detail, but marked by the impress of genius and by the sumptuous liberality which disdains to carry out such work in a paltry and cheeseparing fashion. Surely the contrast ought to shame our authorities (and our tax-payers, whose money they control) out of this paltry, mean, insignificant way of doing things, and suggest to them a more liberal policy than to spoil the largest new public building of the day by an ill-judged economy. We may add that not only will the clearing out of this north-east corner of the site give the opportunity of making a homogeneous whole of the new building, of extending a somewhat cramped plan, and of possibly making a picturesque vista into the Mall, but it will also get rid of one building which is utterly unworthy of a fine position. It is a misery to those who care about seeing fine sites worthily occupied, to notice the commonplace and uninteresting buildings which are being got all round the new sites adjoining Charing Cross; and if Drummond's Bank were disestablished, one minor architectural *fiasco* would be got rid of, at all events.

In regard to the plan of the new buildings, the quadrangle, to the unhealthiness of which objections have been raised, has now been widened, though we are still in the mind that the closed quadrangle form, for a crowded and rather lofty building in London, to be occupied most fully during the hotter part of the year, is a principle of plan bad in itself. It was suggested by the present editor of this journal some time since, in an article in a monthly periodical, that the true sanitary way of em-

* See *Builder*, May 26, 1883, p. 699.

ploying the quadrangle form would be with open angles and partially open bridges of communication, at an angle of 45 deg. with the main blocks; and that such a scheme (which has never been tried) would prove not only good on sanitary grounds, as getting rid of the trenches of stagnant air in the angles of the courts, but susceptible of good and novel architectural effect. We repeat the suggestion as one worth considering. If the property at the north-east corner of the site is acquired, a re-modelling of the plan would be necessary as well as desirable. Whether any re-modelling of the design can be carried out is also "a question to be asked." It is useless to pretend that many persons who understand what architecture means are satisfied with it. In the main that cannot be helped now. We have, indeed, been urged, from various quarters, to press the suggestion that the whole competition should be re-opened. We have always declined to counsel any such course, for the simple reason that, after all, morality is above art, and no architectural improvement would in our eyes atone for what would amount to nothing less than a breach of faith. But it is impossible to shut one's eyes to the fact that the result of the judgment of a small and heterogeneous committee, apparently proceeding on a preconceived idea of plan, has been to cull out for us a design which is respectable no doubt, but (save in draughtsmanship) nothing more; and in some points, at variance with what among the most educated class of minds are now almost self-evident propositions in regard to architectural truthfulness and significance. We need only point to that illogical array of columns which mount guard along great part of the Park Front of the design; useless masses carrying nothing whatever, taken out of books and planted there as architectural scenery. The Romans did this sort of planted-on column business at each side of their triumphal arches, and it is illogical and unmeaning enough there, though those were essentially show constructions, but it is much more unmeaning to see it continued along a whole range of wall between the windows of offices, because the authors wanted something there and did not know what else to put. We do not mean to be unkind, but that is the plain English of the matter; and what is the use of Ruskin having preached architectural truth for a lifetime among us, if such a sham as this is to be put up in our largest new building? That little matter will bear consideration, at all events. The cost of that bit of scenery would form a handsome subscription towards purchasing the property in the north-east angle. And why are we to have those eternal unmeaning vases along the balustrade,—a worn-out piece of *rococo* which ought to have been buried long ago? We do not care to continue the list; but let us at least have one shot at those preposterous pots,—“a long shot, Sir Lucius, if you love us.”

The other matter referred to, that of Westminster Hall, is in some respects a less important architectural question, but also a more difficult one to come to a decision about, more especially as we have no doubt a great deal of dust will be blown in the eyes of the House when the subject comes to be discussed; not intentionally, but inevitable archaeological and sentimental dust. Now we wish briefly to put to those who may vote on the subject what the matter really amounts to. The removal of the old Law Courts laid bare the west wall of Westminster Hall and the buttresses: the latter very much decayed, and in very bad condition. The wall was found to contain portions of Norman masonry,—merely masonry, nothing to call architecture. On historical grounds no old masonry, bearing the marks of the hand of the ancient workman, should be removed if it can be avoided. On the other hand, it is not a fetish to fall down and worship, as some people make it. The buttresses absolutely require repair; the Norman wall requires preservation from the atmosphere. In the course of repairing the buttresses it would also be quite right architecturally to complete

their design in a manner suitable to their style: architectural completeness and fitness demand that. It might be a reasonable and a practical, though not a necessary course, to build a low cloister between them, which would strengthen them laterally and would at the same time afford a screen to the old Norman wall aforesaid. Those who have taken up the matter have gone much further than this, however. The able archaeological architect they have employed has found various traces in the remains which, with the assistant testimony of old plans and engravings, afford evidence of the existence of a double cloister and a probable battlemented parapet, between the buttresses. The actual design of these has perished; it is only a matter of inference,—probably correct inference as far as it goes, but nothing more. Historically, they are therefore valueless when built up again; architecturally they shoulder up the space between the buttresses, hiding the fine lines of the flying buttresses, and dwarfing the architectural surroundings by a big battlemented parapet, a form which is itself a bad and unmeaning survival from ancient military architecture. As all this “restoration” will be an expensive process, a use must be found for the rooms, and it is proposed to make them into committee-rooms, much smaller and lower than any existing committee-rooms in the House, and lighted with very small and inadequate windows, because indications of windows of that width were found on an old plan made by or for Sir Christopher Wren, showing some of the old walls and windows. It was attempted to find some use for the lower cloister as a carriage porch; but that idea has had to be abandoned by those who suggested it. Lastly, the foundations of another building at right angles to the Hall were found,—simply the barest remains of a foundation, that was all; and accordingly a building was to be built there, and a use found for that if possible, because there had once been one there; and this is called a “restoration,” although every trace of the original building has vanished.

Is this common sense? The question is to the point, for true architecture is a thing based on common sense. In every age when architecture has been a real living thing, people have built a thing because they wanted it *then*, and in the way they wanted it *then*, not because they had reason to think something of the sort had once been there before. The whole affair is a piece of foolish archaeological trifling, utterly unworthy of the name of architecture in its true sense; and those who may vote money for it will have wasted so much on a piece of sentimentality. They will, perhaps, be told, as they have been told before, that architectural journals usually oppose the architectural schemes of the Government. If the charge were true, which in that sweeping form it hardly can be said to be, is it not just possible that we may know something more about what architecture really means than the Chairman of the Westminster Hall Committee, or than some other previous officials who have not given special study to the subject?

But there is another point to be borne in mind in regard to this scheme for which money is asked. The great Palace at Westminster which Sir Charles Barry designed has never been completed. The erection of the proposed mean-looking building at right-angles to Westminster Hall would be a bar to the completion of Barry's design. The erection of the foolish committee-rooms between the buttresses of Westminster Hall would be doing badly what would be far better provided for whenever that design can be completed. We are told, on the authority of the Chairman of the Westminster Hall Committee, that the completion of Barry's design is a thing not to be thought of. Why, we are not told. But what are we to think of the sense of architectural fitness, dignity, and common sense on the part of people who can make all this fuss in favour of a foolish piece of sentimental restoration, and put aside, with a shrug of the shoulders, the question of the completion of the greatest national building by the greatest English architect since Wren (for Barry unquestionably was so), as a matter

of no consequence in comparison with the indulgence of their own archaeological whim of the moment?

THE DECORATION OF THE PANTHEON AT PARIS.

BY CHARLES YRIARTE.

THE Church of Ste. Geneviève at Paris, to which we commonly give the name of the *Pantheon*, will be, in future, in virtue of the pictorial and sculptural decorations which it has received, a national museum, the most complete example of the efforts made by the French artists of the close of the nineteenth century in the art of monumental decoration.

The Pantheon, for each of the successive Governments of France, has been a kind of Palladium, the possession of which they have demanded in order to imprint on it the character which has in turn distinguished them. The Monarchy, in consecrating the edifice to religious worship, would have placed Paris under the banner of Ste. Geneviève, the patron saint of the city; the Republic, in removing the edifice from the worship of that saint, raised the standard of free thought, substituted the patriotic for the religious idea, and, opening the vaults of the temple to the shades of the heroes who had died for their country, and the remains of those who would have honoured it, inscribed on the façade of the temple the fine inscription which we still read there:—

“Aux grands Hommes la Patrie reconnaissante.”

From the year 506 there existed there a sanctuary dedicated to St. Peter and St. Paul. King Clovis, on the eve of a decisive battle on urgent pressure from the Queen Clotilde, had consecrated himself to this worship; and it was in the crypt of the primitive edifice that the ashes of the king long reposed. Clotilde, the friend of Ste. Geneviève, wished that the body of her protector, who had also saved Paris from the invasion of Attila, should be placed in the same crypt after death, and the ashes of the queen herself were gathered there in 545. The hill which then overlooked Paris now the Butte de Montmartre, and then called Mount Leucotitius, acquired, in consequence of the pilgrimages of which the tomb of the saint became the pretext, the name of Mount Ste. Geneviève.

From the sixth to the sixteenth century the church passed architecturally through many phases, but it always preserved the character of a chapel for the worship of relics. It was King Louis XV. who was destined to take the initiative in the construction on that site of a temple which should be to the city of Paris what the Basilica of St. Peter is to the city of Rome.

Following a fashion in use in France since the Renaissance, and which came to us from Italy, he asked for a number of plans in competition from the leading architects of the day. The architect Soufflot presented the best scheme. In September, 1764, the king laid the first stone; and when Soufflot died, in 1784, the triple cupola only wanted its crowning finish. The architect had kept before him as his ideal the Basilica of St. Peter at Rome, but the levelling for the site having materially reduced the height of Mount Ste. Geneviève above the level of the Seine, Soufflot considerably modified his first project. He died full of grief in consequence of the deficient mass of the principal buttresses necessary to sustain the cupola. Four architects,—Brébion, architect to the king, Vielle de St. Maurice, Peyre, and Rondelet (this last a consummate constructor, whose technical treatise on stone cutting is still studied in our schools),—were entrusted with the completion of the temple of Ste. Geneviève. The cupola was far from moment in danger of being compromised through the result of settlements; with considerable effort and by works of consolidation which did not interfere with its general appearance, the architects brought the building to its final bearing and completed the work. Scarcely had the monument been completed when it passed into the hands of the Revolutionaries.

Government, who overturned the *culte* of Ste. Geneviève, and decreed that the temple constructed in honour of the patron saint of Paris should henceforth be consecrated to the glory of France and the religion of patriotism, under the title of the *Pantheon Français* (1791).

It is not out of place to recognise these various vicissitudes; they help to explain the plain and barren style of the actual decoration of the monument; the something indescribable of frigid and austere character, which is characteristic of the reformers of French society, great admirers of the sobriety and symmetry of the antique, wholly in favour of the re-action already provoked by the artists of the time of Louis XVI. This reaction both the Directory and the Empire tended to exaggerate to the extent of adopting no symbols in the decoration except those borrowed from classic antiquity. At less than a half-century's distance such a painting as the "Abduction of the Sabine Women," by David, excited the passionate admiration of a nation who had been previously admiring the *bergeries* of Boucher and the sentimentalities of Greuze; and the "Emile" of Rousseau became the gospel of a society which had just been admiring the poets of the *Œil de Bœuf* and the *petits levers* of Versailles and Marly. In architecture the *palazzo* of our pavilions and *petites maisons*, the ideal architecture of powdered "Marquises" in hoop petticoats and of gentlemen in silk with lace frillings, was succeeded by the austere outline of the Pantheon of Rome. The severe orders of Palladio, the decorations of the acroterion, the garland, and the palm-leaf, copied from the edifices of ancient Rome, constituted the whole ornamentation of a period whose object was to revive the memory of Brutus, and to establish the worship of the goddess of Reason.

The Restoration of 1815 effaced the fine device, "Aux grands Hommes la Patrie reconnaissante," and (a circumstance not easy to forget, whatever be one's political bias) cast the remains of Voltaire and Rousseau into a sewer near the Seine. This crime was enacted at night; apparently it was a kind of reprisal for the violation of the Royal tombs at the abbaye St. Denis by the revolutionary mob. For thirty years the Parisians and the strangers who have visited the crypt of the Pantheon have paid homage to these empty tombs; for there was no proof of this disappearance of the ashes of the two great idols of revolutionary France till 1848, when people behought themselves of opening the sarcophagi.

An experiment in decoration was made by the Government of the Restoration. Baron Gros had the commission for the painting in the cupola, which represented the Apotheosis of Ste. Geneviève. Baron Gérard was commissioned to paint the four pendentives; these were the sole points of colour which arrested the eyes in the great edifice, in the midst of are architectural lines and smooth grey acres. It might be said at the time that these fine paintings made a kind of spot in the architectural *ensemble*, and almost constituted a defect of harmony, the coloured portions attaching themselves to nothing. The revolution of July, faithful to the ideas of the first Republic, re-established the dedication to the *aux grands hommes*," but changed nothing in the general aspect of the edifice. David Angers, however, sculptured the fine pediment which has been still preserved; and, as such to give life to whatever in French sculpture kept up the fine old traditions of the country, as to complete a decorative *ensemble* in harmony with the architecture, artists received commissions for grand groups, historic subjects in keeping with the spirit of the monument, groups to be placed at the entrance of the peristyle and in the interior.

In December, 1851, Napoleon III., who copied complacently the decrees of Napoleon I., set himself the same task, to pacify and restore order, once again reconsecrated the Pantheon, from the "*culte aux grands hommes*" that of Ste. Geneviève. A sufficiently serious attempt was then made, which ended in nothing; a school of religious elocution was founded in the Pantheon, now once more

become a church, under the direction of the Abbé Dnquesnay, who lately died Bishop of Limoges.

The architect to the Pantheon was then M. Constant Dufeux, who enjoyed a great reputation in our national art-schools, and who nevertheless had never given the measure of his ability in any monument entirely constructed under his direction. He took in hand the Pantheon, to fit it for religious service, and as the funds voted were insufficient, he conceived the idea of a provisionary decoration which has lasted to the present day. This decoration consisted in coloured woodwork, in wooden altars draped with gilt hangings, on which sculptures were executed in distemper as in theatrical decoration. The shrine which contained the relics of Ste. Geneviève over the altar specially dedicated to her is the reproduction in plaster and joinery, painted and gilt, of the admirable work which Jean Goujon carved, and the four original statues of which, in wood, figure at this moment in the "Musée de Sculpture de la Renaissance Française."

It is difficult to understand why the Third Republic, which gave itself, in these latter years, to the programme of the abolition of religious orders and the secularisation of buildings devoted to the religious life, did not continue the tradition of the Convention in closing the church of Ste. Geneviève, to make it, as before, the national Pantheon. Quite on the contrary, however, it was the Government, and the very Ministry of M. Waddington, which, under the initiative of the Director-General of Fine Arts (M. le Marquis de Chennevières), in the year 1876, accepted the responsibility of covering the walls of the building with mural paintings, for the execution of which Parliament has been asked to devote a sum exceeding a million francs.

People bowed then, as now, to the idea of developing among French artists the taste for grand monumental painting, the tradition of which is fading day by day. It is certain that our French ideas of centralisation it is the State alone that can encourage such works, and that it is her mission to search among the annual exhibitions of painting for artists who give proofs of their disposition for decorative art, and exhibit facilities which they will know how to employ when great surfaces are confided to them. Some members of Parliament raised objections, and put the question whether, in fact, the most truly beautiful decoration of the Pantheon, that which was most appropriate to its severe style, the nobility of its lines and harmony of its proportions, was not the very immaculate whiteness of its great surfaces, the unity of tonality in monochrome which recalled the great conceptions of antiquity; whether any painting which trespassed strongly and with a blaze of colour on that harmonious purity, would not bring with it the loss of the solemn and grandiose effect produced by the architectural lines alone.

The thesis was a good one to argue upon, and there is nothing in it very repugnant to our feeling. "Rien c'est bien" is an architectural principle which may be often applied with good result; nevertheless, the "Direction des Beaux-Arts," through the mouth of M. Waddington, answered by an irresistible argument: they produced the design of the architect, Soufflot, who had conceived the idea of the Pantheon, in which he had indicated, at that stage of the project, a whole *ensemble* of painted and sculptured decorations, the execution of which was to be entrusted to the leading artists of his own day. No further objection was possible, and the funds were voted.

What was the general project agreed upon? The plan of the Pantheon gives a Greek cross with a peristyle in advance of it. At the intersection of the cross, four colossal piers supported a central dome. This cupola, as already observed, had received the paintings of Baron Gros and Baron Gérard. The scheme of the Director des Beaux-Arts was as follows:—Each arm of the cross presents a nearly unbroken surface of the height of the columns

* We think we have heard something like this on our side of the Channel.—Eo.

which support the entablature; and this surface, from the level of the floor to that of the capitals, only offers two slight projections, those of the engaged half-columns forming pilasters and repeating the colonnade, and (about two-thirds the height of the columns) a slight band or string intended to break the monotony of the wall-surface. It was in the four arms of the cross that the portion to be covered with painting was found; the embayment of the high altar, the *cellæ* of the lateral altars, and the two faces of the vestibule. These would thus be united to the coloured surfaces of the pendentives, and through them with the dome decoration itself. Never could artists find a more propitious field for the exercise of their talents; but with all this, those who had before their eyes their responsibility to future ages, and the consciousness of their own littleness, began again to ask, in the face of these noble expanses of yet virgin wall-surface, if it might not be better not to intrude on their purity. The names of those who were summoned to the honourable task of decorating the Pantheon are all well known, but in mentioning them to readers beyond the limits of their own country, to readers some of whom are perhaps not very familiar with the modern schools of art on other soil, it is perhaps as well to define a little. We are not here concerned so much to discuss the merit of their works, as to give an idea of the scheme adopted by the Director-Général des Beaux-Arts, and to state what is the result obtained from an architectural point of view.*

THE EAST PEDIMENT OF THE PARTHENON.



THE current number of the *Nineteenth Century* contains an article of great interest, by Dr. Waldstein, on the interpretation of certain figures in the east pediment of the Parthenon. Dr. Waldstein maintains that the two figures marked L and M in the Guide-book, and usually held to be two of the Fates, are, in fact, Gaia and Thalassa,—Thalassa resting in the lap of Gaia. Dr. Waldstein supports his view with his usual eager enthusiasm and with that personal conviction that is sure to carry weight, but, equally as usual, his arguments and what he calls his demonstration lag far behind his swift and sometimes prophetic imagination. The interpretation of figure M as Thalassa is not new. As far back as 1822 Weher (before the topographical school came in at all) suggested that the reclining figure might be Thalassa leaning against Amphitrite. Weher's conjecture was a mere isolated shot, not part of a well-considered system; but we think Dr. Waldstein, who so frankly and openly acknowledges his indebtedness to Professor Brunn, might have made some mention of this earlier suggestion.

We incline ourselves to attach considerable weight, if not as yet absolutely to give in our adherence, to Dr. Waldstein's conclusions, but we must decline to accept the mere analogies he brings forward as demonstrations. To turn to the so-called Theseus (which Dr. Waldstein quite rightly, we think, declines to call Theseus at all), Professor Brunn calls the figure the mountain god, Olympos. Dr. Waldstein says that on sarcophagi reliefs he has found a number of mountain gods "hearing in attitude and general type a strong resemblance to the figure from the eastern pediment." What precisely these reliefs are it would have been well if Dr. Waldstein had stated: local personifications are, of course, common enough, and a general statement like this, unless supported either by illustration or direct citation, amounts to very little. A little lower, Dr. Waldstein does cite one actual instance,—an instance already very familiar to all archaeologists, i.e., the mountain god in the Esquiline wall-painting representing the landing of Odysseus on the coast of the Lastrygonæ. About this mountain god he makes a statement which will, we think, astonish the most confiding disciple. "The immediate depend-

* To be concluded in our next.

ence of these types upon the figure in the eastern pediment of the Parthenon becomes, I venture to believe, actually demonstrable when we compare with the Parthenon figure the mountain god from the mural painting of the Esquiline." After this what Dr. Waldstein's notion of "actually demonstrable" is we are at no loss to conceive; he means, he can mean,—we think all who look at the picture and the pediment will agree,—nothing more than that there is a pleasant analogy between them, an analogy which will come in admirably when the question is demonstrated, but which does not, could not, demonstrate it. To have a personal conviction of the truth of a certain archaeological attribution is one thing; to be able to demonstrate it, i.e., make it a matter of necessary conviction to others, is quite another. That Dr. Waldstein has a personal conviction about the Olympos figure we do not doubt, and we even confess we are inclined to share it, but to talk of the matter as demonstrated is a grave confusion of thought, and one extremely likely to cause the ever-ready enemy of archaeology to blaspheme.

So far as literature goes, Dr. Waldstein undoubtedly has the Homeric hymn on his side; but he is too good an archaeologist to press very closely the comparison between literature and art. What we really want are a few substantial instances of art tradition as regards the conjunction of Gaia and Thalassa. For anything we know, Dr. Waldstein may have such instances *in petto*; all we can say is that in this article he does not produce them, and, therefore, his theory is still in the air. It is a little surprising that in a discussion of the figures of the east pediment, he does not even allude to the acute conjecture made by Mr. Murray about the so-called Iris figure. Mr. Murray does not dogmatically assert that this figure is not Iris, and must be Eileithyia; but he points to a long line of artistic vase tradition to show that it is a highly probable attribution. Eileithyia would serve Dr. Waldstein's theory as a transitional figure from the *dramatis personæ* to the cosmical setting, almost as well as Iris herself. Dr. Waldstein's conjecture is so suggestive and so brilliant that we can only regret that it is at present supported in a manner so unmethodical, and hope that he will eventually furnish us with arguments more substantial.

NOTES.

CONSIDERABLE excitement seems to have been caused by the recent discovery of a bronze statue in Rome. The statue, which is more than life-size, and in part in excellent preservation, was seen by a few immediately after its discovery, and rumour was instantly busy to give it a name and a date. It has now been removed to the somewhat jealous guardianship of Santa Francesca. In a warehouse close to the church the statue is housed for the present, and there, by the kind permission of the Director of the Excavations, Sig. Fiorelli, we were able to get a sight of it. The first view is pathetic enough. The statue lies flat on its back on some straw and matting, the uplifted left arm supported on a chair, and is the only occupant of a huge gloomy room. This flat position of the statue is a good deal against a fair estimate of the proportions of the statue, and, perhaps, accounts somewhat for the to us unpleasant effect these proportions produce. The head is extremely small for the body, and the features, especially the eyes and mouth, have a curious compressed,—almost pinched,—look, which contrasts oddly with the powerful finely-developed body. The hair is thick and massively-arranged, and just where it rises from the forehead there is a deep dent which adds to the troubled expression of the face. The surface of the right cheek of the statue is, from some accident of position, in perfect preservation, the original bronze colour is, for about 2 in. square, perfectly preserved, and every line of the working still observable; a growth of soft hair is indicated on both cheeks and extends over the lip and chin. The statue is perfectly nude, and apparently

stood in a somewhat Polycleitean attitude "nno crure"; but as both legs are badly damaged it is difficult to be sure in the present position. The left-hand was raised, and held some object. The right-hand is placed behind the back. There is a slight rift in the upper part of the right arm, but not enough to throw any doubt on the original position. Just in the middle of the body an inscription, as yet unexplained, is scratched, probably a Roman number, as follows: L·VI·T·XXIX. The statue was at first called a Heracles, an attribution suggested by the somewhat excessive muscular development. Perhaps when no authoritative dictum has been pronounced it may be rash to advance an opinion, but our own clear conviction is that the statue represents neither god nor hero, but is a portrait statue; further, that it has no claim to be of either the best or second best period, but that a certain realism of style and also a want of reserve in expression condemn it to at least post-Alexandrian days.

THE proposed system of charging for the names and addresses of sender and recipient in sixpenny telegrams is not likely to commend itself to the public mind. It is, to begin with, such a very decided change of system that it is not likely to be accepted without very strong and convincing reasons shown for its adoption; and the theory of the Postmaster-General that the sender's address is usually surplusage, has already received very strong contradiction on the part of business firms who make large use of the telegraph. In the case of what may be called private or social telegrams, no doubt the sender's full address often is superfluous, but not in the case of business telegrams. On the other hand, we entirely concur in the general principle that the telegraph system should be, if not remunerative, at least self-supporting; in other words, that those who do not send telegrams are not to be charged with any part of the expenses of those who do. A plausible suggestion is that of "Compromise" in the *Times*, who proposes that the address of the recipient should be uncharged, and that the telegram form should be headed only for the one address, leaving the sender to describe himself as far as he thinks necessary in the body of his message. This would effect half the desired saving in space and cost, and be a premium on brevity, without altering the general principle and method of procedure so much as the Postmaster-General's proposition must alter it. But we are against any tampering with the principle of freedom of address. Free addresses, and messages at a halpenny a word, would probably meet the public needs best.

THE promoters and the opponents of the Railway Rates Bills both held meetings last week to consider the present aspect of the question, and to decide upon future action. The latter, as represented by the Association of Municipal Corporations, expressed the satisfaction with which they received Mr. Chamberlain's statement that it was his intention, if the Bills were pressed to a second reading, to oppose them. The Royal Commission proposal does not commend itself to the traders so long as the Bills are in suspense, and the following resolution was arrived at:—"That, in the opinion of this Association, the issue of a Royal Commission, so long as the Bills are before the House, is inexpedient, as tending to show that the Bills had not been unconditionally withdrawn or rejected; but that this Association will hereafter concur in the subject being referred to a Commission which, both in regard to instructions and especially its composition, will command the confidence of the public." The General Committee presided over by Lord Henniker had previously expressed a strong objection to the matter being referred to a Commission, even though the Bills were withdrawn, and until this had been done, or the Bills rejected, they determined not to proceed with further negotiations. Now, as the railway companies had shown their willingness to accept Mr. Chamberlain's proposition, and had promised,—in order to facilitate negotiations,—not to introduce the Bills for the second reading before Easter, it is

not to be wondered at that they resent this, and at their meeting they decided "Not to withdraw the Bills under the dictation of the traders"; and although they do not expect to pass them, they wish to have the subjects discussed in the House. This is, after all, the best thing that could happen for both parties, and if a Royal Commission should be eventually appointed, they would probably find in the discussion some useful material for their work.

THE tramcar disaster which occurred at Bury on the 3rd current may lead us to congratulate ourselves on what has been sometimes regarded as unfortunate, namely, the limited area of the arches that cross over our railways. The tendency to carry a dangerously top-heavy weight,—which was the cause of the Bury overturn,—is thus adequately checked. It should be the care of the Legislature to provide some corresponding limit to contours in the case of tramways. The disposition to pile on a vehicle all that it can carry, and even "to stand up on the top" of the mass, is natural to men ignorant of mechanics; and this is a case which it is evidently dangerous to leave to the unassisted prudence of the English public. The tramway returns ordered by the House of Commons do not enumerate the number of accidents among either the 330 million of annual passengers, or the unenumerated servants, of the tramway companies. We apprehend that the list of casualties must be proportionately much higher than on railways. It would be doing good service if the honourable member who moves for the return of tramways up to next July would add a requisition for the statement of the numbers of servants, the numbers of horses, and the numbers of accidents on each line.

THE case of the Vestry of St. Marylebone v. Rose, which was decided on the 30th ult. in the Queen's Bench Division of the High Court of Justice, deserves a passing note. This was an appeal on a case stated by Mr. L. Rutzen, the police magistrate, with regard to a building erected in Finchley-road, near Marlborough-road Station, in advance of the general line. The questions for the opinion of the Court were,—(1) whether the certificate of the Superintending Architect, with plan annexed constituted a sufficient decision as to the general line of buildings; and (2) whether, the certificate were held to be sufficient, it was conclusive and binding upon the magistrate so that he had no power to fix any other line than that determined by the Superintending Architect. The Court gave judgment in favour of the Vestry, with costs. Mr. Justice Mathew remarked that the main question of the case had been disposed of by the decision of the House of Lords in the case of *Spackman v. The Plumstead Board of Works*, which we have already referred to (*Builder*, pp. 328, 405, *ante*), and replying to an objection that had been taken by the respondent that the Superintending Architect in the plan attached to the certificate had not made the general line of buildings, as found by him continuous, observed that he was not clear that the Superintending Architect was bound to do so; differing upon this point from the opinion of the Lord Chancellor, as expressed in the course of his judgment in *Spackman's case*. Mr. Justice A. L. Smith remarked that a decision of the House of Lords in *Spackman's case* had established that the Superintending Architect is the sole judge of what the general line of building may be, and that the magistrate has no power of supervision over him.

By careful and prolonged study of the Etruscan tombs, chiefly at Corneto, Professor Helbig seems to have succeeded in throwing a ray of light on a mysterious subject. The graves of Corneto (and also of Vulturno, in their earliest forms, two types. First and most ancient, the so-called "tomb of the pozzo," a hole pierced vertically either in the ground or through rock, and containing a vessel with the ashes of the corpse. Second

"tomba a fossa," a square grave containing an unburned corpse; graves of this second time are undoubtedly specimens of "Corinthian" style, and are undoubtedly the work of the Achaean people; so much is also clear of the "tomba a pozzo." The interesting point is that a whole series of hurrying-places have been found in the valley of the Po, which are of a character precisely identical to these "tomba a pozzo" and "tomba a fossa." This affords evidence, that is well nigh conclusive, to prove hypothesis advanced years ago by Professor Helbig, namely, that the Etruscans, like the Romans, came in from the North. This influx Professor Helbig thinks, about at the same time as the Dorian influx into Greece. The paper was read at the "Winckelmannsches" of the Archaeological Society at Berlin.

At the same occasion Dr. Curtius reviewed the work of the past year, and his summary is so valuable that we abstract the substance from the report of his speech in the *Philologische Wochenchrift*. The excavations on the Acropolis have led to important results for the history of archaic Greek art. Foundations of pre-Periclean date have been found here, and monuments, and above all inscriptions of the time of the Peisistratidæ have been brought to light. When we consider that a clean sweep the Persians made of all more obvious monuments of this date, the best residuum becomes infinitely precious. These excavations are still in progress. Especially valuable, too, for the history of archaic art, have been the discoveries of the temple at Delos. Any opinions on the sculptural schools of the Cyclades must now be based on the monuments gathered together in our newly-founded museum at Myconos. Excavations at Clazomena have brought to the first known monuments of early Ionic pottery. America has been busy at Athens, and the full publication of the results of their new excavations is eagerly expected. At little was left by the Prussians to be recovered at Olympia has been carefully worked together by the Greek Government; the east quarter of the great Palaestra has been cleared; and small fragments of the pediment of the metopes, a few bases of statues, some archaic bronze and stone works have been dug out. Popular interest will, undoubtedly be most excited by Dr. Schliemann's discoveries at Thyrsus, but to archaeologists they will interest to the investigations carried out at the Asklepeion near Epidaurus. Here unusually fruitful yield of inscriptions and architectural and sculptural remains has been found, and many details added to our knowledge of ancient medical practice. Our knowledge of pedimental sculpture has received important additions from the discovery of the masks in porous stone, with representations of the gods; Epidaurus has also yielded fragments of this particular department of sculpture. Further afield come the Lycian districts of Bendorf, which we have elsewhere mentioned in detail; and last, though nowise least, continuation of the work at Pergamon. The interest of these Pergamene excavations, in connection with the marbles of the great altar, but subordinate discoveries have followed beyond the limits of the altar terrace, and of scarcely equal value. The labours of the present year, the report of which has not yet reached us, may have much to show.

It is interesting to hear from Athens an exact statement of the money expended in archaeological work. Mr. S. Kumanandis, in giving the report at the annual meeting, stated that in the past year (1884) 35,000 drachmas (i.e., about 1,400*l.*) had been expended in excavations carried on in Eleusis, Delphi, Olympia, and Oropos, and 45,000 drachmas (i.e., about 1,800*l.*) on additions to national archaeological museums. The total is not a large one, considering the archaeological needs of the country; but it must, of course, be borne in mind that much work is done on quite independently of the funds supplied by the Greek Government. Dr. Schliemann has his own private resources; and Germany, and America, with their

Hellenic schools, are all at work. May the proposed British school at Athens be soon added to the number.

IN the *Literarisches Centralblatt*, No. 52, p. 1,883, appears an interesting account of the now notorious archaeological forgeries at Leghorn. An apparently fine collection of antiquities was presented to this Museum of Leghorn. It consisted of objects, chiefly vessels, of remarkable and hitherto unfamiliar shapes, and a number of undecipherable inscriptions. A good deal of speculation was aroused among archaeologists, but, happily, no one committed himself to any very serious opinion before Dr. Schliemann, with that happy "flair" for which he is famous, scented imposture and pronounced the whole thing a hoax. A full account is given under the title "Raccolta Archeologica Chiellini in Livorno, by Pellegrini," and reviewed in the *Literarisches Centralblatt*.

IN clearing the ground preparatory to laying foundations for a new museum at Treves, the workmen have come upon remains of a mosaic pavement, containing both figures and inscriptions. The design seems to have consisted of the Nine Muses engaged each in instructing some poet or prose writer. At present there have been made out the figure of Urania instructing Aratos; another Muse, name uncertain, instructing the logographer Kadmos; Euterpe teaching the Phrygian musician Agias and Polyhymnia. On the outside border of the mosaic are figures of gods with the names of the months attached. In the four corners are the seasons,—of which Autumn only is preserved.

LETTER FROM PARIS.*

THE exhibition of works in black and white, which we announced last month, has been opened in the Grande Salle des États at the Tuileries. It is, if we are not deceived, from England that our artists have borrowed the idea of this class of exhibition, which has not given, this time at least, all we hoped from it. Too great hurry in hanging, and, perhaps, too much indulgence in the admission of works, have produced results very inferior to what people were expecting. It would, however, be unjust not to note with appreciation the etchings by Gauchere, the engravings of MM. Boivin and Lalauze, the beautiful charcoal drawings of M. Maxime Lalanne, the drawings of MM. Bida, François, Gérôme, H. Leroux, and lastly the charming compositions of M. H. Pille, whose talent as a designer makes us forget his dull and sometimes disagreeable colouring as a painter.

This last observation would apply equally, in relative proportion, to Gustave Doré, whose works are at present exhibited at the Cercle de la Librairie; a singular exhibition, organised with pious care by M. H. Plon (the celebrated printer) and M. Duplessis, curator of engravings at the Bibliothèque Nationale, to whom we owe the biography of the artist.

Doré has been an incomparable designer, with a fecundity almost unprecedented, and his inexhaustible imagination has given birth to some *chefs d'œuvre*. There are in this collection works of extraordinary force, and a diversity of type, style, and manner which confound one. The colossal work of Doré is exemplified, but from the contemplation of it arises fresh in the mind of the visitor the conviction, already long ago formed, that, both as painter and sculptor, Doré has only pursued, without attaining these forms of a talent which only reached its full development when he took the crayon in hand to illustrate Cervantes, Dante, Rabelais, or to interpret his own impressions in his travels in France or Spain, or his residence in London.†

If posthumous exhibitions have their dangers, they form also, for some artists, a magnificent consecration of a talent too soon cut off. This is the unanimous opinion of those who have

* Concluded from last number, p. 476, ante.

† Yet Doré's London sketches were curiously unlike the reality; they were London seen through Doré's spectacles. But we quite agree with our correspondent as to the superior value of Doré's monochrome illustrations to Dante and Rabelais. Indeed, we doubt if he ever did anything superior to the Rabelais, which was a production of his early youth.—E.

seen, at the École des Beaux Arts, the collection of the works of Bastien-Lepage. What vigour, what truth, what masterly simplicity, what absolute respect for nature! Almost all his work is collected here, from his first drawings at the École down to the sketches for the pictures which were interrupted by his death. This exhibition shows plainly that the youthful master was far from having completed his task, and that the future would still have had masterpieces in store for us. There are more than 200 pictures and 117 drawings and water-colours. Without pretending to make a choice among so many remarkable works, we may notice, in passing, "Le Poins," the "Portrait de mon Grand-père," "La Récrite des Pommes de Terre," the portraits of Albert Wolf, Gambetta, and Coquelin, and that of Sarah Bernhardt, which is a marvel of delicacy and sentiment.

From this exhibition to that of the works of Delacroix is but a few steps, and the crowd issuing from the one betakes itself to the other, without the redoubtable neighbourhood of the great master in any way prejudicing Bastien-Lepage, who so little resembles him. Although already belonging to a past generation, and in spite of the oblivion into which romanticism in art has now fallen, the work of Delacroix maintains itself still in those serene regions where criticism cannot penetrate. Putting aside certain faults of method which are often and perhaps too much dwelt upon, there remain nevertheless beauties of the first order which give to that exhibition a strong attraction. "Le Martyre de St. Etienne," "L'Amende honorable," "Les Deux Pescari," "L'Entrée des Croisés à Constantinople," "La Barque du Christ," "Le Giaour," "Jésus au Jardin des Oliviers," and especially "Boissy d'Anglas à la Convention," that sketch so finely translated in the etching of Braqueumonard, are imperishable pages which one is happy to see united in an exhibition which has for its object to raise to Delacroix the monument which he should have long since had. And while on this subject let us add that the "Entrée des Croisés," which up to this date has been exiled at Versailles, is now to take its proper place among the treasures of the Louvre.

Following the example of the water-colourists, the pastellists of France are also about to constitute themselves a society and to exhibit their works every year in the galleries of M. Georges Petit. The first exhibition, organised by M. Roger Ballu, will take place this month, and will comprise works by MM. Emile Lévy, Lefebvre, Baudry, Gervey, Bessard, T. Berand, Cazin, John Lewis Brown, Jaquet, Adrien Moreau, Lhermitte, Philippe Rousseau, &c.; it will be rendered more complete by a retrospective exhibition, in which will figure the pastels of Latour, Rosalba, and other charming masters of the eighteenth century.

There is yet another exhibition very well suited to the Parisian public, which goes to indulge its curiosity in the Goupil galleries, Rue Chaptal, to see the drawings which Edouard Detaille has executed for a grand publication to be entitled, we believe, "L'Armée Française." M. Detaille's reputation is long since made; no one knows better than he how to render the military types of both French and foreigners. His drawings have marvellous precision, irreproachable correctness; his unerring pencil does not forget a fold of the cloth or a buckle of the helms, a bit of the braid or a button of the gaiters; it is impossible to imagine anything more carefully done. But does not this very exactitude weary one in the end? The personal details are given with such minute fidelity that life-like character disappears, and these admirable drawings seem like excellent photographs heightened by a tint of water-colour. Apart from this criticism one cannot but recognise the interest of this exhibition which passes in review before us, with so much learning, the variety of uniforms worn by the French army from the last century to our own days.

To finish with these special exhibitions, which tend to multiply more and more, we have an announcement of an exhibition of an entirely new kind, and which will certainly not want originality. A group of Republican journalists propose to collect the works of artists who have become celebrated, and who at the outset were refused admission into the *Salon* by a jury even more academic than that of to-day. It is one way of showing the public what the spirit of clique in matters of art is capable of, and what cruel injustice the Institute is to be accused of

against those whose talent posterity has recognised. "Tanta-ne animis celestibus ira?" It will certainly be piquant to find there, in touching posthumous confraternity, Courbet, Rousseau, Millet, Daubigny, Pavis de Chavannes, Troyon, Manet, and even—Delacroix!

Henri Lehmann, who was one of the most eminent and inflexible among those select judges of the old days of the Académie des Beaux Arts, carried to an extreme his horror at the novel tendencies of modern painting. Lehmann is dead, but his artistic hatred has survived, and in his will a sum of 30,000 francs was left to the Institute, to found a triennial prize of 3,000 francs in favour of the young painter who in his works should have shown the strongest practical protest against the fancies of the Impressionist school.

We must not forget to mention the splendid present which the Committee of the Société des Artistes Français have made to M. Bailly, President of that Society since its foundation. It is an album containing an original drawing by each of the members, and signed by fifty painters, twenty sculptors, nine architects, and ten engravers. This inestimable collection has been presented to M. Bailly by M. E. Guillaume in the name of all his colleagues. M. Bailly is known, beloved, and respected by all the artists in France, and in other countries, who have had the opportunity of appreciating the kindness of manner and goodness of his heart in his relations with his brother artists, and we are glad to register this homage rendered to the venerable President of the Société des Artistes Français.

SMOKELESS HOUSES AND MANUFACTORIES.

This was the subject of a lecture delivered at the Parkes Museum (by invitation of the Council of the National Smoke Abatement Institution), on the 26th ult., by Mr. Thomas Fletcher, F.C.S., of Warrington.

The lecturer said:—There is no possible doubt that all large towns can be made absolutely smokeless with economy, and also that the strongly acid nature of the atmosphere in all large towns and cities can be very greatly improved. How bad the state of things in London is at present may be judged from the fact that, wanting some litmus paper, which is used in testing for weak acids, I failed totally to obtain any, after a long search, which was not already turned in colour by the acid of the atmosphere, and I had to telegraph direct to the makers for some. I held a strip of this paper out of a railway carriage window for a few seconds, with the result that the exposed part was turned red by the acids in the air. The mud in the streets, the damp stone walls, and even the moisture on the leaves of plants, all gave a distinct acid reaction. I have seen the leaves of plants, miles away from the city, burned by a light shower after a fog in the city. When our towns are smokeless the total consumption of fuel will be decreased enormously, as I will prove to you, both in houses and manufactories. The most advanced users of fuel are beginning to see through the fog and smoke, and I believe it is now a question of a very limited time before we see the end of the nuisance. The question of smoke must be looked at from a money point of view, and smoke abatement must be either compulsory or profitable. Not one householder or manufacturer in a thousand cares how much smoke he makes provided it goes the right way up his chimney. My principal business to-night is to give you actual results obtained in my own works and house, which are, and have been for a long time, practically smokeless. The house was built with the ordinary fireplaces for coal, an open fire range with boiler, hot-water cylinder, and the usual appliances. What it would cost to work this with coal entirely I cannot tell you, for the simple reason that gas has been used, more or less, since the house was built. Those who have had experience with coal will be able to compare the figures as to comparative cost. In the first place, absolutely no alteration has been made with any existing fireplaces or fittings, except that a large gas-meter and good-sized gas-pipes have been fixed. The extensions as regards gas have been gradual, and in the last eight years probably 5l. may have been expended in gas fittings, to get a large service to every room in the house. The first cost of the whole of the appliances, gas fireplaces, cooking, water-heating, bath-heating, washing, drying, ironing, &c., at "Stores" prices, for the house, which

contains thirteen rooms, would be about 26l. Of the three sitting-rooms, two are used only at intervals, and fires are used in at least three bedrooms every night, and every morning for about seven months in the year, fires being also lighted whilst the bedrooms are being used as dressing-rooms. The whole of the cooking for ten persons, water-heating for baths, and general domestic purposes, and a portion of the washing and drying (sometimes all) are done entirely by gas. Now comes the question of cost. In the first place, it would be practically impossible to have coal fires in the bedrooms both night and morning, as we have them, and here gas scores one important advantage. If it were possible, there would be with us at least twelve fires to be lighted every day for six or seven months. This, and the consequent cleaning, would be nearly, if not quite one servant's work; in fact, if the extra labour in cooking by fire and the usual style of washing are added, there would certainly be quite the work of a servant, which, for seven months, would mean in food and wages at least 16l. Our total gas bill for twelve months has been, on an average, with gas at 3s. 3d. per 1,000, 8l. for lighting and 13l. to 14l. for all other service, i.e., fires, washing, cooking, and baths. This for the last two years may be considered an experiment, and, being so, no doubt has had extra supervision, which, when discontinued, may possibly mean 5l. or 6l. per annum in extra waste; but the fact remains that with ordinary care the work has been done in a style totally impossible with coal, for two years in succession, at about the same cost as coal, and with a great saving in servants, dirt, and inconvenience. Further than this, whilst one of the children was suffering from scarlet fever, we were enabled to maintain perfect isolation in the upper part of the house, and so prevent the spread of the disease—a matter almost if not quite impossible if gas had not been available for all purposes. From what I can learn, it would appear that in the districts where coal is plentiful and comparatively cheap, it costs about 7l. per annum for the kitchen fire and about 3l. each for sitting-room and nursery fires. In London, where coal is twice as costly as with us, I do not believe the actual expenditure per annum is, on the average, any higher, the fire-grates being very much smaller, and the lavish expenditure of coal common in the North is checked in this neighbourhood by its excessive cost. The necessary cost of fuel for any domestic purpose is exceedingly small, the actual cost bearing no proportion whatever to this, which is ruled by habit and education, rather than by necessity. The London fireplaces strike a visitor from the coal country with astonishment at their apparently ridiculous smallness, but they soon learn that, by a slight alteration in the method of dressing, they can keep themselves quite as comfortable, or even more so, than by a large fire. As the cost of fuel goes up in different countries, so do we see its consumption going down, whilst the same operations are being performed. This reduction in quantity of fuel is apt to strike those accustomed to more extravagant ways as mean and uncomfortable, but it is simply a question of habit. There can be no meanness in economy, nor is there likely to be any discomfort if the economy is not accompanied by meanness: a cook in India will do more good work with a pound of fuel than a North of England cook will with twenty pounds. Many English cooks will burn one hundred pounds or more of coal in preparing a dinner; on the other side, I may refer to some tests made for the Committee of the Gas Institute, and published in November, 1884. In one of them, with a consumption of 25 cubic feet of gas, which is in fuel value equal to about one pound of coal, the work done was 7½ lb. mutton roasted (not baked), 1½ lb. soles grilled, 5 lb. potatoes roasted, a rice pudding, rhubarb tart, and samples of puff pastry baked, the weights of the latter three dishes not being taken. The whole of the cooking was very well done. I do not wish you to imagine that even this small quantity of gas fuel was absolutely necessary, as the actual heat absorbed by the food whilst being cooked would not be one-fourth of this. There is a limit to excessive economy in the fact that the necessary arrangements for this are not always either cheap or easy to manage for such irregular work as domestic cookery. We have rather large and straggling plant-houses and conservatory, the boiler of which is heated by coke, this giving a smokeless chimney. I

am not an advocate of smoke prevention, but has been commonly dealt with, as an abatement which is desirable at any cost, and would not use any of the arrangements referred to except as a matter of direct advantage, and only an average mortal, and consider own pocket and convenience. One of the culprits with gas has been that for its purposes an open fire is sometimes a necessity, and this, the missing link between the old and new systems, I think we have at last succeeded in obtaining, by a gas fire which will bake, heat water, and warm the kitchen, a single burner. Those whom business has driven into closely-populated districts in the morning will, I think, agree with me, in private houses, as a whole, are as great a nuisance as regards smoke as manufactories. The people employed in a works will, as a make more smoke and create a greater nuisance with their house chimneys than is made in the works. The workman's wife can, by the use of gas, save herself a great amount of dirty work and reduce her expenses to a great degree even than those who are in a better position in worldly matters. There is no objection against the adoption of coal gas as a fuel for domestic purposes in the fact that it has been, and still is, almost invariably sold at a fancy price.

My recent statement in the *Journal of the Society of Arts*, that we carry on a manufacture employing 130 (and more recently 140) men, with the necessary steam power, forges, &c., without any smoke, has called forth many comments and expressions of disbelief. I only say that if our chimneys, which are five in number, have a smoky end it is outside in full view from the Warrington Station, the London and North-Western Railway, is used for the fires and forges, simply matter of economy, and the steam boiler worked also with coke, occasionally assisted by a very small quantity of slack, a space of half an inch being open under the furnace doors to supply a thin film of air to the surface of the fire. Our steam boiler, those who do not know it, is a joke; it is old-fashioned, externally fired, egg-shaped pattern, 15 ft. long, 3 ft. 6 in. diameter, a fire 3 ft. wide and 2 ft. 8 in. long, a shallow flue, 5 in. deep, the whole length of boiler, without return. It fortunately happens that Mr. Paterson, the President of the Manchester District Association of Gas Engineers, has been making experiments on the evaporative power of coke and coal in a double-flued cast-iron boiler, 18 ft. long and 6 ft. diameter, the cost of which is about three times that of iron, the space occupied being more than double. In this boiler, with two fires, he evaporated an average of 724½ lb. of water per hour, at 1 lb. of coal for every 8.05 lb. of water converted into steam. With coke in the boiler he evaporated 765.3 lb. per hour with an average of 7.8 lb. of water per lb. of coke. In a small boiler, with a single fire, we have evaporated in a twelve days' test 1,000 lb. of water, and the average fuel consumption of years has been, as near as I can possibly estimate, 1 lb. of coke to every 7½ lb. of water converted into steam: the exact figures to decimals are not available, because we use from the coke supply for the blacksmith's fires. The credit of the high duty of the boiler may be given to the width and shallowness of the flue and firebox, and with a very good result. The boiler inspectors objected to the flue, wanting proper external examination, so we were setting away, making a deep flue of usual form. As a matter of experiment, was left open for six months, and our fuel consumption went up about 20 per cent. We fill the deep flue behind the bridge with bricks, so that they can be removed for inspection of the boiler, and our fuel consumption has dropped to its normal level. You will find in mind that I do not recommend so small a boiler to be worked so hard as to evaporate 1,000 lb. of water per hour, as it is extremely difficult to prevent priming, but the fact we can on an emergency get, with a good expansion valves, about 30-h.p. indicator from a boiler 15 ft. by 3 ft. 6 in. with coke fuel, is, I think, an unanswerable argument in favour of a smokeless boiler. The fire bars 12 in. from the bottom of the boiler; at thick fires are used, and the boiler is, on inspection, reported to be in first-rate condition by the Manchester Steam Users' Association who are, perhaps, the most independent:

to please of any boiler insurance commission. If it paid better to have a chimney we should have one, so far as insurance inspector would permit. Steam have occasionally tried coke as a fuel and to keep up steam: an explanation of failure has been afforded by our having time to drive the boiler to its maximum power. After clinking the bars k mass of cold and possibly damp coke is on, which, under ordinary circumstances, affects the supply of steam at once. The time of firing, a thin scattering of is thrown on the top of the coke, a clear steam flame rises instantly, which keeps up until the coke is fairly incandescent capable of doing the work; if, when going our hardest, we had omitted to do so, like some others, should have failed to obtain satisfactory results, although this is a necessity. We have in the Lancashire district a large number of works which, in opinion of the proprietors, cannot be done on without making smoke. At the meeting of the Society of Engineers my own flameless combustion was received with curiosity, and the demonstrations were as laboratory experiments rather than as commercial facts. That they created an impression in the minds of earnest inventors was proved by the communications received from scientific men all over the world. The value of the possible application of a system of heating has been fully appreciated as an abstract idea, and endeavours have been made to reduce it to practice on a commercial scale. I think the honour of having applied it practically in large furnaces may be given to Mr. F. Radcliffe, the forger at the Royal Arsenal, Woolwich, the steel-making furnace of the simplest construction and of exceedingly low cost, he has used a gas-producer of almost unlimited capacity, from which the hot gas is taken direct to the furnace, a simple continuous regenerator and a furnace of a power which we may say is practically almost unlimited. With the introduction of the hot gas into the furnace he obtains a heat of any character, and a regenerator which is free from tarry to choke with burned pitch, and exceedingly simple and cheap in construction. The amount of waste heat which, in the experimental furnace, goes into the chimney, can be easily utilised to make steam for the engine which is always required for dealing with the products of the furnace. I have used this furnace whilst in full work, and also looked into the chimney, and both as free from flame and dirt as this room. I may take it as an accomplished fact that compact, and cheap furnaces can be which will make gas from the poorest fuels, will give a pure flameless heat of any character and of any required intensity. It is a question of form and detail to adapt a system, not only to the open hearth itself in which it is now used, but also for puddling, all classes of reverberatory work, glass-making, heating gas-retorts, and a fact any purpose where high temperatures continuous heat are wanted. The waste is always needed for steam raising, and in this there are many other industries to which any remaining heat could be applied. There are several purposes to which gas is used to a limited extent, and matters are at present in a state of transition. Amongst these I mention bakers' ovens and furnaces for red glass and enamels. No doubt, in a time, these and other matters will be used so fully as to make the adoption of a new necessity of the trades; a beginning is made, and a little time now is needed to effect the arrangements, which, up to the present, do not fulfil all necessary requirements, every trade as to simplicity, convenience, and economy. The ground has been cleared by independent experimenters, and I think it may be said that both houses and all manufacturing industries can be profitably carried on without smoke, and it is simply a question of time as to when this state of things becomes general throughout the world. The use of gaseous fuel is settled beyond all doubt on the best of all possible grounds, it is profitable to use, and users of solid will soon discontinue their present system until they learn their position in the matter.

COMPLETION OF NEW PALACE AT WESTMINSTER, AS DESIGNED BY ITS ARCHITECT, SIR CHAS. BARRY, R.A.

THE following letter has been sent by Mr. Charles Barry to Members of Parliament, and we are requested to give it further circulation, which we very willingly do, agreeing in general with the views expressed in it, and holding that the ultimate completion of our great national building of modern times is a matter which is not to be shelved at the instance of a committee, mainly composed of very amateur archaeologists, who are bent on carrying out a piece of 'fancy' restoration. Mr. Barry writes:—

"This important subject has, I think, been overlooked by the Committee on Westminster Hall in the smaller consideration of whether or not the west side of Westminster Hall shall be restored and left open to public view.

On this matter I submit the following remarks on certain designs for a cloister building between the buttresses on the west side of the Hall, and represented by painted models on the site, representing two modes of treating the question.

It seems a waste of public money to carry into effect a so-called restoration which is conjectural only, so far as design is concerned.

It seems a waste of public money to start with this idea of restoration, authentic or not, and then to try and find some use for a few rooms which would be contained in the new work.

If further rooms are wanted at the New Palace, the proper course would be to consider their number, use, convenient size, and convenient position, and then to find if and where such accommodation could be got in connexion with or addition to the present building.

Three or four rooms are contained in the proposed cloister and building at the north end of the same, and are said to be intended for committee-rooms.

Those between the buttresses are narrow (only 20 ft. wide), low (only an average of 13½ ft. high) have ceilings in part sloping; have two small windows in each, giving insufficient light, and they are isolated from the rest of the building, being approached only by stairs which would project very inconveniently into Westminster Hall.

Under these rooms an open arcade is proposed, practically useless for any purpose.

In short, the said rooms are, in my judgment, entirely unsuitable for committee-rooms, and no other use has been ever defined for them.

As to external effect, the two-storied building between the buttresses, which it is said is the one preferred by the Committee, dwarfs the side wall of the Hall (if it is to be left open to view), already low in effect, in spite of a lofty parapet proposed to be added, for which no authority exists, its existence, height, and design, being all matter of conjecture.

The above-named building at the north end of the proposed cloister, at right angles to it, and the design of which is also matter of conjecture, is, as designed, low, with little architectural character, and will, I think, have a very mean effect as seen from Bridge-street, Great George-street, or Parliament-street. The one room in it will serve no ascertained purpose, and is isolated from the rest of the building.

The general effect of the whole treatment thus proposed (viz., to attempt to restore the west side of Westminster Hall to what it may or may not have been in the time of Rufus), will be thoroughly incongruous with the far more important building of the New Palace at Westminster, of which it unavoidably now forms a part, since the style of architecture of the Hall is essentially different from the style adopted for the Palace. The details of the former are consequently quite out of scale with those of the latter, and the harmonious effect which should be preserved throughout so important a building will be entirely sacrificed. More or less picturesque it may be, but devoid of the dignity and unity which should be characteristic of an important public building.

I see that some architects who gave evidence before the Committee speak of this mutilation of architectural harmony as a 'pleasing foil.' Surely it is rather a violent and unpleasing contrast of two conflicting ideas.

No sort of reason is given for any of this work being done at present, save the protection of the now exposed and partly decayed side

wall of the Hall and its buttresses from the effects of the weather. This may be done in either of two ways, and at one-fourth of the cost of 25,000l. to 35,000l. now proposed to be spent on useless buildings, viz. —

(a.) Either by cutting out and replacing all decayed and decaying stone, as is being now done at Westminster Abbey;

(b.) Or by repairing the buttresses and covering in the side wall of the Hall with a low passage or cloister sufficient for that purpose only, and which cloister or passage might be constructed either in stone or other material.

I think the former the most reasonable course to pursue.

By this means the only area which exists adjoined to the New Palace available for the enlargement of that building, having regard to surrounding thoroughfares, if and when the need for such enlargements arises, will be kept free and useful when so wanted.

It has been admitted by all the witnesses before the committee, professional or otherwise, that when such enlargement shall be needed, the design of Sir Charles Barry in respect of this area should be carried out, as conceived by him and recommended to the Government in 1854, the design and plans of which are extant, though no doubt some modifications in detail (but not in principle) would be needed to suit the actual public requirements at the time.*

Mr. Shaw Lefevre has suggested, in his evidence before the committee, that the designs of Sir Charles Barry 'may be understood to be given up.' This is a gratuitous assumption. Now is the time for their practical consideration.

In any case I think nothing should now be done beyond replacing or protecting the decayed stone of the walls and buttresses of Westminster Hall, and preserving careful record of the foundations and remains of former buildings on this area, for the archaeological interest attaching to the same, by making measured plans and taking photographs of the same.

It may, I think, be further urged that consideration should now be given to the question whether Sir Charles Barry's design should not very soon be carried out, as it would effect a large saving annually of public money now paid for rents of dispersed buildings in London rented temporarily and expensively for various purposes connected with Government or Parliament.

Authenticated returns of such out-offices so rented would, it is believed, make this abundantly clear, while the convenience of concentration seems obvious, and has been repeatedly advanced by different Governments as one chief reason for the erection of the various public offices which have been erected from time to time. Such arguments would surely be equally valid in this case.

No evidence was given by the architects who were called in support of the proposed plan as to the accommodation it provides being either required or good of its kind (which it certainly is not), but they were agreed that Mr. Pearson had treated the matter 'qua restoration' with ability, which nobody has denied.

I contend, however, in conclusion, that such a restoration, which is practically useless for any public purpose, should not be the consideration in this case, but the true aim should be to do nothing which might conflict with the fitting completion of the most important building which this country possesses, and one acknowledged by Englishmen and foreigners to be an architectural work of which the nineteenth century may well be proud. And if this be so surely some regard is due to the recorded intentions of its architect how most fittingly to complete it.

I need hardly say that the part which I have taken in this controversy has been dictated by the duty which I owe both as son and as architect to my revered father's memory.

CHARLES BARRY, Architect.
No. 1, Westminster-chambers,
March, 1885.

Clerks of Works' Association of Great Britain.—The second annual dinner of this Association will take place on Monday evening next at the St. James's Hall Restaurant, Regent-street. Mr. Goymonr Cuthbert, A.R.I.B.A., will preside.

* A perspective view of Sir Charles Barry's design is on view in the Tea-room of the House of Commons.

Illustrations.

THE PALAIS DE JUSTICE, BRUSSELS.

A GLANCE at what the good people of Brussels have lately been doing in the matter of public buildings is calculated to take a little of the conceit out of the peripatetic Briton. The population of London alone is equal to that of the whole Belgian kingdom, and the population of Brussels is less than that of a first-rate English manufacturing city. But while we have been for twenty years or more hesitating to spend a poor half-million or so on the housing of two of the great departments of the State, although urged thereto by economical considerations, the Brussels Municipality has expended no less a sum than two millions and a half sterling on their New Law Courts, and, undismayed, is laying out an additional half-million in providing suitable approaches and surroundings to the building; sacrifices, made in great measure out of a pure love of art, which may without exaggeration be called heroic.

The new Palais de Justice,--of a portion of which we give an illustration on a larger scale than that of the view which has already appeared in our pages,--occupies a commanding site, and is seen from all the country round. Its enormous mass impresses all beholders, but the magnificent amplitude of the structure is only fully realised when the interior has been explored. It is essentially a monument of architectural art,--providing, incidentally, eight small law-courts and some minor accessories, which, however, absorb but a very inconsiderable fraction of the whole. The buildings cover an area of between eight and nine acres, the main frontages of the block being 656 ft. and 558 ft. respectively. The Central Hall is of vast dimensions,--279 ft. in height to the lantern,--and the subordinate apartments are proportionately magnificent.

The author of this stupendous work is said to have been an ornamentalist rather than an architect, and an examination of his work supports the statement. His architecture is full of eccentricities. They are not the result of ignorance of the principles of art, and can only be put down to a wanton defiance of architectural traditions. The most unwarrantable liberties are taken with the general proportions and dispositions, and the details are often little short of barbarous. One cannot help thinking that the project was never studied in perspective, and that the several façades were independently arranged without due consideration of their mutual adjustments. Our illustration shows one of many examples of a capricious treatment of the principal orders, the frieze and architrave of one being squeezed into the depth of an adjoining frieze, Ionic caps jostling against Doric triglyphs without rhyme or reason. Nothing is gained by such irregularities, which are far too numerous and very much to be regretted in this otherwise fine design. The central lantern was the subject of several trial models, and the result fully justifies the thought and care expended upon it. In contour, proportion, and detail it is by far the most satisfactory portion of the exterior of the building. The stately is exactly right in scale and treatment, and shows how very far our Continental brethren are in advance of us in this important feature of all really fine architecture. The sculpture and ornament of the interior are worthy of all praise, being abundant and of uniformly high excellence. Statues of heroic size,--Demosthenes, Lycurgus, Cicero, &c.,--already grace the broad flights of steps which lead from the porticos on either side of the main entrance to the *premier étage*, and funds are being ungrudgingly voted for the completion of the series. But, perhaps, the highest praise of all should be given to the ornamental plaster work in low relief with which the ceilings of the halls and corridors are adorned. In this part of his work the architect was thoroughly at home, and he has not spared himself either in the variety of his designs or their exquisite and delicate beauty. The exterior mouldings are almost always coarse and ill-designed,--and the angles of his blocks of building when seen *en silhouette* are clumsy and unartistic to a degree. But every line of the interior has been traced with a quite Grecian subtlety, and the curves of consoles and brackets are of surpassing grace and refinement. Nor is the breadth of the general effect less remarkable than the extreme beauty of the details. The courts are

adorned with Belgian and other marbles, and the fittings are of rare woods, of quiet and appropriate treatment. The only point in which a little more care might have been exercised is the ornamental metal-work, which, from some unexplained cause, is certainly below the general artistic standard.

Notwithstanding all its faults, and they are many and grievous, the building is beyond question a work of genius,--wayward and unequal if you like, but genius still. With pain one feels obliged to add that its gifted designer shared a too common fate of genius,--that the anxieties and responsibilities of his position, aggravated by the meddling of official mediocrities, first drove him out of his mind, and then led him to death. He has, however, lived to accomplish sufficient for fame. He leaves behind him a monument of amazing originality and power, which will not only perpetuate his own personal skill, but form an enduring and honorable record of his countrymen's unselfish love of art.

The constructive difficulties of the undertaking were considerable, and have been on the whole successfully overcome. An instance of the kind of perversity which the work exhibits in so many forms is the use of monolithic or trilobed columns carrying architraves formed of small stones which are obviously kept in position by concealed expedients. The weights of the enormous superstructure are prodigious, and of very varying incidence; but a careful scrutiny does not discover any very serious settlements, nor any of those serious fractures which one might reasonably have expected to meet with in a work of such unusual magnitude and complexity.

The building was commenced in 1866, and opened in 1883, and we congratulate our Belgian friends on their splendid achievement.

It will be some years before it can be said to be complete in all its details. But the work is going on. Fortunately the architect made careful provision for everything necessary to complete the building before illness, long foreseen, disabled him from supervising the execution of his designs. The whole will, therefore, bear the impress of a single mind. It is a building of which, in spite of faults of detail, any age might be proud. And in the roll of the foremost architects of the nineteenth century posterity will surely accord an honorable place to that of Joseph Poelaert.

THE CHURCH OF ST. HIPPOLYTE, DELEF.

THE view of this church, which we give this week, is drawn from the plan and geometrical drawings furnished to us by its eminent architect, Herr Cuypers. The site being limited in extent, the transept form could not be adopted on the ground-plan, but the line of aisles is broken by two quadrants, as seen in the view, to break the monotony of the side elevations. The main portion of the church is built in yellow and red brick. The shafts round the apse are in Swedish granite, the others in sandstone. The tower rests on piers driven deep into the foundation, about one yard apart from centre to centre.

The style of detail in portions of the building, more especially in the spire, differs very remarkably, as will be seen, from what we are accustomed to recognise in this country as in keeping with the feeling of Medieval architecture. It is partly, however, for that very reason that this design, by an architect of the highest eminence in his own country, may have a certain additional interest to our readers, as a practical exemplification of the influence of local habit and association on architectural taste.

DESIGNS BY THE LATE M. E. HADFIELD.

IN connexion with the illustrations of Churches by the late Mr. Hadfield, of Sheffield, we now give in full the memoir of Mr. Hadfield, which was read at a recent meeting of the Institute of British Architects--

"After being articled to Messrs. Woodhead & Hirst, of Doncaster, and improving his professional knowledge in the office of Mr. P. F. Robinson, Fellow, then an architect of note in London, Mr. Hadfield settled at Sheffield, where he commenced practice in 1837. In 1838 he entered into partnership with his fellow-pupil and friend, the late Mr. John Gray Weightman, an arrangement which lasted until that gentle-

man retired from professional life in 1858. From the first Mr. Hadfield was actively engaged in general professional practice, chiefly in the northern and midland counties, and among a variety of public and private buildings designed by him and his partner may be named the tower hall, Glossop, the Norfolk and Fitzalan market halls, also the Queen's Tower, Sheffield, Kneppington Manor, Boreatton Park, and later, in conjunction with Mr. George Goldie, who had been his pupil, the Farm, a local seat of the Dukes of Norfolk; Glossop Hall, for Lord Edward Howard; several schools, besides many important churches in England and Ireland. Mr. Goldie, after a partnership of eight years, commenced practice alone in London in 1861.

The revival of the Gothic style, which received so great an impetus forty-five years ago, found in Mr. Hadfield an active votary, and the churches and schools erected at the time from the designs of himself and his partner show the result of much zealous study.

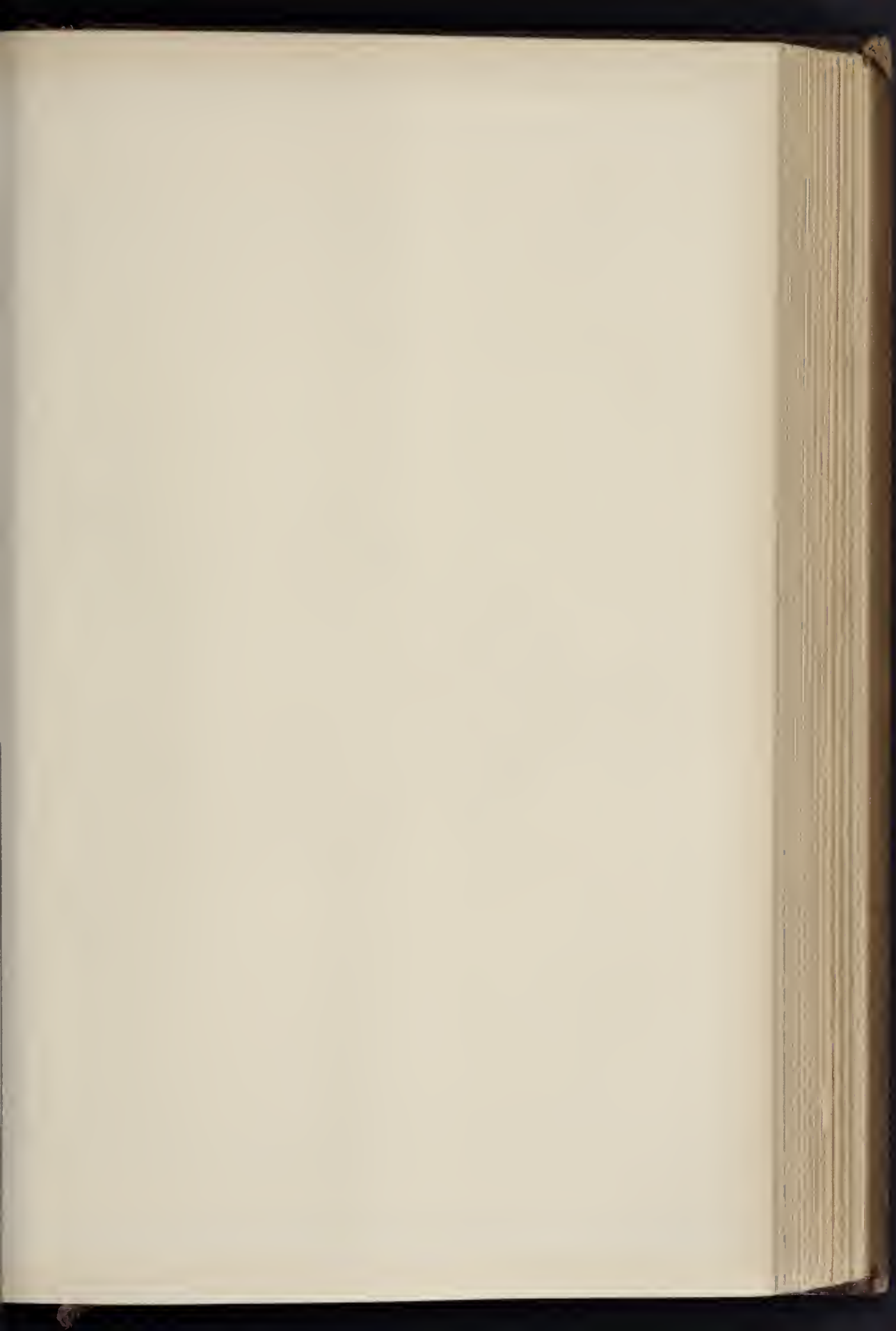
The churches they built at Carlton, Worksop, Masborough New Mills, and Matlock Bath are earlier instances, followed immediately by others at Liverpool, Birkenhead, Manchester, Middleton, &c., and when Augustus Welby Pugin, writing in 1842, what he termed 'a review of the state of ecclesiastical architecture,' dwelt with all but exclusion on his own works as being worthy to form the text of his remarks, he pays Mr. Hadfield the compliment of describing and illustrating the little church there just built at Masborough, near Rotherham.

In 1844 was begun St. John's Cathedral, Salford, one of the very first 'revivals' of a large cruciform church with a central tower and spire. It is given by Mr. Eastlake as an instance, with an illustration, in his very interesting work. That this and several other of the architect's churches in Lancashire and elsewhere showed a great advance was universally admitted by those who hailed the Gothic revival as it gained ground.

The dissatisfaction which some critics were expressing as to copying too literally rather than developing from ancient models began soon to assume a decided form in the pages of the *Rambler* where may be seen, in its number of September, 1843, a view and description of St. John's. The article of Mr. Capes, in his magazine and review, the *Rambler*, were so talented and convincing as to induce several architects to offer designs and suggestions for town churches in its pages. The late Mr. C. Parker, the author of 'Vill Rustica'; Mr. W. W. Wardell, now a leading architect in Australia; and Mr. Hadfield, were of this number, the latter contributing a design in the Byzantine style to the January number 1850. Grieved by its sharp criticisms, and accustomed to little but adulation where church architecture was the question, an amusing and characteristic pamphlet next appeared from the pen of Mr. Welby Pugin, entitled 'Remarks on the articles in the *Rambler*,' which gives a lively insight of the progress of the 'revival.' In it the round-arched design, of course, came in for an unmerciful scolding, and expressions more direct than elegant testify to the wrong doing of a friendly rival, who could dream of deserting the pointed arch. Not that these remarks ruffled the temper of the peccant architect,--a smile, with a good-humoured verbal protest, was the reply. The design in question was afterwards carried out, with some modification, in the church at Malberry-street, Manchester; but the English Gothic of the fourteenth century remained, after all, Mr. Hadfield's chosen style, as instanced in the well-designed church at Burnley, 1845, and still more in a better-known work, St. Mary's, Sheffield, begun in 1846, which gained for its architect much credit.

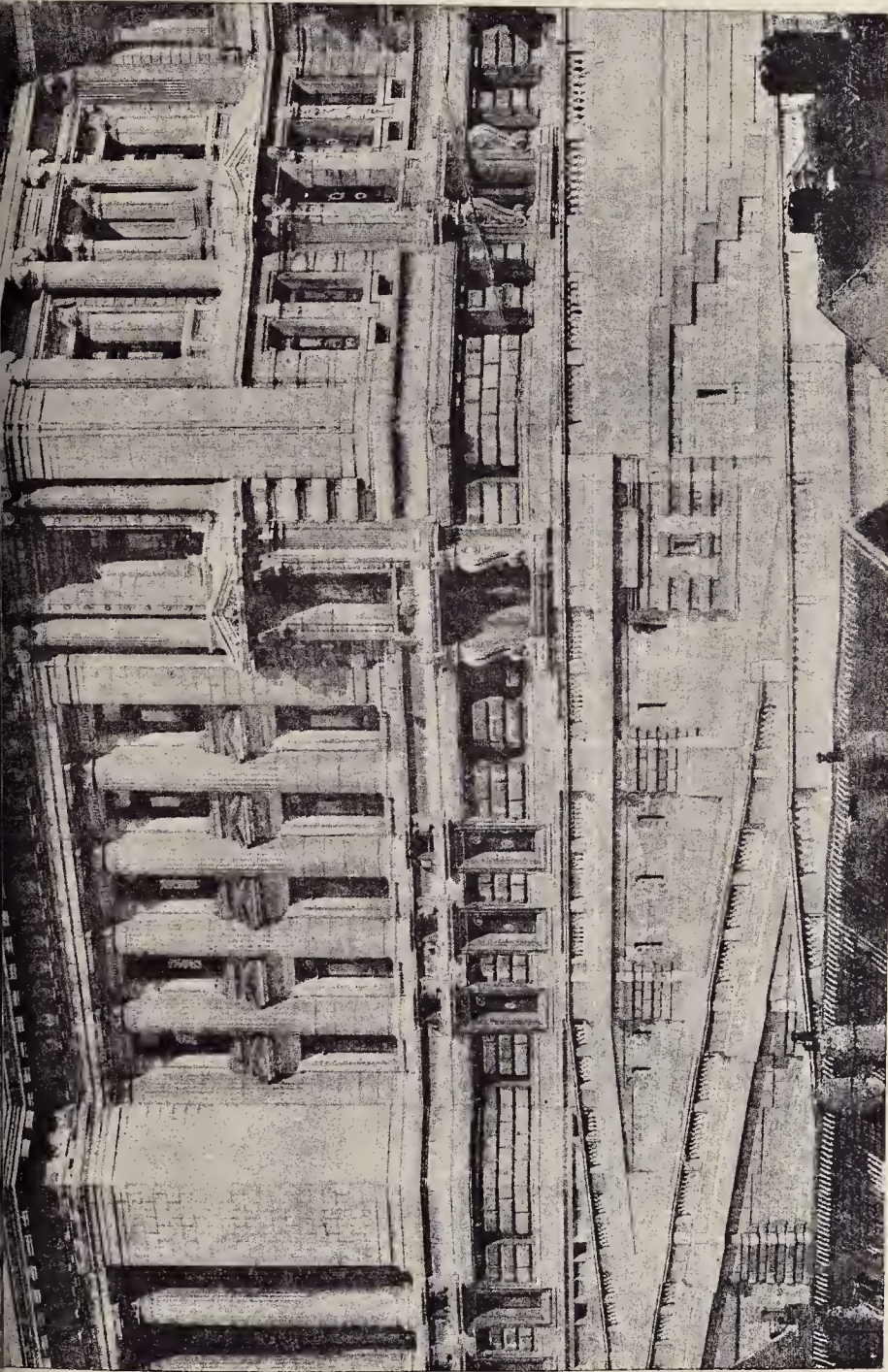
This church, near to his home, completed only by degrees, and avowedly the favourite of all his works, may be taken as the ideal of his aims. Not of great scale,--150 ft. long and 85 ft. wide,--nor possessing any unusual or startling feature, its composition is even and well balanced, both in plan and elevation, without any without. The effect is thus just such as to give increased pleasure after a first acquaintance and to allow itself to grow, the simplicity of parts and the fitness, even richness, in the details of others, being most satisfactory,--neither oppressive or forced, but consistent with a placid worship, as, indeed, it was till near its end.

In the busy West Riding, the early growth of the railway system furnished much employment to Mr. Hadfield's firm, and in associating



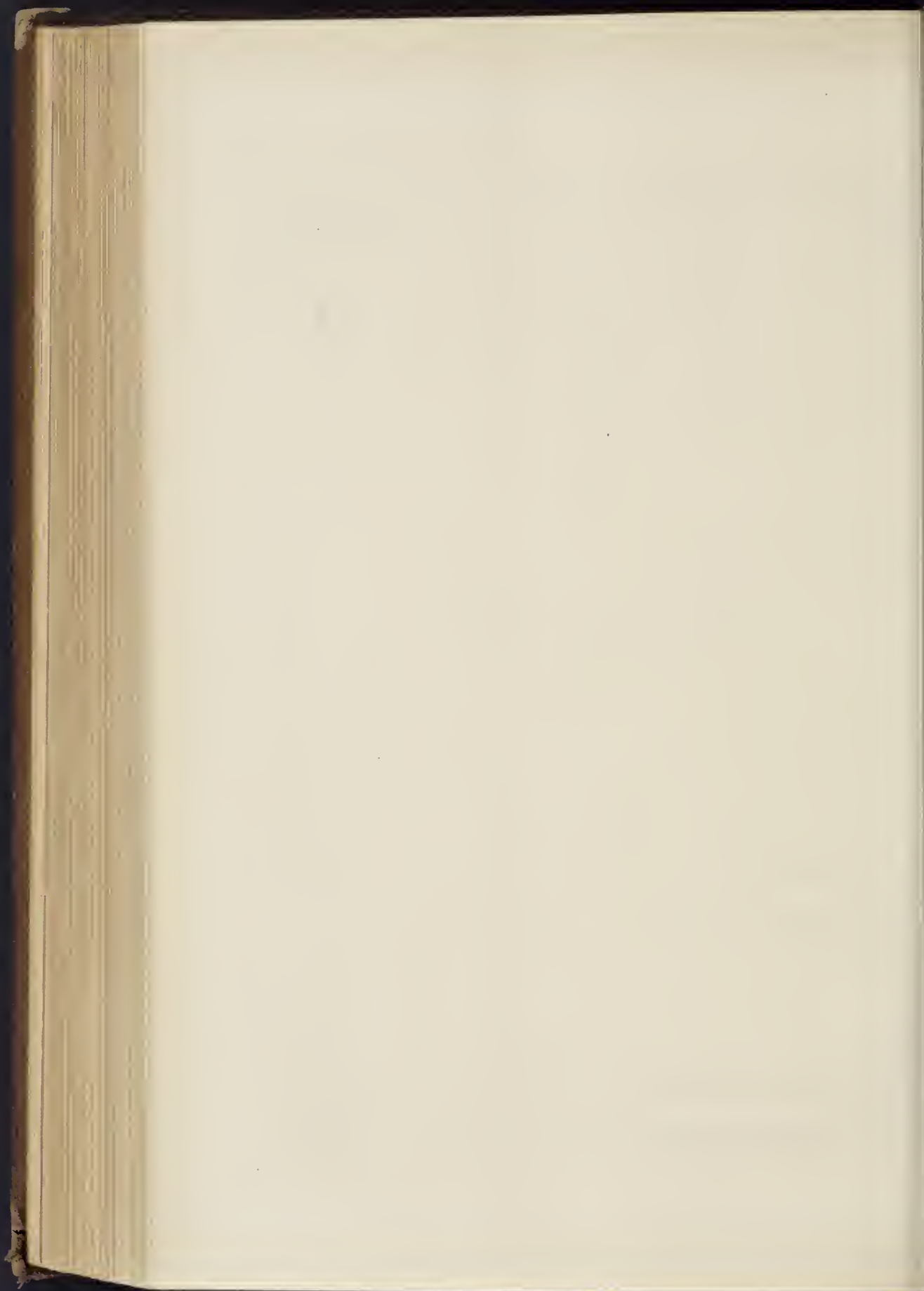
THE BUILDER. APRIL 11, 1885.

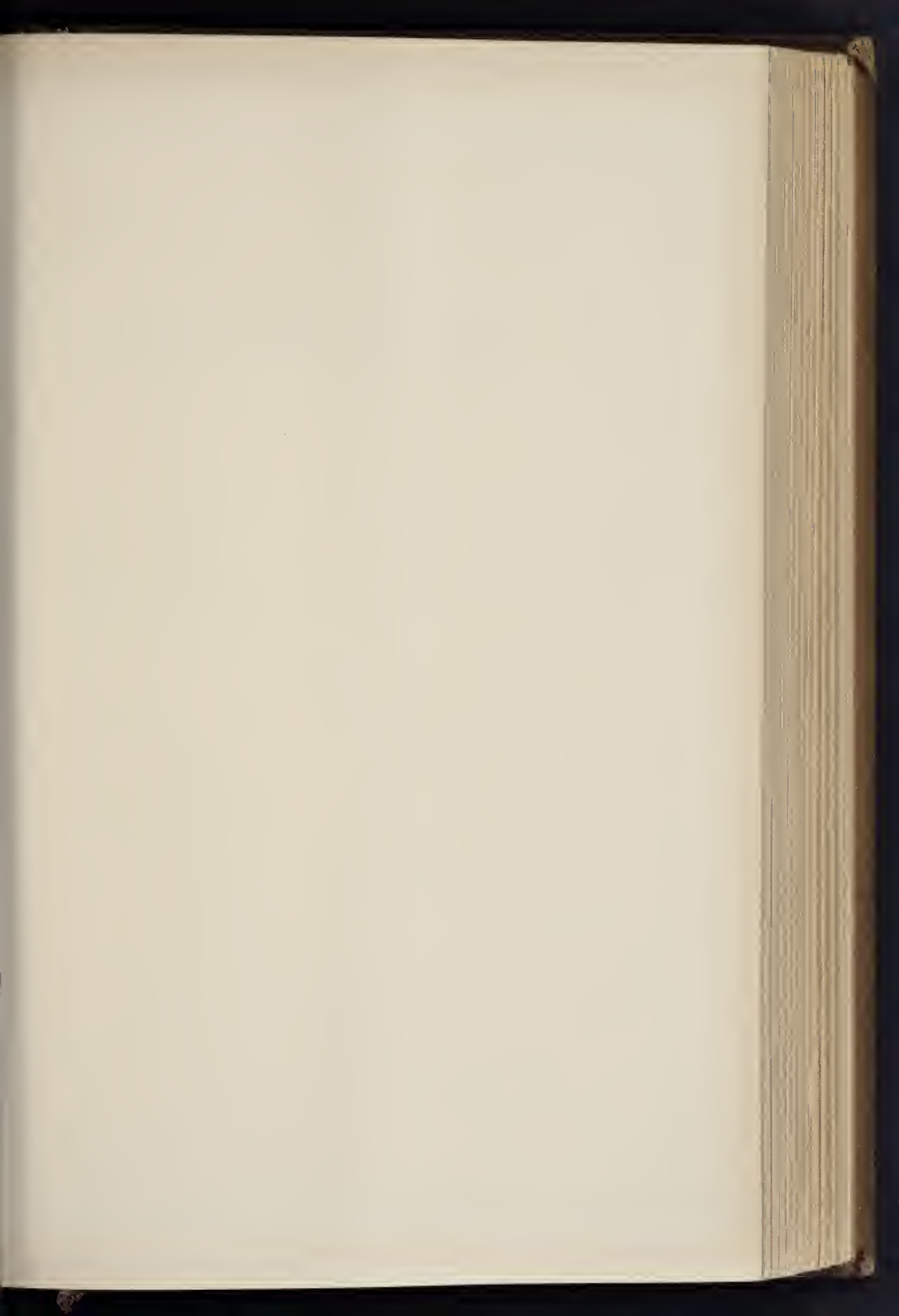


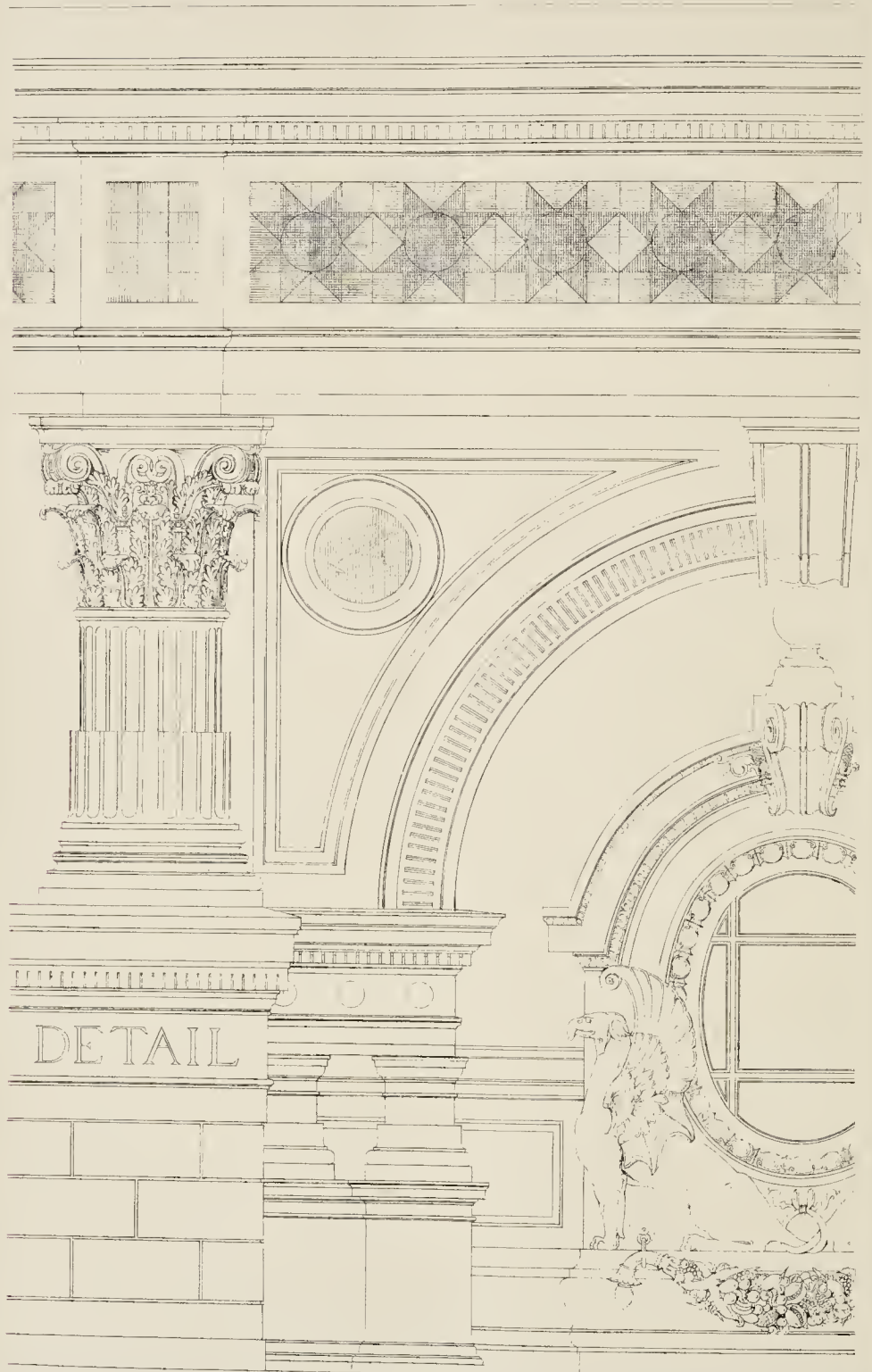


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PORTION OF THE LAW COURTS BUILDINGS, BRUSSELS.
THE LATE HERR POELAERT, ARCHITECT.







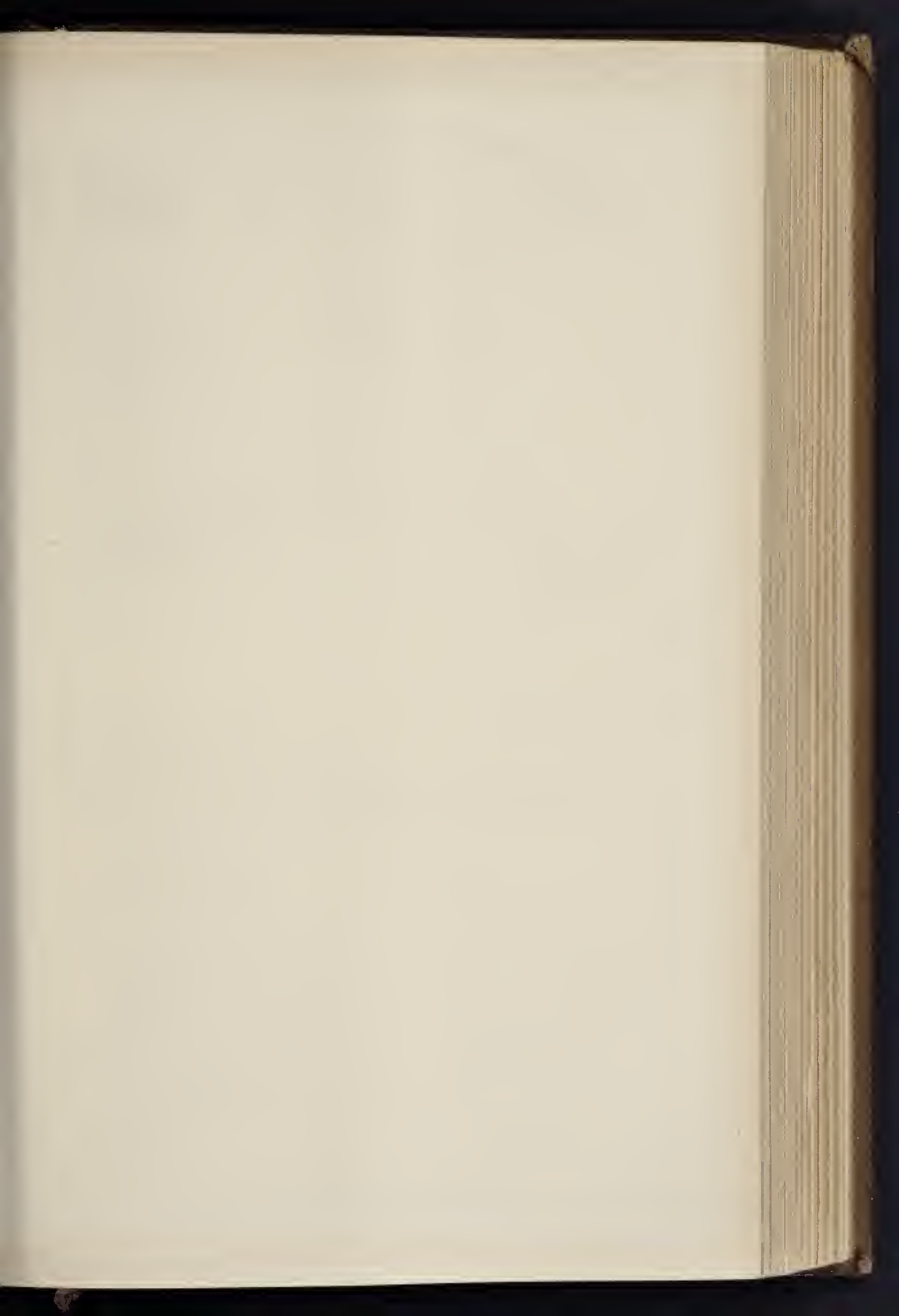
TITE PRIZE DESIGN, R.I.B.A.

EXTERIOR DETAILS.

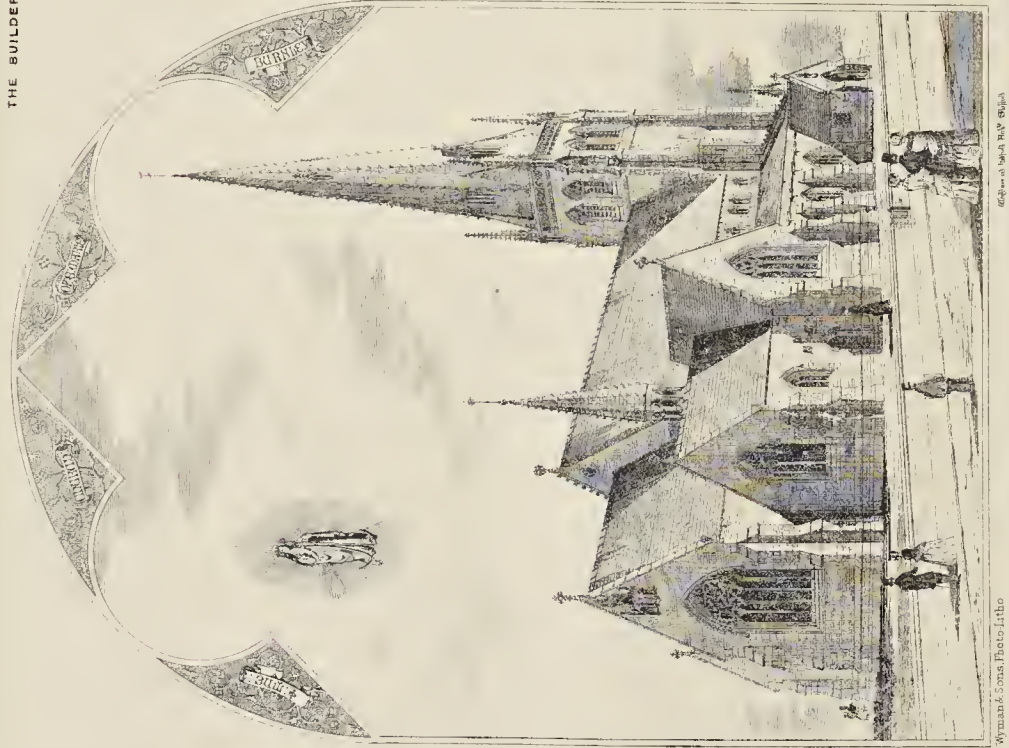
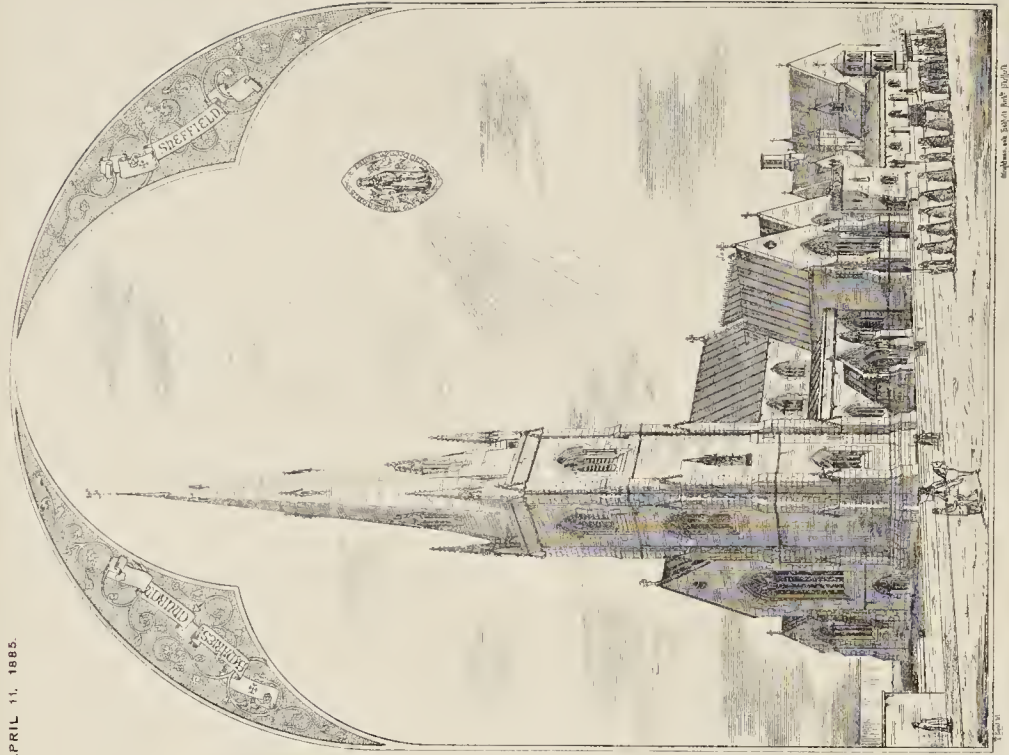
J. F. Bell Photo Lith & Printer 8 Castle St. Holborn London E.C.

By MR. J. A. CAMPBELL

(For General Design, see BUILDER, March 28th).



THE BUILDER. APRIL 11, 1885.



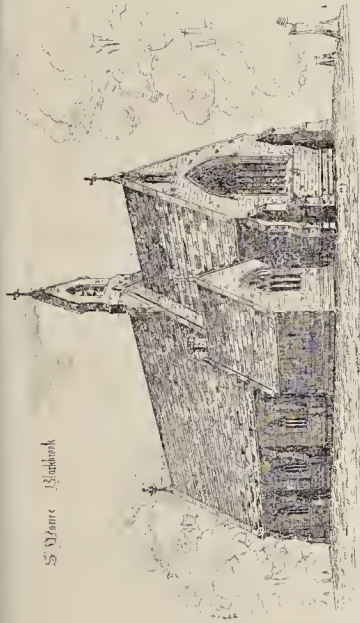
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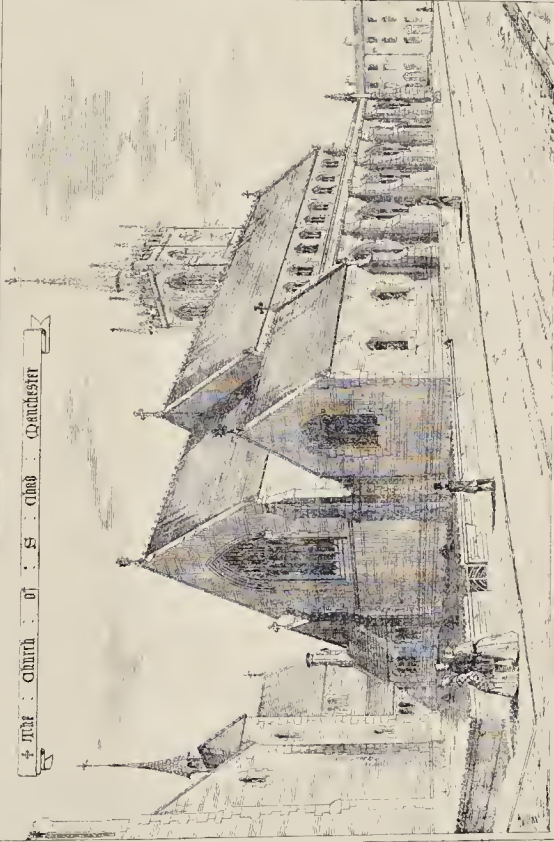
CHURCHES BY THE LATE M. F. HADFIELD, F.R.S.A.

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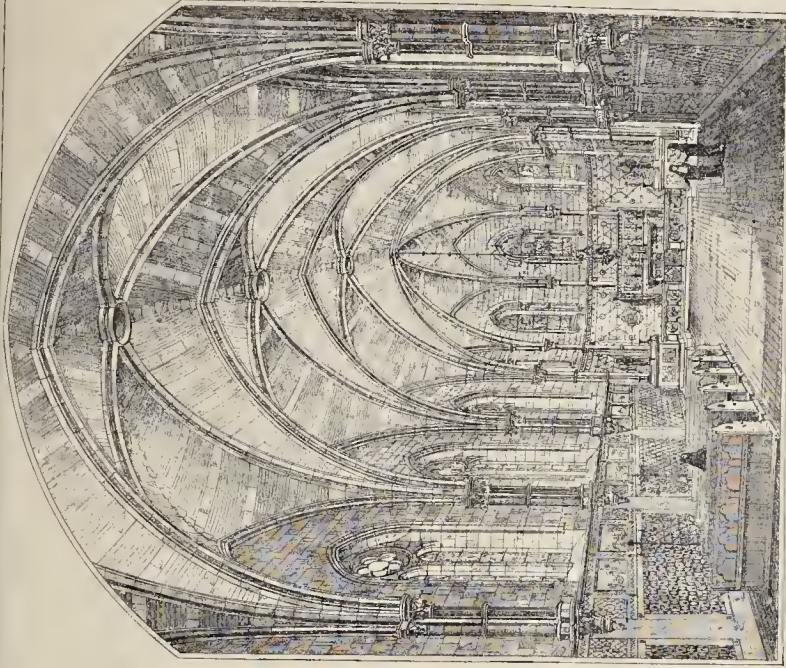
S. Marie, Glendebank



St. Mary's Church, Chester



Wymann & Sons, Photo Litho



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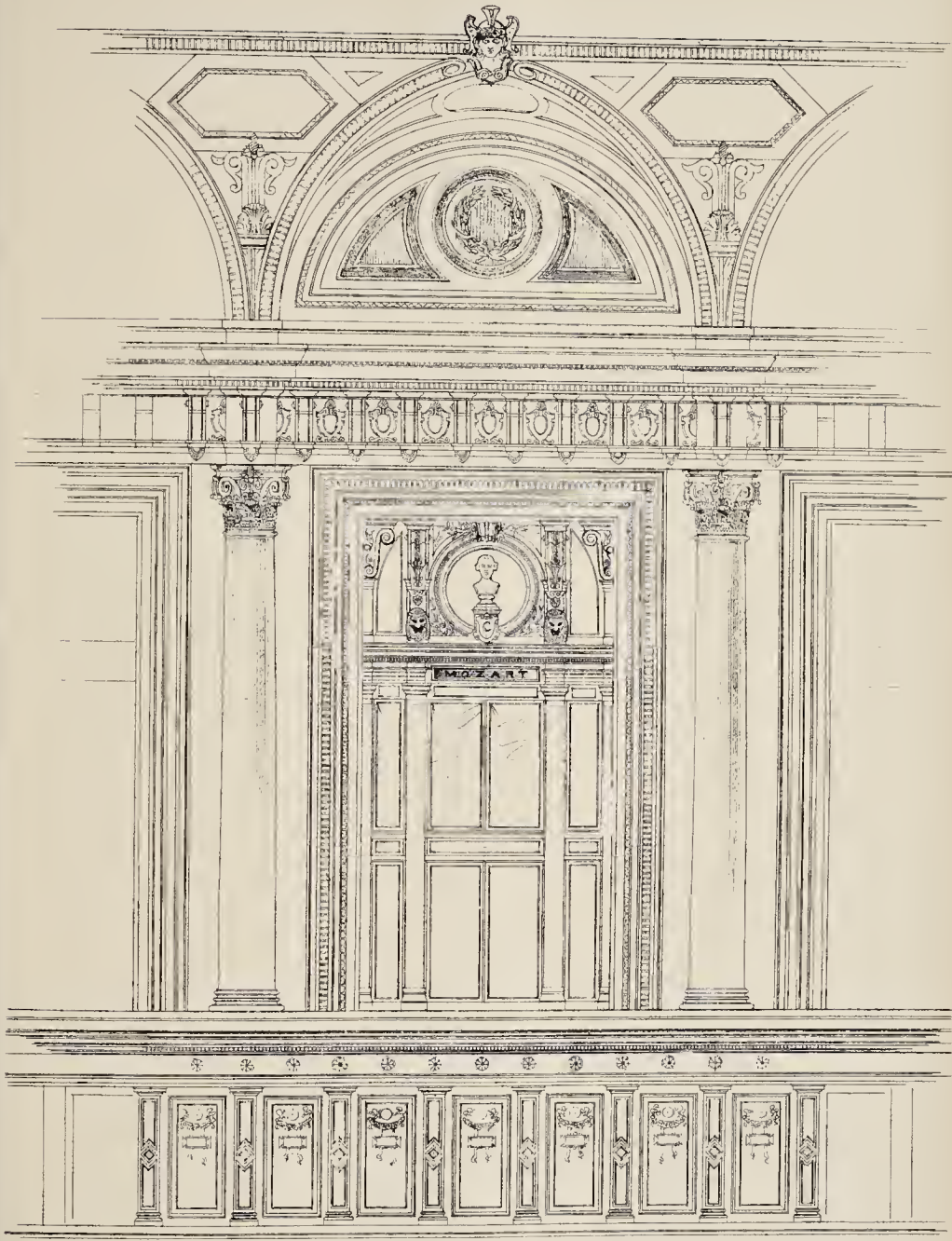
St. George's Church, Liverpool



St. George's Church, Liverpool

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CHURCHES BY THE LATE M. E. HADFIELD, F.R.I.B.A.



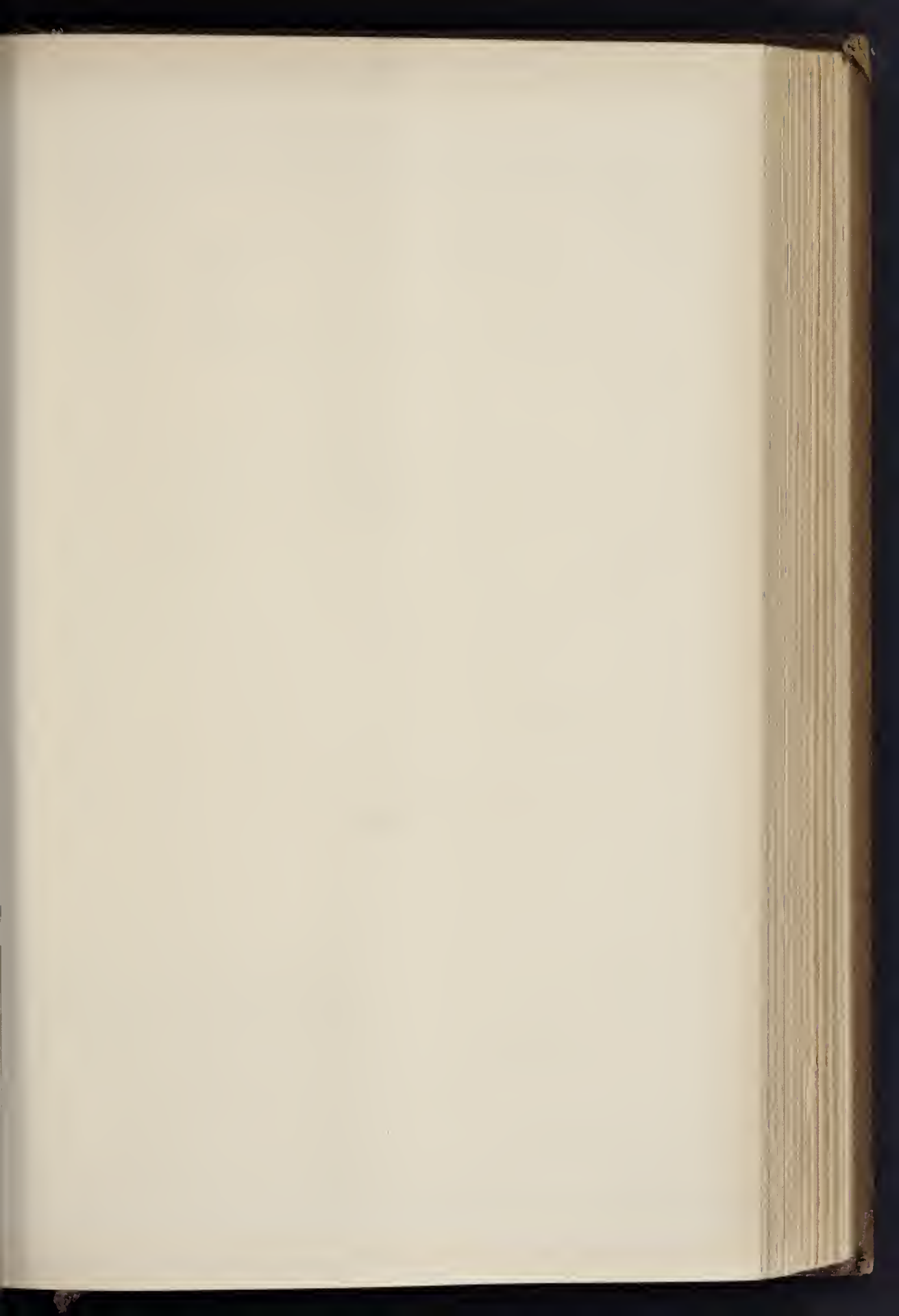
TITE PRIZE DESIGN, R.I.B.A.

DETAILS OF PRINCIPAL ROOM.

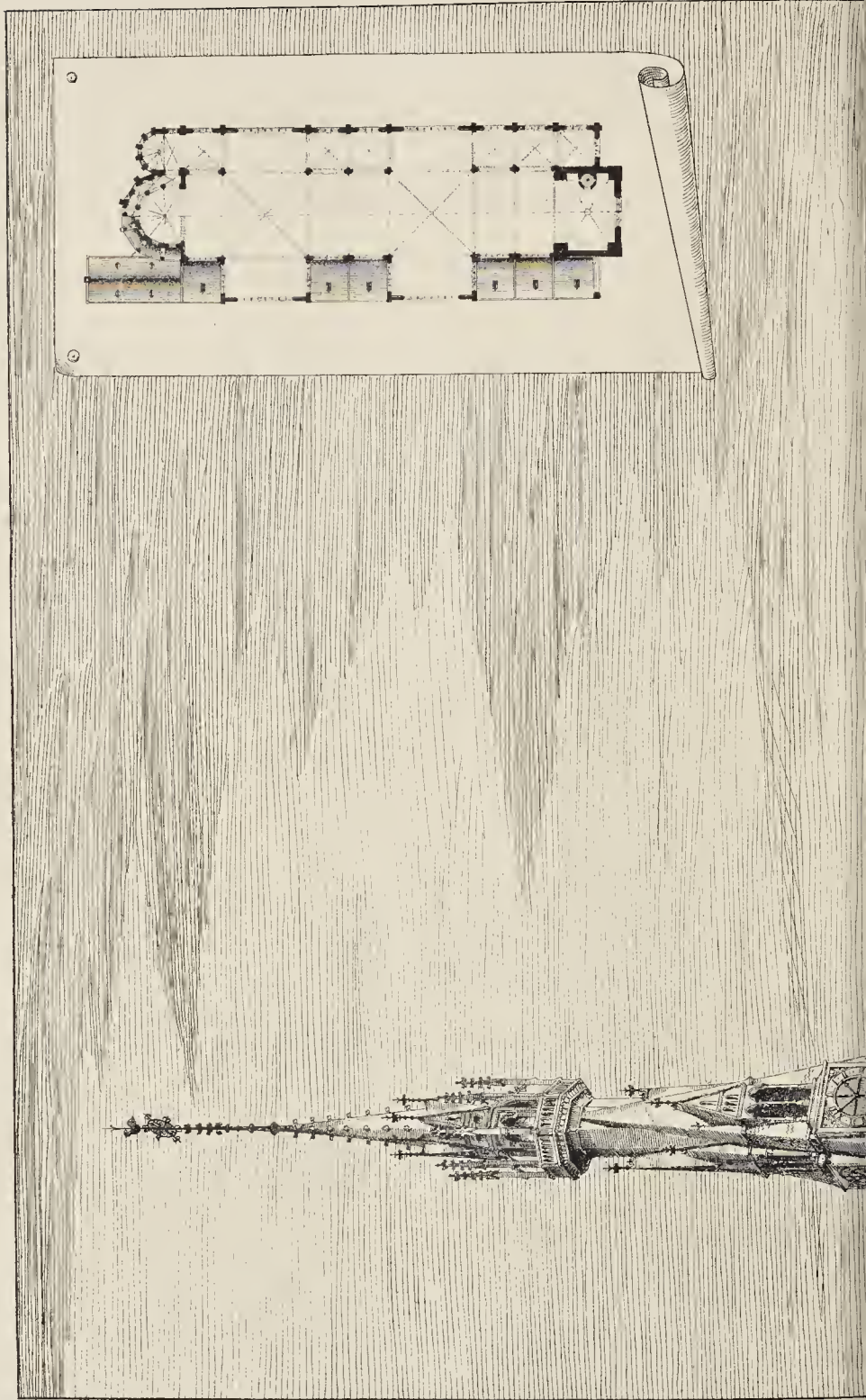
(For General Design, see BUILDER, March 28th).

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By MR. J. A. CAMPBELL.



THE BUILDER. APRIL 11. 1865



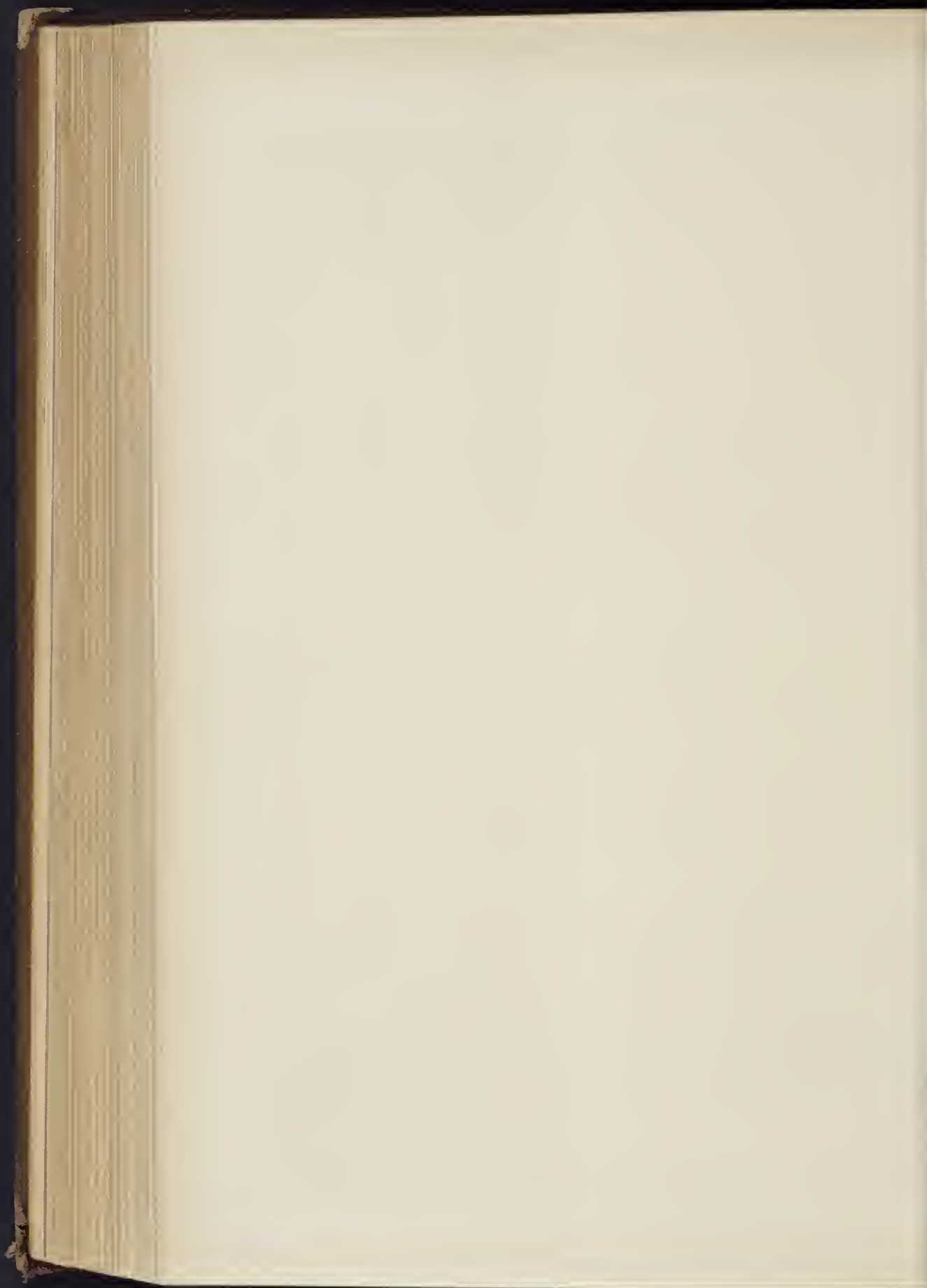


Reissite St. Hippolyte in Delft, J. C.

Herr P. J. H. COUPEERS, Architect.

THE CHURCH OF ST. HIPPOLYTE AT DELFT.

FRANK T. BAGGALLAY, DEL.
F. T. Bagallay, Lith. & Printer



COMPETITIONS.

with Mr. John Fowler, the engineer, they designed the Gorton depot, and various stations and works on large sections of the Manchester, Sheffield, and Lincolnshire Railway. These were followed by some important hotels built for this and the Great Northern Company,—the Victoria Hotel, Sheffield, 1860; the Railway Hotel, Grimsby, 1863; and the Great Northern Hotel, Leeds, 1865. This last commission, obtained in a limited competition, afforded scope for Mr. Hadfield's practical talent and matured experience. The plan is meritorious, and has proved to be well considered. As a design, the building is a very effective one. Profuse ornament is eschewed, and much judgment is shown in the application of detail, all of it suitable, and generally evincing originality.

Having practised alone for a few years, Mr. Hadfield took into partnership, in 1864, his only son, Mr. Charles Hadfield, who had completed his education by passing through the student's grade of this Institute. With continued activity a number of civil and ecclesiastical buildings were carried on,—Bleak House, the residence of Mr. Fowler, the engineer, and Thornbury, for Mr. Mappin, M.P.; the Sheffield Club House, the banks at Chesterfield, Rotherham, and Mexborough; the Gas-office, the Drill-hall, and the Intake Public Cemetery, at Sheffield; the Custom-house at Grimsby; the Market-hall, Howden; and the Institution for the Deaf and Dumb, near Tadcaster, besides various houses, schools, churches, and convents, that at Mount Pleasant, Liverpool, being one of the more effective designs. Between 1859 and 1865 a gate-house, a chapel, and some monumental works were carried out at Arundel Castle; a more recent commission from the Duke of Norfolk to Mr. Hadfield being the Sheffield Corn Exchange, in 1878. This was among the best works to which he gave serious attention. (It is a large and richly-executed building, in the Tudor style, comprehending an hotel, the Norfolk estate office, and other offices and chambers, with shops under, so planned as to enclose a central glazed court,—the corn-market itself.)*

Many of our members have enjoyed the acquaintance of Mr. Hadfield, who joined the Institute as an Associate in its earlier years, and who had become in time one of the elder Fellows, and had served on the Council.

In professional, as in private life, Mr. Hadfield was always genial, tolerant of opinion, and popular, though able to hold and express his opinions with weight; and among his townsmen he bore a high character. He took part in advocating several public improvements, and was one of the founders of the Gentleman's Club. Another object which he strenuously worked for was the School of Art, and providing a home for it in Arndel-street, Sheffield. After holding the office of President for three years, he continued to be a member of the Council.

Mr. Hadfield died on March the 9th of the present year at his residence, Knowl House, near Sheffield, at the age of seventy-two years.†

DETAILS OF THE "TITE PRIZE" DESIGN.

We give this week two of the sheets of detail from the design by Mr. J. A. Campbell for "A Pavilion at a fashionable watering-place," which gained the "Tite Prize" this year at the Institute of Architects. The general elevation and plan we gave in the *Builder* for March 25. The first page shows part of the external elevation, in which the author has contrived to impart to those time-honoured "properties," the griffin and the "swag," rather more than their usual effectiveness: the second page shows a portion of the interior of the music-room, the detail of which is elegant and suitable.

"Things one would rather have left unsaid."—Fair visitor at a studio on "Picture Sunday."—"Thanks so much for giving me this opportunity of seeing your Academy picture, Mr. McDuffier,—and good bye!" He. "Delighted to have seen you. I suppose you are now going to see Smythe's picture, over the way?" She. "Oh, no! I shall see that at the Academy, you know!"—*Punch*.

* Several of the buildings enumerated have been illustrated in the pages of the *Builder*. Of the Sheffield Corn Exchange we gave a large view and plan in our number for November 12, 1861. Another important and effective building, being the new offices for Messrs. Pawson & Brailsford, printers and lithographers, Church Gates, Sheffield, was illustrated in our pages by a large view and plan more than a year ago, viz., February 23, 1864.

Public Baths for the Borough of Stockport.—The award in this competition was made some months since, when the design submitted by Mr. J. C. Prestwich, architect, Leigh, near Manchester, was placed first, subject to the estimates for the work being obtained by the Corporation within the stipulated sum of 5,000*l.* given in the "Instructions to Competing Architects." The Sanitary Committee of the borough met on the 6th inst., when tenders were opened, the whole of which will be found in our list of tenders, the lowest and accepted tender being 4,865*l.* The work will be at once proceeded with, under the supervision of the architect.

Co-operative Stores, Jarrow-on-Tyne.—The building committee of the Jarrow Industrial Co-operative Society, having invited architects to send in competitive plans for their new premises in Hill-street, have received ten sets of drawings, from which they have selected those bearing the motto, "Commerce," by Mr. J. W. Hanson, of South Shields and Jarrow, and have appointed him architect for carrying out the work.

New Church Schools, Accrington.—It having been decided to erect new schools in connexion with the above church, in Hargreaves-street, Accrington, the Committee invited the following architects to submit designs, viz.:—Messrs. Maxwell & Tuke, of Manchester; Messrs. Stones & Gradwell, of Blackburn and Accrington; and Mr. George Baines, of London. The plans sent in have been on view for the last fortnight, and, on the 26th ult., a meeting of the members of the church was held, at which the recommendation of the Building Committee, that the design submitted by Messrs. Stones & Gradwell be accepted, was confirmed. The building will be erected on the site of the present school, which, however, will be enlarged by the acquisition of three houses adjoining. It is expected that the cost will be about 3,500*l.* The design chosen shows two entrances,—the main entrance in Hargreaves-street and one in Chapel-street. Accommodation is provided on the ground-floor for 304 girls, 176 infants, and 72 babies, with convenient cloak-rooms, lavatories, &c. There is also a private room for the mistress. A tea-making room is also provided, having a lift for communication with the upper floor. By raising a revolving shutter between this room and the adjoining class-room, a large room is obtained for cookery classes. There is ample playground accommodation, part of which is under cover. On the first floor there is a large assembly-room containing 337 square yards (exclusive of gallery at one end) and approached by staircases from both streets. There is also a lecture-hall containing 151 square yards, a large committee-room, and ante-room for use in connexion with the platform; also an ante-room to serve as cloak-room both for lecture-hall and assembly-room. For Sunday-school purposes the assembly-room can be divided into a number of classrooms. The style adopted is Gothic of a simple type.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The seventh ordinary meeting of the current session was held at Queen's College, on the 31st ult. The Vice-President, Mr. W. H. Kendrick, was in the chair. A paper was read by Mr. H. Clere on "Artisans' Dwellings, the Artisans' Dwellings Acts, and cognate Acts of Parliament." The lecturer advocated the adoption of the flat system in preference to the vertical system for artisans' dwellings, and exhibited a number of plans and drawings of proposed and existing buildings in support of this view. A vote of thanks, proposed by Mr. F. Bailey, and supported by Messrs. Franklin Cross, Victor Scruton (Hon. Sec.), H. H. McConnal, T. W. F. Newton, and the Vice-President, was unanimously awarded to the lecturer. After a lengthy reply by Mr. Clere to many points raised in debate the meeting terminated.

Edinburgh Architectural Association.—On Saturday last about seventy members of this Association left Edinburgh by train for Roslin. The scene of the excursion was Roslin Chapel and Castle, and the party were under the leadership of Mr. Andrew Kerr, who read a paper. The lower chapel, which might be regarded as a separate building, with a priest's chamber on the south side, was, he remarked, said to have

been erected by Lady Elizabeth Douglas, and dedicated to the Virgin Mary. The upper chapel, or collegiate church, was founded by Sir William St. Clair, third Earl of Orkney, on St. Matthew's Day (21st of September, 1450), and dedicated to St. Matthew. The present chapel was intended for the choir of the complete building, which had been founded to its full extent. The foundations had been traced a considerable length; but those of the cross west wall were removed about the end of last century. The western part or nave appeared to have been intended to embrace a central, with a double aisle on each side, after the manner of the nave of Toledo Cathedral. The choir was confined to a single aisle on each side of the central one, and a double aisle at the east end, more properly, a retro-choir, embracing four chapels. The entire arrangement of the choir was almost a repetition of that of Glasgow Cathedral, only Roslin Chapel had been more carefully studied in the elaboration of the ornaments. The plan of thirteen of the pillars was the same as that of those in the nave of Segienza in Spain. One special peculiarity of Roslin Chapel was the "horizontal arches" over the side aisles. In these, however, safety arches were concealed by a face ornament on each side. In some parts of the chapel there appeared indications of representations of religious or other allegories, and in the western compartments of the roof Scriptural teachings were plainly represented in the sculptures. The entrance to Roslin Castle had originally been protected by a trench and drawbridge, which were replaced by a stone arch about the end of the sixteenth century. The castle formed an irregular oblong square, with gardens at the south and east sides. On the left of the court was the "Lamp" tower, known by that name on account of signal lights having been displayed from it. The keep or donjon tower at the south-west corner was erected towards the end of the fourteenth century, and the buildings on the west side connecting the towers were built about the middle of the fifteenth century. These contain domestic apartments and a chapel. The buildings existing upon the north-east side were erected between 1597 and 1622, and were arranged for additional servants' accommodation, including a great hall with a fireplace of characteristic design.—At the usual fortnightly meeting of the Association, held on Monday evening last, Mr. D. Purves read a paper on "House Drainage and the Sanitary Arrangements connected therewith." Referring to the question of water-storage, he recommended that cisterns should be placed as near as possible to where the water was to be drawn, and be of such dimensions that the water would be renewed each day; that each cistern should be fitted with plug-valve, and the bottom so sloped that this valve would entirely empty the cistern; that this valve should be connected with pipe and trap to waste-pipe arrangement, and have pull and cord in an accessible position, that the cistern might be emptied without trouble at any time. When it was necessary to have a large cistern a great benefit would be derived by having a division fitted in it, self-acting, with syphon arrangement between the two compartments, so that the whole water could be emptied out periodically instead of being mixed up from day to day. All cisterns should be carefully covered and placed in such positions and so fitted that the unskilled might inspect them conveniently.

Presentation to Mr. Thomas Seward.—At a meeting held at the Crown Baths, Kennington Oval, a few days ago, Mr. T. Seward, who is leaving the firm of Messrs. Higgs & Hill, of Crown Works, South Lambeth, was presented by them with a purse of gold, also with an album from the workmen, while a black marble clock and ornaments, inlaid with malachite, was presented by the foremen and clerks. The clock bore the following inscription:—"March 27th, 1885. Presented to Mr. Thomas Seward, by the foremen and clerks in the employ of Messrs. Higgs & Hill, together with a purse of gold from the firm, as a token of esteem and regard, at the close of thirty-five years' service with them and the late Mr. William Higgs." The annual entertainment afterwards was given by the firm to their employes and their wives, and of whom upwards of 1,000 sat down to a substantial meat tea. Such entertainments bespeak good feeling between masters and men.

REARS OF HOUSES.

SIR,—I think a little consideration will show that the "consensus of opinion" you mention in your issue of the 25th ult. [p. 464] will not be the opinion of the Courts, and for the following reasons. It is an established rule that no Act of Parliament, or any part thereof, can be annulled, except by express language in a subsequent Act, unless the wording of the subsequent Act leaves no doubt as to the cancellation.

Now, in sec. 29 of 18 & 19 Vic., c. 122, there are two classes of houses dealt with: those whose rooms can all be lighted from a street or alley, and those buildings which cannot. The Metropolis Management and Building Acts Amendment Act, 1882 (45 Vict., cap. 14), sec. 14, does not make any mention of any distinction of buildings, but deals with the area at the back, beginning by an increase of 50 ft. on the Building Act before mentioned.

Of course, if the Amendment Act were not an amendment Act, the language "every new building" would clearly mean every building; but as in the Building Act there are two distinct classes of houses, it appears as if it would commend itself to the Courts that buildings lighted and ventilated from a street or alley were not intended to be interfered with, but only those buildings which are lighted in part from the rear; and this really seems the intention, because the amending Act follows the wording of the Building Act, only giving increased air space.

You will notice, in confirmation of this view, the final words in the paragraph in the Amendment Act distinctly state that the provisions of this Act shall be in addition to, and form part of, the rules of the Building Act. Now the increased space is an addition, and there is no word indicating a radical change like the abolition of a right to build premises which can be lighted entirely from the street or alley.

I had my attention called some time ago to this paragraph in a responsible manner; for I received instructions to value for a mortgage a terrace of shops which had been created after the passing of the Amendment Act, and after much consideration of these clauses I advised my clients that the buildings were in conformity with the requirements of the Act.

All will admit the importance of removing all doubt; and, I trust, now you have called attention to the Acts, such a result will ensue.

BANISTER FLETCHER.

** We think that the construction put upon the Acts in our article was the right one, and that the maxim "Leges posteriores priores contrarias abrogant," which specially governs the construing of legislative enactments where they are opposed to each other, applies, and that buildings erected after the Act of 1882 must have the increased area, whether they can be lighted from the street, &c., or not. The rules of the Building Act do not affect the question, as they apply to other matters not within sec. 29 of the Building Act.

THE PROPOSED "GORDON" HOSPITAL AT PORT SAID.

SIR,—If my memory serves me aright, a house was purchased in 1882 at Port Said from Prince Henry of the Netherlands, for "strategic purposes," at a cost of 70,000.

If not made use of militarily,—which I fancy is not likely to be the case,—why should not this mansion be utilised for the memorial in question? I feel sure the nation would approve of its being devoted to such a purpose, and it would help to make the money now being subscribed go further than in the erection of an entirely new building.

C. E.

THE LOWEST TENDER.

SIR,—Whatever may be the legal bearings of the question, I cannot agree as to the expediency or the morality of rejecting the lowest tender, except upon grounds which might be held to justify the act, such as incapacity, or want of position, or previous bad work, which might be even subject of public inquiry if demanded by the builder. Much clamour has been made for many years by the public as to the dishonesty of builders. My belief is, they are as honest as any other class of tradesmen. But the unfair dealing of employers will not tend to make them retain their honesty; and I for one do not see the fairness of making a professedly public offer, equally open to all alike, with the foregone determination to employ some one else, "from neighbourly feeling," if only by their professedly public offer they can heat him down to the lowest penny.

I have had the lowest tender rejected from the want of capacity and position in the man tendering; and again from an attempt to revise the tender after being sent in. If any one

should wish to ensure the employment of a proper man, it is easy enough to invite only such as will satisfy their requirements. Anything like jobbery will only disgust good men, and architects who sanction it will find themselves in a position to obtain only second-class tenders. In a recent case I was on the point of rejecting the lowest, merely on account of its being so low that I feared the work could not be properly done. I feared that I should have lost a most capable and fair-dealing man. The highest was 6,600*l.*, the lowest 4,800*l.*

WM. WHITE, F.S.A.

FIREPROOF FLOORS.

SIR,—We thank you for the insertion in your number of Feb. 28th [p. 321] of our letter on this subject, and as the question raised by your note is one of considerable importance, we are writing again in the hope that the matter may be thrashed out, and a satisfactory conclusion arrived at.

In your note you state that a beam in good concrete requires no top flange.

This opinion, we take it, is founded on the supposition that the concrete and iron form together a compound beam, in which the former takes the compressive, and the latter the tensile strain. If this were so, a series of round rods under the concrete would fulfil the conditions of stability. But when spans of as much as say 16 ft. have to be considered with a thickness of only 6 in. of concrete (by no means unusual dimensions), the impossibility of carrying out such a construction becomes obvious.

Regarding the matter in another light, the weight of the concrete alone represents, in many cases, a large proportion of the total floor load to be supported; and it will be admitted that in making fireproof floors in the usual way, the whole of this load must be carried by the iron beams acting as girders and not as ties, because the concrete before it has set and whilst straining the iron by its weight cannot possibly afford any sensible resistance to compression.

We should also be glad to know your reasons for suggesting that a tee-iron is more effective than a girder section of equal area and weight.

If it could be shown that rolled iron joists with unequal flanges would reduce the cost and increase the efficiency of fireproof floors, we should be foremost in advocating their use; but no such advantages are now patent to its use, regarding the matter merely in its mercantile aspect, we should like to be assured of a sufficient demand before providing a supply with which to meet it.

ROBINSON, DREW, & CO.

** Our "reason" is simply our knowledge of the fact that concrete beams, with imbedded iron bottom flanges only, have been tested to very severe cross strains at Messrs. Kirkaldy's testing works. The sections so tested included various arrangements of iron and concrete, among them the precise one to which our correspondents refer, of a series of round rods embedded in the lower portion of the concrete beam. We have been permitted to refer to Messrs. Kirkaldy's books to confirm our recollection, but the results are not available for publication here. It is, of course, quite possible to have other tests made for the special object of investigating the point, and we should think it quite worth while.

COLLAPSE OF A LARGE-SIZED SEWER.

SIR,—A case of the above has lately happened in the execution of the Dorking sewerage works, and since, although they are not without precedent, such cases are happily rare, particulars doubtless will be of interest to your readers. The pipes were 21 in. in diameter, and 1½ in. thick (Jennings's make), and were first-class specimens of stoneware pipes. They were laid in a trench 13 ft. deep and 4 ft. 6 in. wide. The subsoil strata were alluvial,—upper green sand and gault clay; the latter was nohly and full of water when the trench was excavated, but was got into a dry good condition by means of small agricultural drains laid as subsoil pipes 6 in. below formation level on each side of the trench. The sewer-pipes were laid in the ordinary manner on their barrels, with joint holes for the sockets, which the latter probably touched throughout, but upon which they had no undue bearing. The joints were Stanford's patent (the chipping for which doubtless slightly weakened the pipes), over which a hard clay was worked to prevent leakage. The mode of filling in after the pipes were laid, carried out in accordance with the specification, was unique. The finest material was selected (sifted, if necessary), it was laid to a height of 2 ft. above the highest parts of the first three pipes; other similar material was then thrown upon that and carefully pushed along on to the next pipe, and so on, no ramming whatever being permitted until this fine soft filling material was 2 ft. above the highest parts of the pipes. The remainder was then thrown in and rammed, there being two rammers specified

* The publication of this letter has been unavoidably delayed.

to one filler. The pipes being thus without lateral support (for the loose filling could have been of no possible use in this respect), and practically arches without abutments, it is scarcely surprising that every pipe collapsed as far as the ground had been filled in. The ramming applied to the last 9 ft. of filling consolidated it into one mass, 4 ft. 6 in. wide, which settled bodily. There were 4 ft. of soft unrammed filling at the sides of the pipes, and only 2 ft. on top of them, so that when the mass subsiding had compressed the soft filling on the top of the pipe to its greatest density, the filling at the side was only half compressed; consequently, 13,000 lb. of earth ultimately settled upon each pipe, whose crushing strength was not equal to one-half that weight.

IGNORAMUS.

TEMPLE BAR.

SIR,—I think the site suggested in "Delta's" letter of the 30th ult. [p. 497, *etc.*] for the re-erection of Temple Bar a most excellent one, and in every way more appropriate than carting it away to Epping Forest, where it would be entirely out of its element. In the Temple it would still be "Temple Bar" and amid the most interesting associations, historical and civic; more than this, it would still be in the "City."

There is no difficulty, as we see in this case, in finding suitable sites not only for Temple Bar, but for the Burlington House Colonnade and York Gate, should it be found necessary to disturb the latter; the difficulty is in getting the proper authorities to do the work. With this view one is glad to welcome such letters as "Delta's," and the assistance of every one who cares for the preservation of such interesting monuments, and I sincerely echo his trust that you will kindly exert all your influence in favour of the movement so cordially taken up by the Institute the other night.

J. M. BRYDON.

LIME-MORTAR GAUGED WITH PORTLAND CEMENT.

SIR,—I notice that some builders are now using lime-mortar gauged with Portland cement in connexion with brickwork, and am informed that the work is stronger than when ordinary lime-mortar is used. I consider that the setting properties of the two materials when so mixed are opposed to each other, and cannot understand how any permanent cementing agent can result, and would be glad to receive further information.

MORTAR.

CHELSEA VESTRY-HALL COMPETITION.

SIR,—Being one of the competitors in the above I think it fully right, in fairness to others who may not have the opportunity of viewing the drawings (which are open this week to public inspection at the Cadogan Club, next Vestry Offices), to draw their attention to the fact that two out of the three sets, viz., Nos. 14 and 26, chosen by the assessor, have not complied with the instructions, having sent in coloured drawings, although it was specifically laid down that the "drawings are to be finished in line in Indian ink."

I wish to ask you, Sir, what good instructions are if they are to be flatly ignored? And also of what use are "Professional Assessors," who allow such things in dire contradiction to the same, as I have mentioned?

I enclose my card.

FIAT JUSTITIA REAT CÆLEM.

* The two competitors referred to kept, if we remember right, the spirit of the instructions, which referred mainly to the getting-up of the elevations. One of them did send a coloured detail of a bay of the large room, but we should hope that drawing acted against his chance of selection rather than in favour of it, apart from the question of regulations. We do not think the injustice is more than a merely technical one.

"STREET ARCHITECTURE OF LONDON."

SIR,—I have read the correspondence that has taken place in your columns [pp. 465, 498] in connexion with the above as applied to the new Street from Bloomsbury to Piccadilly, which is now being formed by the Metropolitan Board of Works.

That the entrance to this new street at the Bloomsbury end should be so greatly disfigured must be a matter of regret to all who have the slightest respect for architecture, leaving out of the question the dangerous curve there will be in this important thoroughfare.

It would have been thought that nothing less than insurmountable difficulties could have induced the Board to have so much marred what might have been one of the finest streets in the metropolis. But, from the letter of "A Large Ratepayer" in your last issue, it appears that the Board had every

facility afforded it for carrying out the work in a satisfactory manner.

That a serious blunder has been committed it is clear, and it is not to be wondered at that the parishioners, &c., feel themselves much aggrieved.

ONE OF THEM.

ARCHITECTS v. CORPORATIONS.

SIR,—I have read the decisions in Hunt v. Wimbleton Local Board, and Yeung & Co. v. Leamington Corporation, and as it is a question of interest to the whole profession, shall be much obliged to you, or to some readers, if you or they can inform me whether that law applies to all public bodies that deal with public money.

DUBIOUS.

PROVINCIAL NEWS.

Market Harborough.—Last week Major Tulloch, R.E., held an inquiry into an application by the Market Harborough Local Board for a provisional order to purchase land in the parish of Husbands Bosworth for the purpose of a water supply for this united district. Mr. Rawlins and Mr. Clark represented the Local Board; Mr. Owston and Mr. Thomas watched the proceedings on behalf of the Canal Company; and Mr. Wratistlaw and Mr. Stewart were present in the interests of the Rugby Board of Health. Mr. Owston produced the Grand Junction Canal Act of 1810, showing that the company had the right of water within a thousand yards of their property. He intimated that it was the intention of the company to resist the adoption of the proposed Walton Holt scheme. Mr. Wratistlaw pointed out that the proposed scheme, if carried out, would interfere with the Rugby water supply, and stated that it was the intention of the Rugby Board to oppose the scheme. Mr. Rawlins, Clerk of the Harborough Board, and Mr. Everard, of Leicester, engineer, contended that no one had a prescriptive right to water taken out of the bowels of the earth. Several persons held that the supply of water was in some instances cut off, and in others contaminated by the construction of the large sewers through the town. Major Tulloch laid great stress on the fact that Dr. Grant's report stated that there were in the Local Board district no fewer than 144 houses without water supply. Some doubt was expressed as to the truth of the statement, but the inspector pointed out that a water supply in the legal sense meant a supply on the premises of pure water. He mentioned that water might look beautiful and sparkling, and still be utterly unfit to drink. They could not tell whether or not it was dangerous without analysis. The Inspector, in answer to a question, said Mr. Everard, who was a very careful and painstaking man, told him that he had examined the whole district with a view to obtaining a water supply for the town, and as near to it as possible, and he was sorry to say that he had come to the conclusion that there was no available supply nearer than Walton Holt, which was about seven miles away. If, however, any one could propose a better one and nearer the town he would be glad to consider it.

Bedale.—New kennels for the Bedale Hounds have been provided on the premises known as the Low-street Stud Farm, which were acquired for the purpose. The buildings which formerly comprised the stud groom's cottage, loose boxes, and covered sheds for brood mares and foals, with chambers for provender above, are now converted into huntsman's and stud groom's houses, quarters for the helpers, corn, hay, and straw chambers, and saddle-room, with stabling for twenty-two horses, and lodging-rooms for the dog and hitch packs, whilst another wing, containing cooking-house, feeding-house, three spare kennels, with rooms for the whips, and meal-chamber above, has been newly built, and a room for drying saddlery, &c., a spacious washing-box for horses, and a fish-house or larder have also been added. A row of wooden houses, for hitches with puppies, given to the Hunt by Major Dent (the late master) has been removed from the old kennels and placed in a sheltered and dry situation, within a neatly-fenced grass yard in the corner of the kennel field, near at hand. Before commencing the alterations and additions required, the committee commissioned Mr. Henry Walker, architect, of Whitley, to visit Lord Middleton's kennels at Birdsall, near Malton, also other kennels, and when the plans were completed tenders were advertised for, and the contract for the work was let to Messrs. G. & B. Mackenzie,

builders, and J. Todd, joiner, of Catterick, Messrs. Mattison, of Leeming Bar, doing the ironwork, and Mr. William Wray, of Catterick, the painting.

Plymouth.—A West-country paper says that Mr. John Pethick, builder and contractor, of Plymouth, has ceased to be the Government contractor for repairs at the Royal William Victualling Yard, Royal Marine Barracks, and Royal Naval Hospital at Stonehouse. For a considerable number of years Mr. Pethick has been fortunate enough to secure the triennial contract for the repairs in these establishments and also in the dockyards at Devonport. But this year he loses both contracts. The work is to be done by the Director of Works Department at the Dockyard by Government instead of contractor's labour, contracts being entered into only for the materials. In the Hospitals, Victualling Yard, and Barracks at Stonehouse the old system of contracting for labour and materials is to remain in force, but the tender of Mr. Marshall has been accepted for the three years, commencing April 1st, instead of Mr. Pethick's. Why the Admiralty should continue the old system for the three establishments at Stonehouse, and abolish it for those at Devonport, is not, says the paper in question, very clear.

Oxford.—The venerable clock of New College, which has for so many centuries sounded the hours at this College, having become unfit for further service, is now replaced by one of new and superior construction, from Mr. J. W. Benson's Steam Clock Factory, on Ludgate-hill. Graham's dead-heat escapement, a compensated pendulum, and all the latest improvements have been introduced. The clock will strike the hours on a great tenor bell of 1 ton 3 cwt., and chime on eight smaller bells the well-known Oxford quarters.

Harrogate.—It is proposed to rebuild, on an enlarged scale, the Harrogate Bath Hospital, at a cost of about 15,000l., the old structure, built sixty years ago, having become too small and unsuitable for the demands made upon it. The site now comprises an area of four acres, and it is proposed to provide accommodation for 100 resident patients.

CHURCH-BUILDING NEWS.

Kingsbury.—Kingsbury Church, Middlesex, which has hitherto occupied the fate of suburban churches, is about to be enlarged and restored, at the instance, it is said, of the Ecclesiastical Commissioners, who have refused to divide the parish until the old church has been enlarged. The church is remarkable for its extreme simplicity, being a mere parallelogram on plan, about 70 ft. long by 18 ft. 6 in. wide, without aisles or chancel. It is almost entirely without decorative features, but impresses by its absence of pretension. It retains its original roof, which is celled and is, apparently, in good preservation, if one may judge from the firm line of the ridge externally and the general condition of the slating. The walls are of flint, with fire-stone quoins, and are coated with rough-cast, portions of which have been removed in places, it would seem, with a view to its entire removal. It is to be hoped, if there is such an intention, that it will not be carried into effect, as it will certainly render the church damp. On the south wall, near the altar, is a small brass, removed from a ledger in the centre of the nave, to Thomas Scudamore, described as a servant of Queen Elizabeth and King James for forty-seven years, who died in 1620. On the opposite wall is an upright ledger with a brass, to the memory of John Shephard, knight, who died in 1520, with effigies of himself, his two wives, and their eighteen children. There are marble tablets on the north wall to a Countess of Mansfield, who died in 1560, and were her daughter, who died in 1580, and were buried in the church, and a similar tablet to Lady Vernon, who died in 1553. Dr. Stukeley, in his account of the Brill, prefixed to his "Iter Boreale," supposes that the church stands within the site of a Roman camp, which was Caesar's second station after he had passed the Thames. Lysons asserts that the name of the place denotes a royal residence,—perhaps, of some of the Saxon monarchs. It is certainly a place of great antiquity, Edward the Confessor having made a grant to Westminster Abbey of one-third of the fruit growing in his woods there.

Manchester.—On Easter Eve the reredos

erected in St. Matthew's Church, Ardwick, Manchester, in memory of the first and late rector, was unveiled immediately before the evening service. The central feature is a cross of white alabaster, 6 ft. high, with a background of red veined marble, which stands under a boldly-projecting canopy supported by shafts. At either side of this central cross and canopy are two arches with back-grounds of coloured alabaster, and which contain carving emblematical of the eight Beatitudes. On each side of the head of the canopy are five cusped arches. A battlemented cornice completes the structure at the top. Immediately above the Communion-table is a shelf of red marble; and beneath the foot of the cross are carved the words "Till He Come." The narrow spaces between the reredos and the north and south walls of the sanctuary are filled with a diaper of terra-cotta and stone. The design has been made by Messrs. Medland & Henry Taylor, architects, of Manchester. The work has been carried out by Messrs. Earp & Hobbs, under the superintendance of the architect.—A carved oak pulpit, and lofty pyramidal canopy, have recently been placed in St. Paul's Church, Manchester. They have been designed by Messrs. Medland & Henry Taylor, of Manchester, who suggested the canopy, as a sounding-board was necessary to enable the preacher to be heard at all, and also to relieve a certain baldness in the appearance of the interior of the church.

Holbeck.—The Church of St. Matthew, Holbeck, after having been closed during upwards of three months for alterations and re-decoration, was re-opened by the Bishop of Ripon on Saturday last. Holbeck Church is an edifice capable of accommodating more than 1,000 worshippers. Prior to the alterations it was furnished with the old-fashioned, uncomfortable, and unsightly straight-backed pews, in five of which there were tables. The entire body of the church has now been seated with open pitch-pine benches of a uniform size, the seats being covered with carpet. The windows in the nave have been reglazed, and the walls painted in light colours so as to relieve the interior of its heavy appearance. Formerly the gallery ran to the chancel opening, but now the ends are rounded off, with the result that a considerable amount of additional light is secured. The pulpit has been brought out of the chancel and placed against the wall at the end of the gallery on the left-hand side. The gallery front has been painted and all the pews in the upper part of the church. The decoration of the chancel and the ceiling of the nave has been carried out by Mr. Powell, of Lincoln and London. The choir seats are of pitch pine, stained and varnished. The organ has been thoroughly overhauled by Mr. Sagar, of Leeds. Mr. Nicholson (Leeds) is the contractor for the builders' and joiners' work, and Mr. Jackson for the ordinary painting and glazing. The total cost of the alterations and improvements will amount to a little over 1,000l.

Aveton Gifford.—The restoration of the ancient parlous screens which formerly stood between the two easternmost bays of the south arcade in the parish church of St. Andrew, at Aveton Gifford, being now completed, they have just been replaced *in situ*, after an absence of sixteen years from the edifice. In the year 1869, being in a dilapidated condition, and seemingly past repair, they were removed from the church, and lay uncarved for and almost forgotten in the rectory cellar until last summer, when the Rev. W. D. Pitman, the present rector, felt constrained to restore them to their original position, and with this end in view enlisted the services of Mr. Harry Hems, of Exeter, to whom was entrusted their renovation. The screens now re-erected measure about 22 ft. in length, and show much delicate detail. The lower panels on the one side are traceried, and on the other are decorated by the raised "linen" pattern. The upper parts are of open work, and are surmounted by richly-carved cornices and crests. During the progress of the works just brought to a conclusion, fragments of some other screens were discovered. These are to be utilised by being formed into screens destined to occupy the two bays in the north arcade immediately facing those now erected. This additional work has also been placed in the hands of Mr. H. Hems.

Farmley.—The chief stone of St. Michael's Church, Farmley, was laid on Easter Monday. The church is being built in the place of one erected in 1761, which has become too small for

the requirements of the parish. The new building will be a stone-faced structure, with a few traceried windows, and will have a wooden porch, buttressed sides, and picturesque outline. It is designed to suit its special position, which is surrounded by the thick belt of forest trees forming the boundary to Farnley Park. Internally the building will consist of nave, north and south aisles, chancel, organ-chamber, and vestries. On each side of the nave and chancel will be an arcade of arches carried on columns, and crowned with a range of traceried windows. The roof will be of unvarnished pitch pine arranged in deep panels, with moulded principals forming regularly spaced bays. All the walls of the interior will be faced with buff-coloured terra-cotta blocks supplied by the Farnley Iron Company, the surface of which will be varied by one or two bands of ornamental work. All the columns, arches, and other stonework of the interior will be of red stone. The architects are Messrs. Cborley & Cannon, of 15, Park-row, Leeds; the builders being—Masons, Messrs. Wood & Sons, Churchwell; joiner, Mr. J. Taylor, Yeasdon; plumber, Mr. J. Woffenden, Leeds; slaters, Messrs. Sharp & Harper, Leeds. The entire cost of the building will be about 3,000l., exclusive of some of the fittings. The accommodation will be for 420 worshippers, exclusive of the choir. Towards this sum 2,750l. has already been raised, 1,000l. being the gift of the Farnley Iron Company, and another 1,000l. that of Mr. Porson, who laid the chief stone.

Queensbury.—Queensbury Church was reopened on the 2nd inst., after being closed eighteen months for restoration and enlargement. The church was built about forty years ago. For a long time it answered the requirements of the people of Queensbury, but during late years it has been too small for the increasing number of attendants. With the development of the business of Messrs. John Foster & Son, the population has gradually increased. Up to the time of the closing of the church for renovation accommodation was afforded for about 800 worshippers, and all the seats were occupied. By the recent alterations 150 additional seats have been provided. The extensions and improvements have been carried out at a cost of about 5,000l., which has been defrayed by members of the Foster family. The most important part of the improvements is the erection of a chancel, built from designs prepared by Messrs. Healey & Healey, architects, of Bradford, under whose superintendence the various works have been carried out. In harmony with the rest of the building the chancel is in the Early English style. On the west side of the chancel has been placed the new organ, the gift of the late Mr. William Foster. The oak screen and choir stalls have been furnished by Messrs. Marsh, Jones, & Crih, of Leeds. The renovations in the church have been of a complete character. The old-fashioned high-backed pews have been replaced with seats of pitch-pine. The stained-glass window in the chancel, representing scenes in the life of Christ, has been given by the sons of the late John and Ruth Foster, in memory of their parents. It is by Messrs. Strigley & Hunt, of Lancaster. The window in the south aisle, by Messrs. Winfield (late Camm Bros.), of Birmingham, is given by Mrs. W. Foster to the memory of her late husband. The various works in connexion with the alterations and additions have been carried out by the following firms:—Mason work, Messrs. Michael Firth & Son, Queensbury; carving work, Messrs. Farmer & Brindley, of London; joiner's, Mr. James Wilson, of Bradford; plastering, Mr. Dickson, of Bradford; painting, Mr. Harland, Bradford; heating apparatus, Messrs. Clapham Bros., of Keighley; plumbing and glazing, Mr. Michael Stocks, Queensbury; slating, Mr. James Smithies, of Great Horton; lightning conductor, Mr. Davis, of Bradford; tiling, Messrs. Taylor & Parsons, Bradford. The gas-standards and altar-rail have been fitted up by Messrs. Dutton & Power, of Manchester.

Penzance.—The parish church of St. Madron is about to be restored under Mr. Sedding's directions. The church is an interesting one, and it is the mother-church of Penzance.

Iron Storehouses for the War Department.—Having completed their Suakim contract, Messrs. Clarke, Bunnell, & Co., Limited, have received further instructions from the War Office to erect iron storehouses at the Royal Army Clothing Depot, Pimlico.

DISSENTING CHURCH-BUILDING NEWS.

Edgbaston (Birmingham).—The new Wesleyan chapel in Stirling-road, Edgbaston, Birmingham, has lately been opened by the Rev. Dr. Dale, M.A. Although intended eventually as a lecture-hall and school-building, the present structure has been adapted and fitted as a place of worship for the society and congregation, who will at once take possession of it. The architect has adopted the Gothic style of architecture, but has subordinated it to the object sought to be attained, namely, the adaptation of the building for its present and future uses. It has a central hall lighted with clerestory windows, with rooms opening out of it. The new chapel has been designed to consist of a main hall, 60 ft. by 23 ft., with ten compartments or class-rooms adjoining for the accommodation of the various classes when under instruction. These rooms, which are about 12 ft. square, are divided from the principal apartment by glazed and revolving partitions and curtains, so that when required they can all be made available for congregational purposes. Provision is also made for the addition of other class-rooms when necessary, and the position of the superintendent's desk enables him to overlook the whole of the class-rooms when occupied by the scholars. Including the class-rooms, the interior dimensions of the building are 55 ft. by 60 ft. In place of the conventional pulpit there is a rostrum at the recessed end of the building, and the floor is fitted with pews and chairs for a congregation of 400 persons. On the site, however, there is ample space for the future erection of what may be called the chapel proper, to seat 800 persons. The building is lighted by an imposing window at the main entrance, and by several side-lights, all of which are glazed in lead with coloured and tinted glass. The chapel is built of red bricks with red stone dressings, and a half-timbered gable. The cost of the new chapel and the circuit extension scheme is something over 3,000l. The architect is Mr. Ewen Harper, of 57, Colmore-row, Birmingham, under whose superintendence the work has been carried out by Messrs. James Smith & Sons, builders, of Great Tindal-street.

Teignmouth.—The Wesleyan chapel at Teignmouth has been reopened by the taking of the building has been lengthened by the erection of a portion of the school-room, and a new school-room has been constructed. The whole of the old-fashioned pews have been removed, and open pitch-pine benches substituted. A new rostrum takes the place of the pulpit, and immediately behind and above it has been fixed a large stained-glass window. The chapel has also been newly painted and decorated, both inside and out, and the result has been to give the whole building a much lighter appearance. By the enlargement accommodation has been provided for about 150 additional worshippers, and the building will now seat 600. The improvements have been carried out at a cost, including the price of the land for the new school-room,—of between 1,400l. and 1,500l. The work has been executed (from the designs of Mr. John Watson, architect, of Torquay) by Mr. John J. Hayman, contractor, the joiner's work having been entrusted to Mr. R. Valentine.

Truro.—St. Mary's Wesleyan Chapel, Truro, has been re-opened, after renovation and alterations involving a total cost of about 2,000l. Open seats of pitch pine have replaced the old pews. The whole of the works have been carried out from the plans, and under the direction of Mr. Silvanus Trevail, architect. The contractor was Mr. W. Battershill, of Truro, the sub-contractors being,—Mr. W. Glasson for glazing and decorating, Messrs. M. & J. Clements for the masonry, Messrs. Cook & Son, for the plumbing, and Messrs. Smith & Son, Birmingham, for the ornamental ironwork. The organ has been re-voiced, and several stops added to it, by Messrs. Brewer & Co., of Truro.

Scarborough.—On the 2nd inst. twelve memorial stones were laid in connexion with the new Wesleyan Methodist Chapel which is being erected on the South Cliff at Scarborough. The building will occupy a prominent position at the corner of Prince of Wales-road and Ramshill-road. It is designed in the Decorated style of Gothic architecture, and will consist of nave, transepts, and chancel, which, together with an end gallery over the vestibule, will accommodate about 550 persons. A large lecture-room and two class-rooms are arranged at the back of the chancel end, the organ-

chamber opening into the nave and chancel with wide arches. A spire will occupy a prominent position at the south-west corner. The architects are Messrs. Morley & Woodhouse, of Bradford and Bolton. The total cost, including spire, will be about 5,000l.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.	
MARCH 24.	
By JOHN LEES.	
Ashstead, Surrey—A plot of freehold land	263
Reigate, Nutley-road—A freehold chapel and plot of land	400
MARCH 26.	
By BUCKLAND & SONS.	
Windsor, "The Grove House Estate"—34 plots of freehold land	3,855
MARCH 30.	
By G. A. WILKINSON.	
Old Kent-road—Freehold ground-plot of 100l. a year, reversion in 26 years	7,650
Abbey Wood, Kent—"The Cottage," and 1½ acre part freehold and part leasehold	1,680
By TOPPIS & HARDING.	
Notting-hill, Crescent-street—"The Shamrock" Beerhouse, freehold	770
By HUNTINGDON & CO.	
Camberwell, Grove-lane—"The Kerfield Arms," 7½ years, ground-rent 20l.	1,610
Westbourne Park—Southam-street, 77 years, ground-rent 7l. 10s.	400
By HARRIS, VAUGHAN, & JENKINSON.	
Woolwich, High-street—"The Watsman's Arms," beerhouse, freehold	700
MARCH 31.	
By J. & W. JOHNSON & CO.	
Bethnal-green—No. 2, Thomas-street, 61 years, ground-rent 15l.	340
No. 26, Edward-street, 61 years, ground-rent 10l.	360
No. 14 and 15, Matilda-street, 16 years, ground-rent 3l. 8s.	185
No. 4, Russell-lane, 17 years, ground-rent 2l. 15s.	110
By DRENNAN, FEWSON, FARMER, & BRIDGEWATER.	
Clapton-common—29, freehold	1,780
Leith Hill, Surrey—The freehold residence, "Laylands," and 36a. 0r. 17p.	2,150
Seven freehold cottages, and 1a. 0r. 29p.	410
By FARBREBROTHER, ELLIS, CLARK, & CO.	
Grosvenor-squares—4, Upper Brook-street, and stabling, 21 years, ground-rent 200l.	6,000
Borough—2, 3, and 4, Mackman-street, and 2, Great Dover-street, 20 years, ground-rent 300l.	1,300
By REYNOLDS & EASON.	
Tottenham—36 and 38, Vicarage-road, freehold	450
A plot of freehold land	27
Kingsland—33, Buckingham-road, 38 years, ground-rent 3l. 10s.	340
Islington—88 and 90, Southgate-road, 34 years, ground-rent 7l. 4s.	805
Finchley—2 and 12, 12 years, Torrington-squares, 80 years, ground-rent 47l. 10s.	3,025
Notting-hill—An improved ground-rent of 10l. a year	80
Edgware-road—123 and 125, Church-street, and the Temperance Hall, 16 years, ground-rent 85l.	600
Holloway—56 Penn-road, 69 years, ground-rent 10l.	830
By W. HALL.	
Holt, Wilts—Freehold house and la. 0r. 9p.	210
Accommodation land, 22a. 0r. 22p., freehold	1,800
By MESSRS. EICHOOD.	
Hyde Park—38, Albion-street, 37 years, ground-rent 10l. 10s.	1,560
Rogent's Park—61, Upper Gloucester-place, 38 years, ground-rent 22l. 8s.	800
APRIL 2.	
By C. C. TAYLOR & SON.	
Stepney—2 to 7, Angel-alley, cophold	615
By DALE & SON.	
Mile-end—48, Harford-street, 32 years, no ground-rent	350
No. 155, Skidmore-street, 27 years, ground-rent 2l. 10s.	220
Lower Clapton—41, Elderfield-road, 89 years, ground-rent 6l. 10s.	300
By MARSH, MILNER, & LANGTON.	
Shoreditch—42, Duke-street, freehold	355

Church Furniture and Fittings.—Among the works executed by Messrs. Jones & Willis, of London and Birmingham, for use at Easter, are a carved oak reredos for Kirkby Ravensworth Church, and an oak pulpit for the Church of Magourney, Ireland. They have also in hand a memorial pulpit for Ballycastle Church, in memory of the late Dean of Ripon.—Messrs. White & Sons, of Oxford-street, London, have just completed some wrought-iron screens, wrought-iron entrance-door hinges, polished brass altar-rails, and polished brass chandeliers, &c., for St. Agnes's Church, Liverpool; also some work of a kindred character for St. George's Church, Cullinstown, near Newcastle.

Bronley Sewers.—Mr. Hugh S. Cregeen, Surveyor to the Bromley Local Board, writes to say that the sewers reported upon by Mr. Rogers Field, and referred to in a "Note" in our last (p. 474), were not designed by him (Mr. Cregeen), nor carried out under his superintendence.

The Student's Column.

DESCRIPTIVE GEOMETRY.—X.

WE have now become thoroughly acquainted with both the operations of changing the projection planes, and of rotating, which are to descriptive geometry the four rules to which the following problems will show us the method of reasoning we use in attacking any new question we may have to solve. We begin first by analysing the question and finding out what are the divers conditions which the result must satisfy.

Most often there is an infinity of elements (points, lines, or surfaces) which would satisfy each one of the conditions, and we have to determine the series of elements which would satisfy these conditions taken separately; if amongst the divers series of elements there be any one element in common, then that element (point, line, or surface) will satisfy all the conditions of the problem, and therefore it is the result required. A very simple example, taken from plane geometry, will illustrate our mode of reasoning. We are asked to find out a point situated at say half an inch from a point O and three quarters of an inch from a point r.

The first condition will be satisfied by all the points of the circle of $\frac{1}{2}$ in. radius round the centre, O, the second condition by all the points of the circle $\frac{3}{4}$ in. radius round the centre, r. It is evident that the points a and b, where the circles intersect one another, satisfy both conditions of the problem, and are, therefore, the points required. (See fig. 51.)



Fig. 51.

All the problems of descriptive geometry are really as simple as the above; they seem difficult on account of the trouble we have of realising what our drawings represent in space, and this we can only succeed to do by much practice.

Through a straight line, A, carry a plane, Q, perpendicular to a given plane, P.

In this problem we have two conditions, for each of which there are an infinite number of

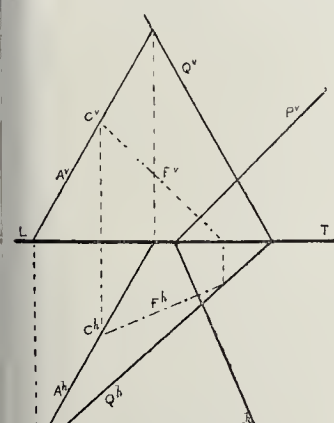


Fig. 52.

answers; an infinite number of planes will pass through the line A, and an infinite number of planes will be perpendicular to any given plane P; but there is one plane which will satisfy

simultaneously both conditions. A plane is determined when it contains two straight lines; of course the requisite plane must contain the line A, condition number one; on the other hand, all the planes perpendicular to the given plane P contain lines perpendicular to the plane P; that is condition number two. Therefore, if through a point, C, of the line A we draw a line, F, perpendicular to the plane P, then the plane Q, which contains the lines A and F, will satisfy both conditions of the problem, and is, therefore, the plane required. (The projections of a line perpendicular to a plane are perpendicular to the traces of the plane.) (See fig. 52.)

We have gone fully into the preceding problem so as to initiate the student in thinking for himself; for we should be very sorry if he only got from us rule-of-thumb learning, with a bundle of recipes for solving a certain number of problems, and no more. In the following problems we shall cut our explanations short, and leave the student the task of reconstituting for himself the general argument on which each solution is based.

Through a point, C, carry a straight line, I, so as to meet two other straight lines, A and B.

We first draw a plane, P, passing through the point C and the line A; then we draw another plane, Q, passing through the point C and the line B, the intersection of these two planes is the line I required. The student will do well to carry out these operations on paper, but as they offer no novelty we shall dispense with giving a figure for the same. Nevertheless this is one of the most important problems which we shall often have to solve in masonry.

Through a given straight line, A, carry a plane, P, having an inclination equal to the angle α given.

The horizontal trace P^h of the plane passes necessarily through the point a where the line A enters the plane of the plan. If by a point, c, of the line A we draw a line, D, following the inclination of the plane P, the foot d of that

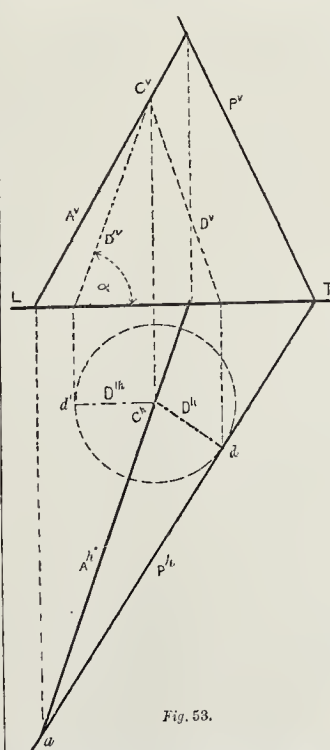


Fig. 53.

line D will be another point of P^h. If round a vertical axis, c^he, we rotate the line D until it be parallel to the elevation plane, the elevation of D^h will then give us its real inclination. We

know that inclination to be the angle α ; therefore, we can draw D^h, the foot of which is d^h. When rotating back the line D to its real position the foot d^h describes an arc of a circle around c^h to get to its position d; we conclude, therefore, that P^h is tangent to that circle. (See fig. 53.)

Given the angle formed by two straight lines and the inclination of each of them, find out the angle they project on the plan.

We can assume that the elevation plane contains one of the straight lines, say C S is its elevation, and L T its plan; this done, we shall take the other line through the point S. If we rotate it round the axis S^hS, we know by its inclination its position S^m when contained in the elevation plane, and that in rotating the point m describes a circle round S^h. If, on the other hand, we rotate the line S m round the first line, C S, as axis, we can again draw it when contained in the elevation plane, for we have the angle, α , it forms with C S. The point m will then be in m^h, and S m^h will equal S m^h; in rotating back, the elevation of the point m will travel on the line m^hm^h, perpendicular to the axis of rotation, C S, we

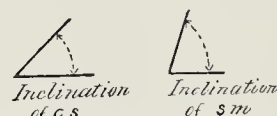
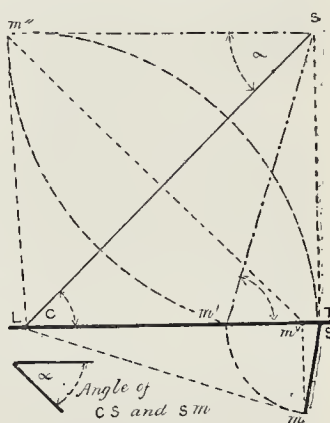


Fig. 54.

deduct therefrom m on the circle formed by m in the first rotation round the axis S^hS and m S^h S^m gives the angle required. A simplification is obtained by the fact that C m is equal to C m^h; therefore, by drawing a circle round C, with radius C m^h, we get m at its intersection with the circle round S^h. (See fig. 54.)

RECENT PATENTS.
ABSTRACTS OF SPECIFICATIONS.

86, Combined Door-knocker and Bell. R. H. Hepburn.

Causing the knocker and bell to sound simultaneously when the knocker is used, the prolongation or rod at its point passing through the door strikes on a bell. The rod may strike the edge of a bell, supported on a central stand, or, in another modification, a bell-crank lever may be substituted for the rod, one end of the lever being carried through the door to bear against the tip of the knocker. The metal piece against which the knocker usually strikes is preferably dispensed with, and a strip of leather may be used to further deaden the sound.

125, Hydraulic Lift. A. Clark.

The dead load of the cage rams, &c., is counterbalanced by a supplementary ram working in an independent cylinder, which is kept in constant communication with the pressure supply. The diameter of the ram is such that it cannot raise the cage by itself, thereby enabling the cage, when empty, to descend.

221, Suspending Corrosive Action of Acids, &c. D. Urphart.

The corrosive action of acids, &c., is suspended by mixing them with absorbent substances, such as infusorial earth. The mixtures thus obtainable are useful for many purposes, disinfectants, cleaning metals, &c.

512, Kitchen Ranges. J. Dean.

Consists in forming a hot-air chamber by a metal casing surrounding the oven, and fastening the same to the range, thus making the range complete in itself, and easily set in position.

1,088, Ventilating Drain-pipe. J. Becket.

An open pipe of U-shaped cross-section is inserted in the house-drain between the house and the sewer. On each side of the pipe the brickwork is built up to the surface of the ground, and the opening at the top is covered by a grating. These pipes may be utilised to form a continuous open drain, in which case the brickwork is dispensed with, and the gratings are laid immediately on the pipes.

6,388, Parquet Flooring. H. A. Duprené, Paris.

The strips or boards which form the floor are supported by an under floor or joists, and prevented from shifting by tongues of wood or metal which fit into suitable grooves made in the ends of the strips, the use of nails or screws being entirely dispensed with.

12,478, Roller Blind. J. E. Hopkinson.

A groove is made along the edge of the roller, either from one end of the roller or at intervals; into this a strip or strips of heavy metals is placed to counterbalance the weight of that part of the blind which is unrolled.

APPLICATIONS FOR LETTERS PATENT.

March 27.—3,910, T. Wood, Improvements in Boilers for Kitchen Ranges, &c.—3,916, E. Omerod and W. Horne, Rendering Cements Luminous and Damp Proof.—3,932, J. Homan, Improvements in Fireproof Floors.—3,945, D. Putzeys, Alarm Extincteur of Fires in Chimneys.

March 28.—3,956, H. Steven and W. More, Improvements in Spiral and other Stairs constructed principally of Iron.—3,958, H. Steven and W. More, Improvements in Sewer Traps.—3,965, E. L. Harmsome, Improvements in Constructing and Carrying up Concrete Walls and other Structures, and in Apparatus for same.

March 30.—4,014, F. Wildgose, Improved Safety Sash Ventilation Bolt.—4,018, E. and E. H. Ludlow, Adjusting and Attaching Door Knobs to Spindles.

March 31.—4,030, W. Willett and H. Ball, Improvements in Rock Drills.—4,067, C. H. James, Improvements in Latches or Fastenings for Doors and Furniture.—4,078, H. Gilchrist and C. Bellamy, Construction of Gas Pliers and Gas Tongs.—4,081, A. Mackie, Improvements in Heating Apparatus.—4,084, G. Redfern, Improvements in Bakers' and similar Ovens.—4,086, W. T. and C. Smith, Mathematical Drawing Instrument or Compass.

April 1.—4,068, J. Taylor, Improved Lock Furniture.—4,105, W. Neilson, Combined Latch and Bolt Locks.—4,119, E. Benn, Improvements in Cutter Bars, or Tool Holders for Turning, Planing, and Shaping Machinery.—4,125, S. Low, Jun., Apparatus for producing Upcast Draught in Ventilation.—4,127, F. Cooper and J. Stanley, an Improved Manufacture of Polishing Material.—4,131, H. Walker and G. Clark, Improvements in Dust Bins.

PROVISIONAL SPECIFICATIONS ACCEPTED.

15,325, W. Watson, Improvements in Decorative and Ornamental Designs—960, A. Graham, Self-acting Bolt-fasteners for Cupboard Doors, &c.—1,372, F. Naunstad, Ventilating Chimney Top.—1,848, F. Potany, An Improved File.—2,035, C. Price, Kils for Burning and Drying Bricks.—2,771, J. R. Cast, Apparatus for Setting the Teeth of Saws.—3,094, W. Sharp, Construction and Glazing of Street and other Lamps.—3,179, C. Nokes, Pulley-wheels for Chandeliers, &c.—3,191, A. Sweet, Improved Cisterns.—3,230, H. Taylor, Movable Ventilating Sewer Manhole Covers and Frames.—3,288, S. Collier, Cross Spring Tip Cart.—3,349, F. Egges, Spring Hinge.—3,346, H. Sans, Improvements in Hinges.—3,409, S. Hellyer, Improvements in Pedestal Wardrobes and Mounting same.—3,464, R. Eversed, Flushing Cisterns.—3,477, T. Wilson and B. Johnson, Chimney or Ventilating Cowls.—2,904, J. Prince, Improvements in Brick and other Kils.—3,000, S. Furnival, Moulds for Moulding Plastic Articles.—3,067, J. and H. Rust, Improved Vitreous Material for Paving Purposes.—3,215, J. Collings, Improvements in Wardrobes.—3,315, D. Macdonald, Damp-proof Walls.—3,422, D. Thomson, Improvements in Ventilating.—3,512, E. Summerfield, Adjusting and Fixing Door Knobs to their Spindles.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

5,931, R. Ormerod, Apparatus for Forming Domes and Circular Buildings in Concrete and Plaster.—8,750, J. Donald, Improvements in Fire Grates.—8,779, J. Johnson, Apparatus for Working Electric Bells.—10,331, V. Monsel, a New Economical Stove.—11,965, H. Curzon, Collecting Rain-water

for Storage.—12,181, W. Bahre, Apparatus for Preventing the Slamming of Doors.—8,899, C. Wenner, Ventilation of Buildings.—2,825, F. Grisler and A. Logemann, Smoke-consuming Furnaces.

MEETINGS.

SATURDAY, APRIL 11.

Architectural Association.—Visit to the Northumberland Avenue Hotel. 3 p.m.

MONDAY, APRIL 13.

Society of Engineers.—Mr. J. Dixon Gibbs on "The Distribution of Electrical Energy by Secondary Generators." 7.30 p.m.

Clerks of Works' Association of Great Britain.—Second Annual Dinner (St. James's Hall Restaurant). 7 p.m.

TUESDAY, APRIL 14.

Institution of Civil Engineers.—Mr. W. Shelford "On Rivers running into Tideless Seas, illustrated by the River Elber." 8 p.m.

WEDNESDAY, APRIL 15.

Society of Arts.—(1) Dr. B. W. Richardson on "The Removal of House Refuse Independently of Sewage." (2) Dr. Thomas Hawkesley on "A Proposal for the Abolition of Water-Carriage in the Removal of Effete Organic Matter from Towns." 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—Quarterly Meeting of Members. 8.30 p.m.

British Archaeological Association.—Mr. E. Maunde Thompson, F.S.A., on "Archbishop Wilfrid's Vocabulary." 8 p.m.

St. Paul's Ecclesiastical Society.—Mr. E. P. Loftus Brock, F.S.A., will read "Some Notes on the Churches of London." 7.30 p.m.

Manchester Society of Architects.—Council Meeting. 3 p.m.

THURSDAY, APRIL 16.

Society for the Encouragement of the Fine Arts.—Mr. George Aitchison, A.R.A., on "Architecture in the Nineteenth Century." 8 p.m.

Institution of Civil Engineers (Special Meeting).—Mr. Thomas Stevenson on "Tides and Coast-Works." 8 p.m.

Dundee Institute of Architecture.—Professor Erwing on "The Sanitary Inspection of Dwelling houses."

SATURDAY, APRIL 18.

Edinburgh Architectural Association.—Visit to Forth Bridge Works and Rosyth Castle.

St. Paul's Ecclesiastical Society.—Visits to St. Giles's Church, Gristlehead (8.30 p.m.); and St. Sepulchre's, Son-hill (4.30 p.m.), under the guidance of Mr. G. H. Birch.

Miscellaneous.

The Proposed Gordon Memorial Hospital.—The choice of Port Said for the proposed establishment of a Gordon Memorial Hospital appears to be adversely commented on by professional and public opinion in Egypt. It is strongly urged that by far the most suitable place is Alexandria. It is the seaport of Egypt, the centre of commerce, and has a population of nearly 200,000. Port Said is an outlandish insanitary little town, with only 12,000 people, of whom about six families are English. There is no highway to it from any part of Egypt except from Suez by the Canal, and ships passing through the Canal do not stop at Port Said. Nor is there any railway communication with it, so that a hospital there could benefit only an odd seaman landed from a passing vessel, or, perchance, a stray traveller. In Alexandria, on the other hand, with its extensive shipping, as the import and the export city of Egypt, a large number of British seamen every year are landed for resident treatment in a hospital. For this they have to depend on foreign institutions, and are attended by nurses that do not always speak their language. English residents, also, in the towns and villages of Egypt, that have no real home where they can be attended to during sickness, go to hospital in Alexandria as the commercial centre, and could not go to Port Said for want of railway communication.—*Lancet.*

The Removal of the Ruins of the Old Tay Bridge.—At the monthly meeting of the Perth Town Council on Monday, Lord Provost Martin referred to the successful issue of the litigation of the town against the North British Railway to have the ruins of the old Tay Bridge removed, and said it would be the mind of the Council that they should give notice as early as possible in the Court of Session for the company to fulfil their agreement. Alluding to the action of the company in asking Parliament to do away with the obligation, he said that it would form a most dangerous precedent were it given effect to.

St. Bartholomew's, Smithfield.—We are asked to mention that the illustrations of the Priory Church of St. Bartholomew-the-Great, East Smithfield, which appeared in the Builder of March 28th, were from a series of photographs taken by Messrs. Bedford Lemere & Co., No. 147, Strand, W.C.

British Archaeological Association.—The meeting of this Association on the 1st Mr. Thos. Morgan, F.S.A., in the chair. Sheraton reported the discovery of the foundations of a small Norman chapel, in a field Ludlow, which has been called "Chapel F" from time immemorial, although there were record whatever of any such building had stood there. The foundations showed it consisted of a simple nave ending in a circular eastern apse. A few encastings were found. Among various antiquities were exhibited by different members several of the singular objects manufactured many years ago by the Whitechapel firm "Billy" and "Charley." Their forged articles were exposed at the time by Mr. Cumyng, F.S.A. (Scott), and some other members of the Association, but so many articles are still current in old curiosity shops, that, in the interests of this generation of collectors, the selection exhibited had brought together by Colonel Adams, F. Mr. Loftus Brock, F.S.A., exhibited a fine bronze mounting of an old English cab, probably a relic of the Great Fire. elaborate paper was then read on Domesday Book, by Mr. W. G. Grey Birch, F.S.A. author treated at length upon the origin of Survey and of the mode of its compilation pointing out that it did not include the entire northern counties, probably an account of the disturbed condition. The three books of Domesday were fully described, and the peculiarities in these pointed out, attention being drawn the long misunderstood portion of the Cambridgeshire portion in the British Museum. The importance of collating the various MSS. dwelt upon, and it was suggested that would afford abundant and useful work for the Domesday Society. A paper by Dr. Alf Fryer, on ancient glass, containing an elaborate of analysis, had to be taken as read, on the lateness of the hour.

Archæology at University College London.—Arrangements have been made a course of five lectures on Greek Numismatics to be delivered by Mr. Barclay V. Ho Assistant Keeper of the Department of Coins and Medals in the British Museum. The following are the heads of the Syllabus:—Lecture I. (April 20), "Coin-types and Religious Symbolism,—Portraiture." Lecture II. (April 27), "The Babylonian and Assyrian Weights, and the Invention of Coined Money." Lecture III. (May 4), "Transmission of the Art of Coining from Asia to Europe." Lecture IV. (May 11), "The Trade-routes from Greece to the West-Magna Græcia." Lecture V. (May 18), "The Greek Coinage of Sicily in the fifth century B.C." The lectures will be illustrated by maps, diagrams, and casts taken from the original coins.

Death of Mrs. G. T. Clark, of Dowla.—We notice with much regret the announcement of the death of the wife of Mr. G. Clark, F.S.A. A Cardiff paper speaks in appreciative terms of her labours among the poor Dowla, a place which is described as "a simple hovel workshop covered with smoke and haunted with a howl which goes on incessantly night after night." In fine weather the east wind reveals sulphur fumes, and in wet, habitation, save the acclimatised, is horrible. How ladies refined and cultured, could elect to live in such a spot, and devote their lives in compassionate labour, with all the greenness of gladness in the world around them, notwithstanding, is one of those facts which do more to support one's faith than any exercise of metaphysics or philosophy.

Wood-block Flooring.—Messrs. Geary & Walker's patent system of wood-block flooring has been adopted for the New Science Art Museum at Edinburgh. This firm has also received instructions to lay their floors at several other important new buildings of various parts of the country. We have before noticed Messrs. Geary & Walker's patent system of laying this kind of flooring. In addition to their method of "keying" the blocks, they also use a new composition which, being very adhesive, forms an additional "key." It is claimed that this composition also preserves the blocks and is damp-proof.

The Institution of Civil Engineers.—The annual dinner of the members will be held on Wednesday, the 29th inst., in the Conservatory of the Inventions Exhibition. After the dinner there will be an informal private view of the Inventions Exhibition, more particularly of the electric lighting arrangements.

Improvements at Burntisland Harbour.
The new sidings and embankment-wall completed at Burntisland, at a cost of 2,800l., are now affording increased facilities for the coal traffic. The south hoist, on east quay of dock, and enlargement of return mains, were provided by Messrs. Armstrong & Co., for 751l., and the same firm substituted an iron framework, on an extended scale, at No. 1 hoist, for the decayed wooden frame, raising the lift from 15 ft. to 22 ft., at an expense of about 927l. Standpipes and tanks have been furnished for Nos. 1, 2, and 3 hoists, for relieving the back-pressure of the return mains, and expediting the lowering of the lifts. A new chimney, 600 ft. in height, is being raised at the engine-house, at an estimated cost, with brick flues, of 200l. Repairs on the dock-heads are almost completed, at an expenditure amounting in the

aggregate to 800l. The masonry has been thoroughly tied back with strong iron rods, fixed to concrete blocks, which is expected to obviate the shifting and cracking of the walls in this exposed quarter. The work of replacing the old cofferdam by a substantial stone quay-wall, running parallel with it, but taking in other 25 ft. of the tidal basin, is being carried out, in successive contracts, by Mr. Thomas Chalmers. This wall is founded on bearing-piles, driven down through clay and mud, a foundation being thus secured at 34 ft. from cope level. It is built with rubble concrete, faced with ashlar, and the remaining 600 ft. is intended to be proceeded with until a junction is formed with the embankment at the head of the tidal harbour. The works have all been designed and superintended by Mr. R. Henderson, the resident engineer.—*Scotsman.*

For Tonbridge Union Infirmary, Messrs. H. H. & E. Cronk, architects, Tonbridge Wells. Quantities supplied:—
 Parnor & Son, Margate £4,370 0 0
 Gullard & Son, Southborough 4,095 10 0
 Balsam, Bros., London 4,659 0 0
 John Jarvis, Tunbridge Wells 3,960 0 0
 Edward Proctor, Woolwich 3,900 0 0
 Edward Wheatley, Tonbridge 3,885 0 0
 James Longley, Crawley 3,853 0 0
 G. & F. Penn, Pembury 3,547 0 0
 Slaters & Son, Leicester 3,514 0 0
 W. & T. Denne, Walmer 3,698 0 0
 W. J. Adcock, Dover 3,670 0 0
 P. Peters, Horsham 3,655 0 0
 R. Webster, Folkestone 3,653 0 0
 J. J. Wise, Deal 3,610 0 0
 John Bingham, Hove 3,097 0 0
 Foster & Dicksee, Rugby 3,590 0 0
 Punnett & Sons, Tonbridge 3,573 0 0
 Denne & Son, Deal 3,480 0 0
 Wallis & Clements, Maidstone 3,383 0 0
 Q. Austin, Tonbridge 2,908 0 0

For the erection of a mission-hall and premises at Myrtle-street, Blackstock-road. Messrs. J. E. Goodchild & Son, architects, 81, Finsbury-pavement.—
 Extra for Screen.
 Woodward £1,250 0 0 £46 0 0
 Flaxman 1,220 0 0 51 0 0
 Chessum 1,169 0 0 40 0 0
 Johnson 1,169 0 0 40 0 0
 Thomas Wontner 1,169 0 0 40 0 0
 Smith & Son 1,154 0 0 35 0 0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Making-up and Sowing Factory-road	West Ham Local Bnd.	Lewis Angell	April 14th	ii.
Out Shoots	do.	do.	do.	ii.
Making-up and Paving Roadways, &c.	Willersden Local Board	G. Claude Robson	do.	ii.
Pumps, Engines, and Sledge Presses	do.	do.	do.	ii.
Painting and Repairs	F. Sage & Co.	do.	April 16th	ii.
Midland Railway Co.	A. A. Langley	Official	do.	ii.
Writings, New Post-Office, Etcetera	Com. of H.M. Works	Official	April 17th	ii.
Aver, Tilbury Dock-road	Saabrooks & Sons	E. C. Allam	do.	ii.
Cast Iron Pipes	Maidstone Wat. Works	E. Easton & Co.	April 18th	ii.
Circular Reservoir	Grds. Haslingden UG.	W. S. Tll	April 20th	xxix.
Wood Paving	Birmingham Public Works Committee	do.	do.	ii.
Engine-House	Tuteham Local Board	De Tape	April 21st	xx.
Lead Material	Lewisham Bd. of Was.	do.	do.	xx.
Roads and Sewers, Chatto's Estate, Clapham Common	do.	W. N. Dunn	do.	ii.
Canals and Locks, South Acton Estate	L. B. and S. C. Ry. Co.	H. G. Turner	April 22nd	xxix.
Leaving Carriageway and Footways	A. Robertson	C. N. Lalley	do.	xxix.
Boundary-Wall, &c., Workhouse School	Met. Board of Works	Official	April 23rd	ii.
Additional, &c., to Orphanage Buildings	Guardians of St. Mary, Kilington	W. Smith	do.	ii.
Public Baths and Free Library	Railway Servants' Orphanage, Derby	do.	April 24th	xx.
New Hospital, Newbury	Rochester Corporation	H. L. Tacon	April 25th	xx.
Alteration, &c., Gutfell Sewer	The Committee	Official	April 27th	xxix.
New Pumping Machinery	Dover Corporation	Official	April 28th	ii.
Extension of Fillets, Utley Reservoir	Rotherham Cer.	J. Mansergh	April 30th	xx.
New Municipal Offices, Police-courts, &c.	Barnley Corporation	H. Holton	May 13th	ii.
Semi-detached Cottages	do.	do.	Not stated	xxix.
Erection of Six Small Houses	Proprietors, Belmont Estate, Sutton	E. S. & H. Bossey	do.	xx.
Recreation of Corn Exchange	Abingdon Corporation	Chas. Bell	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Assistant, Borough Surveyor's Office	Reading Corporation	Not stated	April 14th	xviii.
Resident Clerk of Works	Govns. Luton School	do.	April 16th	xviii.
Clark of Works	Wellington (Somerset) L.B.	do.	April 21st	xviii.
District Surveyor, East Kensington	Met. Board of Works	do.	April 22nd	xviii.

TENDERS.

For new roads and sewers at Bignor, for Messrs. Steel, Dootle, & Marshall. Mr. W. L. Barrett, Assoc. M.Inst. C.E., engineer.
 J. W. Hobbs £4,630 0 0
 A. T. Catley 4,170 0 0
 Thos. Adams 4,289 0 0
 Chas. Chamberlain 4,167 0 0
 W. H. Dewar 4,093 0 0
 J. W. Holtham 4,085 0 0
 F. G. B. Marshall 3,983 0 0
 Bolton, Bros. 3,897 0 0
 J. H. Etheredge 3,839 0 0
 Thos. Rigby 3,832 0 0
 Cook & Smith 3,800 0 0
 Arthur Smith 3,750 0 0
 B. Cook & Co. 3,741 0 0
 John Harrison 3,578 0 0
 Chas. Killingback 3,543 0 0
 Robert Nicholson 3,498 0 0
 Josh. Butt 3,439 0 0
 Wm. Williams 3,350 0 0
 J. C. Trueman 3,305 0 0
 Geo. Newman (accepted) 3,203 0 0

For repairing roads for the Acton Local Board. Mr. Nicholson, Lally, surveyor:—
 A. Waller £6,439 0 0
 Nowell & Johnson 6,125 13 3
 J. G. B. Marshall 6,112 0 0
 James Pizey 5,817 0 0
 B. Cook & Co. (accepted) 5,645 0 0
 [Surveyor's estimate, 6,537l.]

For decorations at the Foresters' Hall, Clerkenwell-road, for the Ancient Order of Foresters:—
 Mann £247 15 0
 Gooden 170 0 0
 Grimston 167 12 0
 Kinloch 134 0 0
 Chapman 123 0 0
 Flintham 122 11 0
 Dearing & Son 109 0 0
 Edes 91 0 0
 Stevens 87 0 0

For English Congregational Church and schools, Colwyn Bay, North Wales. Mr. Gwen Edwards, architect and surveyor, Rhyll, North Wales:—
 Plan A. Plan B.
 Foulkes & Son, Rhyll £2,550 £2,300
 J. Berth Jones, Llanrwst 2,864 2,264
 Owen Lloyd, Colwyn Bay 2,450 2,263
 J. Williams & Son, Rhyll 2,300 2,077
 A. Dorkington 'Rhyll' 2,720 2,000
 E. Roberts, Conway 3,683 1,976
 * Plan B accepted with certain modifications.

For rebuilding 13, 15, and 17, Gray's Inn-road, Holborn as two shops and dwelling-houses, exclusive of shop-fronts and fittings to ground-floors and basements, for Mr. A. J. Hollington. Mr. R. W. Crawley, architect, 12, Trinity-square, Tower-hill:—
 Spaight & Co. (accepted) £255 0 0

For Waanstor Water Supply, for the Frome Rural Sanitary Authority:—
 Hardigg £361 12 10
 Barnes & Sons 321 2 1
 Read 297 0 0
 Vallis 284 10 0
 Bodman & Son 273 0 0
 Smith 252 1 11
 Wilcox 243 0 0
 226 7 0

For the erection of two villas, at Woburn Sand, for Mr. F. Moore. Mr. F. T. Mercer, architect. Quantities supplied:—
 Poole £955 0 0
 Sharrett 910 0 0
 George 890 0 0
 White 882 0 0
 Laughton 870 16 0
 Harrison 819 0 0
 Warton & Walker 814 0 0
 Young 817 10 0

For new drapery premises, for Messrs. Barrett & Greenland, High-street, Hereford. Mr. W. W. Robinson, architect, 21, King-street, Hereford:—
 Wm. Cullis, Victoria-street, Hereford (accepted).

For the erection of Baptist chapel and lecture-hall, St. Benedict-square, Lincoln. Mr. J. Wallis Chapman, architect, London. Quantities supplied:—
 Add if in Pitch-pine.
 Martin & Sims, Lincoln £3,380 £75
 J. & T. Hines, Lincoln 3,293 100
 Walter & Heuman, Horncastle, 3,068 163
 J. M. Harrison, Lincoln 2,982 75
 Richardson, Lenke, Boston 2,944 75
 Cross, Brayford-side, N. Lincoln 2,929 50
 Baines, Newark, Notts. 2,855 29
 Knight, Martin 2,880 29
 Young, Lincoln 2,823 70
 Greenwood, Mansfield 2,809 70
 J. W. Harrison & Sand, Lincoln 2,668 75
 Horton, Lincoln 2,511 35
 Otter & Broughton, Lincoln 2,510 35
 J. B. Harrison, Lincoln 2,490 45
 Storey & Son, Bourne, Lincoln 2,400 50
 J. Crosby & Sons, Lincoln 2,328 50
 * Accepted.

For additions and improvements to the Bull and Bush Tavern, Hampstead. Mr. H. Hardwicke Langston, architect, 9, Great James-street, Bedford-row. Quantities by Mr. F. H. A. Hardcastle:—
 Nightingale £1,930 0 0
 Falkner 1,895 0 0
 Eady 1,861 0 0
 Johnson & Co. 1,850 0 0
 Gould & Brand 1,773 0 0
 Harris & Wardrop 1,769 0 0
 W. & H. Castle 1,763 0 0
 Ridout 1,610 0 0

For the erection of a class-room adjoining the infant school, for the East Grinstead School Board. Mr. S. W. Haughton, architect, East Grinstead:—
 Charlwood Bros., East Grinstead £330 0 0
 W. Pledge, East Grinstead 297 0 0
 G. A. Taylor, Forest Row 285 10 0
 J. Morris, Ashurst Wood 265 0 0
 G. Quickenden, East Grinstead 250 0 0
 * Accepted.

For the erection of schoolroom, North End, East Grinstead. Mr. S. W. Haughton, architect:—
 Head & Wallis, Lingfield £351 0 0
 S. Wolbur, Crawley Down 315 0 0
 G. Beard, East Grinstead 307 10 0
 J. Morris, Ashurst Wood 260 0 0
 Charlwood Bros., East Grinstead 233 0 0
 Foster, East Grinstead 221 0 0
 W. Pledge, East Grinstead 177 0 0
 * Accepted.

For alterations and repairs to Edenbanks, Edenbridge. Mr. S. W. Haughton, architect:—
 Charlwood Bros., East Grinstead £219 0 0
 Beale & Son, Tunbridge Wells 235 0 0
 J. Tooth, East Grinstead 233 0 0
 T. Dives, Lingfield 223 15 0
 D. Smith, Tunbridge 223 0 0
 J. Jarvis, Tunbridge Wells 215 0 0
 Goodwin Bros., Edenbridge 181 0 0
 * Accepted.

Accepted for dwelling-house, bakchouse, &c., for Mr. Mortimer, Spring-road, Bedford. Mr. F. T. Mercer, architect. Quantities supplied:—
 Long £695 10 0

For the erection of public baths, for the Corporation of the Borough of Stockport. Mr. J. C. Prentwich, architect, Leigh, near Manchester. Quantities by the architect:—
 Total.
 £ s. d. £ s. d.
 Cordingley & Sons 6,150 293 205 0 0 6,648 0 0
 Geo. Parkinson 5,291 255 229 0 0 5,775 0 0
 Thos. Norbury 5,338 179 186 0 0 5,706 0 0
 Geo. Warburton 5,265 268 129 0 0 5,623 0 0
 John Mathews 5,129 307 231 0 0 5,558 0 0
 Wm. Winnard 5,052 230 250 0 0 5,530 0 0
 Wm. Brown 5,020 240 237 0 0 5,517 0 0
 W. Southern & Sons 4,969 2 0 303 0 0 5,489 0 0
 Ralph White 4,925 195 215 0 0 5,335 0 0
 F. & W. Meadows 4,905 189 278 16 9 5,302 16 8
 J. Broadhurst 4,900 191 185 0 0 5,275 0 0
 Geo. Macfarlane 4,860 185 280 0 0 5,295 0 0
 R. N. Hill & Sons 4,818 194 215 0 0 5,227 0 0
 W. H. Brown 4,769 192 194 0 0 5,143 0 0
 Peters & Sons 4,765 180 154 0 0 5,049 0 0
 Froggatt & Briggs 4,676 189 244 0 0 5,106 0 0
 * Extra for paving in white glazed bricks to bottom of plunge baths.
 † Extra for roof boarding in lieu of plaster ceilings.
 ‡ Accepted without boarding under slates.

For building four workshops, and repairing four houses, for Messrs. Sampson & Friedlander, at Greenfield-street, Whitechapel. Mr. J. Hudson, architect, Leman-street:—
 Gladding £276 0 0
 Jas. A. Taylor 830 0 0
 Heath 894 0 0
 Isaacs & Cohen 844 0 0
 Coulson Bros. 790 0 0

Accepted for supplying steam lifts to factory at Vauxhall, for Messrs. Barrett & Co. (Limited). Mr. E. K. Rawlings, architect, 3, Victoria-street, Westminster:—
 Waygood & Co. £735 0 0

Accepted for sundry sanitary works to workmen's dwellings, Tabor-street, Southwark, for Mr. E. C. Martin:—
 J. Jarvis & Sons £375 0 0

For new residence and stabling, Hart-hill, Luton, for Mr. J. Enrage. Mr. W. J. Pearson, architect:—
 F. White £1,585 0 0
 D. Parkins 1,559 10 0
 T. Neville 1,462 0 0
 Slough Bros. 1,475 0 0
 Dunham & Son 1,390 0 0
 H. Spencer 1,315 0 0

For alterations and addition to the Addington-square Baths, Camberwell, for Mr. Sparrow. Mr. E. Marsland, architect:—
 Greenwood £380 0 0
 Shipco 851 0 0
 Fisher 835 0 0
 Watson, Dulwich 825 10 0
 Downs 822 0 0
 Thompson 731 10 0

Accepted for alterations to Melford Lodge, Undeshill-road, Dulwich, for Mr. Paulin. Mr. J. G. Baynes, architect:—
 T. Watson, Dulwich £180 8 6

For house in Bath-road, Reading, for Mr. William Weldon. Messrs. Morris & Stallwood, architects, Reading:—
 Bottrell £1,015 0 0
 [No competition.]

For rebuilding 1, Frier-street, Reading, for Mr. W. F. Elandy. Messrs. Brown & Albury, architects, Reading:—

Woodruff	£3,067 0 0	Time.
Wornham	2,543 0 0	33 weeks.
Higgs & Sons	2,523 0 0	32 "
Bottrell	2,499 0 0	34 "
Kingslee	2,295 0 0	29 "
Searle	2,280 0 0	27 "

For rebuilding the White House, Bramley, near Guildford, for Captain Webster. Messrs. Peak, Lunn, & Peak, architects, Guildford:—

Mitchell Bros., Shalford	£2,550 0 0	Finish by
Harvey Brown, Bramley	2,536 5 3	Dec. 31
Martin, Wells, & Co., Aldershot	2,500 0 0	Sep. 30
Pinkley, Milford	2,488 8 2	Dec. 31
Harris & Sons, Working	2,473 0 0	Dec. 31
J. Bottrell, Reading	2,378 0 0	Nov. 9

For house and stables at Wallingford, for Mr. Frank Weldon. Mr. W. Ravenscroft, architect, Reading:—
 Smallbone £2,628 0 0
 Cook 2,623 0 0
 Higgs, Goring 2,622 10 6
 Brasher 2,550 15 5
 Higgs & Sons, Reading 2,543 0 0
 Winkworth 2,521 8 9
 Margetts 2,468 0 0
 Searle 2,440 0 0
 Bottrell 2,390 0 0

For alteration and new warehouse at 158, Old Kent-road, for Mr. A. Bennett. Mr. W. Barnes, architect, Choumert-grove, Peckham:—
 Hiling £179 17 0
 Nore 148 16 0
 Hardiman & Watts (accepted) 128 0 8

For alterations, repairs, and decorations to premises at No. 54, Oxford-street, for the Medical Battery Company. Messrs. Denison & Bargman, architects, 16, Essex-street, Strand:—
 Coils & Son £1,417 0 0
 McLachlan & Sons 1,324 0 0
 E. Triggs 823 0 0
 J. M. Alacey & Son 580 0 0

For a new disinfecting chamber, for the Bromley Local Board. Mr. Hugh S. Cregeen, surveyor:—
 George Gill £124 0 0
 J. Taylor & Son 110 0 0
 T. Crossley (accepted) 114 10 0

For alteration of premises in Albion-street, Leeds (previously occupied by the National Banking Company), for Messrs. Ford & Warren, solicitors, Mr. Thomas Wain, architect, 18, Park-lane, Leeds. Quantities by the architect:—
 Excavator's, Bricklayer's, Mason's, Joiner's, and Carpenter's Work:—
 John Hall Thorp, Leeds £598 15 0
 Franks & Evans, Leeds 585 18 0
 Nicholson & Son, Leeds 584 0 0
 Irwin & Co. (accepted) 550 0 0

Plumber and Glazier's Work.
 Thompson Bros., Leeds 85 0 0
 Lindley, Leeds (accepted) 81 0 0

Plastering.
 Franks & Evans (accepted) 49 10 6

For new laboratory, Reading School. Messrs. Chas. Smith & Sons, architects:—
 Wornham £283 18 0
 Higgs & Son 489 0 0
 Woodruff 487 0 0
 Simmonds 472 0 0
 Bottrell 470 0 0

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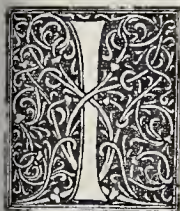
ILLUSTRATIONS.

National Monument, for the "Place de la Nation," Paris.—M. Dalon, Sculptor	547
Lubeck in the Sixteenth Century.—From an Old German Engraving	550-555
Collège Sainte-Barbe: Entrance from Courtyard; Façade to the Rue Valette; Plan.—M. Lheureux, Architect	546, 558-559, 563
Portion of Design for a Municipal Mansion (Scene Medallion, Medal of Merit).—By Mr. J. Thompson	562

CONTENTS.

The Smaller Classical Museums of Northern and Central Italy	527	Portion of a Design for a Municipal Mansion: Scene Medallion	544	Lime Mortar gauged with Cement	567
The Decoration of the Pantheon at Paris. By Charles Yriarte	538	Competition	544	Superimposed Iron Columns	567
The Metropolitan Board and Bills in Parliament	540	The Northumberland Avenue Hotel: Visit of the Architectural Association	565	Interlocking Roof Tiles	567
Notes	542	The Architectural Association Soirée	565	Collapse of a large-sized Sewer	567
School Boards and Architects	542	The Distribution of Electrical Energy by Secondary Generators: Society of Engineers	565	Coloured Cement	567
Association of Municipal and Sanitary Engineers and Surveyors	542	Becker's Patent Cooking Apparatus	566	Recent Patents	567
Agricultural Resources of India	543	Clerks of Works' Association of Great Britain	566	Recent Sales of Property	568
Competitions	543	Harbours and Docks	566	Meetings	568
Monument designed by M. Dalon	544	Open Spaces in Rear of Houses	567	The Student's Column: Descriptive Geometry.—X.	568
Lubeck in the Sixteenth Century	544			Ecclesiastical Art Exhibition	570
The Collège Ste. Barbe, Paris	544			Miscellaneous	570

The Smaller Classical Museums of Northern and Central Italy.



N the matter of classical archaeology, modern Italy is doing her best to redeem a mis-spent past. Treasures of art she has always cherished with an eager, if somewhat ignorant, reverence; and the materia of archaeology, which has an interest and a charm, scientific instead of sensuous, she too often ruthlessly destroyed. Every lover of art has stopped to look at the wonders of Greek vase-painting gathered together in careful selection in the Etruscan Museum of the Vatican, but every archaeological student has ached with the remembrance of thousands of inferior specimens willfully broken up as mere unsaleable "roba," at the mouth of the tombs whence they were dug. But such things are of the past. The South sent her message of beauty to the North, and the North has made fitting answer by the colder voice of science. On the summit of the Capitoline Hill stands the German Archaeological Institute, and there North and South have met together and two,—that would be foes, and should be friends,—art and archaeology, have kissed each other.

The right method once inaugurated in Rome spreads quickly to the provinces. Arezzo, Cortona, Chiusi, Orvieto, Corneto, and the like, are all learning that honour, and even profit, come not from the blazoning forth of one or two show antiques, and the fabrication of countless shams, but from the careful and complete excavation of their own local necropolis, and the systematic exhibition and classification of the results. Even so late as five years ago exact information was difficult to obtain in any local collection. The student, as opposed to the purchaser, was a hybrid to be discouraged. Attentive study of a vase or a relief, was supposed to be the preliminary step to a course of bargaining. More vexatious still, the guardianship of archaeological treasures was given over into the hands of custodians as superstitiously jealous as they were ignorant. The old order is not quite passed away, but the new is steadily advancing; the local cicerone still lives, and alas! still lies, but, for the most part, he is supplanted by the authorised and scientifically compiled catalogue. We purpose to gather together a few of the instances in which, especially as regards collections of Greek vases, marked advance has been made.

If we wish to study Greek sculpture we must study what has been found, and still to a large extent remains, in Greek lands. If we want to study Greek vases we must, owing to the accident of Etruscan fashion and Etruscan trade, study what has been found and largely still remains in Italy. The museums of Northern Italy are, naturally, not rich in art treasures, which have been the chief yield of Etruria; but a few scattered treasures have found their way into the museums of Turin and Milan, though, because they are isolated, not into north Italian Guide-books. Egyptologists, of course, know their Turin, but for the classical student there is a small collection of Greek vases, which contains one specimen of special interest, a signed vase by Euthymides. Dr. Klein, in his recent list of signed vases, notes eleven by this master, and to his list we may add the Turin vase as a twelfth. In Milan, if the traveller can disengage his attention from the sensational architectural splendours of the city, he will find, in collections given over for the most part to Medieval "roba," one or two classical matters worthy of note. Foremost among these, in the Museo Archeologico,—now in the basement of the Brera Palace,—is a very primitive bronze situla. It was found in a grave near the Villa Giovia, about three-quarters of an hour from Lake Como. The situla is decorated with *repoussé* work, consisting entirely of a succession of dots. The designs are very crude and early: a frieze of men on horseback, or rather attached to the sides of their horses, for there is no attempt to depict them as riding,—men on foot; stags with branching horns; a doe suckling her young: this last drawn with a very vigorous naturalism. With the situla was found the armour of the dead warrior. The whole contents of the tomb are carefully published by Sig. Biondelli, who supposes the tomb to have belonged to a Gallic warrior. Anyhow, it is of the highest interest as a specimen of local Italian art, before it was subjected to Greek influence. Milan has a right, of course, to her own discovery; but we wish that these rare specimens of early Italian work could be collected together, as their juxtaposition might possibly make some sort of chronological classification possible. Beyond this situla the Museum has scarcely anything of classical interest. A fragment of a wall-painting from the Farnesina, a Roman lamp, representing Actæon and his dogs; and another, with a design of Cupid among flowers, and three small bronzes, *i.e.*, a Spinario, a crouching Venus, and a Mars resting in the pose of the Ludovisi Mars, a small marble copy of the Capitoline Satyr, and a Greek gravestone, complete the list.

The city of Milan has recently been enriched

by the gift to the municipality of the Poldi Pezzoli Collection. The collection under the title, "Fondazione artistica Poldi Pezzoli," is preserved in exactly the same state that it was at the death of the possessor, and the magnificent rooms, furniture, &c., add greatly to its attractions. No one will pass over the fine paintings of Leonardo da Vinci's school, nor the splendid specimens of sixteenth-century enamel work; but the catalogue recently issued makes no mention of the classical gems of the collection. In the Sala Dorata are two small one-handled wine-cups (*cyathoi*), white ground, with black figures. On the one is represented a scene of grape-gathering. Two satyrs perched high up in a vine are busy filling baskets with huge bunches of grapes; on each side of the grape-gathering scene are the familiar "Dionysiac" eyes. This cup is a marvel of delicate execution; the careful balance of the two satyrs, the symmetry of the clusters of grapes, and even of the two baskets, make it also a tiny marvel of composition. The companion *cyathos* is of exactly the same shape and technique, but slightly inferior workmanship. The design represents menads and satyrs on each side of a recumbent Dionysos. The design is framed on each hand by heraldic griffins. Two vases of such conspicuous beauty could not have so long escaped notice and publication, but that they are of small size, and are hidden in the depths of a museum mainly modern and Medieval.

Passing on to Parma, if the student can steal an hour from the study of Correggio, he will find in the Palazzo della Pilotta a small and remarkably well-arranged museum of antiquities, recently re-organised. Among them the contents of an Etruscan tomb found in 1852 near the Porta Garibaldi are especially noticeable, also collections of Greco-Roman antiquities found at Velleia. Among its vases the Parma collection contains the amphora with two scenes between Odysseus and Circe, a subject extremely rare on painted vases. This Parma vase is well known, but in the museum at Bologna we noted a second instance of the same subject, which seems to have escaped hitherto the notice of collectors and monograph writers. Nor is this a matter of surprise, for the vase had suffered severely from fire, and the design, though clearly traceable when once perceived, is, failing the clue, almost undecipherable. It represents Circe, who has started up in alarm from her seat at the threatening approach of Odysseus; to each side the comrades of Odysseus (all with beast-heads) are escaping in various attitudes of amazement and despair. Save for this vase the collection at Bologna is too well known, and through the courtesy of its director, Count Gozzadini, too easily accessible to students, to

need description. In spite of some recent acquisitions its principal attractions still remain the monuments from the Felsinean Necropolis, arranged, displayed, and catalogued in a way that is a model to all Italy.

The Greco-Etruscan museum at Florence is less sumptuously circumstanced than that of Bologna, but its arrangement is not less admirable. The director (Professor Milani) had before him a far more difficult task. In the case of recent excavations, such as those which have in the main supplied the Bologna Museum, the director has but to keep together the objects found in one tomb, and he secures a classification, if not absolutely chronological, at least highly instructive; but where, as in the case at Florence, the Museum is made up of odds and ends, vases that have come out of private collections, discovered no one knows when or where, then obviously classification must be based on internal evidence. Professor Milani is a good representative of the rising school of young Italian archaeologists, trained in Germany for the best of reasons, *i.e.*, that till quite recently Germany has been the only possible place for training. His museum is a model of careful, systematic work. Here, and here only, so far as our knowledge goes, has some attempt been made to classify the vases known as "buccheri nero." Nearly every painted vase of importance in the museum has been photographed, and is thus available for study all the world over. Perhaps the time will come when it will be part of the business of the director of every museum to see that the monuments under his care are thus made readily accessible. The catalogue of the museum is not yet complete.

To pass from Florence to Arezzo is a long descent in the archaeological scale, but Arezzo is fully aware of its importance as the ancient centre of a strictly local manufacture of a peculiar sort of red ware, with designs impressed in relief. The museum once in the charge of the *Fraternità dei Laici* is now in process of rearrangement, and the *Accademia Petrarca* has published a small guide-book in which scraps of archaeology are oddly mixed up with lives of the celebrities of Arezzo and notices of the principal alberghi. A fine collection of miscellaneous antiquities has been got together, and is most courteously shown to visitors, by a local architect, the *Cavaliere Fungini*; its chief strength lies in majolica, but one room is devoted to Etruscan urns and red Arezzo ware.

Leaving Arezzo, we come to the country proper of Etruscan shades, where every city and every museum is set on a hill, and results are not always duly proportioned to difficulty of access. Cortona still rests her claim to archaeological fame on her enigmatic "Muse" and her lamp with eight Sirens; but for these and the lovely view of the *Thrasymene* lake there is little to tempt the archaeologist to climb the hill.

It is otherwise at Perugia. The long-standing collection of Etruscan antiquities in the University has recently been increased by the bequest of the whole of the *Guarda-Bassi* collection. The *Cavaliere Guarda-Bassi* had been a collector from quite early youth, and one who had tempered his zeal with discretion, so that the collection is a fine one. It is a subject for great rejoicing when a private collection merges in a public museum. Family pride can be sufficiently gratified if the collection still bears the founder's name, and the risk of dispersion by illiterate or impecunious descendants is obviated. The gem of the *Guarda-Bassi* collection is, undoubtedly, a beautiful bronze mirror case, with *Bacchus* on a panther in relief. The vase collection of the University museum is not a large one, but it contains a few pieces of great interest. Most of these are catalogued in an admirable little guide compiled by *Angelo Lupatelli*; but there is one noticeable omission. Whether the vase we are about to speak of has been added since the publication of the guide we could not, in the absence of the director, ascertain, but in one of the wall-cases of the fourth room we came unexpectedly on the famous *Troilus* vase, by the potter *Euphronios*. The vase is perfectly well known, pub-

lished by *Gerhard*, and fully discussed by *Dr. Klein* ("Euphronios," p. 9). It was found at *Vulci*, and once belonged to the *Canino* collection; but *Dr. Klein* says of it that the last news of it was that it was sold by auction in Paris, and of the buyer no record kept. How it came into the *Perugia* Museum we are unable to say, but there it undoubtedly is, and, alas! in very bad condition. At *Orvieto*, just opposite the great cathedral front, within a stone's throw of *Luca Signorelli's* demons, are two fine vase collections,—one belonging to the Municipality, the other the private property of *Count Faina*, but, with the utmost generosity, always open to the public. In this latter collection, by far the finer of the two, are some fine specimens of the *Corinthian Kelche*. A complete catalogue is shortly to be published, and will be a very important contribution to the literature of vase painting.

We have kept *Corneto* to the last because it has an importance all its own. The excavations made year by year and still continued in the necropolis of *Tarquinii*, are fast raising the *Corneto* museum to the highest rank. It is at present under the able supervision of *Signore D'Asti*, and contains some of the finest specimens of Greek vase-painting extant. At present no classification is attempted; as year by year brings new material this material is set aside and marked with its date. This classification, though not, of course, attempting to be scientific, has, for the archaeologist who seeks to keep himself *au courant*, obvious advantages. Five minutes in the museum will tell him what is new since his last visit. The "find" of 1884 has not been a very large one, but it has yielded a remarkable archaic amphora inscribed and decorated with the exploits of *Herakles* and *Iphitos*. This vase is in process of publication by the *German Archaeological Institute* at Rome. In fact, at *Corneto* no one has a chance against the Germans; every archaeological prize of any importance is instantly pounced upon by the watchful Prussian eagle who sits upon the *Capitoline Hill*. Scarcely a day passes at *Corneto* without bringing to light some fragment of antiquity. As we went to the outlying Etruscan tombs we passed a trench newly sunk from which two heads of Etruscan type roughly carved had, the day before, been excavated; they lay still by the side of the trench.

A good many of the private collections once existing at *Corneto* have lapsed; the collections of the *Palazzi Bocconera*, *Falzacalpa*, *Margi*, are no more, but the *Bruschi* collection is still kept together. Perhaps nowhere does the vase-student suffer keener pangs. With all courtesy he is admitted; he is begged to honour the house with his name and signature; he is even permitted, though under strict vigilance, to handle the vases. But publish one, even sketch one,—never! And yet that collection contains a priceless *Centaur* cylix, signed by the potters' names, *Aristophanes* and *Erginos*, a matchless archaic amphora with the wrestling of *Peleus* and *Thetis*, a *Dionysos* in a racing galley on a black-figured amphora, beautiful enough to set any archaeologist's heart longing, and he must go away and leave them unknown and, what is worse, insecure.

On the whole, unatters are hopeful for local archaeology in Italy, but, there is no denying it, the subject has still its seamy side, and a seamy side apt to be excessively irritating to the student. The boundary line between *custode* and *direttore* is still in Italy of delicate and anxious demarcation. The civil *custode*, to whom last year you gave a couple of francs, is this year a *direttore*, hristling with importance and red tape. You ask him a question meekly enough, and as he makes answer the misgiving steals over you that this gentleman's academic baptism has not been by total immersion. Thinking in your simplicity that archaeology is neutral ground, you arm yourself with a letter from some Government official of high place and, gladly confident, present it at the local museum only to find that the director is an ardent son of the *Papacy*, and that the door is closed to you for ever. Or you arrive at some obscure

village on the festival of the patron saint: in two hours the diligence will start which is your only hope of return to civilisation for at least a week, and in those two hours the local museum is to be seen; local cults are interesting, but it is trying to find the director prostrate before his patron's skull with the museum keys in his pocket. The Italian innkeeper still survives, *splendide mendax*: as you wearily consume your almost impossible food he still spreads before you his cheaply manufactured "antichità," which, believe him, his own hands took from an Etruscan tomb; only last night he sold half his treasure to an English milord, and another is coming to-morrow; now is your chance. You decline indignantly and rashly embark in a protest against imposture, for next morning you pay the price of the rejected "antichità" in the shape of exorbitant charges for your sour bread and sourer wine. At another time you have come far to see some particular vase long enshrined in your memory, and you hear with some sinking of heart that the collection is about to be moved: the smiling *Sindaco* of the place conducts you three flights of steep stairs only that you may gaze panting on packing-cases sealed with official seals. You offer to return in three weeks or a month; when will they be unpacked? you ask, and the true Italian answer meets and confounds you, "Chi lo sa?" Or, worst of all, you see the object of your desire before you, but high aloft in a glass case, dark with dust and closely locked, and by your side is a boy or girl of ten years old, vested with municipal authority and the keys, or, perhaps, some half idiot old harridan, or all three, and in chorus they declare that the cases may not be opened, that their life is in danger if they do your bidding; but a franc all round soothes them, and the keys are in the lock, but they never turn,—probably never have turned. They are not keys that fit at all, only symbols to terrise the intruder and make him pay black-mail.

These and like sorrows await the seeker after knowledge in the byways of classical lands; but, for all that, if in his heart he carry some love of human nature and a great patience, and in his purse abundance of small change, he will leave Italy well instructed and still better amused.

THE DECORATION OF THE PANTHEON AT PARIS.*

BY CHARLES YRIARTE.



THE entrance of the vestibule, to the right and left, the two portions of cross wall, bounded by two pilasters, were entrusted to *MM. Bonval and Galland*; the longitudinal wall on the right was delivered over entirely to *M. Puvis de Chavannes*, and that on the left to *M. Delaunay*. *MM. Cabanel and Humbert* had the surfaces of the two transverse walls to the left of the cupola, along with *M. Paul Baudry*, the decorator of the *Grand Opera House*. *MM. Levy, Blanc, and Maillot*, were entrusted with the right arm of the cross. Lastly, the longitudinal altar, containing the high altar, was entrusted to *MM. Meissonnier and J. P. Laurens*. *M. H. Chert*, as an artist brought up in Italian traditions, was commissioned to make the cartoons for the mosaic to be executed in the bay occupied by the high altar, in accordance with the traditions of the Byzantine school, and of the *Basilicas of Ravenna* and of *S. Paolo Fuori Le Mura*.

Each of these artists, in the course of his career, had given proofs of his leaning towards monumental art. *M. Puvis de Chavannes*, whose appointment was most contested by the realist school, as well as by the Classicists (a rather singular fate), was, nevertheless, the one who was most in the secret of architectural convenances, and who knew how, abstracting himself from mere detail, to produce the most harmonious effect as a whole. The intervention of *M. Meissonnier*, who paints ordinarily in thoroughly *Liliputian* proportions, was very little expected in a company among whom

* Concluded from our last number, p. 507, ante.

special faculties for painting on a large scale were specially looked for. But it is no secret that the painter of "La Campagne en France," and of "1808," had dreamed for a long time back of an opportunity of showing that the talent of an artist is independent of the size of the surface on which it is displayed. The acceptance of such a work, if out of the line of his usual practice, was the result of an enthusiasm which is part of his very nature; perhaps also of the earnest solicitations of the "Directeur des Beaux-Arts."

What a singular spectacle, in truth, and what an astonishment for posterity, if it had had the opportunity of contrasting with the minute and microscopic productions of M. Meissonnier, the great walls on the Pantheon covered with giants created by the same pencil. But time has passed, and M. Meissonnier, engaged on numerous works, solicited on all sides, pressed by the demands of life, and already touched by the advance of age, has left the walls so far untouched, and it is pretty certain that those who will succeed us will have neither the surprise of contrast which the Directeur des Beaux-Arts wished to realise, nor proof of the efforts of which the artist believed himself capable. The other names which we have cited have their *raison d'être*. M. Alexandre Cabanel made his *début* more than thirty years ago, in paintings of heroic scale. At the Pantheon, with a conscientious punctuality which is rare among artists of any country, he executed with business-like rapidity the "Episodes in the Life of St. Louis." M. J. P. Laurens had for his subject "The Life and Death of Ste. Geneviève." He brought to the task his dramatic talent, his vigorous scale of colour, his conscientious research in archaeology, and a certain unity and spontaneity of style which seems to put out of question all idea of concession to circumstances. M. Levy, a young painter who has, year after year in our exhibitions, grappled with large surfaces, represented the incidents of the "Life of the Emperor Charlemagne"; and when people stand before his painting, there rise to the lips the names of Subleyras, Jouvenet, and other French painters of the seventeenth and eighteenth centuries. M. Blanc had been commissioned to recall the drama of "Attila," and "Clovis at the Battle of Tolbiac." Earnestly pre-occupied with the relation of architecture to decorative painting, he made it his object to produce *silhouettes* of a monumental character; and, the better to mark the epoch of his subject, in the frieze above the horizontal band before named, where most of the artists employed have introduced a procession of personages somewhat in Pan-Athenaic taste, he collected the portraits of most of the remarkable men of the political and social France of the period. M. Maillot, who was to represent, in the rear of the altar where the relics of St. Geneviève are laid, the part which the worship of that saint had played in the city of Paris in the Middle Ages, considered himself bound to look back to that time; and, studying in manuscripts, in frescos, in miniatures, in the sculptures of cathedrals and their beautiful gilt and painted redoses, the costumes, monuments, and manner of the epoch, he restored the epoch itself, and executed his compositions *à la carte*, in a distinctly archaic style. When those works shall have received the toning of time, they will, perhaps, he attributed, at first sight, to a date four centuries previous to that of their actual execution. M. Paul Baudry, the brilliant decorator of the foyer of the Opera House, drawn away from this work by the task of decorating the Château of Chantilly, has as yet executed nothing. M. Delaunay, MM. Bonnat and Gaultard have their works still in their studios, though in a very advanced stage; and, at the time of writing this, M. Humbert, the youngest of the party, is still waited for and has not fulfilled his task.

I hasten to quit these mere enumerations, which may be fatiguing to the reader, more especially since they are not supported by any representation of the compositions of which I am speaking. The most interesting point is in regard to the relation of each painter's

work to the rest, and of the whole to the architecture. The proper medium for such works should evidently have been fresco; but when we consider that our French artists are by no means familiar with this method, and that it is not very compatible with our climate and with our cold churches, it is easy to understand why this idea was abandoned, and it was determined to paint the works as easel pictures, and then attach them to the walls. There is one important point to be borne in mind in connexion with this part of the subject,—oil-painting induces a manner less broad; it is, on general admission, less monumental than fresco, and in total effect it must always lose something from the point of view of unity, for the painting is not so incorporated with the architecture. How is one to connect such paintings with the sober ornamentation of the edifice, and how can one pass without violence from the bare and cold walls to the brilliant vivacity of costumes charged with gold and precious stones, and to the brilliant lighting of the scenes represented?

One of the artists whom I have named, M. Galland, classed among "decorators," and whose speciality, till now, consisted in painting architectural devices, fruits, flowers, and monumental figures (one of the few French artists of the day who has put into practice that fruitful principle of the Renaissance period which wills that an artist should practise all arts simultaneously), was charged with the design of the borders which should unite the paintings with the architecture. He contrived a kind of frieze design, of intermediate type, of medium colouring, obtained by a mingling of gold with grey tones, consisting of wreaths and other decorative elements which achieved the transition, enclosing the compositions as in a border of tapestry. It has been observed that the broad surfaces to be decorated were divided by the engaged half-columns playing the part of pilasters. It was decided to leave the shafts of these half-columns their natural colour, and not to interrupt the three portions of the composition which were cut by these shafts exactly as the lead-lines of a stained-glass window cut through a figure. This was to leave to the architecture its natural rôle, giving at the same time to the painting the conventional character necessary to every composition executed for the decoration of an architectural monument with which it must connect itself.

The spectacle which is presented to the eyes and the mind by such a monument, finished, complete in itself, and which all the arts have united to decorate, may in many ways be compared to the effect of a grand musical composition in which all the instruments and voices have each their own part suited to themselves, but for that very reason contributing so much the better to the effect of the whole. It is rare, at any time and in any country, to find that each of the artists whose aid is called in by the architect (*the chef d'orchestre* whose mission it is to conduct the whole) has that perfect sentiment of discipline from which alone a harmonious whole can result. In the Pantheon, this stumbling block was more difficult to avoid than in any other edifice; for by the special disposition of the plan in the Greek cross form, the eye would take in, in quick succession, the two arms of the cross, and contrast the one with the other. It is easy to understand the risk of entrusting the wall on the right face to a colourist, and letting him have the full bent of his genius, and that of the left face to one who was more especially a draughtsman who would look for his effects in harmony of lines and in tone of retiring half-tints. One can hardly imagine, in short, Ingres and Delacroix summoned to figure face to face with one another in such a decorative scheme. Without saying that the contrast is quite so striking at the Pantheon as in the two cases we have supposed, one can see nevertheless M. Bonnat, whose tones are sombre, and whose shadows are deepened almost to blackness, representing a "Supplice de Saint-Denis," which takes place in an interior, face to face with M. Galland who paints the "Prédication de St. Jean" under the luminous sky of Palestine. Yet for all that, one can hardly expect of artists

who have already won renown (and who keep it by the very force of their temperament) that they should renounce their special gift to bend to the sober scale of the one who is least of a colourist among them. M. Puvis de Chavannes, for example, without troubling himself about the colour-scale of his next neighbour, has struck his habitual note, harmonious, sweet, and pale; and his paintings remind one of faded tapestries, gently and harmoniously discoloured by the hand of time.

The art of mosaic, born in antiquity in a sunlit land, practised later and with brilliant success by the Byzantine artists, and of which the finest examples are still those of Ravenna and of the old Basilicas, has become in our time, for the Western nations, a decorative element which they endeavour to acclimatise among themselves. In a vast *ensemble* such as that of the Pantheon, we must endeavour to make an application of it, and to give to our artists and French school of mosaicists the occasion to show how far they have assimilated the methods of the Italians, which have been looked to as their guides. M. Hébert, Director of the "Académie de France" at Rome, drawing his inspiration from the archaic compositions of the tenth century,—in regard to the necessary convention of form and contours, more bounded even than those of fresco,—must, nevertheless, remain *modern*, under pain of being in violent contrast with the painters charged with the decoration of the wall-surfaces surrounding the high altar. The difficulty may be said to have been surmounted; but one soon feels the necessity of uniting to the brighter surfaces which surround them the brilliant gold and the vitrified ground of the mosaic; and in this effort to apply coloured decoration to a building of which, till recently, the colourless stone was its only ornament, the artist who has conceived it and the architect who has to realise it, have been carried off their feet. It must evidently have been so; all those who have attempted to apply polychromatic decoration to a monument hitherto only adorned by its plain stone surface, know the fate that awaits them. They have not escaped it at the Pantheon. Little by little each day has done something more in adding a new decoration, resulting from the principal decorative scheme, with the risk of finding that, in place of having embellished the monument at the cost of the greatest sacrifices, one has compromised for ever the solemn grandeur and perfect harmony of the building. The mosaic executed in the neighbourhood of the high altar naturally called for a coloured frieze in the entablature; in its turn, this will demand painted fillets on the pilasters; and at this moment, in order that the colourless surfaces remaining may not cause a kind of hole (*un trou*) in the whole work, they have got to the point of ordering, from the manufactory of Gobelins, tapestries which will serve, so to speak, as a binding colour, a passage and transition between the cold surfaces of the columns, plinths, and surbases, and the surfaces covered by the artists; as one sees in the choir of the Cathedral of Cologne and of the churches of Nuremberg, and the majority of those of churches of the Middle Ages which still retain their original decorative furnishing. That done, it has naturally followed that the leading sculptors of the French school,—the Chapus, Falguères, Merciers, Dubois, &c.,—have been called upon, and groups in marble have been placed here and there of a tone warmer than the stone, which assist still further the transition between that and the coloured surfaces. And thus it is that the Pantheon is becoming, from day to day, a museum of contemporary art which will give the precise measure of what the French school can do, in the way of monumental decoration, at this latter end of the nineteenth century.

Obituary.—Mrs. Palmer, of the firm of M. A. Palmer & Co., builders, of 7, Old Gravel-lane, St. George's East, died on Good Friday, at the age of 74 years, of an attack of apoplexy. Mrs. Palmer was one of the oldest inhabitants of St. George's, had been all her life in the parish, and for more than fifty years in the premises in Old Gravel-lane.

THE METROPOLITAN BOARD AND BILLS IN PARLIAMENT.

THE Metropolitan Board of Works has presented petitions against several schemes before Parliament in the present session. Among others the Board has petitioned against the Columbia Market and Railways Bill, on the ground of the insufficient widths of the bridges over Hackney-road and Harwar-street, and that it is proposed to stop up and appropriate the site of certain streets without paying compensation. The petition against the Great Eastern Railway (General Powers) Bill, by which the company seek to obtain powers to widen their main line on the south side between Upper North-street, Bethnal Green, and Devonshire-street, Mile End Old Town, near the Globe-road Station, prays that provision be made for securing in every case an adequate span and headway for bridges over the public streets, for preventing any projections beyond the general line of frontage, for regulating the design of bridges, and providing that any bridge or arch over the public way should be made water-tight and sound-proof, and that any street or way bridged or arched over should be lighted at the expense of the company.

In the case of the Greenwich and Millwall Subway Bill, which proposes to extend the time for the completion of the works and to give compulsory powers for the purchase of land for the purpose of forming a subway under the river Thames between Poplar and Greenwich, the petition alleges that the inhabitants of the metropolis will be injuriously affected if such extension of time, &c., as is contemplated is authorised by Parliament, that the company is and has been entirely unable to obtain the necessary capital for carrying out the work, but that if the powers of the company are extended they will be made the basis of a claim against the Metropolitan Board for compensation in the event of the Board obtaining powers for establishing improved means of communication across the river.

The King's-cross, Charing-cross, and Waterloo Subway, which, although described as a subway, is in reality a railway, is petitioned against, the petitioners submitting that the construction of the proposed subway will involve grave inconvenience and damage which will far outweigh any public advantage which it may afford. It will interfere with the Northumberland-street sewer, the Middle Level sewer (Main Line and Piccadilly Branch), the Essex-street sewer (Main Line), the Fleet sewer, and the Victoria Embankment and Low-level sewer, and derange the present metropolitan system of drainage. It is alleged on the part of the Board that the construction of the subway will probably entirely prevent, and will certainly render more difficult and costly, necessary or desirable extensions and improvements of the Main Drainage system. It is further submitted that the powers sought to be acquired by the Bill with regard to the subsoil of the streets should not be conferred upon a company, but that such subsoil should be reserved for the various purposes for which it may be required by public authorities.

The London and Blackwall Railway Bill, for widening the railway of this company on the north side, between Little Prescott-street, Whitechapel, and Bower-street, Stepney, and on the south side between the last named street and Stepney Junction Station, is petitioned against on the general ground of the interference that would be occasioned to the Board's sewers, and the inadequate means of control provided by the Bill with regard to bridges and arches over the public way.

The London and South-Western Railways (Various Powers) Bill is opposed on similar grounds to the preceding Bill.

The London Central Subway Bill, by which power is sought to construct a railway from Liverpool-street to Charing Cross, is opposed by the Board on similar grounds to those set out in the petition against the King's-cross, Charing-cross, and Waterloo Subways Bill.

The Bill to extend the time for the purchase

of lands and for the completion of the market at Shadwell, authorised by the London Riverside Fish Market Act, 1882, will be opposed by the Board. The powers conferred by the Act of 1882 will expire on the 24th of July in this year, and the time for the completion of the works will expire on the 24th of July, 1887. It is proposed by the Bill to extend the time for the purchase of land for three years, and for the completion of the works for five years, from the time limited by the Act of 1882. The fifty-fifth section of the Act exempts the streets and buildings belonging to the company from the operation of the Local Management Act and the Metropolitan Building Act, and any by-laws or regulations made in pursuance of such Acts. The petition against the Bill alleges that the effect of the section in question will apparently be to exempt the company from the whole of the municipal legislation affecting the metropolis, and that the law with regard to sewerage, drainage, street cleansing, repair and maintenance, the prohibition of buildings constructed of improper materials, the removal of dangerous structures, the levying of local rates, the regulation of the construction of streets, and the various other matters dealt with by the above Acts, would be abrogated so far as the company's property is concerned.

The Bill promoted by the London, Tilbury, and Southend Railway Company recites in the preamble that the company have entered into an agreement for the purchase of the disused burial-ground of a community known as the Seventh Day Baptists in Mill-yard, Whitechapel, and that by reason of the Disused Burial Grounds Act, 1884, the company are prevented from dealing with the land in question, and they seek to be exempted from the provisions of the Act. This Bill is opposed by the Board, on the ground that it is contrary to public policy and Parliamentary precedent that the provisions of a public Act with reference to burial-grounds should be set aside in the manner proposed by the Bill.

The Metropolitan Railway (Various Powers) Bill is opposed by the Board. This company propose to acquire for the purpose of their undertaking an area of nearly two acres of land in the parish of Clerkenwell, on both sides of the railway between King's-cross Station and the Metropolitan Meat Market. This is objected to on the ground that the acquisition of such a large area of ground may lead to considerable crowding and obstruction of the streets in the neighbourhood. It is further submitted by the petitioners that if it should be considered desirable for the company to acquire the land in question the company should be required to widen that portion of King's-cross-road extending westward from its junction with Baker-street, and also to widen and improve the end of Granville-place leading into Granville-square. A portion of an open space forming part of Whitechapel-road is proposed to be taken by the company, and the petitioners suggest that if the company be empowered to acquire this land it should be left open for the use of the public.

The London and North-Western Railway Company propose to lay a single line of rails across Worship-street, Finsbury, for the accommodation of their goods traffic. This is objected to by the Board as being inconvenient and dangerous to the public. The company further propose to acquire the premises known as the Spread Eagle, Piccadilly-circus, for the purpose of their undertaking. The Board by their petition allege that they are advised that if the company are authorised to acquire these premises by their Bill, any building erected upon the site would be exempt from the first part of the Metropolitan Building Act, and they submit that the purposes for which the premises are to be used should be more strictly defined, and that any building erected thereon should be subject to the Metropolitan Building Act.

The South-Eastern Railway Company by their Bill propose to extend the time limited by their Act of 1882 for the purchase of certain additional lands in the parishes of Deptford, Greenwich, St. Martin's-in-the-Fields, and St.

Olave's, Southwark. This Bill is opposed on the ground that the Board has purchased, at a large expense, the land and buildings necessary for the widening of Tooley-street, and that the widening has been completed, but that by reason of the neglect of the company to elect, as they are empowered to do, whether they will purchase the surplus lands, the Board are unable to sell or relet the ground fronting upon the new street. The petitioners further submit that no adequate obligation has been laid upon the company with regard to the rehousing of the labouring classes who will be displaced by the carrying out of the works authorised by the Bill.

The Westminster (Parliament-street, &c.) Improvements Bill contemplates the formation of a company for carrying out certain improvements in the neighbourhood of Parliament-street similar in character to those proposed in connexion with the Parks Railway of last session. The improvements suggested are the widening of Parliament-street between Charles-street and Great George-street to 120 ft., the widening of Charles-street between Parliament-street and Delahay-street to 50 ft., the widening of a portion of Delahay-street to 60 ft., and the formation of a new street, 50 ft. wide, between Parliament-street and Delahay-street. This Bill is opposed by the Board on the ground that the streets are inconveniently planned, and that the estimate of the cost is inadequate for the work. The petitioners further allege that the proposed alterations are of considerable importance, and that, however desirable such alterations may be, they should not be carried out except in a manner to be approved by the Board as the representatives of the ratepayers of the metropolis. Attention has been called to this matter in the House of Lords, as we have already noted (see p. 440, ante). The petitioners refer to the experience gained by the powers conferred by Parliament on the Westminster Improvement Commissioners for effecting a somewhat similar improvement, namely, the laying out of Victoria-street, Westminster. The existence of the powers so conferred, it is asserted, caused great public inconvenience, and ultimately involved the public authorities in considerable expense, and the petitioners are apprehensive of similar results in the present case. If the improvements are commenced and left incomplete, or are delayed, the Board are apprehensive that themselves or the Westminster District Board may be called upon to complete the works.

The Board in every petition against a Railway Bill require that provision should be made in the Bill prohibiting the company from placing any notice, placard, or advertisement on any work or building in sight of any street, or public thoroughfare in the metropolis.

NOTES.

THE Parliamentary debate on the War Office site was reached on Thursday evening, the 9th, after all, but the vote carried merely amounted to a sum of 10,000l. for preliminary expenses. Mr. Beresford-Hopwood moved the reduction of the vote by 1,000l. in order to take the sense of the House in regard to a building which he rightly described as "sadly disappointing," regarded as a production of national art. It was "commonplace, and overloaded with ornament." Mr. Shaw-Lefevre lectured the House on the subject, stating that he had been mainly responsible for the progress of the matter so far, a fact which may account in some degree for the unsatisfactory result obtained. Mr. Shaw-Lefevre's claims to pose as an architectural instructor to the House may be gauged by the fact that he compared the design with that of the Houses of Parliament, to the disadvantage of the latter, and suggested St. George's Hall at Liverpool, as a parallel case of a fine design produced in a competition by an unknown man. Any one who can seriously make such comparisons shows himself entirely without perception of what constitutes greatness in architectural design. Both St. George's Hall

and the Houses of Parliament are emphatically works of *genius*,—marked by the force, originality, and unity of conception characteristic of genius. The new design for the War Offices is simply a draughtsman's design, put together from books and precedents. Mr. Hope's suggestion that the distribution of the rooms should be accepted, and the "carcase clothed with artistic features" is, we fear, one hardly possible to realise without absolutely throwing over the architects; and that, as we have said, would be a breach of faith. But it would be possible to associate with them an architect, say an able man of the modern French school, who would pull the whole design together and supervise the details. Mr. Hope's amendment was supported by 26 votes, as against 45 for the original motion,—a pretty fair support considering how indifferent the subject is to most members of the House. We do not regard the matter as settled yet; and we must caution members against accepting as their instructor in architecture the late First Commissioner of Works, who has made it evident that he has no qualification whatever for such a *role* except that furnished by his recent official position and by his apparently very abnormal self-confidence.

THE Joint-Committee representing the Meteorological Office and the Meteorological Society appointed to take into consideration the question of "the decrease of water in springs, streams, and rivers," and also "the simultaneous rise of the flood level in cultivated countries," have elicited replies containing several series of observations made by various well-known authorities in this country. So far as the available records go, there does not appear to have been either any marked general decrease or increase of the water supply in England, though there have been isolated cases where either or both have been occasionally experienced. During a period of sixty-five years a deficiency of water has occurred in sixteen, at intervals varying from one to eleven years, while there has been an excess in seventeen years. The dry years seem to have occurred at somewhat quicker intervals, for five years out of the sixteen have occurred at seven, nine, ten, and eleven years' intervals, whereas there have been only two intervals of seven and eleven years respectively in the wet year. The causes of fluctuation or increase in the height of the flood levels of rivers depend so much on the characteristics and configuration of the respective basins that it is impossible to base any general conclusion from specific instances, but the fact of any absolute progressive decrease in the aggregate water-supply of a country generally is quite capable of determination. Such decrease, however, has not as yet seemingly taken place in England, though the inconvenience arising from local droughts has been often experienced, and will continue to be felt until measures are taken to store some of the superabundance in certain localities for the purpose of distributing it in times of deficiency to others, or permanently supplementing a defective supply.

THE character of the lines of communication between Russia and the Afghan frontier is a subject of paramount interest for the moment. The basis of any Russian movement may be placed at Michailovsky, on the south-eastern shore of the Caspian, to which spot access is given by the steam flotilla on that sea. From Michailovsky the Trans-Caspian Railway was completed, in September, 1881, to Kizil Arvat, a distance of 144 miles. Thence to Askabad, a distance of 135 miles, the route lies chiefly through desert, or rather deserted country. From Askabad to Sarakhs is 185.5 miles, and from Sarakhs to Herat 202.5 miles, making a total distance of 667 miles from the shore of the Caspian to Herat. The distance from that city to the mouth of the Bokan Pass is 400 miles, as the crow flies, but the road makes a circuit of 600 miles round the foot of the mountains and by the valley of the Helmund River. Between Sarakhs and Herat the road lies through the Robat Pass of the Borkhut Mountains, at an elevation of 3,100 ft.

above the level of the sea, and about 900 ft. above the surrounding locality. Thus, from Michailovsky to Sibi is 1,266 miles, a distance through a difficult and deserted country for the most part, which nothing but a very tempting and definite object could induce a military expedition to encounter.

THE work of piecing together and arranging the shattered fragments of the Pergamene marbles is still energetically carried on at Berlin by the two sculptors, Frere and Possentis. Certain recent combinations have been made which lead Frere to think that the conjectural restoration of the great altar, published by authority, and now widely known, is fundamentally in error. He believes that the great stair-case which led up to the platform of the altar was not, as has been hitherto supposed, on the south, but on the north side. Further excavations will have to be carried out before his conjecture can be proved. Meanwhile, writers and teachers on the subject will do well to hold their doctrine on this point in reserve. Frere has further succeeded in putting together, out of fragments hitherto inexplicable, a very interesting group, in which one of the snakes,—in which so many of the giant figures terminate,—is engaged in battle with a monster somewhat like a crocodile. Probably this fight went on somewhere in the retinue of Poseidon, of whom no trace remains. Two colossal heads,—one of Trajan, the other of Hadrian,—are about to be set up in the Berlin Museum. They are reported to be of splendid execution, and are interesting as belonging to the class of acrolithic statues, *i.e.*, statues the trunk of which was of wood, with armour of bronze, while the extremities were of marble. The statues, reliefs, &c., from the Sabouroff collection, of which we spoke last year before they were shown to the public, are now exposed to view, with the exception of the beautiful Salamis bronze, which is being cleaned. In a paper recently read on the subject of this bronze, Dr. Furtwaengler came to the conclusion,—which, we think, no one will dispute,—that the Salamis bronze belonged to the beginning of the fourth century B.C., and was a work of the Argive bronze school. The long curls, of which slight remains are visible on the shoulders, make it probable that the statue represents Apollo. The statue is the only bronze of any size which we possess from the best period of bronze work. The Berlin *Philologische Wochenschrift* rightly observes that the acquisition of the Sabouroff grave-reliefs raises the Berlin Museum at once to a high rank as regards monuments of pure Attic work. Its fame no longer now rests on the Pergamene marbles only.

A CORRESPONDENT writes:—"On Thursday, April 2nd, another fine bronze statue was found at the new theatre on the Via Nazionale, Rome. It is in a much better state of preservation than that recently discovered; in fact, with the exception of flaws at the knees, it is perfect. The statue represents a boxer seated, and resting himself after the fatigues of the contest. The body is bent slightly forward, the legs are wide apart, whilst between them one hand rests upon the other, the thighs supporting the forearms. The head is turned towards the right shoulder, the open mouth seeming to draw in breath, replenishing the exhausted lungs, so the breasts are somewhat sunken. The thick, curly beard, moustaches, and hair denote strength, which is fully shown in the muscular body. The contest has evidently been severe: the hands are swollen, also the ears, neck, and nose, showing that, although he may be the victor, victory has not been achieved without leaving traces of a hard struggle. The *cestus* is bound round the hand and well up the forearm, ending in a fringe. It is very different from the simple strap, as represented in Canova's boxer in the Vatican, being loaded with a heavy piece of metal across the palm of the hand, thus adding weight to the blow. The statue was found within 4 in. of a wall of the Baths of Constantine, and was evidently buried when those baths were erected; and then narrowly escaped discovery. It was

found seated on the fragment of a capital which fortunately held the figure together, and enabled the workmen to excavate it, and carry it to the Magazine. It is unique, and we should say the man represented is not a Greek. The height of the seated figure is 4 ft. 4 in."

ROME is just now fated to be fortunate. Near the Porta Salaria a necropolis has been discovered, and already not only a number of ancient cippi, but also some sarcophagi, reputed to be of great beauty, have been dug out. These last are in excellent preservation, and still contain the dead men's bones. They are decorated with reliefs of considerable mythological interest. Among the designs are "The Rape of the Leukippidæ" and the "Nurture of Bacchus." It seems that there is some doubt as to whom the spoils belong to, and they are kept, as is usual with discoveries in Rome, as strictly invisible as possible. This habit of being mysterious about discoveries is based on the very commonplace desire to raise the money value in case of a sale, aggravated by the wearisome officialism which always waits upon ignorance.

DURING recent weeks some ordinary works of repair have been in progress in that portion of the crypt of Canterbury Cathedral known as the French Protestant Church. These works required the removal of a portion of the floor, and certain excavations were made. The workmen speedily came upon a large number of fragments of elaborately carved and moulded stonework. They were carefully removed to the office of the Cathedral Architect, Mr. Austin, where they remain, for the most part, for safe custody. They consist, without a doubt, of portions of a very elaborate monument or shrine, being very finely wrought, and coloured blue, vermilion, and gold. The style is that of the middle of the fourteenth century. The fragments are so broken that few of them join, and no portion is of large size. From the repetition of the parts it is possible to recover the design, and to show the nature of the monument to which they belonged. Many of the fragments are portions of delicately-carved canopy-work, indicating that there were many small niches to have such ornamental terminations. Among the fragments was a very small piece of a sculptured robe, evidently a portion of an ecclesiastical figure of life-size, and a single pearl remains embedded, as one of the ornaments of the robe, in the surface of the stone.

ON inspection of the cathedral it is found that several of the fragments of shafts agree in character with the remains known to be those of the shrine of St. Dunstan, on the south side of the choir, just to the east of Archbishop Sandbury's monument. There are here traces of a small projecting structure of which three moulded columns remain embedded in the wall. The return mouldings of the plinths are also visible, and since there are, as well, the marks where the arches and tabernacle work above the columns sprang from, it would be no difficult task to recover the design. The length is marked by the fragments in position, as is also the height. The details of some delicate diaper work agree exactly with what has just been found. Traces of very good wall decoration in colour remain between the plasters referred to, and these indications have additional interest from the discovery now made. The position of the shrine of St. Dunstan is given in the register of Prior Henry, now in the British Museum, printed in Dart's History of the Cathedral. It is expressly stated that his body was in "feretio suo juxta magnam altare versus austrum." The shrine was doubtless demolished at the Reformation, when many other of the wonders of the cathedral were removed. There were here pieces of Aaron's rod, of the clay out of which Adam was made, and several other such "curiosities," as they are called by Professor Willis. Some of the fragments found may prove to relate to some one or another of the shrines removed in the sixteenth century.

A REMARKABLY clear summary of the working of fifteen of the principal railways in the United Kingdom has been prepared by Messrs. Hollebone and Trench, which deserves the attentive study of all railway shareholders. During the six months ending with last December, the falling-off in the merchandise and mineral receipts of these lines amounted to 598,899l.,—a sum which the increase of passenger and other receipts reduced to 472,701l. The corresponding decrease in working expenses was only 50,791l. But the operation of the Cheap Trains Act, 1883, reduced the Government duty, to the advantage of the railway companies, by 136,849l. To the net decrease in revenue thus arrived at, which is 285,061l., have to be added the charges on new capital, amounting in all to 245,018l. On the Metropolitan line the prior charges on capital have decreased by 18,561l.; and on the North-Eastern by 3,746l. During the half-year on the London and North-Western the increase under this head has been as much as 62,728l.; the dividends paid by this great line having fallen off by 89,202l. The Great Eastern, with an increase in gross revenue of 25,287l., accompanied by a decrease of 11,653l. in working expenses (including saving of duty), has paid 28,883l. more in dividend, as well as 14,674l. for charges on new capital, in the year. But this is a solitary case. Four lines have managed not to reduce their dividends, but the balance of the falling off in the net revenue of the lines compared has been 285,061l. And thus a further capital, bearing interest to the amount of 245,000l., has been expended to earn a diminished gross revenue. The deduction from dividends on the ordinary stock of nine of the companies cited is thus as much as 524,754l.,—a loss, if not recouped, equal to a depreciation of more than ten millions sterling in the capital value of these lines.

FORTY-FIVE pounds is not a large sum as consolation for a whole family suffering from typhoid fever, and a son being compelled to take a voyage to Australia in consequence. But these were the damages which were awarded Mrs. Chichester by a jury in an action against her landlord for not putting the drains in order. It appeared in this case of *Chichester v. Lance*, which was tried before Mr. Justice Wills and a special jury, on the 14th instant, that the landlord of the house had undertaken to put the drains in order. We must assume from the case that he did not properly comply with his undertaking, and he has had to pay damages and costs. It will perhaps be a lesson that Baptist Ministers from Wales, for such was the defendant, should not purchase houses in London and then let them, unless they are fully alive to all the responsibilities of their lay as well as their clerical position. It must further be observed in this case that the landlord had agreed to put the drains in order. The tenant, therefore, showed more foresight than many of the class in making such an agreement, and considerable courage in seeking for her remedy in the Law Courts.

THE Superintending Architect of the Metropolitan Board of Works, having regard to the views expressed in the late cases of *Spackman v. The Plumstead Board of Works* and *The Vestry of St. Marylebone v. Rose*, has decided to remodel his certificate as to lines of frontage under section 75 of 25 and 26 Vic., c. 102, as the one now issued does not meet the present state of circumstances.

WE understand that the Buccleuch Memorial Committee have given up their first idea of an equestrian statue, and have commissioned Dr. Rowand Anderson to prepare a design of more architectural character. This, as embodied in the architect's first sketch, consists of a lofty pedestal having three stages of reliefs in bronze, twelve in all, illustrating incidents in the history of the Buccleuch family. A statue of the Duke, in his robes as a peer, surmounts the pedestal. Besides the reliefs there are small detached figures at the angles and heraldic and other emblems. It has been proposed to give the subsidiary decorations to resident sculptors, and to entrust

the statue of the Duke to Mr. Boehm; but nothing is settled as yet.

FROM some correspondence which has reached us it appears that something not very "straight" is going on about the competition for the Newcastle-under-Lyme public buildings. The Assessor, Mr. Lockwood, of Chester, chose, we are told, three designs, signed "For England, Home, and Beauty," "Mind and Body," and "Bonâ Fide," for the first, second, and third premiums respectively. Then it is announced in the local papers that, though the award has been confirmed by the Council, four other designs are to be taken into consideration for possible execution. This, if true, is simply making the competition a farce. If the first premiated design is not the best for the purpose, it should not have been premiated; if it is, it should be accepted for execution.

UNDER the title of the "Common-sense Drying Apparatus" we have before us the particulars of a patented system of drying timber and other things, which seems to us as perfect a one as can be needed or desired, and, beyond the first outlay, a cheap one. The apparatus used by the company who have introduced this excellent system, of which Mr. L. R. Fuller is the patentee, can be fixed to an existing drying-room for the purpose of seasoning all kinds of timber, cut or uncut. The room used requires to be fitted up specially to render the walls non-absorbent, and steam pipes are laid over the floor for warming the air. The timber is first "sweated" by sprays of steam, which dissolve the sap; the air laden with the moisture is extracted by a fan worked by steam and taken to a condenser kept at a low temperature; here the moisture condenses and the air, now dry, is returned to the drying-chamber to be again used to take away more moisture to the condenser, and this process it repeats until the timber is "seasoned." This is simple and we should say most effectual and speedy. The machinery is of American production, but an agency for it has been established in London. The Americans seem to be getting well ahead of us in matters of this kind.

THE subject of cremation is to be dealt with on Thursday, the 23rd, in a lecture at the Parkes Museum by Sir Spencer Wells. It is known that this eminent surgeon has given his strong support to cremation as the system of the future; and whatever may be the difference of opinion among scientific men on the subject (differences arising out of mere sentiment need hardly be taken account of,—they could only have a temporary effect), the systematic exposition of it by so high a medical authority cannot fail to be of great interest.

SCHOOL BOARDS AND ARCHITECTS.

TO the layman it seems very unjust that when a corporation has obtained the benefit of work, it should evade the responsibility of paying for it on the ground that the contract under which it was executed was not under seal. But, as our readers are aware, such is in many cases the law, as we have endeavoured from time to time to show, especially in reference to the latest of the decisions which have thus laid down the law, namely, *Young & Co. v. The Mayor of Royal Leamington Spa*. In delivering judgment in that case, Lord Justice Lindley pointed out that though it was perfectly clear that by the provisions of the Public Health Act, 1875, every contract exceeding 50l. must be under the seal of the urban authority, yet that the general law on the subject was somewhat in a doubtful state. We endeavoured, in a paper on "Contracts of Corporations,"* to explain what that state was; and now there comes another decision which,—at any rate, so long as it is not reversed on appeal,—settles the law as regards work done for a School Board. The case is the more important to our readers, because it settles without doubt,—if it settles nothing else,—that an architect at any rate has a right to recover against a School Board for work done, though the contract under which he has done the work is not under seal.

We refer to the decision of Mr. Justice Mathew, given after taking time for consideration, in the case of *Scott v. The Clifton School Board*. Law Reports, 14 Queen's Bench Division, p. 500 (April number). The work done was that which belongs to the usual business of an architect, namely, preparing plans for buildings,—in this case schools,—and for superintending their erection. The orders under which Mr. Scott acted were agreed to by resolution of this particular Board, and were recorded in the minutes of their proceedings; they were not, however, sealed with the seal of the Board. When work has been done, and it is evident that a person is entitled to some remuneration the law must be very clear to enable a judge to decide against such a claim. There is, however, in the Elementary Education Act, no provision, in so many words, that a contract must necessarily be under seal. But in that statute it is to be found a section which states that "any minute, if signed by the chairman, shall be receivable in evidence in all legal proceedings, without further proof." Mr. Justice Mathew having regard to this section, and to the cases which have decided that some corporations are sometimes liable, so to speak, give the go-by to the cases on the other side, and held that it was unnecessary that the order should be under seal, and that, having done the work, the architect was entitled to be paid for it.

But on a second ground the Judge held the Board liable, and this is, perhaps, even of greater importance than the other part of the case. The 35th section of the Elementary Education Act states that a School Board may appoint a clerk, and a treasurer, and other necessary officers. A part of the third schedule says "the appointment of any officer of the Board may be made by a minute of the Board, signed by the chairman and countersigned by the clerk (if any) of the Board, and any appointment so made shall be as valid as if it were made under the seal of the Board." Mr. Scott was appointed architect to the Board in the manner stated in the Act as above, and the subsequent orders were communicated in like manner by the clerk. The Judge, on this part of the case, held that Mr. Scott had been duly appointed architect to the Board, not for the temporary purpose of planning and looking after the erection of the schools in question, but as a permanent official. It was contended on behalf of the Board that an architect was not such a person as was contemplated by the statute; but said Mr. Justice Mathew, "although after the erection of the schools his duties might not be onerous, there is no reason to suppose that it was intended that he should not continue to act whenever his services were necessary. Further, the regulation is intended to be one of general application, and in large towns where there are many schools there may well be the necessity for the appointment of an architect as a permanent official of the Board."

The application of this case is therefore clearly two-edged; on the one hand, it decides that those doing work for a School Board which is essential to their business as such a Board, are entitled to be paid for the work so done. In this sense the case seems to apply as much to a builder as to an architect. On the other hand, it settles that a person appointed by minute in regular form architect to a School Board, even though the primary object of his appointment be that he shall perform a temporary duty, is a permanent official of the Board, and so is entitled to be paid for his work till his appointment is cancelled.

Association of Municipal and Sanitary Engineers and Surveyors.—A Lancashire and Cheshire District Meeting will be held at Burnley, on Saturday next, April 25th. The members will assemble in the Council Chamber, Elizabeth-street, at half-past eleven a.m. Mr. J. E. Stafford, A.M.I.C.E., the Borough Surveyor, will give a short sketch on subjects of local and of professional interest, and will show and explain the plans of the intended new waterworks, municipal buildings, and hospitals. At one p.m. the members will proceed to the Store Yard of the Corporation and inspect the "Refuse Destructor," "Elevator," and "Tool Sharpener," and afterwards to the new public Abattoirs, River Invert and Gasworks Walls, Danco House, Canal and Railway Bridges, Scott's Sewage Works, and, if time will allow, the Bank Hall Colliery.

* See *Builder*, Aug. 12, 1882.

AGRICULTURAL RESOURCES OF INDIA.

It was not till a rapid succession of famines within the last quarter of a century had brought home to the Government of India the fact that there was almost a total absence of agricultural statistics that any attempt was made to organise a systematic collection of data, agricultural and meteorological, whereby some idea might be formed of the possible annual out-turn of the food crops of the country during the respective seasons. After the last great famine the Home Government despatched Sir James Caird on a mission of inquiry, and, subsequently, special commissioners were appointed, who, in their turn, submitted a very able and exhaustive report, in which, amongst other suggestions, was recommended the formation of a distinct Agricultural Department on whom should devolve the collection of all the information possible regarding the commercial and economic products of India, with a view to their embodiment in periodical reports. At the head of the new department was placed Mr. Buck, a distinguished member of the Indian Civil Service in the North-West Provinces, who has recently given an interesting lecture on the subject before the Society of Arts, under the presidency of Sir J. Caird. As England has so great an interest in all that concerns the economic productions of India, and only a few persons had the opportunity of hearing Mr. Buck's lecture, a brief notice of it will, doubtless, be acceptable to many readers of the *Builder*.

Perhaps one of the points least capable of being correctly apprehended by persons not conversant with India is its enormous size. This Mr. Buck very happily illustrated by comparing it with Egypt—a country very similar in many respects, but with only one-fiftieth of its capacity in every particular. India, though so large in itself, is, after all, but a shred of the vast Asiatic continent, but yet the most valuable portion of it, owing to the fact of its possessing a treasure in its rainfall. This treasure, however, is not by any means equally distributed, and hence arise the great uncertainties in agricultural operations and the extreme oscillations to which the food output is exposed. The problem which has been exercising the Government of India for many years is how those oscillations may be mitigated, if not altogether obviated. Before describing the measures which have been undertaken, Mr. Buck gives a short description of Indian cultivators, and of the prevailing system of agriculture. The former he pronounces to be "the most patient, hard-working, and, in many cases, skilful agriculturists that can be found on the face of the earth. Inured to privation, accustomed to maintaining life on short meals, and with scanty clothing, they give their labour for the smallest return it is possible to conceive. The consequence is that, broadly speaking, the agriculture of the country is carried on by a vast human machine,—a machine of flesh and blood, which is cheaper in its working than it is possible for any machine of steam and iron to be"; and hence he concludes that, until wages have risen to a much higher standard, the question of increasing the products of India by the application of machinery must be considered a secondary one.

The system of agriculture he describes as that of *petite culture*, the country being split up into many millions of five-acre farms. It is to the maintenance of the holders of these farms in a normal condition of health and strength, rather than to the supplying a starving population with food in a time of famine, and to the adoption of measures to increase the produce of the country rather than to the distribution of the existing supplies in a time of scarcity,—in other words, the policy of maintaining agricultural operations at the highest attainable standard of efficiency, that the recommendations of the Famine Commissioners pointed.

Mr. Buck then proceeds to enumerate the measures necessary to secure that end, and, strange to say, he gives the place of precedence to the promotion of railways; that is to say, to the mode of carriage rather than to the means of increasing production, apparently in contradiction to the principle he just previously stated to be essential. He is quite correct when he goes on to say that "railways with few exceptions tend to ameliorate the condition of the cultivator mainly in two ways,—first, by insuring a better average price for his produce when he has a surplus for export; and secondly,

by bringing him food at a cheaper price when he has insufficient for subsistence." It is easily conceivable that there may be tracts blessed with a superabundance of food over and above the requirements of its inhabitants, and that the construction of a cheap means of communication between it and another tract where there is a redundancy of population with a deficiency of food may be the best and readiest method of supplying the wants of the latter; but on the principle, rightly advocated by Mr. Buck at the close of his lecture, that in legislating for the wants of India it is necessary to do so for it as a whole, and not for fractional portions of it only, surely the most obvious measures, when the well-being of the whole empire has to be considered, should be such as will not only secure from fluctuation its food supply, but will increase its out-turn. If so, the measure of first importance would rather be a reliable system of irrigation, and the next, the means of insuring its distribution. Perhaps it would be a truer economic principle that the two measures should proceed simultaneously, for to increase the outturn from the soil without providing the means for its subsequent distribution would be a doubtful benefit even to the locality immediately concerned, but to provide increased facilities for the conveyance of food which was not to be forthcoming in the hour of need would be productive of good to no one. There is, however, another consideration which does not seem to have occurred to any of those who have hitherto been engaged in these discussions, and that is, while the construction of lines of intercommunication is useful, nay essential, for the easy distribution of the existing food supplies of the country, its economic advantages are confined to transferring capital from one portion of the empire to another, and therefore it does not in any way tend to develop or increase its actual wealth. On the other hand, the construction of a class of works which tend to double the out-turn of agricultural and economic products, coupled with lines of communication for its conveyance to the markets of the world, directly leads to an increase of commercial transactions, and either by an interchange of commodities, or by actual specie payments introduces fresh and foreign capital into the country generally, and so conduces positively and tangibly to an increase in its resources and wealth. Hence there must be considerable reserve in assenting to Mr. Buck's conclusion that "the expenditure of capital on railways affords a quicker benefit to a greater number than irrigation or any other measure Government can undertake, and rightly heads the list" of remedial measures.

His remarks on canal and well irrigation are much to the purpose, as also his disposal of the objections which have occasionally been raised as to the evils resulting from irrigation. Those not conversant with the subject understand the term "irrigation" in India to be limited to the mere act of covering the land with water; whereas a proper system of irrigation combines drainage, with protection from floods where necessary, and water carriage where possible. Of this last point, it is to be regretted that Mr. Buck has made no mention. Advocating expenditure on railways with a view to facilitate and cheapen carriage, not only has he omitted to suggest any improvements to the waterways, but has not even made the slightest allusion to them, and yet if any country in the world stands in need of the cheapest of all methods of transit, it is India. A strange oversight on the part of the head of the Agricultural Department, with whom it might be supposed the extension of the wheat trade between India and England would of itself be of sufficient importance to suggest an inquiry into the reasons why that trade is still practically monopolised by America, when all that is needed for its permanent transfer to India is such a reduction in the cost of its conveyance to the ports for shipment as will admit of its being sold at a profit in London, even when prices are as low as at present.

Mr. Buck next advocates the reclamation of waste lands, estimated at 100 millions of acres, and the establishment of fuel and fodder reserves, the latter so necessary for the maintenance and improvement of the cattle which over the greater part of India are, as a rule, kept in very low condition. This measure is followed by that of emigration, on which there is a good deal to be said, judging from the very varying opinions expressed during the discussion which followed the lecture. Emigration to foreign

countries of kindred climatic conditions, styled by Mr. Buck "Greater India," but where the ratio of wages is three or four fold higher than in India, has much in its favour; but while there still remains so vast an area awaiting reclamation at home, it is open to question whether the better policy would not be to encourage a transfer of labour from where it is superabundant to home tracts where it is deficient.

The last measure treated is the improvement to be effected by new machines and new methods of culture. With very few exceptions, Mr. Buck thinks the time has not yet arrived when the introduction of agricultural machinery can be profitably utilised, not as respects a reluctance on the part of the cultivator to avail himself of it, as to the fact of which he has satisfied himself that his cattle are not sufficiently strong to work heavier appliances. The cultivator's readiness to use machines adapted to the power of his cattle has been already evidenced by his adoption of improved sugar-mills in parts of Bengal. Mr. Buck has a word to add on the favourite theme of many self-constituted Indian reformers, the indebtedness of the Indian cultivator, whose position, however, he considers to be not so bad as it has been represented; but, at the same time, he points out that the only way to keep him out of the hands of the money-lender is to eliminate, as far as possible, the uncertainty which now attends his harvests. While acknowledging that in some tracts the state of the Indian cultivator is "deplorable," he at the same time observes "that it is due not to the cruel treatment (as has often been so recklessly alleged) that he receives from his British rulers and their representatives, but from his mistress Nature and her capricious moods, against the tyranny of which every nerve is now being strained to protect him"; and he concludes with the gratifying assurance that though "much, very much, yet remains to be done, and though the work of protection is far from being accomplished, yet whatever picture may be drawn of local distress in some parts of India, in the greater part of the empire, the condition of the cultivator is materially better than it was fifty years ago." The charts which Mr. Buck states are in course of preparation by the Indian Survey Department, and which will illustrate the industrial and agricultural resources of the empire, cannot fail to be of the highest interest, and will, doubtless, be attentively scanned by thousands of visitors at the forthcoming Exhibition in 1886.

COMPETITIONS.

New Vestry-hall for Chelsea.—The Vestry of Chelsea considered at their meeting on Tuesday night a long report by the Committee of Works as to the various designs submitted by competitors for the new Vestry-hall. Seven plans had been selected as best deserving consideration, and of those the committee, advised by Mr. Henry Hunt, who had been appointed the professional assessor, recommended that Nos. 26, 14, and 18 be the designs, the authors of which should receive premiums of 100, 50, and 30 guineas respectively. The committee's recommendations were adopted, and it was then agreed to reveal the names. The author of the first (No. 26) proved to be Mr. J. M. Brydon, F.R.I.B.A., of 5, Cambridge-place, Regent's Park; the author of No. 14 was Mr. William Leck, of 20, Moore-street, Chelsea; and Messrs. Newman & Newman, of Tooley-street, London Bridge, were the authors of No. 18. Mr. Brydon was then by formal motion appointed architect for the enlargement of the hall, the cost of which will be 15,000*l.*

New Church at Mosley Common, near Tyldesley.—Mr. F. H. Oldham, F.R.I.B.A., of John Dalton-street, Manchester, has been the successful architect in a recent competition for a new church at Mosley Common, near Tyldesley, which is to be proceeded with at once. Mr. T. Worthington, a vice-president of the Royal Institute of British Architects, was the assessor.

Peterborough Cathedral.—It is stated that the Archbishop of Canterbury has given his award in the Peterborough Cathedral controversy. He advises the appointment by the Dean and Chapter and Restoration Committee of an executive of seventeen to decide the question; failing which, his Grace recommends that the first plan of rebuilding the tower, as originally provided for, be adhered to.

Illustrations.

MONUMENT DESIGNED BY M. DALOU.

THE monument, of which we publish an illustration from a photograph of the sculptor's model, is designed for the decoration of the "Place de la Nation," and the municipal administration count upon solemnly inaugurating it on July 4th, 1886. Surrounded by sparkling fountains and masses of green verdure, it will occupy the centre of the vast central basin of that "Place" which for some years has been called "Place du Trône," and which is situated at the extremity of the Boulevard Voltaire.

The artist from whom the city of Paris has commissioned this great piece of work is well known in England, which, indeed, offered him a generous hospitality. It was there that he lived during long years, and there that his fine talent became fully developed and ripened. M. Jules Dalou was the favourite pupil of Carpeaux, whose nervous and expressive talent his own recalls. For him, as for his master, nature is no dried-up convention, cold and stiff, but a living and palpitating model, communicating to the marble or the bronze which reproduces it its own life and animation.

The model of M. Dalou's design figured in an open competition, in 1879, for the monument to the Republic inaugurated on the 4th of July, 1883, in which competition M. Charles Morice was the fortunate victor. M. Dalou gained nothing officially then, not even "honourable mention," though all the world of the public and the press agreed in considering his work as quite out of the common groove,—frankly original and thoroughly decorative in treatment.

The Academic clique, even more than the restricted conditions of the competition, operated in excluding this most remarkable design from success; but the Municipal Council of Paris did itself the honour to repair the wrong done by this unexpected judgment, in voting the acquisition of the group of M. Dalou at a price of 70,000 fr., and granting, for the cost of casting it in bronze, a further sum of 140,000 fr.

It was then that the material difficulties commenced. The artist, whom the political amnesty had recalled to France, arrived in Paris, but with no notion where he could commence to model his figures, some of which would be nearly five metres in height. The Municipal Council, wishing still further to second his efforts, had an immense shed constructed in planks in the neighbourhood of the Champ de Mars, and it is in this hastily improvised atelier, with the wind blowing through the gaps of the hoarding, and the rain coming through the skylights, that, since 1880, M. Dalou has been working without cessation at this group and at the completion, at the same time, of two other groups now well known: "Le Triomphe de la République," an alto-relief for the Hôtel de Ville; and "Mirabeau aux États Généraux," commissioned by the Chamber of Deputies.

We will endeavour to give what must at best prove but a dry description of the work, which, in spite of all kinds of difficulties, is proceeding step by step and carrying out more and more fully the promise of the original model.

On a car drawn by two lions and guided by the genius of Liberty brandishing a torch, the figure of the Republic stands upright, in an attitude of triumph, command, and protection. To right and left of her, on either side of the car, two other figures representing Labour and Justice are pushing onward the wheels; the first represented under the aspect of an ouvrier, with naked torso, mallet on his shoulder, sabots on his feet; the second under the aspect of a woman richly draped. Peace, carrying the symbols of Plenty, marches behind the car, scattering as she goes flowers and fruits. The child figures symbolising Instruction, Equity, Wealth, &c., contribute to the decorative effect of the whole composition.

This rich composition, full of movement, rests on a pedestal divided, by great reversed consoles adorned with acanthus foliage, into four faces decorated with attributes in relation with the general idea of the monument. The lateral figures, as well as the animals and children, are treated with great spirit and knowledge, finely modelled, with a great feeling for decorative effect. The garlands and the other decorative adjuncts have been modelled and executed by

the sculptor himself, who is too rich in resources to have occasion to call in the assistance of specialists for those accessory details which sculptors generally leave to ornamentists.

It will be understood that the reproduction in bronze of such a work will be a long and difficult task, requiring the most minute care, especially as the artist has decided on employing for this work the system *d'cire perdue*, in accordance with the traditions of the Renaissance, and which is so favourable to the perfect execution of work in bronze.

Thus, although the model of the principal figure, as well as that of the car, is already completed and cast, and the other models far advanced in clay, M. Dalou does not expect to be able to hand over his colossal group to the City of Paris before 1886. Our readers are already aware that the French Government has not chosen to wait for that inauguration to give to the energetic artist the recompense so well earned by him. The jury who selected the work for execution in 1883 have already given him the most liberal recompense, and a few days after the *Journal Officiel* enrolled among the names of the new "Chevaliers de la Légion d'Honneur" the name of the most brilliant representative of the younger school of French sculpture.

R. B. FENWICK.

* * * The front view of the group we illustrated in the *Builder* of July 9, 1881, remarking at the time that the side view, which we now give, was even finer. We may eventually give a larger illustration of the completed work in the bronze; but we have thought it worth while to illustrate the original model of so remarkable a work, rather than wait for its completion.

LUBECK IN THE SIXTEENTH CENTURY.

The panoramic view of Lübeck is a reproduction of an old German wood-engraving on a very large scale. It is an example of a type of work which was not uncommon in the early days of wood-engraving, when representations of towns in this manner were rather popular subjects, and among these were some of the largest engravings ever made. The present example is about 10 ft. or 12 ft. long. Messrs. Kell have succeeded very well in reducing it to manageable size without losing clearness of definition.

THE COLLEGE STE. BARBE, PARIS.

We give this week two views and a plan of the Preparatory School of the Collège Ste. Barbe, Paris. In the *Builder* of June 21st, 1884, we mentioned, in connexion with the last Congress of French Architects, the visit of the members to the Lycée Janson de Sailly. But, among the institutions of this nature, rather private than governmental, there is one which has always maintained a foremost rank among houses devoted to secondary classic education, and given to the State an admirable example to follow; that is, the Collège Ste. Barbe, situated in the Place du Panthéon, and directed by M. Dnieff, member of the "Conseil Supérieur de l'Instruction Publique."

"Sainte-Barbe," as it is familiarly termed, comprises in its programme the whole circle of secondary education, from the elementary grammar classes carried on in its accessory establishment ("L'Internat de Fontenay-aux-Roses," or "Sainte-Barbe des Champs"), passing by intermediate classes to the rhetoric classes of the "Collège Ste. Barbe," in the Place du Panthéon (at once a boarding, semi-boarding, and day-school), and terminating in the advanced classes of literature and science with which the "École préparatoire" is more especially connected. This latter, in juxtaposition to the Collège, has its special entrance from Rue Valette, and, as its name indicates, is intended to receive, either as "externes" or "internes," the elder pupils who are preparing for Government schools, such as the École Normale, École Polytechnique, École St. Cyr, &c.

It is this "École préparatoire" which, having developed considerably of late years, has given rise to the construction of the new buildings in connexion with the Collège Ste. Barbe and grouped with it adjacent to the Bibliothèque Ste. Geneviève, and which deserve note for the arrangement of the plan, the suitable treatment of the façades, and the ingenious design of its furniture and fittings.

The architect of these buildings, which cover 2,000 square metres with five stories in height, and have cost nearly two million francs, is M. Lheureux, one of the sectional architects to the City of Paris.

Cast iron, wrought iron, and sheet iron, employed in columns, floors, stairs, and roofs; stone and brick in the façades; pine, oak, and pitch-pine for the interior woodwork; together with cement and mosaic, are the principal materials which M. Lheureux has made use of, and which he has turned to account in a manner always practical and often very worthy of study.

The most interesting portions of the new construction are the large refectory in which 500 can be seated at once, the dormitories and the private studies for the older pupils, the covered gymnasium and the drawing-school with lecture-halls adjoining; this latter apartment and the lecture halls or theatres can, by an ingenious arrangement, be in a few hours disencumbered of their special fittings and even of their platforms, in order to form a grand *salle de fêtes* intended to accommodate all the personnel of Ste. Barbe, scholars and teachers, as well as numerous visitors.

All these new portions, and the main stair-cases (of iron) which give access to them, are in other respects far more in common with the old Collège, and the two establishments have a common playground, the court, across which, at certain hours, the great shadow of the dome of the Pantheon extends. The larger view given in this number shows the exterior façade and entrance towards Rue Valette, and the smaller one the entrance from the inner court, at the end next to the Bibliothèque Ste. Geneviève.

The views are from photographs, and the plan is reproduced from that originally communicated by the architect to the pages of the *Encyclopédie d'Architecture*.

PORTION OF A DESIGN FOR A MUNICIPAL MANSION.

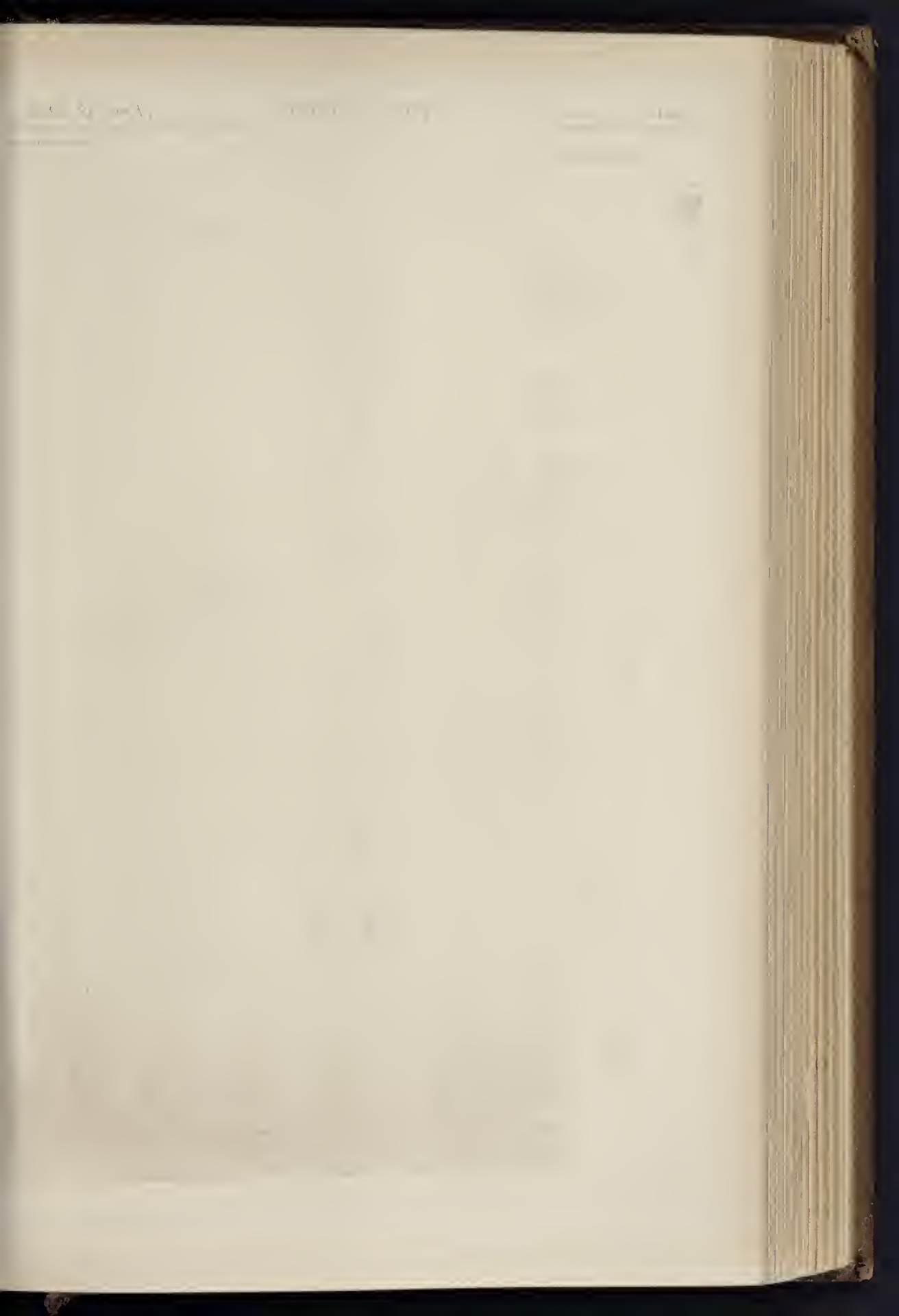
SOANE MEDALLION COMPETITION.

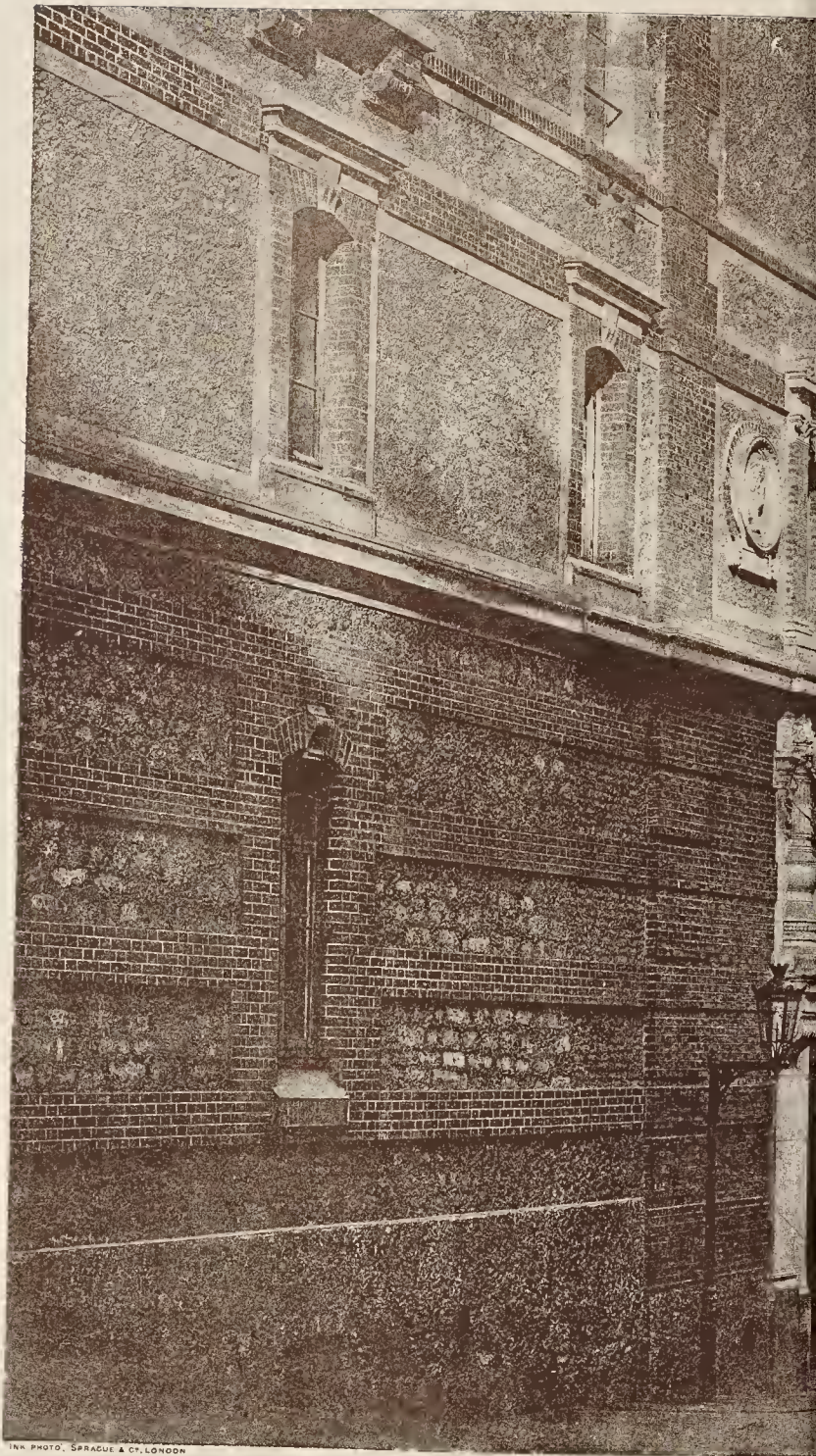
In the first number of the *Builder* of this year, in an article on "Architectural Illustration," we drew attention to the necessity of clear definition and uniform blackness of lines (however thin they might be) in drawings which were to produce successful results in photo-lithography. The drawings by Mr. J. Thompson, which obtained a medal of merit in the last Soane medallion competition, are an unfortunate example of this. We had intended to reproduce the perspective view (which, though too like a town-hall, looks very well as a whole); but owing to the author having aimed at producing softness of effect, by using half-tint ink for the lines in the middle distance and sky (and to a general want of sharpness of line), the result was such that it would have been impossible to publish it. The detail elevation, which we publish, gave better results; but even there it will be seen that the fluting-lines of the columns are very faint and "rotten" in effect, not the result of defect on the lithographer's part, but of the fact that the lines in the drawing were grey and not black. The lines could, of course, have been put in again on the stone, but we preferred to leave them as a practical example of the necessity of lines of black and even tint for photo-lithography.

Of course the author may say that he did not make the drawing with that object, but we are disposed to hold that a line drawing, properly so called, should produce its effects and gradations by management of line, not by weakening the ink for half-tints. At all events, those who wish their drawings to be eventually published in lithograph form would do well to bear this caution in mind.

Eastbourne Improvement Scheme.—The

Eastbourne Improvement Bill, now before Parliament, having caused much local interest and considerable opposition from some of the ratepayers and one or two of the magistrates of the borough, a poll was demanded, and the result made known on Wednesday last, the figures being:—For the Bill, 2,269; against it, 1,459, giving a clear majority of 810 in favour of the measure. The Mayor (Mr. G. Ambrose Wallis, C.E.), who is engineer to the sea-front works under the Duke of Devonshire, supported the Bill.





INN PHOTO, SPRADUE & CO. LONDON

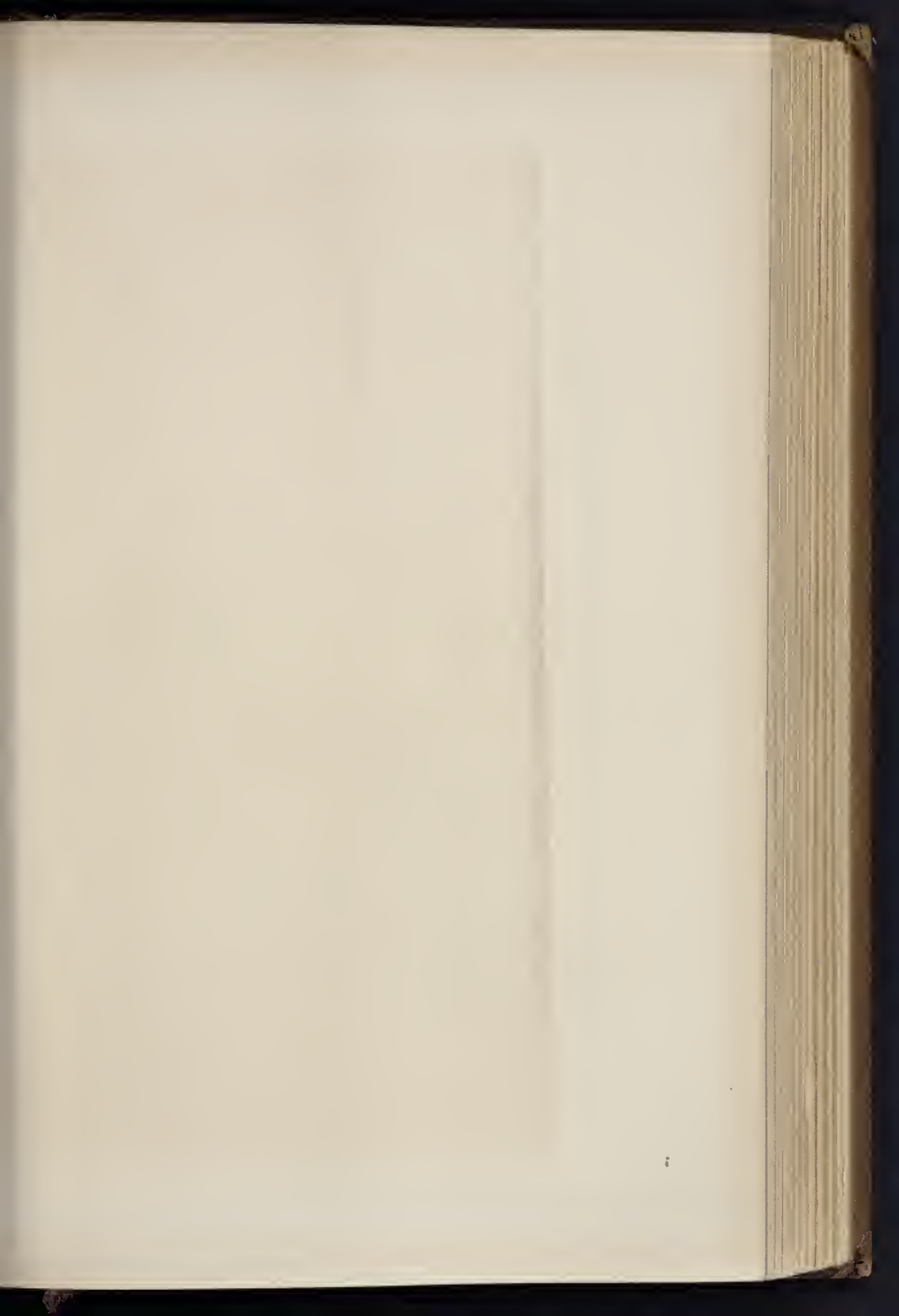
NEW BUILDINGS, COLLEGE SAINT

FAÇADE 2



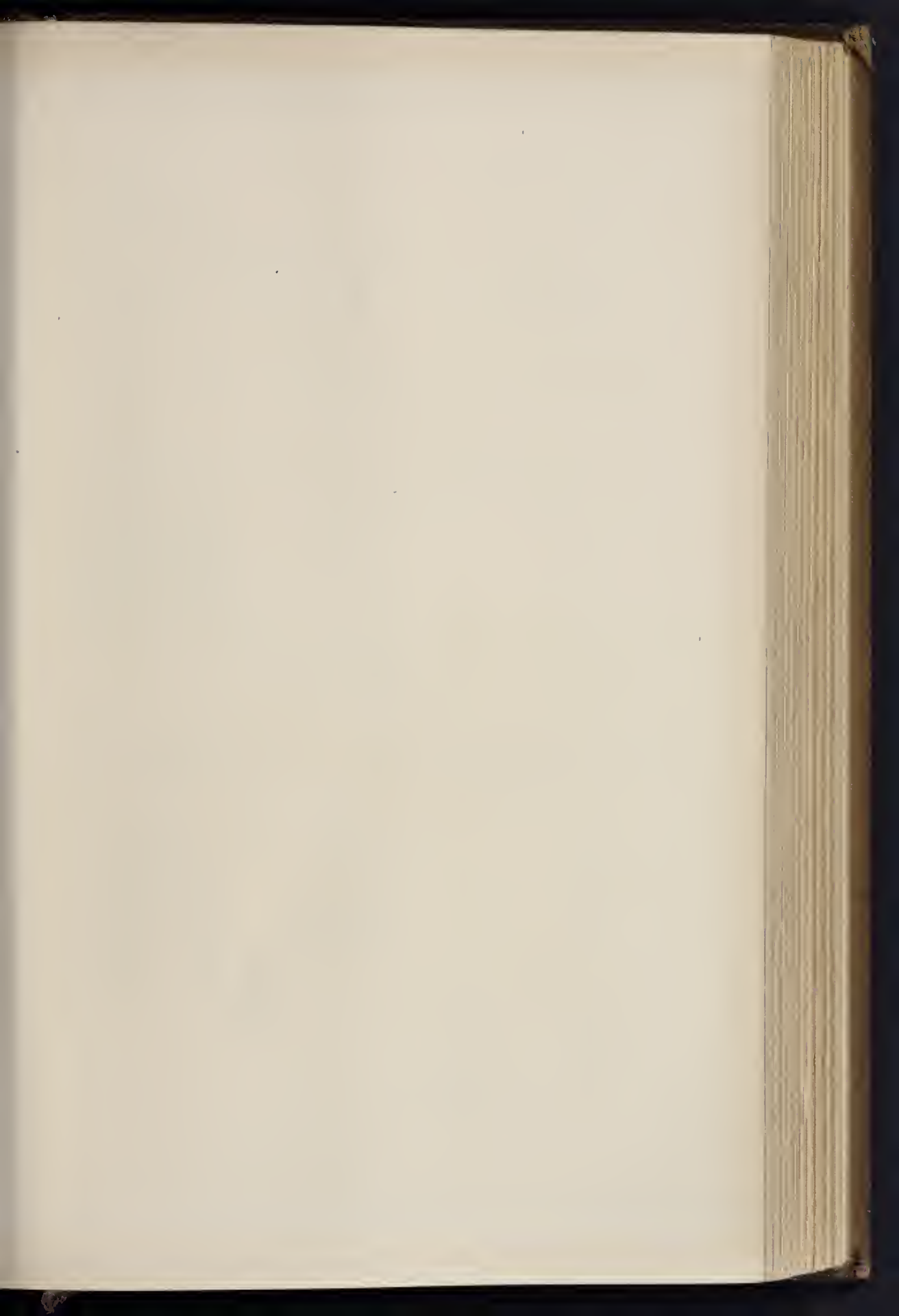
PARIS. M. LHEUREUX, ARCHITECT.

LEITE

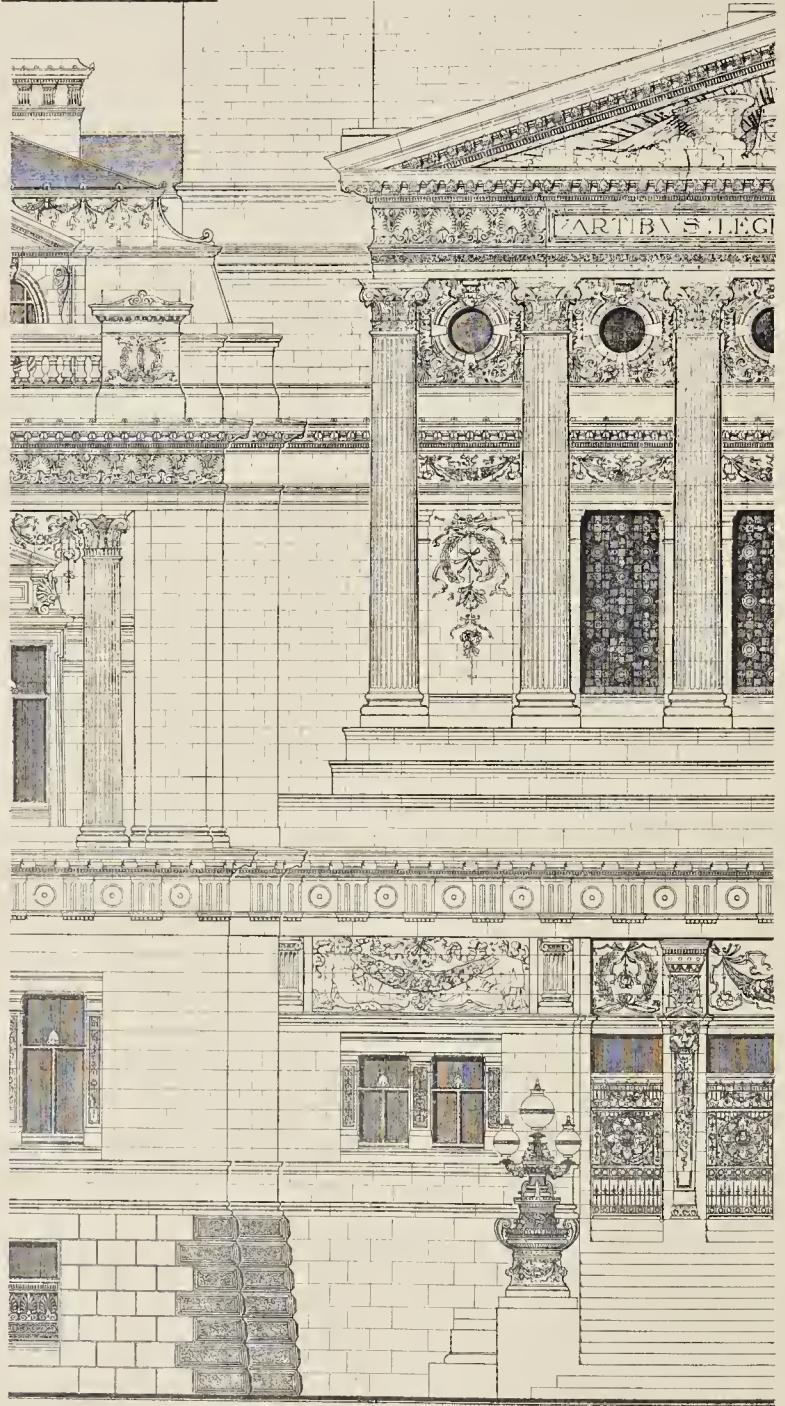




COLLEGE SAINTE BARBE, PARIS M. LHEUREUX, ARCHITECT.
ENTRANCE FROM COURT YARD (SEE A ON PLAN)



Part of Front Elevation



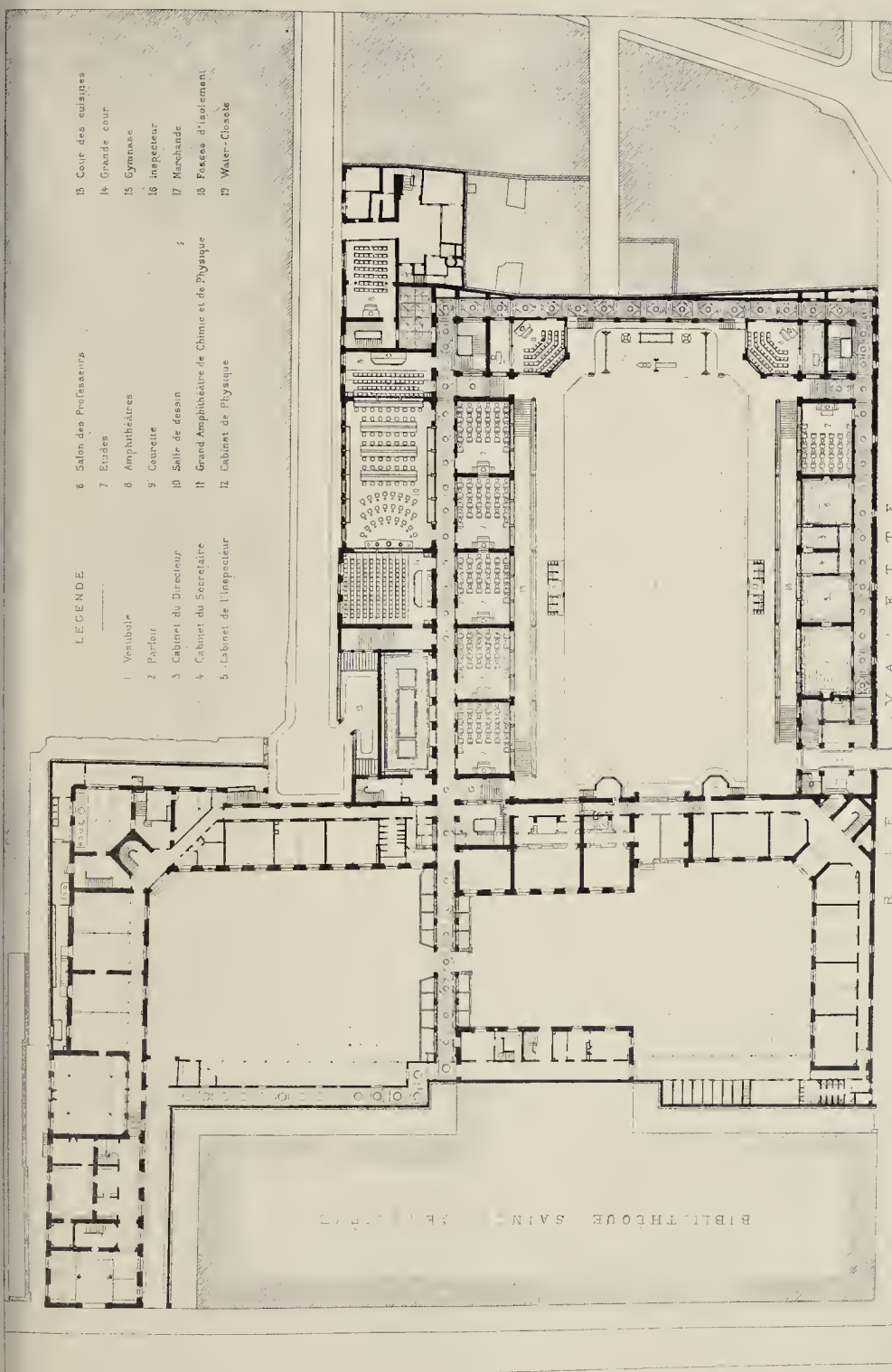
Scale 1/4" = 1'

Soane Medallion, 1855.
Medal of Merit.

PORTION OF DESIGN FOR A MUNICIPAL MANSION.

Wyman & Sons, Photo-Litho

By MR. J. THOMPSON.



LEGENDE

- 1 Vestibule
- 2 Parloir
- 3 Cabinet du Directeur
- 4 Cabinet du Secrétaire
- 5 Cabinet de l'Inspecteur
- 6 Salon des Professeurs
- 7 Etudes
- 8 Amphithéâtre
- 9 Courette
- 10 Salle de dessin
- 11 Grand Amphithéâtre de Chimie et de Physique
- 12 Cabinet de Physique
- 13 Cour des sœurs
- 14 Grande cour
- 15 Gymnase
- 16 Inspecteur
- 17 Marchande
- 18 Passes d'isolement
- 19 Water-Closets

Wyman & Sons Photo Litho

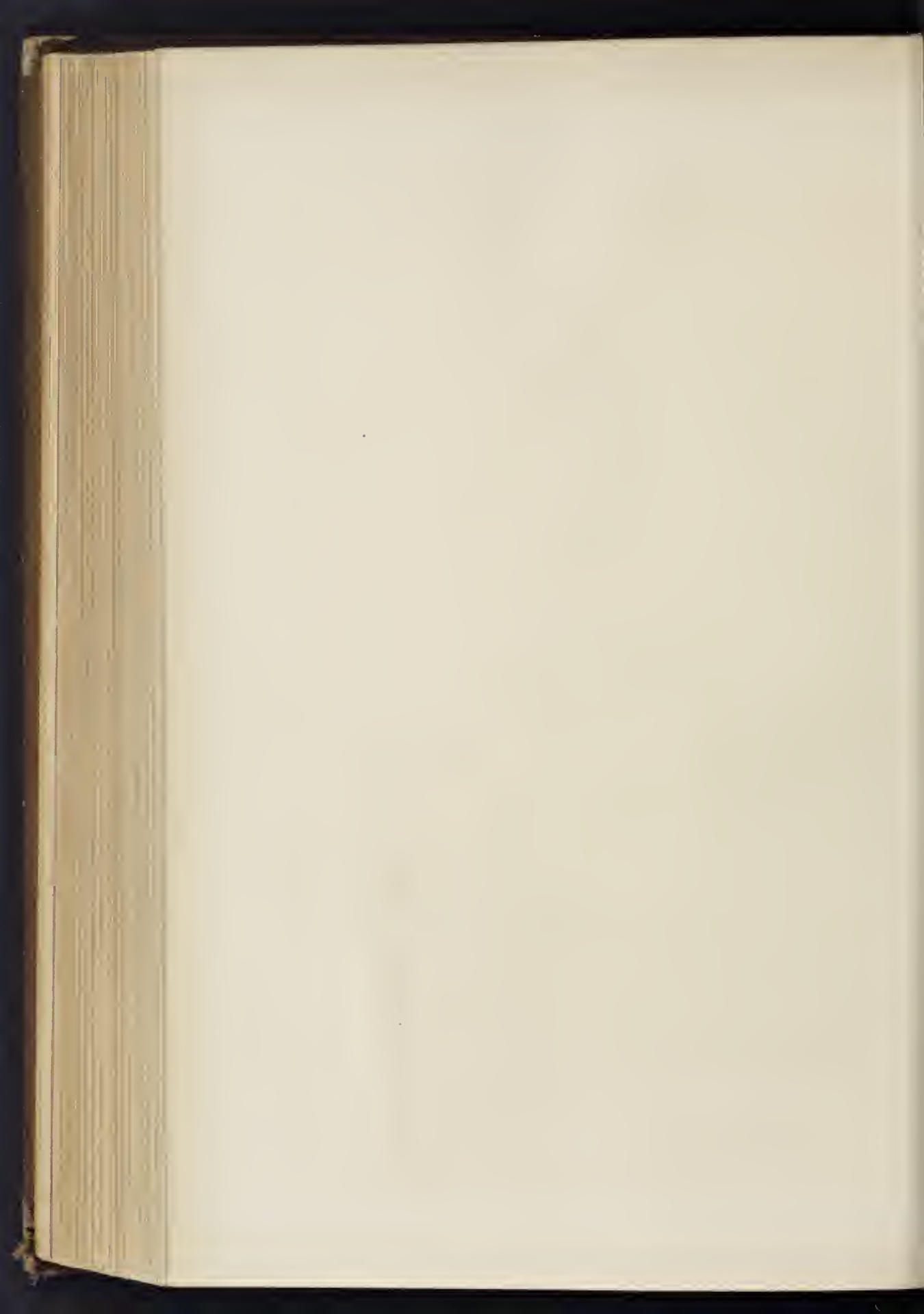
PLAN OF COLLEGE SAINTE-BARBE, PARIS.—M. LIEUREUX, ARCHITECT.

E. Lieureux



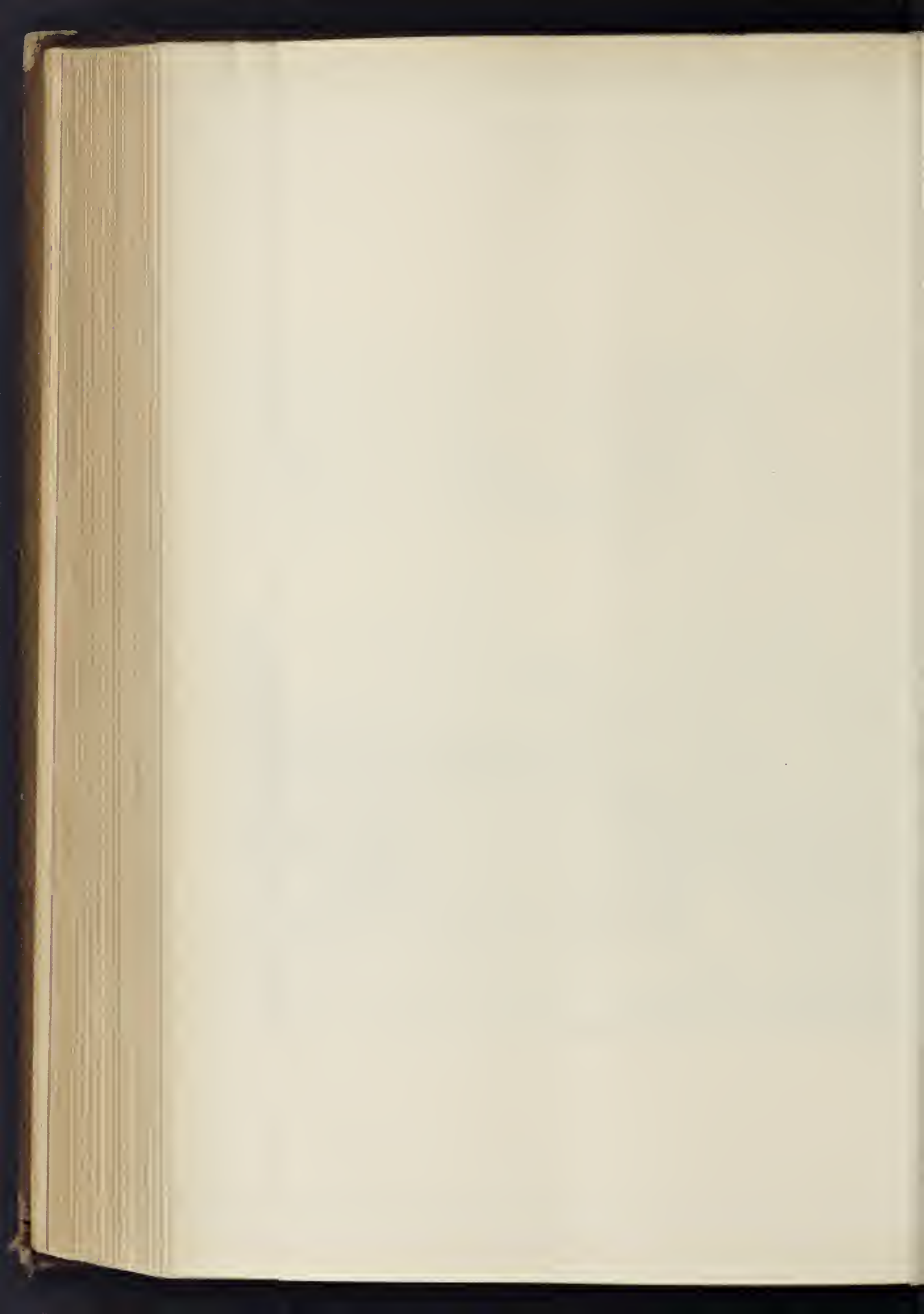
INK PHOTO. SPRAGUE & CO. LONDON

NATIONAL MONUMENT, FOR THE "PLACE DE LA NATION," PARIS. M. DALOU, SCULPTOR.





LÜBECK IN THE SIXTEENTH CENTURY FROM AN OLD GERMAN ENGRAVING.



THE NORTHUMBERLAND AVENUE
HOTEL.

VISIT OF THE ARCHITECTURAL ASSOCIATION.

THE sixth visit this year by the members of this Association took place last Saturday, to the Northumberland Avenue Hotel, Charing-cross, now in course of erection from designs by Messrs. Isaacs & Florence. The members assembled at three p.m., and were received by Mr. Lewis H. Isaacs, who was subsequently joined by Mr. H. L. Florence, his partner. A number of working and detailed drawings were shown. Mr. Charles Till, the clerk of works, was also in attendance. In explaining the drawings and building, Mr. Isaacs said great difficulties were encountered in preparing for the foundations of the hotel, in May, 1883, when a contract was entered into with Messrs. Perry & Co., builders, of Tredegar Works, Bow, who executed the works from the foundations, including the basement and part of the ground-floor. Owing to the nature of the site the excavations for the external walls had to be taken down to the great depth of 50 ft., to reach a solid foundation. A large quantity of running water was met with, which was found to come from an old river which took its rise at Highgate, and fell into the Thames about this point, and a powerful pump had to be worked by a 10-horse power engine, night and day, for six or seven months. The works were next stopped by the failure of the original company, and on the formation of a new one another contract was entered into with Mr. J. W. Hohhs, builder, of Croydon and Queen's-buildings, Southwark Bridge-road, who took up the work in September, 1884. The building has now been carried up to the fifth story. The intention of the first company was to erect an hotel with a frontage to the Avenue of 353 ft., but 53 ft. of land at the Charing-cross end being mortgaged, this, on the failure of the company, was lost. The services of the architects, Messrs. Isaacs & Florence, being retained by the new company, the design had to be largely remodelled to suit the present frontage of 300 ft. The site is in the shape of a triangle nearly, being 162 ft. deep at the deeper end, and contains upwards of 32,000 superficial feet. The building is to contain eight floors besides the basement, the main roof being 110 ft. above the ground-line. The style of architecture is the Italian Renaissance. The front elevation will be entirely faced with Portland stone, supplied by the firms of Messrs. Crickmay & Co., of Portland and Weymouth; Steward & Co., of Portland and Nine Elms; and by the contractor, Mr. Hohhs. The stone carrying is being executed by Messrs. Daymond & Sons, of Edward-street, Vauxhall. The cast-iron stanchions were supplied and executed by Young & Co., of Eccleston Foundry, Pimlico; and the iron girders and stanchions by Dibley & Son, Mansion House-chambers, Queen Victoria-street. A number of rolled iron joists have been supplied by Mr. Matthew T. Shaw. The ground-floor contains a large dining-room or *salle à manger*, 93 ft. by 42 ft., and has a circular apse at one end, and two side wings in addition; there will also be several coffee-rooms, and rooms for billiards and other entertainments. The large dining-hall will be 32 ft. high, or up to top of first floor. The first floor is reached by a grand staircase in the centre of the building, and the upper floors by two other large staircases, and two passenger-lifts.

Through the 53-ft. slice of land being cut off, accommodation for 100 rooms, as intended, was lost, and the upper floors will now contain about 600 reception and bed rooms, with conveniences, and the hotel as now planned will stretch from the National Liberal Club at the Charing-cross end to the buildings recently erected by the Society for Promoting Christian Knowledge. The basement is covered over the whole area with concrete 6 ft. thick. It contains, besides the accommodation for the heating apparatus and engine-room, a number of spare sitting-rooms, and extensive cellars. The area courts are faced with glazed white bricks supplied by Messrs. Cliff, Balfour, & Co., and by the Farley Company. In excavating for the foundations, Mr. Isaacs said a few specimens of Roman pottery were found at a depth of 32 ft. The entire cost of the structure as originally designed to cover the larger area was 200,000*l.*, the building now being proceeded with on the reduced scale will cost 160,000*l.* The whole of the works are being executed from designs by the architects, under the super-

intendence of Mr. Charles Till; the general foreman of the works being Mr. Shnto.

The visitors having inspected the various parts of the building as far as it has proceeded, returned again to the ground-floor, when Mr. H. D. Appleton, honorary secretary, proposed a vote of thanks to Messrs. Isaacs & Florence for their permission to view the building and to Mr. Isaacs for kindly explaining it.

THE ARCHITECTURAL ASSOCIATION
SOIRÉE.

No one can be always serious, and earnest students as the members of the Architectural Association are, they, twice a year, deign to amuse themselves; once, at the commencement of the season, they invite their friends to help them, and, on that occasion, the entertainment is usually of a decorously common-place description, and it needs a general hat-smashing to make the evening a very exciting one. But when they meet again in April it is with the object of enjoying themselves in more or less Bohemian style, the significant word "smoking" appears upon the invitation card, and we put on our hat to go with a pleasurable curiosity as to what the entertainment committee shall have provided for our amusement.

This year, for the second time, the *soirée* took place in the Westminster Town-hall, which was already well filled when, at half-past eight, Professor Eloc à Smada, a learned archaeologist of the twenty-second century, proceeded to address his audience upon the arts and architecture of the remote nineteenth in a lecture entitled "The Brass Age." The lecturer, in the course of his remarks, referred to a rare volume called "A Book on Building," evidently by a great authority on the subject. No actual domestic buildings of those days could be pointed to, because, in consequence of an odd, but legalised, custom, a house was liable to be forfeited a few years after its erection to the ground landlord, and the architects, being men of genius, contrived to erect buildings which would last until the time of forfeiture arrived. So accomplished were the architects of that time that they practised in all styles, but their preference was for the "Sanitation" style,* and some of the greatest minds of the age devoted their energies to designing traps and cowns, pipes, pans, and patent junctions, and other features necessary to its development. After some reference to the dress of the period, the learned Professor concluded by calling attention to the curious diagrams on the wall, including a conjectural restoration of a building in the Sanitation style, in which the serpentine windings of drain-pipes, surmounted by tasty cowns, and crowned with an elegant smoke-preventer, produced a *tout ensemble* not so unpleasant as it might have been. There were also drawings of stained-glass windows by Mr. E. C. Lee, representing the "airy-scrappiness" of the period, and a clever picture by Mr. A. B. Pitt, of the emaciated body of a cat discovered in Conduit-street, and represented clasping a pillar, which was the crest of the Institute of Architects.

The lecture was much applauded, and was succeeded by one of Professor Kerr's good-humoured speeches; and then, after a short interval, "The Ghost: a Burlesque Extravaganza Tragedy of Hamlet," as the programme had it, was introduced with a song by Marcellus, an office boy,—Mr. Killmister,—in which he informed the audience how he did not become an architect. A characteristic conversation with Tracio, the pupil,—Mr. Miller,—is interrupted by the appearance of the Ghost (Mr. Gotch) and Tracio, who, in another song, tells how the latter is the elder brother who is supposed to be dead, and to whose practice and wife John Claudius, the ignoramus, has succeeded; and how, taking advantage of his brother's taste for unsweetened gin, he keeps him in duration vile to do the work while he himself takes the credit and profit. This story is repeated to Hamlet & Beckett, the art-critic,—a part excellently played by Mr. Blagrove, whose mimicry of certain well-known persons was as entertaining as it was good-natured, and is confirmed by the Ghost himself, who, in strict accordance with precedent, will speak only to Hamlet. The latter threatens to expose the fraud, and sends Tracio for his diary, but John Claudius Thorpe,—Mr. A. Young,—enters and threatens an

* We fear the evidence the learned Professor could collect would hardly bear out this statement.—Ed.

action for libel, and Hamlet, recollecting a recent *cause célèbre*, dissembles. Then, in a scene between Thorpe and the Ghost, the former is posted for an interview with his client, Sir Thomas Tresham, and the drawings being examined, a chimney-stalk is found to be carried on nothing; but the Ghost excuses himself by saying that the matter can be "set right in the details" or "omitted in execution." Something not shown upon the drawings is sought for in the specification and eventually found among the "Provisional saus." Meanwhile Sir Thomas Tresham,—Mr. Booth,—is announced. The plans are shown him, and many absurd explanations, due to misunderstood hints from the Ghost, who has assumed the appearance of a statue, are given by Thorpe, but, when the crucial question as to cost is asked, the former says he'll be — if he knows; and, coming down from his pedestal and being recognised and seconded by Sir Thomas, threatens his brother with an action, and the scene closes with an agreement to refer the matter to arbitration.

The second scene is laid in the arbitration room in Conduit-street. Hamlet & Beckett appears as arbitrator, and Mrs. Gertrude Weldon Porfia, the actor of which part retains his incognito, is counsel for the Ghost. The witnesses are called and cross-examined by Porfia, and Marcellus is asked what are his duties in Thorpe's office, and mentions that, among other things, he has to

Take out the quantities, and sweep up the cinders,
To draw the details, and clean the windows.

The case for each side being concluded, the arbitrator proceeds to make his award, and first gives "every one a silver medal," but is disconcerted by the Ghost's claiming an "extra" medal on the ground of being a Scotchman. The affair is finally concluded by the elder brother receiving back his practice and his wife, and the younger being condemned by & Beckett, in a black cap and in solemn tones, to read his Book on Building,—a sentence which causes the criminal to fall fainting into the arms of his pupil.

The play was replete with audacious puns and comic references to the recent sayings and doings of the profession, and several pretty songs were introduced, the most effective being perhaps the final duet by Messrs. Booth and Gotch.

At the conclusion, the actors were twice called back, but repeated cries for "author" met with no response.

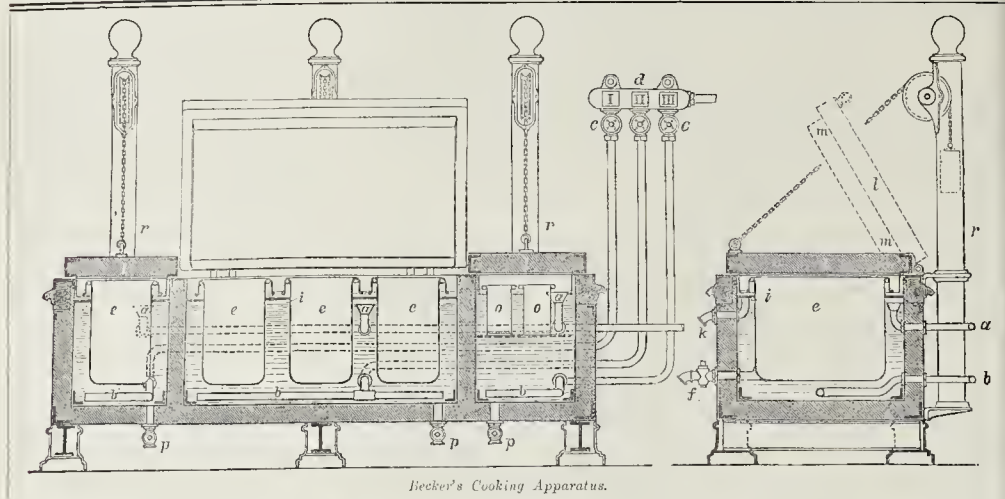
During the evening Mr. Stuart's Orchestral Society performed a selection of good music, and at about eleven o'clock dismissed the company with the national anthem.

The entertainment was a decided success, and the Association is very much indebted to the gentlemen who took so much trouble to provide it; but we think that some of the older members felt themselves a little aggrieved that there was so small an opportunity for friendly chat, and that the absence of so many familiar faces may have been partly due to the growing tendency of the annual *soirée* to become merely an entertainment. A. A.

THE DISTRIBUTION OF ELECTRICAL
ENERGY BY SECONDARY GENERATORS.
SOCIETY OF ENGINEERS.

At a meeting of the Society of Engineers, held on Monday evening, April 13th, at the Town Hall, Caxton-street, Westminster, Mr. Charles Gandon, President, in the chair, a paper was read by Mr. J. Dixon Gibbs on this subject.

The author laid down the following principles:—A complete system of electrical distribution necessitates the supply to individual householders of electrical energy to be applied at will to the production of light by means of any type of lamp, whether arc or incandescent, or to the production of mechanical power by means of production of mechanical power by means of motors, or to the production of currents suitable to electro-chemical purposes. Every lamp or other receiving apparatus must act independently of the others, and without affecting them. The regulation must be automatic, instantaneous in its action, and require no attention; and, further, must be of such a nature that the generating dynamo machine shall produce at each moment the exact amount of electrical energy necessary to supply all the apparatus in action. Nothing that has yet



Becker's Cooking Apparatus.

BECKER'S PATENT COOKING APPARATUS.

THIS apparatus, of which a longitudinal and transverse section are here given, has been in use for some time in Germany for cooking on a large scale in civil and military establishments, and it has been in use for some little time on trial in the kitchens of the St. Pancras work-house.

The following is the explanatory reference to the portions figured in the section:—

- (a) Funnel of overflow connected with condensing pipe leading to cistern, and serving to regulate the water bath.
- (b) Steam pipes provided with minute holes bringing steam to each compartment.
- (c) Steam valve and stop-cock affixed to the steam pipe of each compartment.
- (d) Steam distributor, whence the steam coming from the boiler is distributed through the valves *c c c* into the pipes *b b b*.
- (e) Cooking vessels or pans, fixed to the hearth-plate *i*, and surrounded by water.
- (f) Taps fixed to the pans *e e e*.
- (g) Hearthplate, in which the several cooking pans *e e e* are fixed, and which is covered with a layer of water of $\frac{3}{4}$ centimètres (1 in.).
- (h) Iron knee with valve and socket tap to let off water from hearthplate *i*.
- (i) Double walled covers to each compartment filled with insulating material.
- (j) Copper rim fixed to cover *l*, which, when the cover is down, dips into the water on the hearthplate *i*, hermetically closes the vessels and protects them from outer air.
- (k) Small movable cooking pans.
- (l) Taps to let off the baths.
- (m) Pillars with counterweights, chains and rollers, to balance cover *l*.

The apparatus fixed at St. Pancras is capable of cooking for about 500 persons, at an estimated expenditure of about 1½ cwt. of coal per day. The head cook of the workhouse kitchen reports very much in favour of the apparatus. It is, from what we saw of it, exceedingly compact and handy to work. All steam is kept out of the actual cooking vessels by their edges being trapped in a trough of water, as shown. The heat is well shut in by the double wall and cover of the whole; how little waste of heat there is is shown by the fact that during cooking, with the water at a temperature of 85°, the outer face of the lid is quite cool.

The apparatus can be left over-night at 85° (the usual temperature used), and will be found in the morning, without any attendance, to have sunk no lower than 75°: so we are informed, but of this we cannot speak from observation. The cook who has been in charge of it is of opinion that there is much less waste of nutriment in using this apparatus than with the ordinary copper; he puts the difference of loss at 7 per cent. as against 20 per cent. with the copper. The inventor, Mr. Carl Becker, is anxious to have the apparatus introduced to the notice of architects and managers of public institutions, barracks, &c., in this country. As far as our inspection of this one specimen goes, and the particulars we learned as to its operation, we should recommend it as well worth attention, where it is desired to have cooking done on economical terms, and with clean and compact working, for large numbers of people.

CLERKS OF WORKS' ASSOCIATION OF GREAT BRITAIN.

THE second annual dinner of this Association took place on Monday evening last at the St. James's Hall Restaurant, Mr. Geymour Cuthbert, A.R.I.B.A., in the chair, supported by a large number of the members and friends of the Association.

In proposing the toast of the evening, "Prosperity to the Clerks of Works' Association of Great Britain," the Chairman referred to the great services which intelligent and competent clerks of works were able to render to architects in these days of hurry and hustle, when architects were called upon to provide buildings for varied and often novel purposes. An architect who had a competent and reliable clerk of works could safely delegate to him a great deal of the general supervision of the execution of his buildings. It was because the Association had for its primary object the bringing together of all competent clerks of works with a view to their mutual benefit, that it was deserving of the warm support of the architectural profession. The Association had now been established three years, and from what he could see of it, it had a vigorous and useful career before it.

Mr. Dashwood, the Secretary, responded, stating, in the course of a humorous speech, that the Association now numbered nearly a hundred members, and had established a small monthly *Journal* as a means of communication between the committee, the members, and architects.

The other toasts included "The Architects and Surveyors," proposed by Mr. Wilkinson, and responded to by Mr. C. Hareton; and "The Hon. Treasurer" (Mr. John Oldrid Scott), proposed by Mr. Hocking, who referred to the great services which Mr. Scott had rendered, and continued to render, to the Association.

HARBOURS AND DOCKS.

SIR,—In your valuable article on my book on "Harbours and Docks," which appeared in your issue of the 4th inst. (p. 471), you express a desire for a clear explanation of the statistical diagram showing the tonnage of the vessels entering eighteen of the principal British ports each year, from 1873 to 1883, which appears on p. 628 of the book. Your reviewer states that the figures are not in accordance with those given in the "Statistical Abstract" for 1883, owing, apparently, to its omitting the important item of coasting traffic. My diagram was based on the Navigation and Shipping tables issued annually by the Board of Trade, and purposely includes coasting vessels as well as foreign trade. These official tables are clearly the proper source whence to derive such statistics. Moreover, in estimating the trade of a port, it would manifestly be most unfair and inexpedient to leave out of account the coasting or home trade, as the capabilities and prosperity of a port must be measured by its whole trade, and not merely by its foreign and colonial trade, which in some ports is of comparatively minor importance. Taking, for instance, the Tyne ports, which send so much of their coal to the British ports, the tonnage of the vessels entering in 1883, according to

been done in the way of lighting streets or isolated establishments by means of machinery on or near the premises can claim to amount to a distribution of electricity, which to be practical must be effected from distant central stations, and with the same facility as gas or water.

It is generally admitted that the limit of large conductors being soon reached, the future lies in the employment for distributive purposes of conductors of small diameter: this necessitates the employment of currents of small quantity and high electro-motive force, which, not being generally suitable for direct use, require to be transformed on the spot where the energy is to be utilised into currents of small electro-motive force and varying quantity, suitable in fact for any purpose. The Caillard-Gibbs Secondary Generators are such transformers. In the type now in use the inducing and induced circuits are composed of copper discs superposed, and furnished with ear pieces for the purpose of connecting them together. The simplicity of this method of construction is obvious; the weight and size of the apparatus are remarkably small in relation to the work it is capable of performing. The measurements made by Dr. Hopkinson, and by a Committee of the International Jury of the Electrical Exhibition of Turin, confirmed by practical experience, amply prove their return in effective work to be ninety per cent.

The currents obtained by means of induction are necessarily always alternating, and are not on that account adapted to many purposes, such as the driving of various kinds of motors and electro-chemical purposes: the inventors have sought and found a way of overcoming that difficulty by straightening out or redressing an alternating current. This is accomplished by a simple apparatus which has the property of taking, under the influence of a very small current, a speed which is synchronous with the changes of direction of the current which feeds it.

The employment of alternating currents of high electro-motive force, on conductors metallically closed, with the terminals of the dynamo machine, has been admitted by high authorities to be practically free from danger to the public.

An important installation is being prepared in Bond-street by Sir Coutts Lindsay & Co., Limited, under the Caillard and Gibbs system, of the merits of which the public will shortly have an opportunity of judging.

St. Clement's (?) Well.—We understand that an old well answering fairly to Stow's description of the position of St. Clement's Well, was come upon the other day in the at present waste ground adjoining the Law Courts, between Clement's Inn and the Courts. According to our informant, the well was bricked round and contained water about 30 ft. below the ground level. It was filled in, and nothing done to mark the spot, which seems rather stupid.

away any water that enters them. The bar, in one piece of metal, is open at the top, and the edges are turned over the glass to keep it in place. The glass is retained by the elasticity of the bar, which is sprung together to admit it. It is further secured either by a spring cap or by T-headed bolts, which hold on an outer cap and press against the under sides and thereby spread out the bar. When double glazing is required the bar is modified, so that the flange and trough are at a lower level. Sheets of glass are then carried in the two angles formed by the bars and pieces of metal.

APPLICATIONS FOR LETTERS PATENT.

April 2.—4,150, J. O'Callaghan, Securing Door Knobs or Handles to Spindles.—4,151, W. Heys, Manufacture of Fire or Water Proof Boards from Asbestos.—4,154, B. Best, Improvements in Chandlers.—4,164, W. Stobbs and E. White, Appliance for Preventing Down-draught in Chimneys.—4,169, G. Holloway and H. Stanning, Improvements in Window Fasteners.—4,170, F. Robinson, a Collapsing Wardrobe.—4,183, W. Berry, Construction of Tool Holders.—4,192, G. Henkel, Improvements in Hoisting Machinery.—4,193, W. Lako, Heating or Warming Apparatus.—4,215, F. Vergard, Improvements in Stoves and Fire Grates.—4,209, F. Henderson, Improvements in Flushing Apparatus for Water Closets, &c.

April 7.—4,239, J. Miller and C. Cameron, Improvements in Washhouse Bins or Boxes and in Flushing Drains.—4,241, P. Walker, Improvements in Ventilators.—4,243, H. Allison, Improvements in Burglar Alarms.—4,245, C. Longbottom, Fastening Window Sashes, Doors, &c.—4,247, G. Crowe and W. James, Cisterns or Flushing Apparatus for Water Closets, &c.—4,269, W. J. and W. F. Rowe, Waste Preventing Cisterns.—4,275, T. Oakley, Domestic Fireplaces.—4,280, A. de Bourbon d'Esate and Others, Additional Improvements in Vacuum and Method of Applying same.—4,289, D. Waldie, Improvements in Mortise and Tenon Work.—4,294, P. Jensen, Improved Arch or Span Bricks or Blocks.—4,295, H. Lake, Fastening Doors.—4,297, H. Lake, Locks for Fastening Doors, &c.

April 8.—4,342, N. Lines, Boring or Drilling Wood or other Material, vertically, or at any required angle.—4,344, J. Gibbard, Wooden Block Flooring and Lining for Walls.—4,345, W. Sidwick and J. Day, Latch Locks.

April 9.—4,379, H. Ibbotson, Opening and Closing Sash Windows.—4,397, J. Lamb, Improvements in Ventilators.—4,398, C. Murray, Manufacture of Bricks, &c.—4,403, M. Conrath, Embossed Wall and Ceiling Decorations.—4,413, W. Pope, Securing Sliding Window Sashes and Shutters, and Fasteners for same.—4,419, W. Stein, Improvements in Bakers' Ovens.

PROVISIONAL SPECIFICATIONS ACCEPTED.

725, C. Tebbitt, Bricks for Paving Cattle Markets, Sheds, Yards, &c.—1,189, T. Thorne, Improved Burglar Alarm.—2,321, W. Stobbs, a Novel Construction of Spike or Nail.—3,368, G. Whiteside and J. Hoyle, Apparatus for Brushing and Clearing Timber previously to Planing, Cutting, or Sawing.—3,420, G. Shorland, Improvements in Air-warming Grate Backs.—3,549, W. Lea and J. Beech, Adjustable Brackets for Supporting Shelves, &c.—3,507, G. Sowbery, Ventilators for Buildings.—3,550, B. and J. Cross, Waste-preventing Cisterns.—3,661, A. Stephens, Apparatus for Supplying Water to Water-closets, Urinals, &c.—3,701, G. Stevens, Opaque Stained Glass for Wall Decorations, &c.—2,934, A. Ransome and T. Wilkie, Wood Planing and Moulding Machines.—2,992, J. Beauland, Improved Brick, Quarry, or Slab for forming Smoke and Air Flue in Chimney Stacks.—3,022, H. Haddon, Machinery for Cutting and Dressing Stone.—3,435, J. Brown and T. Porter, Apparatus for Climbing Chimneys, Shafts, Columns, Steeples, &c.—3,552, J. Barnett, Improvements in Stoves.—3,585, G. Wolff, a Wood Stain.—3,604, J. Anderson, Self-regulating Water-waste Preventer.—3,660, J. Lewis and C. Rawlings, Fire Grates and Stoves.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.
6,262, H. Lake, Improvements in Bridges.—6,274, J. Harill, Window Blind Pulley Racks.—8,810, W. Lake, Apparatus for Dressing and Shaping Stone.—9,172, W. Morgan, Latches for Gates and Doors.—2,886, W. Miller and C. Nichols, Accelerating the Setting and Hardening of Cements.—2,988, H. Kurten, Improvements in Water-closets.—3,938, H. Lake, Materials for Covering Walls and Ceilings.—7,490, W. Clark, Apparatus for Casting or Forming Ceilings, Coating Walls, &c.—8,175, A. Dobbing, Improvements in Flooring Cramps.—3,138, G. Martin, Improved Method of Securing Slates to Roofs.

Chubb & Sons' Lock and Safe Company (Limited).—The new hall, library, coffee-tavern, and industrial dwellings which this company have provided for the use of the men and families in connexion with their works in the Glengall-road, Old Kent-road, will be opened on Monday afternoon next.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

APRIL 8.	
By GRAVES & SON.	
Westbourne Park—4, Durham-terrace, 66 years, ground-rent 10 <i>l</i> .	£980
APRIL 9.	
By VENTON, BELL, & COOPER.	
Hackney—177, Mare-street, 65 years, ground-rent 16 <i>l</i> .	1,250
By R. TOMLINSON & CO.	
St. Margaret's, Twickenham—"Novesium Lodge," 86 years, ground-rent 9 <i>l</i> .	620
By NEWSON & HARDING.	
Stamford Hill—8 to 11 even, 37 years, ground-rent 75 <i>l</i> .	1,400
Ball's Pond-road—195 and 197, 33 years, ground-rent 6 <i>l</i> .	690
Nos. 2, 3, 15, and 16, Stanley-street, 67 years, ground-rent 7 <i>l</i> , 10 <i>l</i> .	1,160
Peckham—Ground-rents of 16 <i>l</i> . a year, reversion in 35 years.	340
Barnsbury—14 and 15, Little Payne-street, 19 years, ground-rent 4 <i>l</i> .	220
By E. STRIMON.	
Wandsworth-road—Ground-rent of 24 <i>l</i> . a year, reversion in 12 years.	1,150
Walworth—14 and 16, Elizabeth-street, 19 years, ground-rent 6 <i>l</i> , 6 <i>l</i> .	280
Gray's Inn-road—29 and 31, Harrison-street, 17 years, ground-rent 12 <i>l</i> .	400
Kenish Town—7, Healey-street, 66 years, ground-rent 6 <i>l</i> , 10 <i>l</i> .	410
Bermondsey—29, Moonrow-road, 53 years, ground-rent 8 <i>l</i> .	335
Kennington 1 and 2, Clayton-place, and 2 and 4, Clayton-street, 51 years, ground-rent 6 <i>l</i> .	835
APRIL 10.	
By DOWBERT & WOODS.	
Old Kent-road, Oakley-place—The British Schools, 20 years, ground-rent 12 <i>l</i> , 10 <i>l</i> .	70

MEETINGS.

SATURDAY, APRIL 18.

London Association of Foremen Engineers and Draughtsmen—Anniversary Dinner at Cannon-street Hotel 6 p.m.
Edinburgh Architectural Association.—Visit to Forth Bridge Works and Kossyth Castle.
St. Paul's Ecological Society.—Visits to St. Giles's Church, Cripple-gate (3.30 p.m.), and St. Sepulchre's, Snow-hill (4.30 p.m.), under the guidance of Mr. G. H. Birch.

MONDAY, APRIL 20.

Royal Institute of British Architects.—Tenth Ordinary Meeting. 8 p.m.
Surveyors' Institution.—Mr. A. J. Burrows "On Romney Marsh, Past and Present: a sketch of the Reclamation of this and adjoining Marshes." 8 p.m.
University College.—Mr. Barclay V. Head on "Greek Numismatics." 1. 4 p.m.
Society of Arts (Lecture Lectures).—Captain Abney, F.R.S., on "Photography and the Spectroscope." 1. 8 p.m.
Inventors' Institute.—9 p.m.
Leeds and Yorkshire Architectural Society.—Members' Soiree.
Edinburgh Architectural Association.—Mr. James Clark on "Ornament." 8.30 p.m.

TUESDAY, APRIL 21.

Statistical Society.—Mr. E. W. Brabrook, F.S.A., on "The Relation of the State to Thrift: Ten Years' Statistics of Friendly Societies and Similar Institutions." 7.45 p.m.
Birmingham Architectural Association.—Mr. A. Reading on "English and Continental Renaissance Architecture." 7.30 p.m.

WEDNESDAY, APRIL 22.

Artists' Benevolent Fund.—Seventy-sixth Anniversary Dinner, Freemasons' Tavern. 7 p.m.
Civil and Mechanical Engineers' Society.—Mr. T. M. Rymor Jones "On Rendering Wood for Building Purposes Non-Inflammable." 7.30 p.m.
Society of Arts.—Mr. Henry Cunyngnane on "Technical Education, with reference to the Apprenticeship System." 8 p.m.

THURSDAY, APRIL 23.

Parker Museum of Hygiene.—Sir Spencer Wells on "Cremona." 8 p.m.
Society of Antiquaries.—Anniversary. 2 p.m.
Society of Telegraph-Engineers and Electricians.—8 p.m.
York Architectural Association.—Mr. B. Priestley Shires on "Theatre Planning and Construction." 7.30 p.m.

FRIDAY, APRIL 24.

Architectural Association.—Professor T. Roger Smith on "A Prison for Architecture." 7.30 p.m.
Metropolitan Board of Works.—Election of a District Surveyor. 12 noon.

SATURDAY, APRIL 25.

Architectural Association.—Visit to the Church of St. Bartholomew-the-Great, West Smithfield. 3 p.m.
Association of Municipal and Sanitary Engineers.—Lancashire and Cheshire District Meeting at Burnley. 11.30 a.m.

The Manchester Ship Canal.—On Wednesday afternoon the Select Committee of the House of Lords appointed to inquire into the merits of the Manchester Ship Canal Bill gave their decision on the engineering portion of the scheme so far as the estuary of the Mersey is concerned. The Chairman stated that the committee were satisfied with the engineering portion of the scheme, and had decided to allow the Bill to proceed. The Committee will now commence an inquiry into the commercial aspect of the scheme.

The Student's Column.

DESCRIPTIVE GEOMETRY.—XI.

Produce a line, A, forming with the elevation and the plan the angles α and β .

WE assume that the line A passes through the point s in the elevation plane and require only to find its horizontal trace or foot, m. If we rotate A round the axis S' S, we know, by its inclination α , its position A' when contained in the elevation plane, and that in the rotation the point m describes a circle round S'. If, on the other hand, we rotate the line A round a horizontal axis of which the point s is the elevation, until the line A be parallel to the plan, we know that A¹¹ will be horizontal and A¹¹ will form the angle β with L T; besides which S¹¹ m¹¹ being the real length of the line sm, will equal sm'. In this second rotation m¹¹ describes a circle round the point s, and m¹¹ a parallel to L T; we deduce therefrom the plan A' and the elevation A" required. (See Fig. 55.)

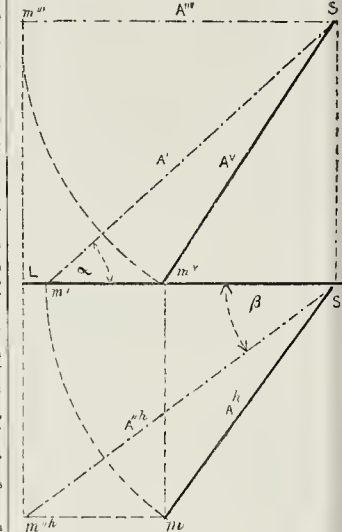


Fig. 55.

Let A be a line of the elevation plane, B a line of the plan; from the point O where these lines meet we are required to draw a line, F, forming the angle α with A, the angle β with B.

If we make the line F rotate round the line A as axis, it will describe a cone, defined by the angle α which F forms with A. If, on the other hand, F¹¹ rotates round B as axis, it describes another cone, defined by the angle β formed by F¹¹ and B. The real position of F is therefore at the intersection of these two cones, as shown in fig. 56.

We can readily draw F¹ the intersection of the first cone with the elevation, thanks to angle α , and we can draw F¹¹ intersection of the second cone with the plan by means of angle β . If we take on F¹ and on F¹¹ the points m' and m¹¹ at equal distance from o, they will meet in m when rotating round their respective axes A and B. The point m' will move in a plane of which P¹ is the vertical trace; and the point m¹¹ in a plane of which Q¹¹ is the horizontal trace. If we take the plane Q as auxiliary elevation plane, we shall be able to draw on it the circle described by m¹¹ and the trace P¹¹ of the plane P; the intersection m¹¹ of these two lines is the elevation of a point m of the line F; we can find therefrom the original projections m' and m¹¹; then join them to the point O, which will give us F¹ and F¹¹ required. In fig. 56 we have shown the whole operation by a perspective view; in fig. 57 we give the operation itself as carried out in plan and elevation.

Find the distance from a point o to a line A. We give two ways of solving this question. Firstly.—We turn down the plane which contains the line A and the point o round o

horizontal line of that plane. When the plane is become horizontal, we can then easily draw a line, ox^{11} , perpendicular to the line A^{11} , and this is the distance required. We have not yet turned down a plane round any horizontal line thereof, but if we consider that we have lifted up the plane of the plan so that our ground line $L^1 T^1$ coincides with $o^1 c^1$, the elevation of $o^1 c^1$, the problem is brought back to one we have already dealt with, viz.:—turn

down a plane round its horizontal trace. In our diagram b is a point of the line A ; after the rotation of the plane it comes in b^{11} on a prolongation of $m^1 b^1$, perpendicular to $o^1 c^1$. The circle the point b describes in space has been turned down round the trace, $m^1 b^1$, of its plane, and b^{11} is the position of b on that plane, and $m^1 b^1$ is the radius of the circle described. (See fig. 58.)

Secondly.—If, as in sketch, fig. 59, we take a

vertical plane through the line A and from the point o take op perpendicular to that plane and px from p perpendicular to the line A , the distance ox from o to A is the hypotenuse of the right-angle triangle of which op and px are the sides. We carry out this operation in fig. 60 by making an auxiliary elevation on the vertical plane which contains the line A itself. We then take the distance $o^1 p^1$ from o^{11} to m , and mp^{11} is the distance required.

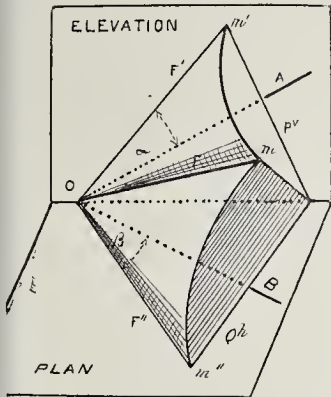


Fig. 56.

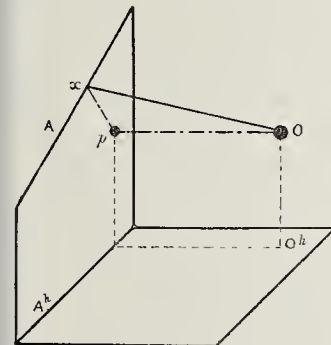


Fig. 59.

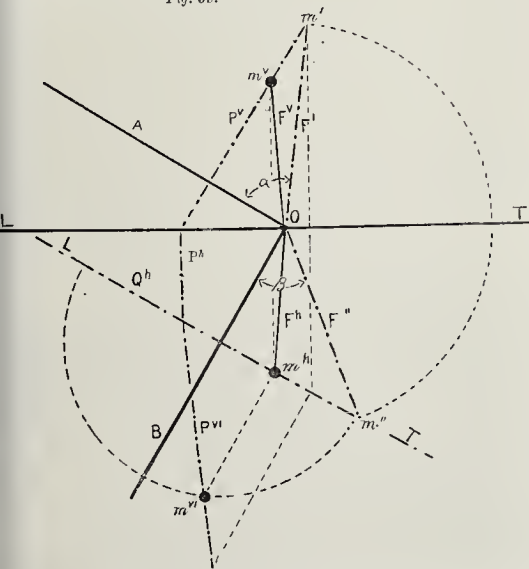


Fig. 57.

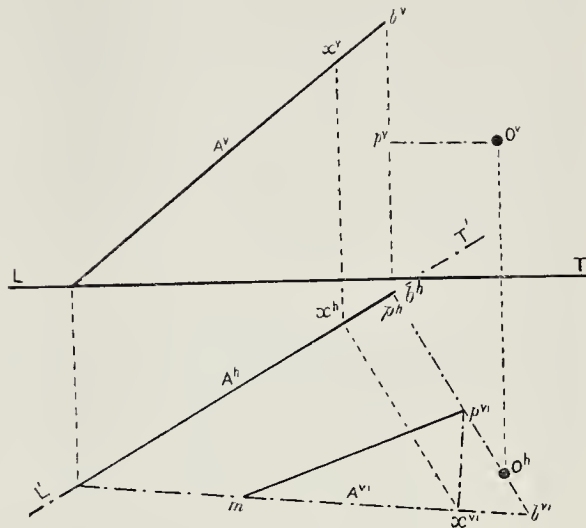


Fig. 60.

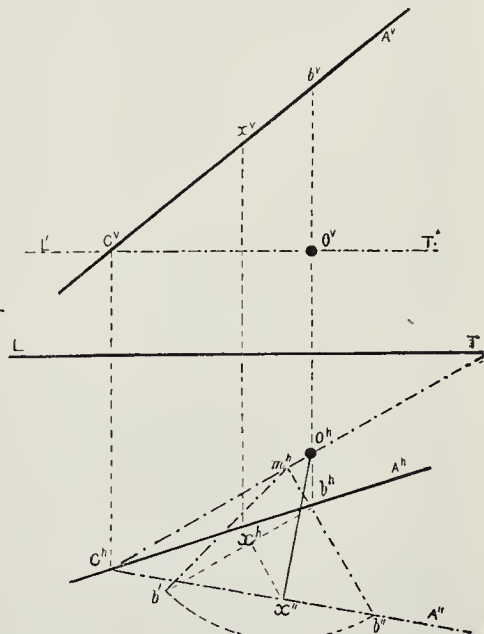


Fig. 58.

Miscellaneous.

Ecclesiastical Art Exhibition.—At the Church Congress this year, which is to be held in the diocese of Winchester, at Portsmouth (on Southsea Common), there will be the usual exhibition of ecclesiastical art, and from the historic wealth of the diocese it is expected that the lean collection will be more than usually interesting. The exhibition will be held in the assembly-rooms of Cawte's Esplanade Hotel, next to Congress Hall, and close to the pier. The promoters of the exhibition hope that the clergy of the diocese and others possessing interesting objects, suitable for the lean collection, will generously assist in making the exhibit of ecclesiastical art a representation capable of sustaining the high repute the diocese enjoys in the estimation of antiquaries and archaeologists. The loans may embrace goldsmiths' and silversmiths' work, ancient and modern, and ecclesiastical metal work in general, embroidery, needlework, tapestry, wood and ivory carving, ecclesiastical furniture, paintings, drawings, architectural designs for churches and schools, photographs, books, and MSS., and other objects of archaeological interest belonging to the churches of the diocese. The collection of disused communion plate is always a special feature of the exhibition. Contributors to the lean collection are requested to send particulars of any proposed exhibit to the manager of the exhibition, Mr. John Hart, 33, Southampton-street, Strand, W.C.

Lifting Buildings in Northwich.—Those unacquainted with the consequences of the rapid subsidence in the salt districts, now going on to such a lamentable extent, can scarcely realise the amount of its cost to owners of property. One of these consequences is that buildings have either to be pulled down and rebuilt, or they have to be lifted, if they are to remain tenable. Probably the case of the Wheatsheaf Hotel and adjoining premises, in Castle-street, Northwich, which has been lifted within the last three weeks, is the most noteworthy one, as having been raised the most—some 9 ft., at one simultaneous effort. This building, which, a month ago, was pronounced a dangerous structure, is now level, but how long it may remain so, with the rapid subsidence going on, remains to be seen. The next highest lift given at one time was probably that of the Winsford Town-hall, with five shops and a corn warehouse, all in one block, which was lifted, some time ago, 8 ft. 6 in., and that, we believe, without a dozen squares of glass being broken. Both these were carried out for the owners by Mr. R. Beckett, contractor, of Hartford.—*Northwich Guardian.*

The Harris Orphanage, Preston.—A Manchester paper says that the plans for the proposed Harris Orphanage have been submitted to the Harris trustees and approved by them, and they now only await the sanction of the Court of Chancery before the commencement of building operations. For the erection of this institution the trustees have granted 100,000*l.*, of which 30,000*l.* will be devoted to the building of the fabric, and the remainder for an endowment fund, &c. It is to accommodate 200 children who have lost both parents, and are not under three nor above thirteen years of age, providing the parents had lived within a radius of eight miles from the Preston Town-hall. The site of the orphanage is twelve acres of land at Fulwood, and it has been decided to adopt the cottage home system.

Railway Improvements.—An automatic apparatus has just been patented by Mr. W. R. Holyoake, and is about to be adopted for the purpose of exhibiting in each compartment of a railway carriage the name of the next station some time before arriving thereat. A bell is connected to each apparatus to call the attention of the passengers to the changing of the tablet. The difficulty hitherto found with all similar contrivances has been the want of an automatic action that would insure the changing of the tablets without the attention of the driver, guard, or porter, because, when the alteration depended on any of them, it was often forgotten; this invention dispenses with their assistance, and its mechanism is simple and inexpensive.

Artists' Benevolent Fund.—The seventy-sixth anniversary dinner of this Corporation is fixed for Wednesday next, at the Freemasons' Tavern, Viscount Hardinge in the chair.

Liverpool City Council.—At a meeting of this council, held on Wednesday last, it was (after some discussion) resolved, on the recommendation of the Insanitary Property and Artisans' Dwellings Committee, "That the sum of 100,000*l.* be borrowed under the Provisional Order of the 31st of May, 1884, confirmed by the Local Government Board's Provisional Orders Confirmation Act, 1884, and that application be made for the requisite sanction of the Local Government Board," and also "That the money so borrowed shall, with the express permission of the Council, be applied only for the purposes of the 7th and 8th presentments." Mr. A. B. Forwood, in moving the resolution, said the council, in the past fifteen or twenty years, had received power to borrow two sums of money, each of 100,000*l.* The first 100,000*l.* was devoted to the improvement of courts and dwellings—the pulling down of houses and improving the character of the courts. The second 100,000*l.* was being expended under the new powers obtained by the corporation in 1884. At the commencement of this year, something like 60,000*l.* of that 100,000*l.* had not been paid away, but there were other presentments that had been made, embracing a large number of houses. The committee were confining their attention to certain districts of the town which they desired to put into sanitary condition before they went further. They were dealing with Henderson-street, Worthington-street, Limekiln-lane, Carlton-street, Chisenhale-street, and Back Portland-street. To complete the work in these districts would require 10,000*l.*, perhaps 15,000*l.*, in excess of the borrowing powers at present possessed, but they required the 100,000*l.* because they had to provide dwellings for the people who were unhoused. All they had provided in the shape of dwellings for the poor was the Nash-grove dwellings.—At the same meeting it was resolved that the salary of Mr. T. Sheldermine, jun., Land Steward and Surveyor, be increased from 1,000*l.* to 1,100*l.* per annum, and that the salary of Mr. Clement Percunnie, City Engineer and Building Surveyor, be increased from 900*l.* to 1,050*l.* per annum, to be increased in twelve months to 1,200*l.* per annum.

"Quarrying and the Preparation of Setts."—A meeting of the Liverpool Engineering Society was held on Wednesday evening last at the Royal Institution, Colquhoun-street, Mr. W. E. Mills, President, in the chair. A paper, by Mr. C. H. Darbishire, A.M.I.C.E., on "Quarrying and the Preparation of Setts," was read by the author. The paper commenced by pointing out that the term "quarry" meant, primarily, the place where the stone was hewn and squared, whereas now it means the place where it is won from the rock, and not necessarily where it is squared. Attention was called to the fact that the dressing of stone, as far as is known at present, was probably one of the first accomplishments a man possessed when the race became distinctly human, and that in every age quarrying stone, and working it up to serve a useful, or even merely an ornamental purpose, has always been one of the leading industries. At the present day, when traffic has become concentrated into comparatively narrow streets of cities and towns, to the extent it has done, exceeding frequently 200,000 tons per yard width of street per annum, the preparation of stone for paving to meet the exigencies of the case is of the greatest importance. The quarry described is situated at Penmaennawr. The system adopted was fully dealt with, the various duties of the different sets of men being carefully gone into. Examples of the tools in use were exhibited, and they appeared simple enough in themselves, but it was explained that the art lay in using them skilfully. The paper concluded with a brief comparison of the system practically in force throughout North Wales with that under which quarrying is carried on in the large quarries of England.

Royal Academy: Architecture School. We understand that the class for architectural modelling will terminate for the session after to-day; and that Mr. Stanuiss will give a series of lessons on the Design of Architectural Ornament, on Monday evenings, from six to eight, as follows:—April 20, "Classification of Bands, Borders, and Strings"; April 27 and May 4, "Bands and Strings, and their Corners"; May 11, 18, and June 1, "Borders and their Angles"; June 8 and 15, "Friezes, and their Corners."

The Chancery-lane Safe Deposit Company's establishment, in New Stone-building, Chancery-lane, was to have been formally opened by Mr. Alderman Fowler, M.P. (now Lord Mayor), on Thursday evening last, but owing to the death of the late Lord Mayor the inaugural banquet has been postponed for a short time. Nevertheless, we believe it is the intention of the proprietor to open the place for business next week. The premises are so devised as to provide elaborate precautions for the safe custody of deeds and valuables of all kinds. The safes and strong-rooms have been constructed by Messrs. Milnor & Co. The vestibule and staircase are paved and lined with marble work by Messrs. Salviati, Burke, & Co. We defer a more detailed description of the establishment, which has been devised by and carried out under the superintendence of the proprietor, Mr. Thomas Clarke. We believe it is proposed to transfer it to the hands of a company now in course of formation.

Enlargement of Ilkley Hospital.—In July last the Committee of the Ilkley Convalescent Hospital decided that the accommodation should be extended, so that the number of patients might be raised from 70 to 100. Plans prepared by Mr. C. H. Hargreaves, architect, Bradford, were approved, and a portion of the work is now being executed under his supervision. As the hospital was originally constructed, there was no dining-room, the women's day-room having been used for that purpose by the whole of the inmates. By means of the extension a separate dining-room will be provided, there will be larger and better kitchen accommodation, and additional dormitories. The old building is of a plain domestic Gothic character, and the new buildings correspond with it. The enlargement of the main building is effected by extending the east and west wings. The cost of the additional buildings will be about 2,100*l.*

York Architectural Association.—On the 9th inst. Mr. George W. Milburn delivered a lecture on "The Decorated Period of Gothic Ornament" before the members of the above Society in the saloon of the Victoria Hall, Goodramgate. The President, Mr. A. Pollard, occupied the chair. The lecturer described at length and with numerous sketches upon the blackboard how the thorn, vine, ivy, oak, and maple were introduced in the formation of capitals, crockets, diapers, spandrels, &c. At the conclusion, the President moved a hearty vote of thanks to the lecturer, which was seconded by Mr. G. J. Monson, and carried. Mr. T. S. Worthington, of Blake-street, was elected an honorary member of the Association. The subject of the churches scheduled to be disused or demolished was brought forward, but after a short discussion the question, for want of time, was postponed for future consideration.

An Old Pulpit in a New Place.—A very fine oak pulpit, carved in the semi-classic style of the fifteenth century, has just been placed in the nave of Winchester Cathedral on a base of oak, a work which Mr. J. Fielder has carried out. The history and object of the pulpit is told in the following inscription on a brass plate:—"This pulpit, formerly in New College Chapel, Oxford, was given by the Warden and Fellows to Charles Mayo, D.D., formerly one of the Fellows of that Society, and it is completed and presented to Winchester Cathedral by members of his family in loving memory of Jane Mayo, his sister, who fell asleep October 8, 1884." There are other memorials of the Mayo family in the stained-glass windows in the north aisle.

Temple Bar.—The *City Press* says:—"The stones of old Temple Bar, which have been carefully stowed away by Messrs. Mowlem & Birt, will shortly be brought to light, and Temple Bar will be again set up in King's Bench-walk. Thus it will be almost within a stone's throw from its old site." It will be remembered that this site for the re-erection of the old gateway was suggested in the *Builder* a fortnight ago.

The Inventions Exhibition.—Messrs. C. Isler & Co., of Southwark-street, have secured a contract for supplying fifteen of their Improved Patent Registering Turnstiles to the International Inventions Exhibition.

Builders' Clerks' Benevolent Institution.—The Carpenters' and Masons' Companies have each voted the sum of ten guineas in aid of the funds of this charity.

The Disposal of Refuse Matter.—Under the presidency of Sir Robert Rawlinson, two papers dealing with the disposal of sewage and town refuse were read on Wednesday evening last at the Society of Arts. The first, by Dr. Thomas Hawkesley, related to the abolition of water carriage in the removal of offete organic matter from towns. The second paper, read by Dr. B. W. Richardson, had reference to the removal of refuse independently of sewage. This he comprised under the heads of house refuse, trade refuse, market refuse, street sweepings, condemned food, slaughter-house offal, and stable refuse; and quoting the authority of Colonel Hayward, Engineer to the City of London, he said that, refuse in the City under the first four heads alone amounted to about 61,230 cartloads per annum. The more rapidly the refuse was removed the better for the health of the community, and it appeared that in towns where there was quick removal there was less disease—a fact which showed that these agencies had an effect, indirect at all events, upon health. Everything connected with this removal, except perhaps in the City, was exceedingly bad in London and most large towns, but this should not be the case, seeing that a profit arose from it. The means adopted for removing horse and trade refuse in the City might be taken as an example for other towns in England; but in the case of seaside places he recommended a system of floating barges such as those in use on the Tyne. He condemned the common system of contracts, and insisted that the parish authorities should themselves undertake the removal of refuse.—The chairman said he felt himself debarred from taking part in the discussion, but, though he was silent, he did not wish it to be understood that he agreed with all the arguments adduced. This, however, he might say, that he considered scavenging as the root of sanitary progress.—A discussion ensued, in which Dr. Alfred Carpenter and other gentlemen took part.

Line of Frontage Case.—In the late frontage line case of the Vestry of St. Marylebone v. Rose, tried before the Divisional Court, and mentioned in our issue of last week [p. 508], an application was made on the 14th inst. to Mr. De Rutzen at the Marylebone Police-court for an order of demolition, which was granted; as also one in the case of an adjoining owner, both of the buildings being used as florists' shops.

The Westminster Hall Question.—Thursday's Standard says:—"The Select Committee on the Restoration of Westminster Hall will meet to-morrow to consider their report. Two draft reports have been prepared, one by the chairman, which substantially approves of Mr. Pearson's plans, and the other by Mr. Dick Peddie, which proposes that the buttresses should be repaired, and that the general question of the restoration of the cloisters should be deferred for future consideration."

The Safety of Cast-Iron Columns.—The safety of cast-iron columns in case of fire, as compared with columns of wrought iron, or pillars of stone, brick, or cement concrete, has been the subject of investigation by Professor Bauschinger, of Munich. It will be remembered that the Berlin police authorities, in consequence of unfavorable experiences with cast-iron columns in recent fires at Berlin, issued regulations forbidding the use of such supports in the construction of dwelling-houses, hinting the employment of columns of wrought iron and clinkers in cement mortar. Cast-iron columns may only be employed if they are surrounded with immovable mantles of wrought iron separated from them by an air space. Professor Bauschinger heated cast and wrought-iron columns weighted with burdens usually imposed in structures first to 300°, next to 600°, and finally to red-heat, and suddenly cooling them afterwards by a jet of cold water, as applied in extinguishing fires. The experiments demonstrated that cast-iron columns, although they were heated by red-heat, and showed transverse cracks when water was applied, supported the weight imposed upon them, whilst wrought-iron columns were bent before arriving at a state of red-heat, and were so much distorted by the application of water that a straightening was out of the question. In reality, they would have collapsed under the weight they had to support. Professor Bauschinger concludes from his experiments that cast-iron columns, notwithstanding cracks and heeds, would continue to support the weights imposed upon them, whilst wrought-iron columns would not. In examining pillars of stone, brick, and cement concrete, the latter proved to be the best. Concrete pillars withstood the action of fire for one to three hours; those of ordinary bricks, as well as those of clinkers set in cement mortar, displayed great resistance; whilst natural stone, granite, limestone, and sandstone,—were not fireproof.

TENDERS.

For new warehouses, corner of St. Mary Axe and Bevis Marks. Mr. E. Collins, architect, 61, Old Broad-street.

Quantities supplied by Messrs. Batstone Bros.:	
Lawrence & Sons	24,985 0 0
Pattman & Fobbingham	4,573 0 0
Shurmur	4,590 0 0
Brass & Son	4,250 0 0
Colls & Sons	4,216 0 0
Shepherd	4,200 0 0
Downs	4,184 0 0
Kirk & Randall	4,022 0 0
Nightingale	3,913 0 0
Morter	3,839 0 0
W. & F. Croaker	3,827 0 0

For part rebuilding, underpinning, and strengthening the tower of St. Leonard's Church, Hythe-bill, Colchester. Churchwardens: Messrs. Ebberts & Cobb, architects, London and Colchester:—

Chambers	£340 0 0
Errett & Son	740 0 0
Dobson	498 0 0
Aubrose	478 6 0

For a boat-house, Sea Front, Dover, for the Dover Rowing Club. Messrs. Cresswell & Freeman, architects, Dover:—

F. Clark, Dover	£123	Iron Roof.
Whelch & Co.	120	£105
W. T. Adcock	115	110

For alterations to the Angel and Crown, 235, Upper-street, Islington, for Messrs. Geelach & Co., Mr. M. A. Leworth, architect, Bishopsgate-street With.

G. Colls	£860 0 0
Shurmur	693 0 0
Larter & Son	674 0 0
Toms	646 0 0
Marr	645 0 0
Jackson & Todd	623 10 0

Accepted for new Baptist Chapel and school at Littleborough. Mr. F. H. Shuttleworth, architect, Littleborough:—

Masons and Joiners.—E. Taylor & Co., Littleborough	£1,471 0 0
Plastering.—T. Black, Todmorden	139 0 0
Plumber.—R. Hudson, Littleborough	104 0 0
Slatings.—S. Barnes & Sons, Todmorden	70 0 0
Painting.—A. Stanfield, Todmorden	60 0 0

Accepted for two houses at Littleborough, for Mr. Jno. Kershaw. Mr. F. H. Shuttleworth, architect:—

Mason.—B. Hartley, Littleborough	£328 0 0
Joiners.—E. Taylor & Co., Littleborough	110 10 0
Plumber.—J. Mills, Littleborough	32 0 0
Plasterer.—T. Black, Todmorden	28 10 0
Slaters.—S. Barnes & Sons, Todmorden	20 5 0
Painter.—C. Whitworth, Rochdale	11 2 5

Accepted for two houses at Littleborough, for Mr. A. Spencer. Mr. F. H. Shuttleworth, architect:—

Mason.—B. Hartley, Littleborough	£400 0 0
Joiner.—N. Rigg, Littleborough	100 0 0
Plasterer.—T. Black, Todmorden	29 0 0
Slaters.—J. Mills, Littleborough	28 10 0
Painter.—C. Whitworth, Rochdale	10 8 0

For the extension of sewerage through the upper portion of Freemantle, for the Shirley and Freemantle Local Board. Mr. Herbert L. Taylor, surveyor:—

Rowe	£450 0 0
Batten	425 0 0
Richardson	420 0 0
Fenny	393 0 0
Faulkner	385 0 0
Butt	380 0 0
Sibsey	348 0 0
Slings	329 0 0
Mears	317 0 0
Crook & Smith, Southampton	317 0 0

[All of Southampton and Shirley.]

* Accepted.

For building additions to Luton Foundation School, near Hereford. Mr. F. R. Kempton, architect, Hereford.

Quantities by Mr. F. Downing, 7A, Whitehall-yard:—	
Page & Son	£7,200 0 0
B. Wale	7,168 0 0
W. Cullis	7,100 0 0
Horsman & Co.	6,897 0 0
C. Edwards	6,859 0 0
T. Collins	6,459 0 0
R. Yates	6,361 0 0
Treasure & Son	6,198 0 0
C. Claridge	6,178 0 0
Jones & Son	5,687 0 0

For works required to be done in making alterations and additions to St. Paul's Church, Wandsworth, for the Building Committee. Mr. Henry E. Coe, architect.

Quantities supplied by Mr. H. P. Foster:—	
Lucas & Son	£1,098 0 0
H. Burman & Sons	1,098 0 0
T. Laphors & Co.	998 0 0
E. Parsons	911 0 0
T. Gregory, Clapham Junction	895 0 0
Stimpson & Co.	878 0 0
Turtle & Appling	878 0 0

* Accepted (subject to certain reductions) at 605/.

For additional wing and chapel at Princess Mary's Village Homes, Addlestone. Mr. T. Heggate Vernon, architect. Quantities by Mr. Cecil O. Saunders:

G. Candier, Streatham	£3,590 0 0
C. T. Adkins	3,480 0 0
Higgs & Hill	3,480 0 0
Prestige & Co.	3,194 0 0
T. Gregory	3,185 0 0
T. Gregory, Clapham Junction	3,181 0 0
Stimpson & Co.	3,060 0 0
J. Holloway, Lavender-hill	3,060 0 0
W. Johnson, Wandsworth	2,988 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitoms of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Public Baths	Cor. Bootle-cum-Linacre	50l., 25l., and 10l.	June 1st	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Circular Reservoir	Grdns, Haslingden Un.	Official	April 20th	ii.
Machine House	Tottenham Local Board	Do Pope	April 21st	ii.
Road Material	Lewisham Brd. of Wks.	Official	do.	ii.
General Repairs, Dwelling House	Chelsea Guardians	do.	do.	ii.
Painting Works	Vestry of St. Lubo's	do.	April 22nd	xv.
Railway Stores	L. B. and S. C. Ry. Co.	do.	do.	ii.
Re-constructing Sewer, &c.	Vestry of the Parish of St. George-in-the-East	do.	April 23rd	ii.
Additions, &c., to Orphanage Buildings	Railway Servants' Orphanage, Dorly	do.	April 24th	ii.
Making-up Carriageway	Horsney Local Board	T. de Conroy Mead	April 25th	ii.
Construction of New Road, S. Acton Estate	The Proprietors	C. N. Lislely	April 27th	ii.
New Police-Station	The Receiver, Metro. Police District	Official	do.	ii.
Water Works, &c.	Grays Gas Co.	F. Morris	April 28th	xiv.
Water Vans for Road Watering	West Ham Local Brd.	Lewis Angell	do.	ii.
Cast-Iron Flexible Pipe Outfall Sewer	Dover Corporation	Official	do.	ii.
Foundations for Station, &c., Bldg., Bradford	Midland Railway Co.	A. A. Langley	May 1st	ii.
Cleaning and Painting	do.	do.	do.	ii.
Loadmaking, &c.	United Land Co., Lim.	Official	May 4th	ii.
Chargement of Post-Office, Landport	Com. of H.M. Works	do.	May 5th	ii.
Boys' School, &c.	Abercree School Board	do.	May 6th	ii.
Completion of New Sanitary Turret, &c.	Guardians of Chelsea	A. & C. Harston	do.	ii.
Erection of Six Small Houses (2nd Portion)	Proprietors, Belmont Estate, Sutton	E. S. & H. Doosay	Not stated	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Engineering Assistant	Sheffield Town Council	150l.	April 20th	xviii.

For alterations and additions to the premises containing the Roman pavement in Jevry Wall-street, Leicester, and other works in connexion therewith. Quantities and specification by Mr. J. Gordon, C.E., Borough Surveyor:—

T. Bland & Son.....	2564 10 0
F. Mator.....	535 10 0
Jno. Chester.....	512 0 0
T. Duxbury & Sons.....	500 0 0
T. C. Tyers.....	422 0 0
J. O. Jewsbury.....	489 14 0
Harry Bland (accepted).....	400 0 0
J. B. Turner.....	389 8 0

[All of Leicester.]

For the erection of a boiler-house, coal-houses, and other works, at the Borough Lunatic Asylum, Leicester. Quantities and specification by Mr. J. Gordon, C.E., Borough Surveyor:—

T. Bland & Sons.....	2500 0 0
T. C. Tyers.....	461 0 0
Chas. Bass.....	469 0 0
J. O. Jewsbury.....	435 15 0
J. Riddett.....	435 0 0
T. B. Turner.....	434 11 6
T. Turbury & Son.....	430 0 0
F. Mator.....	428 0 0
T. Richardson & Sons.....	427 10 0
Jas. Stevens (accepted).....	419 0 0

[All of Leicester.]

For the erection of a residence at Hampton Wick. Messrs. Bray, Webb, & Co., architects, 14, Warwick-court, High Holborn:—

Gibbs & Eves (Limited).....	£1,953 0 0
Harris.....	1,696 0 0
Thos. Wontner Smith & Son.....	1,645 0 0

For alterations, &c., at 55, Harley-street, Cavendish-square. Mr. Ernest Turner, architect, 248, Regent-street:—

Hebblethwaite.....	£745 0 0
Curtis.....	519 0 0
Alden & Flater.....	498 0 0
J. T. Howe.....	497 0 0
Thos. Wontner Smith & Son.....	498 0 0
Patman & Fotheringham.....	430 0 0

For the erection of a hospital for infectious diseases, for the Wrexham Rural Sanitary Authority. Mr. Alfred C. Bangh, architect, engineer to the Board. Quantities supplied:—

Johnson Bros., Hereford.....	£7,473 4 1
David Davies, Cardiff.....	6,460 0 0
Chaloner, Rossett.....	6,243 0 0
Griff. Griffiths, Colcieth.....	5,831 0 0
Hughes & Owen, Wrexham.....	5,841 0 0
W. E. Samuel, Wrexham.....	6,655 0 0
J. Hamilton.....	5,380 0 0
Davies Bros., Wrexham (accepted).....	5,239 10 6

For decoration and repairs at Stoke Newington Wesleyan Chapel. Mr. F. Boreham, architect:—

Bradford.....	£369 10 0
Richards.....	333 15 0
Stapleton.....	351 12 6
L. H. & R. Roberts.....	325 0 0
Chessum.....	311 0 0

For rebuilding 33 and 34, Great Portland-street, for Mr. T. Ebley. Quantities by Messrs. Barber, Boxhall, & Barber:—

Langridge.....	£5,400 0 0
Greenwood.....	5,368 0 0
Hign & Hill.....	5,340 0 0
Hall, Boddall, & Co.....	5,184 0 0
Wm. Oldrey.....	4,957 0 0
Wm. Oldrey.....	4,877 0 0

For additions and alterations at Raven Villa, Blytheshed, Stamford. Mr. J. Goldsack, architect:—

General Works.....	Bath extra.....
Carter & Son, New Broad-street.....	£239.....
G. Ruffell, Forest Hill.....	178.....

Accepted for five new houses, butcher's shop, stabling, sheds, and additional premises, at Stocksbridge, for the Stocksbridge Co-operative Society. Mr. Robert Dixon, architect, Barnsley. Quantities by the architect:—

Excavator's, Mason's, Bricklayer's, and Slater's Work.
Kenworthy & Brearley, Stocksbridge.
Carpenter and Joiner's Work.
James Thompson, Stocksbridge.
Total of above trades..... £1,427 17 8

Accepted for alterations and additions at the Prince Regent, North street, Walworth. Mr. Thos. Lock, architect and surveyor:—

Galland, Hoare, & Co., Walworth.....	2,685 15 0
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For proposed alterations at Bright Lodge, West Dulwich, for Mr. W. F. Hammond. Mr. H. I. Newton, architect, Queen Anne's-square:—

Lamble.....	£1,253 0 0
Godden.....	1,198 0 0
H. Cook (accepted).....	1,119 0 0

For the erection of a new house, shop, and bakehouse in Spring-road, Bedford, for Mr. H. Mortimer. Mr. F. F. Mercer, architect. Quantities supplied:—

T. Loughton & Co.....	£1,039 15 0
Warton & Walker.....	863 0 0
G. Harrison.....	859 0 0
Jas. Potter.....	854 0 0
J. P. White.....	839 0 0
G. Tedd.....	829 0 0
F. H. Long.....	695 10 0

For two pairs of villas. Finchley, for Mr. J. Winkler. Mr. T. F. Shaw, architect, Harlesden:—

Cooper.....	2,607 0 0
Pryor.....	2,600 0 0
Jones.....	2,400 0 0
Greenwood.....	2,300 0 0
Penny & Co. (accepted).....	2,250 0 0

Accepted for pair of villas at Craven Park, Willesden. Mr. T. F. Shaw, architect, Harlesden:—

G. Hardy.....	£1,350 0 0
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SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 36, Catherine-street, W.C., not later than four p.m. on THURSDAYS.

TO CORRESPONDENTS.
J. P.—R. F. Rome (thanks).—A. N. H.—J. G. W.—"An Old Subscriber" (if you wrote openly and honestly, I thought a defect you would be thanked for doing so, but we will not do anything for anonymous correspondents. If you write anonymous attacks does an ungentlemanly action; and, if no one has taught you that, you had better learn it now).—W. M.—C. V. & Co.—M. & Co.—F. G.—Justice.—L. G. M.—F. R.—W. R. H.—D.—A. W. (letter and truglas received).—R. S. G.—M. & A.
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ILLUSTRATIONS.

The Alcázar, Segovia	584-585
The Cathedral, Segovia	588-589
Block of Buildings in Great Tower-street and Mining-lane, E.C.—Mr. Edwin A. B. Crockett, Architect	593
Shops, Gun-street, Reading.—Mr. W. Ravenscroft, Architect	593
Old London Churches: St. Dunstan-in-the-West; All Hallows, London Wall	598, 597

CONTENTS.

The Peterborough Cathedral Question	573	The Cathedral and Alcázar of Segovia	582	Line of Frontage	601
A History of Freemasonry.—By Wyatt Papworth	574	Block of Buildings in Great Tower-street, E.C.	582	Ancient Lights: The Earl of Harrington v. The Building Securities Company	601
National Land Company	575	New Shops, Gun-street, Reading	582	Cooking Apparatus for Large Institutions	601
Notes in Spain, Architectural and Historical: 1. Cathedral and Alcázar of Segovia	577	Old London Churches	589	Sauze Medalion	601
Notes on Flint Work, especially in the County of Suffolk: Royal Testimonies of British Architects	578	On Rendering Wood for Building Purposes Non-Inflammable	589	The Sturtevant Column: Descriptive Geometrical	601
Notes on the Ancient Churches of London	586	Gift of a Public Hall to Hatfield	590	Meetings	602
Architecture in the Nineteenth Century	581	Artists' Benevolent Fund	600	Birmingham Architectural Association	602
		Hereford Sewerage Works	600	Miscellaneous	603
		A Lausdike's Experiment	600		

The Peterborough Cathedral Question.

THE decision of the Archbishop of Canterbury as arbitrator in the contention about the treatment of Peterborough cathedral, published at length in the *Times* of Wednesday last, is a gratifying document to those who, like ourselves, do not entirely concur in its conclusions. The Archbishop has in the main vindicated his aim to be regarded as a suitable arbitrator in the case; and in contrast with all the exag-gerations, sentimentalities, cross questions, and crooked answers which the dispute has hitherto called forth, it is refreshing to read a document so cool, considerate, and business-like, and which takes in hand the whole case with such thoroughness and impartiality, as well as with a knowledge of the bearing of architectural and archaeological considerations, certainly not very often found outside the group of specialists in the study of such subjects.

The Archbishop divides his decision into two main heads: his criticism on the constitution of the committee, and that on the architectural schemes propounded. With the common-sense of a man of business, he points out that in carrying out any great work of the kind it is in the first place necessary that it should be understood who is to have the ordering of it. The Archbishop comments, with a certain sarcastic directness of expression, on the very peculiar constitution, or want of constitution, of the committee for directing the work. "The committee," he says, "consists of fifty or more members not appointed (I understand) on any systematic scheme. The Dean and residentiary Canons are naturally *ex officio* members of it. Its decisions are by majorities of members able to attend on each occasion. The Canons claim to control every decision, and state that they have originated every proposal and formed a decision on each step (until the proposal about the tower) before it came to the committee. They have practically conceded a veto on every step to the committee, but have 'not contemplated vesting themselves of any of the rights or responsibilities relative to the cathedral fabric which are inherent in the Dean and Chapter,' and 'that the committee was formed for the purpose of obtaining funds.'" When it is added that on this basis of constitution any three of the Canons acting together, as forming the majority of the residentiary Chapter, could in any difference have the entire control

of the proceedings, and that, on the other hand, their contract with the builder engages him only to look to the subscription fund for remuneration, most clear-headed folk will agree with the Archbishop that such a constitution is "absolutely hopeless" for the successful execution of a great work.

Dr. Benson accordingly recommends, as the first step, the formation of a committee on a sound basis. The general committee, whose real function is to raise the fund for the work, should appoint an executive committee to control the work; and here the Archbishop suggests a means whereby the *ex officio* members may retain their *ex officio* character and yet be hindered from exercising undue power. He proposes that the Dean and four Canons should be *ex officio* members of the executive committee; that they should nominate four other members, and that the general committee should nominate eight; giving an executive committee of seventeen members, the Dean presiding. This committee should in its turn appoint a sub-committee of three, to be on the spot and watch the work constantly. The general committee would then meet once or twice a year to receive reports and decide on large operations.

Having made this recommendation, Dr. Benson, before proceeding with his judgment on the architectural side of the question, points out that should such a committee be formed it would be the duty of that committee to consider and decide upon the architectural treatment of the cathedral; and he argues that had such a committee been constituted at first the deadlock which has led to his being called in as arbitrator would never have occurred. He therefore proceeds to give his judgment on the architectural question, with the proviso that if the new committee, as recommended by him, be formed, his arbitration on the architectural question may be considered as superseded, and the matter left to be decided by the committee. If those concerned decline to take his advice and form themselves into a committee constituted on a rational basis, then they are to be bound by his decision as to the treatment of the cathedral, and the choice of the various schemes that have been proposed.

These various proposals Dr. Benson simplifies, omitting those which have been practically abandoned, into two. The one, which he distinguishes as A, is the original one, to replace everything that had been taken down exactly as it stood, only giving such strength to the re-construction as to allow of a possible addition to the lantern, in the way of an octagon stage or otherwise, at some future time. The other plan, B, Dr. Benson describes as "what remains through successive stages of a proposal

for a high Norman tower to be erected (or erected) from the ground upon two ancient Norman arches, and two others to be substituted for the pointed arches east and west, with an upper stage of Decorated work, corresponding to the present lantern and following its main lines, but much heightened and embellished. Into the lower arcade of the tower, immediately above the great Norman arches, were to be worked the remnants which have been found of the original arcading, and the whole was, according to this proposal, to be crowned with a high spire." And these are further and more briefly summarised thus:—

"I am, accordingly, to choose between A, viz., the replacement of the pointed arches of A.D. 1380 east and west of the crossing; above these the present Decorated lantern of that date, as it lately rode the four great roofs, with provision for a future superstructure, possibly an octagon, as anciently;—and B, substitution of Norman arches for pointed; above these a Norman story, 15 ft. to 18 ft. high, working in the relics, which probably formed an arcade before A.D. 1380; above this the Decorated lantern, necessarily remodelled to its new position, battlement, and high pinnacles."

The Archbishop gives his judgment for A, which includes the rebuilding of the two pointed arches of the crossing (Sir E. Beckett's "good-for-nothing arches"). This question of the pointed arches is really the turning-point of the whole matter, and a very difficult one to come to a definite conclusion about. Our own conclusion, in considering the matter a short time since,* was that on the whole it was not worth while to replace the two pointed arches now that they were down; that once down and rebuilt, their historical interest would be much impaired, and that their introduction at all by the fourteenth-century architects was a defacement of the artistic unity of the architectural centre of the building. Dr. Benson's reason for taking the opposite view we will give in his own words:—

"In favour of abolition [of the pointed arches] it is urged that they are less 'fine and rich' than, indeed are 'poor and mean' in comparison with the Norman. But they are allowed to be good Decorated work, so that this criticism is only to be taken as a general disparagement of the Decorated style in comparison with the Norman. Against abolition is the fact that they are the central point of the fourteenth-century remodelling of the whole church. They correspond to the west windows and inter-advanced arch before it, to the groining of the choir roof, to the pointed labels so carefully inserted over every clearstory window (as well as over the side arches of the crossing), and lastly to the lantern itself, which they supported. With all these the pointed arches form one sequence. If they are abolished on principle in favour of Norman, much else ought to be abolished throughout the church as fast as opportunities occur, and probably the lantern itself."

* See *Builder*, January 10th of this year.

Of course that is the other possible way of looking at it. If you regard the pointed arches of the crossing in relation with the other Pointed work of the church, they are in place; if you regard them in relation to the crossing, which is the way every genuine architect (as opposed to archeologist), we should say, would regard them, they are very much out of place, and are in fact, eyesores. We naturally take the latter view; but we admit the reasonableness with which the Archbishop puts his own view.

We cannot say so much in favour of the reasons given for rebuilding the lantern just as it was before the failure of the tower. Dr. Benson appears to have made a misapprehension—singular in a document otherwise displaying such clear knowledge of the facts,—in regard to the lantern. He says "it would have to be singularly altered if suspended at a greater height. It was specially designed to ride close down upon the roof. . . . The blind panelling between the windows, which was so arranged as to fit down above the gable, would be without meaning when lifted a space above it." This is surely putting the cart before the horse. The arading stage, against which the roof would naturally have abutted, was removed when the crossing was partly rebuilt, to lighten the weight on arches which had shown themselves inadequate; and the peculiar treatment of the tower was cleverly devised to make the best of disadvantageous circumstances; but it was a kind of architectural makeshift. Having now strengthened the piers so that they will carry a much greater weight, why replace a design the distinguishing feature of which was especially forced on the fourteenth-century builders by the fact of a weak substructure? There may be historical reasons for doing this, but not architectural ones, as the Archbishop seems rather to think there are.

We cannot, therefore, say that we agree with Dr. Benson's decision, and we are disposed to hope that the committee will be reconstituted as he has suggested, and that a scheme more architectural and less archaeological will be carried out. At the same time we must say that the more archeological view of the question could hardly have been more ably or more moderately stated.

To give full weight to the Archbishop's views we subjoin his final summing up in his own words:—

"B has the recommendations:—

First.—Of recovering into its place the design of one of the stages of arading, and of incorporating an existing remnant of it. This, as a mode of gaining height, is recommended by its faithfulness to the past.

Second.—And of substituting copies (with some genuine fragments) of the earlier Norman arches in places of the actual past of the last five centuries. This is recommended on the ground of preference for the style, as well as of the pursuit of superior antiquity.

But B has the following disadvantages:—That 1. As against the principle of faithfulness to the past it obliterates the mechanical effort of 1380, and the chief features of the 'Pointed' remodelling of the whole church about that time; and

2. Alters the design and adaptation of the lantern to its place.

3. That it leaves a large space between the arcade and lantern, to be either a blank or to be used to introduce a novel and most prominent addition.

(4) That it presents an assemblage of features never before in juxtaposition; partly copied and partly old, the old altered in some characteristic points (lantern) to enable them to be fitted together, and the oldest portion appearing between the newest, and that which belongs to the middle period.

The disadvantages of B seem to me rather to outweigh its advantages, and, balancing merits and demerits in the two plans (which is all that I have to do), I cannot but recommend

That the first plan A be adhered to as originally intended and provided for, viz., of replacing in solid and durable work the form of the tower and arches which we received, providing at the same time what may be necessary as preliminary as to heightening the tower, whether by octagon or otherwise.

And that the recovered fragments be fitted together (as well as they can) in some place where they may illustrate the antiquities of the church."

The argument as to the intermingling of styles of various dates in what would be essentially a modern erection deserves serious con-

sideration. But our general summary of the matter is, as before, that the tower as it recently stood was a poor concern, and that Mr. Pearson is a nineteenth-century architect capable, if he has a fair chance, of producing something better.

THE HISTORY OF FREEMASONRY.

BY WYATT PAPWORTH.



THE third volume of Mr. Gould's exhaustive History,* which has now appeared, continues an investigation into "Early British Freemasonry in England." The details of the four chapters comprise,—Masonic Tradition, Sir Christopher Wren, Papal Bulls, Travelling Bodies, Annual Assemblies, the Caballa, Mysticism, the Rosierucians, Elias Ashmole, the Masons' Company, Plot, Randle Holme, the Old Charges, the Legend of the Craft, Light and Darkness, Gothic Traditions, Degrees, and Speculative Masonry. Testimony has already been borne to the great labour and research displayed by the author of this entirely new history of Freemasonry, culled as it partly is from all sources, ancient and modern, with much warm-hearted assistance from some few friends equally zealous with himself in searching for the truth connected with a series of events which have puzzled all investigators. Among the very numerous subjects, and points connected with them, and thoroughly investigated in this volume by Mr. Gould, there are two of much interest to architects. 1. The negation of the hitherto received assertion that Sir Christopher Wren belonged to the Society of Freemasons. 2. The hitherto unknown contemporaneous existence of the Guild of Masons in London and of the Society of Freemasons; while, partly arising out of the latter, is the query,—Did the older copies of the "Old Charges" now collected belong to the former or to the latter body? Discussing the merits of Ashmole's diary, our author conceives that the Sloane copy was in 1646 in use by operative and speculative body, and adds that "we are still in doubt as to what period above 1646 a monopoly, if any, of these ancient documents by the working masons can be viewed as probable." Further on Mr. Gould admits, from the words used by Randle Holme, that "there were then [1688] subsisting unions of practical Masons, in which there was no admixture of the speculative element." Throughout this review the two bodies will be distinguished by "Guild" and "Society," which latter, in an opinion formed by myself after very many years' researches out of the "old records" of the Society (the results of which were published in 1863, and have been largely referred to by Mr. Gould with kindly acknowledgements) much resembles the Hermit Crab, which quietly ensconces itself in the empty shell it finds convenient for its residence. In a previous review of this work it was pointed out that this "History" would be equally available in a "History of Architecture," and future writers upon it, treating of this period, will no doubt avail themselves of the treasures contained in these volumes.

In commencing chapter xiii. our author writes: "It is, I think, abundantly clear that the Masonic body had its first origin in the trade unions of mediæval operatives. At the Reformation these unions, having lost their *raison d'être*, naturally dissolved, except some few scattered through the country, and these vegetated in obscurity for a period of close upon two centuries, until we find them reorganised and taking a new *point de départ* about the year 1717. But by this time the Masonic bodies appear under a new guise. While still retaining, as was natural, many forms, ceremonies, and words which they derived from their direct ancestors, the working masons, yet we find that operative masonry was, and probably long had been, in a state of

decay, and a new form, that of speculative masonry, had been substituted in its place." As this word "speculative" has been used, I shall prefer to notice Mr. Gould's elucidation of it, contained in the closing pages of the volume. "It is," he writes, "a word the import of which has been but imperfectly grasped by members of the craft." It is used as contradistinguished from "operative or practical masonry." But, I would suggest, may it not have been introduced to cover the practice of admitting lay brethren into the local lodge or town guild of operative masons? The author has amusingly referred to a MS. constitution or charge (No. 2 in his list of some fifty others as now collected), wherein it is stated that "Edwin, the youngest son of King Athelstan, learned 'practical' masonry in addition to 'speculative' masonry, for which he was a master," which passage is held to mean that "this 'speculative' was a knowledge of geometry," that the writer of the book did not consider *speculative* knowledge as making the possessor a mason, for he writes, "and became a mason himself," i.e., when he had added the *practice* of that science to his speculative. He was, clearly, not a mason when only in possession of the speculative science." How many of the members of the present society, it may be asked, are qualified as masons under this explanation? It should be added that the manuscript from which the above is quoted is fairly supposed to have been written in the early part of the fifteenth century. Our author gives up several pages to a careful consideration of the date of this and the earlier (or Halliwell) MSS., assisted by the learned authorities in the British Museum and elsewhere.

The word "speculative" was in use in 1582, 1570, 1530, 1643, 1538, and later, as 1658, 1704, 1738, &c., as shown by the extracts and titles of several printed publications quoted at the end of this third volume. It is also important to notice our author's statement that "in England none of the *speculative* or non-operative members of the craft . . . in the seventeenth century were received as apprentices. All appear . . . to have been simply *made* Masons or Freemasons." Then, to what other body could the two earliest, and perhaps also some later, Charges have applied, except to a working Lodge of operative Masons, where the three degrees undoubtedly existed on their own showing? Mr. Gould quotes the two passages in the poem (2) relating to the apprentice; and Ashmole, on his own showing, was made a Mason in the form prescribed by the Old Charges, possibly (as pointed out by Mr. Gould) the copy made by Edward Sankey (No. 13 in Mr. Gould's list) having been read over to him, and his assent given in the customary manner. "Freemasons and Freemasonry, more or less speculative, existed certainly in Scotland, and inferentially in England . . . and if we cannot distinctly trace it back to a higher origin than the sixteenth century, it is only to be inferred that *proofs* of a more remote antiquity may be yet forthcoming." Mr. Gould also states,—"In my opinion, however, Masonry in its general and widest sense,—herein comprising everything partaking of an operative as well as of a speculative character,—must have been at a very low ebb about the period of Moray's death (1673), and for some few years afterwards."

"The road to truth, particularly to subjects connected with antiquity, is generally choked with fable and error, which we must remove by application and perseverance before we can promise to ourselves any satisfaction in our progress." This our author quotes from Dalcho, "Masonic Oration," il, p. 37, and he has acted on his advice. This is a sort of apology for his investigation of the common belief that the celebrated architect, Sir Christopher Wren, was a member of the Society of Freemasons, an assertion which appears to rest upon two sources of authority; first, an obscure passage in Aubrey's "Natural History of Wiltshire," and, secondly, statements in Dr. Anderson's "Constitutions" of 1738. These our author considers are quite irreconcilable with the

* The History of Freemasonry: its Antiquities, Symbols, Constitutions, Customs, &c., derived from Official Sources. By Robert Freke Gould, barrister-at-law, Past Senior Grand Deacon of England. 4to. Lond. n.; Thomas C. Jack, 1884. Vol. iii., 248 pages. The first of the previous volumes was reviewed in this journal in the number for the 3rd of March, 1883, p. 268, and the second in that for the 13th of July, p. 37, and the 23rd of July, p. 102, of the same year.

statements in Anderson's earlier publication of 1723. Aubrey's "History" was written and added to between 1656 and 1691, but only first printed in 1847, under the editorship of John Britton, F.S.A. The extraordinarily minute investigations by Mr. Gould to try and arrive at the truth of the statements and legend, may be very satisfactory to the author, but Masonic writers must be in despair at the result. In some forty pages devoted to the inquiry, we find the following statements:—

"From neither of the extracts from the *Parentalia* are we justified in drawing an inference that Wren was a Freemason" (p. 15). "The fable of Wren's Grand Mastership I shall not further discuss . . . it being sufficiently apparent,—as tradition can never be alleged for an absolute impossibility,—that he could not have enjoyed in the seventeenth century a title which was only created in the second decade of the eighteenth (1717)" (p. 43). "Assuming Wren to have been a Freemason at all,—and in my opinion the evidence points in quite another direction,—he would have had much difficulty in neglecting an office which, at the time named, did not exist!" (p. 49). "The belief that Wren was adopted a Freemason in 1691 [is] at once improbable and ill attested [and] must fall to the ground" (p. 52). (Lastly (p. 55), "The popular belief that Wren was a Freemason, though hitherto unchallenged, and supported by a great weight of authority, is, in my judgment, unsupported by any basis of well-attested facts. The admission of the great architect,—at any period of his life,—into the Masonic fraternity, seems to me a mere fragment of the imagination, but it may at least be confidently asserted that it cannot be proved to be a reality."

Such statements and strong opinions, founded on a most careful inquiry, require no comments at the hands of the reviewer, who, however, takes exception to the remark that the belief, as above stated, has been hitherto unchallenged; for, on reference to the Masonic journals of about twenty years since, it will no doubt be found that inquiries were made at that time on this subject, but without any practical result. However, so difficult is it to kill a legend when obtained from "old records," that Mr. Gould may rest assured that popular writers will continue to transmit the hitherto received statements down to the latest posterity, assisted by the present inscription on a silver plate let into the head of "the historic mallet employed to lay the foundation-stone of St. Paul's," and now belonging to the Lodge of Antiquity, which we are assured by Mr. Gould (p. 47), "presents no less than six misstatements." It will be found in full in *Notes and Queries*, 3rd ser., viii., 6, having been contributed by our old friend "A. A."

There appears to have been also a "muddle" as to the names of the members of the "Strong" family. The *Constitutions* of 1738 state that Wren's wardens! at work at St. Paul's Cathedral were Edward Strong, senior and junior. As the first "Edward" was only 22 years of age in 1673, neither he nor his son could have assisted at "levelling the footstones" in that year. "Thomas" appears to have been the mason who succeeded at the works by his brother "Edward" senior, who claims to have laid the last stone of the lantern, on October 25, 1708, whereas Christopher Wren (the son) also claims the honour of having laid the "highest or last stone" in 1710. It will further disappoint those relying on the "old records" to learn that neither Thomas nor Edward was a member of the Society of Freemasons, although it is now assumed that they did belong to the Company of Masons. That Inigo Jones may possibly have belonged to some body,—of Masons or Freemasons,—has been established by the recovery of his copy of the *Constitutions* or *Charges*, which is dated 1607, and has in it a drawing signed by himself; it is now in the possession of Rev. A. F. Woodford, of London. Any one, however, knowing how greatly Jones was interested in antiquities (in that year he was 34 years of age, and engaged on the *Masques* at the Court of James I.), might assume that he may have had this copy made out of sympathy with the subject,—as any one might do in the present day, were they not printed, and thus easily accessible.

In respect of the tradition of "travelling bodies of Freemasons," which appears to have been first mentioned in 1686, our author cites, for the first time, a very curious confirmation

of an English craft guild by Pope Lucius III. (1181-85), whose privileges had been already confirmed by the English King Henry II. It was Sir William Durdale who told Aubrey that about "Henry III's time the Pope gave a bull or diploma (patent) to a company of Italian architects to travel up and down over all Europe to build churches." Our author considers that "a solution of the problem must be looked for in the history of Italy," or "that in the annals of that period (*temp.* Henry III.) of English history will be found a clue to the explanation of which we are in search." The era (1216-72) of Henry III. is, he states, "especially memorable as a period when the ascendancy of the Pope was at its zenith in these islands,—that Henry was the first monarch of England who paid attention to the arts, and to his munificence are ascribed the most beautiful works of the Medieval age which we possess,—and, if we consider the partiality of Henry III. for foreigners, the constant communication with Rome, and that so large a portion of the English benefices were held at that period by Italians, it may fairly be assumed that these circumstances must have materially influenced the employment in England of the artists of southern Europe." Such a paragraph as this requires further consideration. No facts are given as to the employment in England of foreign artists, and though a few instances occur to the reviewer of such employment, such as those mentioned by Walpole, namely, Odo and his son Fitzodo, goldsmiths, &c.; Masters William and Walter, painters; and Pietro Cavallini, sculptor, I doubt if any of our historians would agree that the architecture of the period was at all affected by the employment of any foreign artificers. Our author then considers the establishment of the two Orders of Mendicants,—the Dominicans, 1215, and the Franciscans, 1210, confined 1274 with the Carmelites and the Augustinians,—all comprising the Friars, in contradistinction to the Benedictine Monks and the Augustine Canons. "These friars travelled wherever they pleased, instructed the people, gathered riches, taught and practised art,—they became possessed of ample buildings and princely houses." Are we to begin to assume that the larger number of edifices of the English Gothic are from the hands of foreign artists? The Abbé Bourassé is quoted as stating that the architects of the Dominicans followed one style and those of the Franciscans adopted another; that these styles are not specified, and that as the Franciscans had not architects of their own body they must either have availed themselves of exterior talent or had recourse to some member of the rival brotherhood. This last is hardly probable, judging from the jealousies existing among such bodies. "These friars," writes our author, "were Italians,—among them were many architects,—commingled with French, Germans, Flemings, and others. They procured Papal Bulls; they travelled all over Europe and built churches; their government was regular . . . and a General governed in chief . . ." as recorded in the *Parentalia*, and so stated by Dugdale and Ashmole! But the term "Freemasons" was not then known, for the very earliest uses of the term yet found are in 1376-7 and 1396, as is hereafter further noticed.

Having discussed the legendary "Grand Masters" and the "travelling bodies," we are taken to the "general or annual assemblies" mentioned in the old *Charges*; one assembly, it has often been stated, but on no good authority, was attempted to be put down by Queen Elizabeth in 1561. These *Charges* mention that the member is to attend, if he knows where the meeting is to be held, and if he be within five, ten, or fifty miles of the place. The annual assembly of a lodge of Masons was evidently a movable one,—due, in my opinion, to the locality of, and to the numbers in, the local body,—for the brother Mason might be at work at a distance, and in a place away from the usual line of traffic, by means of which he might only be able to obtain information! The author's amusing description of Medieval "legend making" need only here be adverted to.

"At what time the oral traditions of the Free-

masons began to be reduced to writing, it is impossible even approximately to determine." . . . nor "the period when they were moulded into a continuous narrative. . . . The curiosity of the early Freemasons would naturally be excited about the origin of the society. Explanatory legends would be forthcoming, and, in confounding as they did, architecture, geometry, and Freemasonry, Dr. Mackey considers that 'the workmen of the Middle Ages were but obeying a natural instinct which leads every man to seek to elevate the character of his profession, and to give it an authentic claim to antiquity' " (p. 58).

A portion of chapter xiii. relates to Elias Ashmole. A very careful investigation into his history; his initiation as a Freemason at Warrington in 1646; and his attendance at an admission at Masons' Hall in 1652, leads to the declaration that "whilst he [Ashmole] is stated to have regarded his admission as a great distinction, there is no direct proof that he was present at more than these two Masonic meetings in his life." He died May 18, 1692, in the seventy-sixth year of his age. This supposed abstention from the brethren has puzzled many of the critics; but Mr. Gould, after a careful scrutiny of Ashmole's diary, arrives at the conclusion that "it is probable that he did in some way keep up his connexion with the Freemasons, but that it was of such a slender character as not to merit any special mention. . . . His diary scarcely gives details on any point except his ailments and his lawsuits, but he would probably have made at least notices of his having attended Lodges, had he done so with any frequency, as he does of having attended astrologers' feasts. . . ." "My own view [writes Mr. Gould], therefore, is that the Ashmolean influence on Freemasonry, of which so much has been said, is not proved to have had any foundation in fact, although it is fair to state that I base this opinion on circumstantial evidence alone, which is always liable to be overthrown by apparently the most trifling discovery. . . . There is no trace, as far as any remaining evidence is concerned, that the Freemasons were in any way connected with any [of the societies he names], [but, on the contrary, that, although they [the Freemasons] had probably in a great measure ceased to be entirely operative, they had not amalgamated with any one of the supposed Rosicrucian or Hermetic fraternities,—of the actual existence of which there is proof,—still less that they were their actual descendants, or themselves under another name. To assume this, indeed, would be to falsify the whole of authentic Masonic history, together with the admittedly genuine documents upon which it rests."*

A NATIONAL LAND COMPANY.

NEW undertakings have ever been introduced to the public with a more imposing array of names than that which is associated with the proposed land company, whose title is yet to be determined. It is not often that Lord Carnarvon and Mr. Joseph Cowen, M.P., Professor Bryce and Mr. Ernest Noel, the Earl of Egmont and Mr. Burt, are to be found upon the same platform, and it may be regarded as a sign of the times that the subject to be discussed at Willis's Rooms, on Friday, is one in which great landowners like the Dukes of Argyll and Westminster, the Marquis of Northampton, and Earl Cowper; capitalists like Sir John Lubbock and Mr. Walter Morrison; and lawyers like Mr. Horace Davey and Mr. Westlake, appear to take an equal interest, though it is to be hoped they will not all take an equally active part in the proceedings.

The scheme, as sbndowed out in the prospectus that has been privately circulated, is definite in its purpose and perfectly intelligible. It aims at increasing the number of landowners (in England) by offering facilities for acquiring agricultural land in small quantities,—in other words, for resuscitating and enlarging the class of yeomen which, from a variety of causes, has almost

* To be continued.

become extinct among us. Granted that it be desirable that we should have a larger number of small freeholders, the questions that follow are, necessarily, whence and how are we to obtain them? The promoters of the company (which it is scarcely needful to say is both commercial and philanthropic) expect to draw their recruits from five distinct sources.

First, the *labourers* who may desire to purchase land either for the purpose of cultivation or for the erection of cottages for their own occupation, will be assisted. But by cultivation is to be understood not so much spade-husbandry, which under present circumstances does not promise much success, but dairy-farming upon a limited scale and cultivation by horse-labour,—the latter requiring a certain number of co-operative, or, at any rate, contiguous, labourers, in order to make it worth the while of any man to keep horses for their accommodation. The holdings would be from one to four acres in extent, and would not demand from their owners more work than could be given after hours, and with an occasional day or half-day at harvest times. As to cottage building, the company might itself undertake this work, or advance a certain sum in the shape of building materials, leaving the purchaser to find the labour.

2. *Small Farmers*.—Here, a certain amount of capital might be presumed to exist, and offers might be made of holdings varying in extent from 12 to 30 acres, a certain deposit being paid per acre before entering on occupation.

3. *Tradesmen*.—These would occupy a certain number of frontages on the main road, and, besides attending to their shops, would be glad to cultivate or employ for pasture an acre or two of land.

4. *Market Gardeners*.—Their holdings would necessarily depend upon the locality, and with them spade labour would be the rule.

5. *Immigrants from large Towns*.—"There is," says the prospectus, "a certain number of men in the large towns, who, having saved some money, wish to retire to country life, occupying themselves with gardening, bee-keeping, poultry-breeding, &c. Besides these it is probable that a proportion of those who now emigrate would, if land could be acquired on easy terms, attempt the experiment of home immigration. Should that take place, which is very desirable, some failures must be expected."

It is not proposed that the holders of the land should necessarily be, from the commencement, its purchasers. In some cases,—especially with the labourers,—it might be safer to hire with the right of pre-emption. But supposing the holder desires to become a proprietor, how is he, without any capital, to do so? The company offers to let him liquidate the cost of purchase either (1) by spreading it over a term of years with annual interest calculated upon the amount of principal still outstanding; or (2) by making the usual rent a perpetual payment. In this latter case there must be buildings erected by the purchaser as a security that the land shall not be returned on the hands of the company. Under any circumstances the holder would be at liberty to sell his holding, subject to any claims which the company might have upon it.

Where possible, the company would be willing to offer a suitable extent of land for co-operative farming upon the same terms of repayment as in the case of individual purchasers.

The funds of the company would, in the first instance, be furnished by the capital arising from the issue of shares. These would be of two sorts,—one limited to 5s., having priority and intended for labourers and workmen, whose active interest in the undertaking essential to its success. These shares would pay not more than 3½ per cent. The other shares, purchasable by the public generally, would be limited to 1/ in amount, and would pay not more than 4 per cent. Shares might be taken in part payment for land purchased.

Such is a brief outline of the undertaking which is about to be launched, and one cannot but wish it success. At the same time, certain obvious criticisms present themselves to our

minds, and, no doubt, will be offered in the course of discussion. Is it necessary, it may be asked, to start a limited liability company to effect objects which our great landowners might do for themselves? If the law of entail forbids them to part with land for such purposes as are here contemplated, there could be no difficulty,—in fact, every facility would be given,—in altering the law.

Next, we cannot but feel considerable doubt whether it is wise to let labourers build cottages for themselves. Efforts are being made to improve cottage accommodation, but, as a rule, labourers themselves are indifferent or even adverse to these improvements; and, if a better cottage costs, as must be the case, more money, and that money is to come, sooner or later, from the labourer's own pocket, can we hope that it will be so expended? Again, there is no class of men in the agricultural community which works harder for bare sustenance than the class of small farmers. Unless, therefore, the terms of the Company are exceptionally easy (and then what becomes of the 3½ per cent. and 4 per cent. on the shares?) it is difficult to see how they could possibly repay principal and interest, not merely upon the cost of the land but on that of the necessary house and farm buildings. Their annual payments must exceed the rent they now pay, and if it be (and, from personal knowledge we know it often is) a hard struggle to earn this, from what source can they hope to get the larger sum which will hereafter be due from them? These, and other considerations, make one at present hesitate to give cordial support to a scheme which, in its object, is unquestionably a good and useful one. It seems to need careful revision by thoroughly practical experts.

NOTES.

MR. RUSKIN'S retirement from the Slade Professorship at Oxford is an event which will be variously estimated, according as preference is given to genius and eloquence, or to sound and commonsense views upon the function and the history of art. Mr. Ruskin's recent lectures have been as remarkable for brilliancy and paradox as any of his earlier or later utterances. But even genius cannot entirely reconcile one to the constant utterance of brilliant paradoxes, and the substitution of fancies for facts, in one of our most important centres of higher education. It will be difficult, if not impossible, to find a successor who will interest audiences as Mr. Ruskin can interest them. It may be quite possible to find a safer and more judicious guide.

THE case of Hogg v. Brooks, which has recently been published in the Law Reports, is worth a passing notice, as it shows a difficulty which may arise in the relationship between landlord and tenant. The tenant in the present case held under a lease for twenty-one years, in which there was a clause that it should be lawful for the landlord to put an end to the lease at certain dates "by delivering to the tenant, his executors, administrators, or assigns, six calendar months' notice in writing" of his intention to do so. The tenant, during the continuance of the term, mortgaged the premises by means of a *sub-lease* to a solicitor, who let them, and who duly paid the rent named by his tenant to the plaintiff. Subsequently, the plaintiff, or rather his assignee (but the effect is the same), desired to discontinue the tenancy, and proceeded to put an end to it in the manner stated in the lease. But the original tenant had disappeared, and consequently the plaintiff served the written notice upon his relations, upon the solicitor, upon the sub-tenant, and upon every one in fact except the necessary person. Not succeeding in thus getting possession, he commenced an action of ejectment, but in this was defeated, since it was held that by the terms of the lease the notice must be delivered to the original tenant. So the landlord did not get his property, but only the trouble of paying the cost of a lawsuit. The moral of the case seems to be that

a lease should always contain the word "sub-lessee" in the proviso we have quoted above in order to enable the landlord to get the benefit of the proviso under all circumstances.

MR. WYKE BAYLISS and other correspondents have recently drawn attention in our columns to the way in which the eastern approach to the new street from Bloomsbury to Regent Circus is rendered both awkward and ugly by the retention of a public house which ought to have been removed. Another and equally striking instance of the manner in which the local "authorities" (such they can be called) allow modern street improvements to be spoiled is to be seen at Holborn Circus, at the corner of Hutton-garden, where a new building has recently been erected for a firm of woollen-draperies. Those who are familiar with Holborn Circus know how much traffic, both pedestrian and vehicular, converges there. For the latter kind of traffic, the wide roads and spacious circus afford plenty of room; while "verge enough" is provided for pedestrians, except at the corner to which we are now referring. The building at the south-west corner of Hutton-garden was the only one abutting on the circus which was allowed to remain without rebuilding at the time the Viaduct improvement was carried out, and the sharp angle of the old building jutted out unpleasantly and awkwardly trenching upon the footpath of the north-west "quadrant" of the circus to within 4 ft. or 5 ft. of the edge of the kerb, the other part of the pavement being 8 ft. or 10 ft. wide. In the new buildings which face the other quadrants or segments of the circus, the angle-facades have been canted or curved so as to secure the *alignement* of the buildings with the sweep of the circus, and it was only reasonable to suppose that when the old building at the corner of Hutton-garden was pulled down, the new building to take its place would be set back at the angle so as to prevent, not merely unsightliness of appearance, but inconvenience and danger to pedestrians. But a reasonable supposition was entertained without giving due weight to the idiosyncrasies and insurmountable ways of our local "authorities," and a new building has arisen on the site of the old one without opportunity being taken to effect an improvement not only desirable but absolutely necessary. The corner question is just outside the City boundary, but surely the Holborn District Board or Works or the Metropolitan Board of Works ought to have stepped in to rectify the line of frontage? As it is, the awkward effect produced is only exceeded by the danger and discomfort to pedestrians which must result from reducing a footpath 8 ft. wide to 4 ft. 6 in. or 5 ft., especially as the contraction occurs at the angle. The thing only needs to be seen to be condemned.

A CONFERENCE will be held in Brussels during the month of June to discuss the question of canal navigation, and the advisability of extending it very considerably throughout the country. Belgium is not the only country which feels that a mistake has been committed in allowing the railway interest to obtain a complete monopoly of the carrying trade. France has for some time past been engaged on the same subject, and the importance with which canals are viewed by French statesmen may be gathered from the fact that, by the Freycinet scheme, 713 millions of francs are to be laid out immediately in developing or improving the existing canal system. It would be a very good thing if the freighters of this country would wake up to a sense of the enormous injury that has been done to English traders by the utter neglect of the canals, which have been so swamped by the railways that they are practically useless. The majority of them have been bought up by the great competing companies, who prefer to see their waterways comparatively idle, in preference to offering the traders a choice of routes, or their acceptance of a lower rate of charge. A more short-sighted policy could not well have been devised. There is enough traffic in the land

to feed both railways and canals; and the offering of facilities by the latter for sending heavy merchandise, in the delivery of which there is no occasion for speed, would stimulate all kinds of trades in a marvellous fashion. If more speed were required than the old-fashioned canal boat can give, it would be perfectly feasible to use steam traction; and we venture to think that the construction of a few good, independent, trunk waterways would form a by no means bad investment, either for capitalist or country.

TANAGRA terra cottas are, among the most antiquity has left us, distinctly the most popular,—we might say, fashionable. Their artistic beauty is fully, and, we think, more than adequately, prized. This being the case Monsieur B. Haussoullier's book on the Tanagra necropolis* should have a wide interest. He has carefully, in the first part, classified the various kinds of funeral monuments, cippi, and stela, that are found at Tanagra, and is thus able to single out local peculiarities. By careful study on the spot he has obtained from the present inhabitants information as to the position *in situ* of stela now removed. One interesting fact he brings out is that the stela in its earliest form was really a primitive altar, its inscription intended rather for the service of the dead than the living. This is only another proof, if one were needed, of the religious, or, we might say, ritual, beginnings of Greek art. The second part of the book deals with the forms of the grave. Here, it appears, chronological classification is impossible, as all the various forms appear contemporaneously. The third, and by far the least satisfactory part of the book, deals with the contents of the grave. M. Haussoullier has not the thorough practical knowledge of vases and vase decorations which alone could see him safely through this portion of the subject. The book is illustrated by even plates, and, taken as a whole, is a valuable contribution to a subject but little investigated.

MORE railway amalgamation is being talked of. The shareholders of the Brighton and South Coast, South-Eastern, and Chatham lines think they can foresee improved dividends resulting from a fusion of those systems, and at a meeting of the Railway Shareholders' Association held last week a resolution was passed expressing the opinion of the meeting at such amalgamation,—or a working agreement,—was most desirable. This was an amendment to the original motion (which was very indefinite), and was carried unanimously. The shareholders consider that the three systems are serving the South of London district in an unnecessarily expensive manner, comparing the position of the three lines jointly with the Great Western. Their expenses bear much larger proportion to the gross receipts than do those of the company named, though the receipts are lower. The scheme seems feasible enough so far, but the question is, will the public be allowed to participate in the benefit? Their receipts are chiefly derivable from passenger traffic, whilst the goods traffic forms the largest item in those of the Great Western; and in our opinion competition,—while often an evil with regard to merchandise traffic,—is a guarantee that the public interest will be served both in the running and equipment of passenger trains. In the event of this somewhat visionary scheme being carried out, will increased dividends be accompanied by increased facilities, or the reverse? We are not prepared to express approval of the proposed amalgamation whilst this remains a questionable point.

It seems a matter of regret that the statue of Hermes carrying the infant Dionysos in the Boboli Gardens at Florence should be left exposed to the chances of weather or the slice of the casual passer-by. The statue is well placed, about a quarter of the way up a great avenue of pines. But, though it is there to great advantage, it would be

better safely housed in a museum. The Boboli Gardens are every Sunday the resort not only of the tourist but of the Florentine "Arry," whose views on art are probably much the same as those of his British contemporary. Already one little foot of the child Dionysos is broken away. The claim of the statue to the care of archaeologists rests on the fact that it is in general type the same as the famous statue of Praxiteles, with, however, certain differences, which have led to the general opinion that it is a copy rather of the work of the father of Praxiteles than of Praxiteles himself. In the Boboli statue the child rests on the right hand, instead of, as in the Olympia statue, on the left arm. The child is treated with much more knowledge of babyhood, but this, of course, is due to the Roman copyist. The figure of Hermes, on the other hand, is much squarer and more Polykleitean in type; it is, in fact, in conception, though not in execution, of just the sort that we might have expected from the generation that stood between Polykleitos and Praxiteles. It is noticeable that in the Boboli as in the Praxitelean group, Hermes looks away from the child in total unconcern.

A RECENT controversy between Sir E. Beckett and Mr. William White has given prominence to the subject of preserving wood or timber by the application of arsenic, and, although it may not be generally known, it is opening up a very old and obsolete question. Mr. William Chapman, who published the results of his experiments in 1817 under the title of "Preservation of Timber from Premature Decay," proved that arsenic afforded no protection against dry rot whatever. So conclusive were his proofs that in the latest work on the subject, "A Treatise on Dry Rot in Timber," by T. G. Britton, late surveyor to the Metropolitan Board of Works" (London: E. & F. N. Spon, 1875), the subject of arsenic as a preservative scarcely finds a place. It is noticed as being detrimental to vegetation; but, in the case of arsenical ores being removed from ground in Cornwall, where they have been stored, vegetation has followed in two or three years afterwards, which proves that it is not effective, unless the mineral is always present. There is nothing in its qualities as a preservative of timber that would warrant its introduction into buildings.

NOTES IN SPAIN, ARCHITECTURAL AND HISTORICAL.

I.—CATHEDRAL AND ALCÁZAR OF SEGOVIA.

ACCORDING to Colmenares, Tuhul colonised Spain, Hercules founded Segovia, and Hispan built *el puente*, "the bridge," as the aqueduct is popularly called. However this may be, it is a fact that among the ancient cities of Spain, of which the origin is so frequently lost in obscurity, Segovia is one of the most interesting. The city proper is located upon a natural fortress formed by perpendicular walls of rock rising out of the valleys around to the height of about 100 ft., and the natural strength of such a site was completed by the picturesque walls, with square and round towers, with which some 800 years ago King Alfonso VI. surrounded it. The shield of the city bears "the bridge," with the head of one of Pompey's sons looking over it.

According to the late Mr. Ford, the name of the city and its foundation are Iberian. Its monuments, ancient and Mediæval, are of the highest interest; and at every turn of its narrow intricate streets you come across some memento of the past. From many different points outside, there are exceedingly picturesque and striking views of the ancient walls, towers, and gateways of the Alcázar perched upon its promontory rock, and frowning above the cathedral rising above all its surroundings; or, finally, of the grand old aqueduct, compared with which all the rest of the picture seems to be mere background.

The Cathedral.

One especial interest in connexion with the Cathedral of Segovia consists in the fact that it was one of the last, if not the very last,

erected in Europe in the Gothic style. While the glories of that style were being elsewhere despised and forgotten in the rage for the revival of the antique, Gil and Rodrigo de Outañon, father and son, worked steadily on in the paths of their predecessors, leaving to posterity a splendid monument in the Christian style of the Middle Ages. It was begun by the father in 1535, and continued by the son, who died in 1577.

Our illustration of the cathedral is taken from the Plaza Mayor. It shows the eastern portion of the building, comprising a choir in the centre, with circular aisle or ambulatory, outside of which are the several apsidal chapels. Although it seems that the general plan and many details are similar to those of the late Gothic cathedral of Salamanca, of which the Outañons were also the architects, the round apse is a variation. In the centre is the chief dome, and beyond, a single western tower, both which in the general view accord fairly enough with the rest of the edifice. The worst fault of the tower is the want of an intelligible finial, the lightning-conductor being far from an artistic finish. It seems that the original Gothic spire was destroyed by lightning early in the seventeenth century, so that the actual summit is of that time.

The right of our illustration shows some of the old houses of the Plaza, underneath which are portales, or porticos of lintel architecture set on square columns, which afford shelter against snow and rain in winter, as well as shade in summer. There are balconies for every floor, supported on long projecting corbels. On the opposite side to the cathedral is the old Church of San Miguel, which has preserved its Romanesque campanile, and its original Gothic plan of nave, transepts, and aisle chapels.

As far as parapet and pinnacles the tower is Gothic, and the Perpendicular outlines are plainly marked, instead of being lost, as in many buildings late in that style, in a mass of details. The seventeenth-century addition consists of a turret, forming an octagonal drum, set in the centre of the Perpendicular tower; this first stage terminating with halustrado and hall, in place of the Gothic finial. This turret is domed, and terminates with a lantern ending in a blunt and emphatically pointless finial. The faces of the Gothic tower are panelled, though the heads of the panels are round. The lantern of the central dome is likewise of Renaissance character, having square-headed windows. However, as before said, the Renaissance character of these details is not so strongly marked as to destroy the generally fine effect of this, the last grand Mediæval cathedral.

The interior fully confirms the opinion here put down as to exterior. The height of nave, aisles, and dome, and the extent in other senses, appear to the eye all on a grand scale; and the actual figures bear out this estimate. The actual dimensions given by Madoz are those:—The nave rises to 120 ft., the aisles to 80 ft., the central dome outside to 250 ft., and the tower to 350 ft.; total length of the ground plan, 420 ft., width, 210 ft., and each side of the tower, 33 ft. Not merely in dimension, but likewise in style, is this cathedral very fine, especially if we bear in mind the century in which it was planned.

The stained glass is really very fine, especially the ruby, emerald, and sapphire; it looks like an excellent specimen of what Winston calls the Mosaic Enamel Style. The date 1544 appears in two windows on the north side. There is quite sufficient in this glass for a study by itself. The subjects are from the Old and New Testaments, apparently arranged as in earlier windows, and in ways like the *Biblia Imperium* and *Speculum Salvatoris*, in groups of types and antitype, one window containing the Crucifixion along with one of its types, the Brazen Serpent. Like the cathedral itself, the glass is evidently not all of the same date. The earlier windows, and more mosaic in style, are those towards the west end of the aisles and clearstory. Those towards the east end present a later, broader, more enamelled, and more pictorial character.

The choir,—in the centre, as usual in Spain, at least from the sixteenth century downwards,—presents the usual carved stalls. These are beautifully wrought in the Gothic style, though surrounded by a later halustrado. The ironwork (*verja* or *reja*) inclosing the Capilla Mayor and the choir presents foliage and flowers finely wrought, and, though later than the building,

* *Quomodo Sepulchra Tanagrarum decoraverint.* Parisiis: A. B. Haussoullier.

it accords well enough with its Gothic surroundings. The cloisters belonged to the older cathedral, which was situated nearer the Alcázar than the actual one, and dated from the twelfth and fifteenth centuries. They were taken down and put up again by Juan Campero in 1524. Geometric forms appear in the window tracery, very similar to those observed in the stucco decorations of the Alcázar. The retablo of the high altar is of beautiful marble, and presents to view the patrons of the city,—the B. V. M. and Child, San Hierotes, the first bishop of the see, and San Frutos, a hermit.

The history of the construction of the cathedral is not without interest. It was in 1510 that the removal from its original site was determined on, but on account of the events of the time, such as the death of Ferdinand the Catholic, in 1516, and the accession of Charles V., it was only begun in 1525. Once begun, the bishop, clergy, and people worked away with a hearty good-will, night and day, working days, and holidays, so that by 1558 sufficient was completed for Divine worship. It was finally completed in 1620, and only consecrated in 1768.

The Alcázar.

The keep of this ancient castle and royal citadel, shown in our illustration, is a lofty tower, the walls adorned with stucco in the Moorish style, and crowned by a parapet set out on corbels, and formerly with twelve salient circular turrets, or bartizans, two at each angle and two between the east and west respectively. Its present appearance shows but a wreck of what it was before the fire of 1862. The castle is admirably placed on a precipitous rock, rising abruptly several feet between two rivers, the Eresma to the north, and the noisy Clamores to the south, which unite at the foot of the cliff. The position of this royal castle on a promontory-rock, between defending streams, has been compared to a ship's prow dominating the waters' meet below, and it must have been in former days well-nigh impregnable. The city walls continue eastwards on either hand, and, to this day, the more ancient aqueduct brings water to the castle. The breadth of the rock at the entrance to the open plateau in front of the Alcázar, now an Alameda and parade-ground, but of old the site of the ancient cathedral, is only some 70 ft.

The date of the foundation of the Alcázar de Segovia, "no se sabe," said our guide, and to this same conclusion, due research being made, we are forced to come. Though, however, nothing certain can be affirmed as to the original foundation, the date of some parts can be fixed exactly. The picturesque bartizan tower bears the name of *la torre de Juan II.*, and belongs to that monarch's time, which includes nearly the first half of the fifteenth century.

The decorations of the Sala de los Piñas were executed by order of Henry IV. in 1452. There are a court and cloister of the time of Philip II., of which the granite pillars suffered greatly in the fire. In the Sala del Trono we observed walls and round-headed windows having every appearance of belonging to the twelfth century. The name Alcázar, which in Arabic means Palace of Caesar, points to a royal foundation in the time of the Saracen dominion. The latter came to an end when Alonso VI. reconquered Toledo in 1085, and there is reason to suppose that the older portions of the actual walls are at least as old as his reign, and so contemporary with those of the city then erected (1073-1108).

The history of this Alcázar represents a compendium of the history of Spain during the Middle Ages. Segovia having been assaulted and destroyed by the Moors in 1082, Alonso, after defeating them, confided the reconstruction of the Alcázar and walls of the city to Don Ramon, brother of Pope Calixtus II. At the same time the vacant city was repopled by "Gallegos, Leoneses, Asturianos," and "Rejanos." The date of all this was 1088. The Alcázar was a favourite residence of Alonso VII., "El Imperador"; and of Alonso VIII., husband of Eleanor, the daughter of our Henry II. Berenguela, their daughter, was horn therein. San Fernando, the conqueror of Seville, was brought up in the Alcázar. "Alfonso al Sabio," and tenth of the name, who counted a long list of kings among his vassals, also resided at Segovia. Tradition connects the name of that monarch with a notable incident in the year 1262, which is thus related by Colmenares, and

perpetuated in some degree by the name of the saloon formerly called "Del Pabellon," and, since the above date, named "Del Cordón." It was publicly rumoured that the king had asserted "that had he been consulted at the creation of the world, some things would have been done differently," and that the king, reproved for his folly by his brother's tutor, had persisted in it. That very night a terrible thunder-storm fell upon the Alcázar, which, according to some accounts, killed several among the courtiers, divided the roofs of the building, and penetrated to the royal apartments. The King, on the following day, made a public abjuration and expiation. In memory of the event the cord of St. Francis was sculptured all around the room.

In the fourteenth century, in connexion with the Alcázar, we find Alfonso XI. and Leonor de Guzman, Pedro el Cruel, and Enrique de Trastámara, whose son, the Infante, A.B. 1366, fell from the arms of his nurse from one of its windows into the precipice beneath, and was killed on the spot. In the fifteenth we meet with Enrique IV. and Isabella the Catholic. In the year 1474 she was here proclaimed Queen of Castile and Leon; the Governor, Andres de Cabrera, and his wife, Beatrice de Bobadilla, having much contributed to her accession. Two years later, a riot having arisen against Cabrera, she rode holdly out among the rioters and awed them into submission by her courage and presence of mind. In 1520 the Alcázar held out against the rebellion of the Comuneros, who, among other outrages, nearly destroyed the old cathedral, and so the place earned the gratitude of the Emperor Charles V. During the romantic expedition of our Charles I. to Spain, to pay his respects to the Infanta Maria, daughter of Philip IV., he was entertained here by the hereditary governor. Later on, the Alcázar was made a State prison, and at last converted into an Artillery College. It was burned in the year 1862. Whether this ever-to-be lamented destruction was voluntary or accidental has not, as far as we know, been clearly made out; however, in December, 1881, orders were issued by the Minister of Public Works for the preservation and restoration of the Alcázar. The restoration is being carried on exactly in its ancient style.

In the illustration the reader sees the Alcázar as it appeared after the fire of 1862, and before the actual restorations were commenced. Not all the salient turrets or bartizans there appear, and even of those which do appear, several were damaged, and had to be taken down. Two picturesque sharply-pointed towers defend the north and south-west angles, which are united by the remains of a corridor, called "Galeria de los Moros." The grand tower or keep of the castle is arranged in two chief stages, the curtained corner turrets and parapet being in part destroyed. The entrance on this, the eastern side, is across the ancient moat of the castle. Several views of the Alcázar as it was before the fire are extant, and in these the beauty of the building is greatly enhanced. In these we see high-pitched gables; lofty, conical, and octagonal spires; picturesque projecting turrets between the bartizans, and the "Galeria de los Moros" has likewise its roof and spirelets complete.

The walls, exterior and interior, are covered with what remains of the very artistic Moorish decorations in stucco, representing circles and other geometric forms, bearing a remarkable resemblance to the Byzantine sculptured ornament of the portal of San Martin already mentioned. The saloons, Sala del Trono and Del Reclimiento, were splendidly adorned in the time of Enrique IV., already referred to. These details are called "friso Morisco," and adorn most of the apartments. The Sala de los Piñas (pine apples) is so-called from the decorations in the roof taking the form of that fruit. Although these details were executed by Moors, the general style of this apartment is rather Gothic than Moorish. Under this head, we noticed a great similarity between the geometric forms of the window tracery of the cathedral cloisters, apparently of the century of Geometric Gothic,—the fourteenth,—and the mural decorations in the Alcázar. Other saloons present more of pure Moorish style. The Sala de los Reyes, now destroyed in the fire, was a very beautiful apartment. The chapel of the castle was erected in the Gothic style, and the groining and other details were delicately executed. The bartizans or turrets of the castle keep are called *almenas* (battlements),

and a tower, so defended, is known as *almenada*. The bartizans (original) on the west face, were, we understood, to remain, while most of the others required to be taken down on account of the damage they sustained in the fire. The stuccoed decorations on the outside of the tower are very effective and picturesque.

With the exception of the Sala de los Reyes, attributed to Alfonso el Sabio, most of the interior decorations we have mentioned belong to the reign of Enrique IV., or to about the middle of the fifteenth century. The style of these details, though showing Gothic influence, like other Moorish examples, from the thirteenth to the fifteenth century, was certainly the work of Moors, professing, doubtless, the faith of Mahomet, though living and working among Christians. This style is now called *Mudéjar*, from an Arabic word signifying *tributary*, and so applied to those Arabians in the Middle Ages who were subject to the Catholic monarchs of Spain. The *Mudéjar* style is now regarded as an important one, and some Spanish authors even advocate its restoration as a sort of national style. Edifices, such as the Alcázar de Sevilla, and the Casa de Pilatos of the same city, are sometimes classed as *Mudéjar*, though to an English eye they seem merely later developments of the Alhambra. In contrast to *Mudéjar*, though the two are often confounded,—even by Spaniards,—we have *Mozarabe*, a term applied as well to those Christians of Spain who were subjects of the Arabian monarchs as to the ancient Spanish rite of SS. Idefonso and Isidore, still in vogue in certain churches of Toledo.

NOTES ON FLINT WORK, ESPECIALLY IN THE COUNTY OF SUFFOLK.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The tenth ordinary meeting of the Institute took place on Monday evening, Mr. Ewan Christian, President, in the chair.

Mr. W. H. White, the Secretary, having read a long list of nominations,

Mr. Cates said it was satisfactory from one point of view to find that provincial architects looked so highly on the advantages of the Examination as an introduction to their candidature. He wished the same feeling was more prevalent in London, and hoped that the good example set by these young men would have more weight with their metropolitan brethren. There were not only candidates from several parts of the country, but also from the colonies, Mr. England, one of the candidates, being the third from New Zealand who had passed the Examination.

The President agreed with the remarks of Mr. Cates, and considered it was very encouraging to find men from the outside wishing to enter their ranks. He hoped that what had been said would be duly attended to by the young architects of the metropolis and the southern counties.

Mr. Baggally, a former Ashpitol prizeman, and Gold Medallist of the Royal Academy, then read a paper on Flint Work, commencing by referring to his indebtedness to those gentlemen who had lent him drawings, and notably to Messrs. Aston Webb, E. Preston Willins, of Norwich, and Mr. Goodall. The subject, he remarked, was one worthy of being thoroughly sifted. It had been first suggested to him by a visit to the picturesque city of Norwich, and its splendid churches, nearly all of which were faced with flint. He examined the flint-work of some twenty buildings there, and was led from astonishment to admiration at the accuracy of the cutting,—in some instances it was impossible to insert a penknife where the mortar had fallen out. He had desired to make a thorough study of the subject; but though he had visited sixty flint buildings in Suffolk, he had only seen half a dozen outside Norwich in other counties, and he would therefore add to the title of his paper the words "especially in the county of Suffolk." The interest chiefly centred in the flush tracery and panel-work, and this was essentially superficial. They had been told that unless a wall was of one substance throughout it was a sham; but the essence of an untruth was that it should deceive, or be intended to deceive. Did they suppose, however, when they saw a man in a broad-cloth coat, that his shirt was of the same material? Or, again, did any one who saw a green meadow, jump to the conclusion that the earth was a ball of grass?

For an eloquent defence of surface architecture he would refer them to Ruskin's "Stones of Venice." Flint was in itself practically inextinguishable. The advantages of such a material for monumental buildings was obvious; it was, at the same time, intractable, and, except in its rougher state, expensive. The small flints commonly used occurred in almost all geological formations, particularly in chalk, gravel, and alluvial soils. It must not be supposed that the different tones of the flints were always original; he believed that more often they were black or grey stones faded, and that a growth of lichens also gave a certain appearance of whiteness to them. Flints might be mixed with mortar and cement, and used as concrete,—indeed, the body of many of the old walls was probably made of this. They might also be built up, as gathered, into rough rubble masonry, as was the case at all periods from the early round towers to the latest Perpendicular churches. In many churches near the coast flatish pebbles from the shore were used in a sort of herring-bone pattern. The next step was to break the flints, and use them in courses, or otherwise, the first being the most usual and artistic mode. For facing only, a further improvement was to split the stones with greater care, and to knock the white coating off, the splinters being stuck into the joints, probably to get an even black surface. This was termed "galetting." Roughly-dressed blocks of stone were used to form a sort of pseudo-diaper, and probably suggested the chequer later on. Rough patterns were also formed by the introduction of brick diapers, as in the old Bishop's Palace at Norwich. Ganged flint work was only a facing material, and might be used in most of the different ways in which such material could be employed. The great difficulty of cutting it no doubt suggested that it was worthy of being set in a framework. The earliest flint buildings were the round church towers. The stones were laid so carelessly, and with so little regard to an even surface, that it seemed to have been the intention to cover their nakedness with a coat of stucco. The fact of similar towers on the other side of the German Ocean being nearly always stuccoed, lent some colour to this theory. The value of stone was remarkably accentuated in some of the earlier Suffolk churches, as at Debenham, for instance. He did not believe that flints were used otherwise than as rubble until towards the end of the Decorated Period, and, for a long time after, the use of split or ganged flint was exceptional. He did not find that the ganged description was introduced before 1450, as St. Peter Mancroft was finished in 1455, Southwold Church in 1460, Walberswick Church in 1479-93, and Saxmundham Church in 1493, &c. He had once thought that before this time bands of brick, tile, or stone had been used to tie the facing into the wall and for other purposes. It seemed difficult to understand how otherwise the flush panel-work of the later time was suggested. Clyffe Church in Kent had alternate bands, but this was too far off to have had an influence over the East Anglian churches. The north aisle of Ixworth Church was seen to be regularly banded with courses of tile, but there were not many examples of bands with random dressed flint facing. In one church he found the nave walls were of elaborate courses of brick and flint, but this church seemed to be of a late period. About the conclusion of the Wars of the Roses, a North Sea trade was established on the east coast, and in consequence of the prosperity which followed, some of the most magnificent ecclesiastical buildings were erected. The suddenly-developed wealth would probably have enabled the builders to fetch good stone, but they evidently desired to produce rich effects with the flint. Once started, this spread like an epidemic. Every man strove to outdo his neighbour in the next parish in the extravagance of his designs, and although many beautiful features were produced, the results were not all equally satisfactory, there being a perfectly bewildering mass of designs. Mr. Baggallay then referred to the different styles in which the flints were used, and notably to the circular and square panels. There were running patterns, and the commonest diaper was a common chequer, which was used in some part of one out of every three churches, as in Southwold and other churches, and also in the guildhall at Norwich. There were hands consisting of various tracery patterns, and the texts and mottoes so

frequently found, might be termed running patterns. He also referred to the different panel patterns, with heads trefoiled, cusped, &c., and stated that panels sometimes took the forms of Perpendicular tracery by the vertical division of the heads. The flint panel was applied to most features of the churches. Among the beautiful features of the late churches in the eastern counties was the light open clerestory, by which a large amount of light was admitted far above the level of the eye, in the same manner as it shone into the Renaissance churches of Italy. In England this effect was somewhat spoiled by the aisle windows, but in the great breadth of the Perpendicular churches a great breadth of design was reached; the manner in which the open roofs made one with the clerestory windows thoroughly satisfying one's sense of fitness. Mr. Baggallay here drew particular attention to the clerestories of the churches of East Stonham; Coddesham; Saxmundham, with its artistic detail; St. Clement's, Ipswich; Framlingham, Walsham-le-Willows, &c. Next to the clerestory, the porch was the most important part on which flintwork was lavished. The Suffolk porches would lead them to deny that the importance of the doorway had been overlooked in this country, and he would instance those of Halesworth, Blythford, Southwold, Mendlesham, and Ixworth. He next touched upon the use of flints in plinths and parapets, and alluded to the faces of the buttresses being decorated with flintwork, instancing the parapets of Woolpit and Walberwick churches, the former being a perfect architectural gem. The old builders seemed to have used the darkest flints in the lower courses, employing lighter shades as they ascended. Brandon in Suffolk had been for a long time the headquarters for the manufacture of gun-flints, and he went there to see the quarrying and cutting of the flints, which were doubtless almost the same as in Medieval times. Each pit was worked by one man only, and was a shaft 40 ft. or 50 ft. deep. On the surface was a stratum of sand from 7 ft. to 10 ft. deep, with chalk containing large numbers of small flints. Below this was chalk, in which at intervals were found the large flints, never more than one stone thick. The largest stones, weighing a hundredweight or more, were seldom got whole. These were all lifted from stage to stage by the man who worked the pit, and the tools used were of the most primitive description. The lowest flints were those most in demand, being regular in shape, fine in texture, easiest to work, and of a pretty grey colour, which, however, often faded. The best were cut into gun-flints and ganged flints, while the commonest were used for rough walls and concrete. In conclusion, Mr. Baggallay said:—It is surely unnecessary to argue in favour of the occasional adoption in these days of cut flint facing, when the opportunity occurs, if only for the sake of a little variety. It is sufficient to point out that if plenty of long bonders, either of the flint itself or of stone, are used, the work is perfectly sound; and also that if it once be granted that facing at all is permissible, then for concrete walls what facing could be better than random dressed flint? The material would be the same or very similar, only of a better kind to that of the body of the wall, and the large quantity of mortar used would cause it to settle almost equally. In regard to the flush panelling, a great deal of which would necessarily be executed in ganged work, the list of prices I have collected shows that the cost would not be prohibitive, and from the point of view which I have attempted to show to be the right one, in which surface architecture appears as not only no sham, but the most sensible and artistic, then its own intrinsic beauty, that it only recommendation for its revival, that it needs. And apart from mere revival, which is in truth but a backward step, it is surely capable of development, or at least of affording a few suggestions for those of us who desire to carry our art onwards. The most obvious of these is the substitution of other materials for the flints. Not to speak of ganged brickwork, which, treated in that way, would be at least as beautiful, there are varieties of marbles at command, at prices certainly high, but not, in these days of cheap carriage, altogether prohibitive. And in what range, although prohibitive. And in what range could marble be more appropriately applied to building than in slabs, cut to a form which does not suggest joinery, or any other material, and tied into the body of the wall by the stone frame which surrounds it; for, of course, we

should not be guilty of imitating the fifteenth century to the extent of making that too merely superficial. Then we could use in a similar way decorative panels of majolica appropriate to the external decoration, like those of della Robbia. Is it quite impossible to sink the panels slightly, and decorate them with frescos? I will even dare to suggest that a modern building, decorated with well-designed tracery of the kind executed in white marble, delicately moulded, and the ground filled with mosaics, would rival in richness and might easily be made to surpass in beauty, the gorgeous fronts of Siena and Orvieto Cathedrals; or a less extravagant proceeding would be to use or develop such banded work as that of Clyffe. The hands might be of a variety of materials—stone and flint, brick and flint, brick and terra cotta, brick and falence, &c. And any one who knows the beautiful effects of this handed work of the various Italian buildings will confess that it would be worth more than a mere trial. Probably some are thinking that these are impracticable suggestions, and there would be, of course, two difficulties in carrying them into practice,—one, to get, even so short a distance, out of the old grooves; and the other, to find a public who would appreciate or pay for our efforts to give them something worthy of this great, wealthy, and go-ahead nineteenth century. But surely difficulties should act but as spurs to our efforts, and I ask, at least, that the matter should receive consideration at your hands.

Mr. Cole A. Adams proposed a vote of thanks to Mr. Baggallay, and observed that the architectural Association last year visited some of the churches mentioned. Had he known the subject of the paper in time he would have placed some photographs taken by Mr. Robinson at the disposal of the Institute for exhibition.

Mr. Charles Barry seconded the vote of thanks, and said the subject had not received any extensive study by the architectural profession, partly, no doubt, from the want of a demand for flint-work. It, however, deserved a great deal more study than had been given to it, and it occurred to him that the flint architecture of England might well be made the subject for one of the essays of the Institute in the future. Except in England the flint architecture was, he believed, almost unknown, and, therefore, there was the greater necessity and opportunity for its study by English architects. It was curious that though the chalk formation where the flint strata was found prevailed over a large part of the country, the flint architecture seemed to be confined almost entirely to the eastern counties; for, though there was the same kind of architecture to be found in Sussex, he believed it was extremely rare in that country, and, at any rate, had not received the care and elaborate artistic treatment which had prevailed in Norfolk and Suffolk. They must, therefore, come to the conclusion that there was some object in adopting that style by the architects of the fifteenth and sixteenth centuries. What was that object? Most probably it was to obtain a greater development of the colour decoration which was known to have been the fashion of that period. The object could not have been economy, because the treatment seemed to be anything but economical. The object, therefore, was, most probably, to obtain colour represented in a durable material, together with a solidity of building. Colour decoration was again receiving the attention of the architect, and it might be that, inspired by these old examples which Mr. Baggallay had discussed, there would arise a desire to use the flint-work of our forefathers. He could not agree with those who complained that inattention had been given, with a few exceptions, to the entrances of the churches. An exaggeration of the doorway often proved to be a defect. The doorway was an important feature no doubt, and, in some cases, might be emphasised without making it the chief feature in the design, but its exaggeration was altogether out of place, as witness the doorway of the Army and Navy Hotel in Victoria-street, Westminster.

Mr. W. M. Fawcett believed that the reason why flint was used more in Norfolk and Suffolk than in Sussex was because it was more difficult to get stone in the eastern counties than in Sussex. It was easy to get Caen or Portland stone by sea to Sussex, but not so easy to get it to Norfolk and Suffolk.

Mr. Charles Barry remarked that there was the sea coast in both cases.

Mr. Fawcett replied that that was so, but the stone would have to be carried farther in the case of the eastern counties. The stone used in Norfolk and Suffolk appeared to have been obtained from Barnack and floated down the canals to Lynn and Norwich. As to colour, he thought that much ordinary colour was used on the churches described, but it had now totally disappeared except in one or two instances in which only traces remained, such as Cockfield Church, Suffolk, in the stone panelling work. The panelling at Isworth Church also suggested that colouring had been used on the stone. He did not believe that the plastering used in these churches was put on in the same way as concrete was now used, viz., with hoards and planks. With regard to the method of laying the stones, he believed they were then laid with greater care than now, the most care being taken that each stone should rest horizontally on its whole under-surface, instead of giving a degree of unrest to the whole wall by being tilted as at the present day.

Mr. Lacy W. Ridge remarked that there appeared to have been no influx of wealth in the thirteenth century, and the consequence was that almost without exception the twelfth-century churches existed. There was a good deal of square flint work in square panels, alternating with stone panels, but little beyond that.

Mr. Aston Wollf referred to Long Melford Church* as a model example of the use of flint and stone work in their most legitimate way. In the case of modern work it was necessary to use the stones in bands. The only modern example he knew was that of a house in Brighton built with flints, which was a charming example of their legitimate use.

Mr. James Fowler (Louth) said that in Lincolnshire and East Yorkshire he could not call to mind one example of this sort of work, because, although they were chalk counties, flints were very scarce there. He wished, for the sake of architecture, that there were plenty of them.

The President, referring to the round towers, said that these had been matters of interest to him for many years. He had examined them in all parts of the country, and had come to the distinct conclusion that they were not of a later date than the rest of the churches. With regard to the matter of decoration, he did not believe that any of the Mediæval work ever partook of the nature of a sham. These flints, which looked so nice and square in the panels, had at the back a strong affinity for the wall, and there was no stronger wall than a flint one, rubble-built. It certainly required a good proportion of flints and good lime, but he could give some remarkable instances of the tenacity of flint-work. The chancel of Cromer Church was destroyed some 200 years ago, and four years back he was asked to state what its restoration would cost. He spent seven hours over the work, and from the stone and flint work on the ground he was able to reconstruct minutely every detail as it originally stood, and give an estimate of the cost, which was 10,000*l.* He believed that in Mediæval times the rubble walls were plastered. In modern days people had been very much afraid of plaster, but if properly executed, with the right materials, it was a sound and legitimate mode of covering a rubble wall, only the old plaster was totally different from our modern cement. The making of inscriptions round buildings was one of his old fancies. It was an ancient and wholesome German custom, and had been made an ornamental feature in Norfolk. At Mendisham he got a coal-hammer and thumped away at the walls. It was like striking the granite rock; there was a solidity of sound about it which was delightful to hear. The vote of thanks was then carried by acclamation.

Mr. Bagallay, in reply, said that he had understood the Architectural Association's excursion was confined to the neighbourhood of Bryn St. Edmunds. He knew of no flint-work abroad, except some simple diaper-work near the coast of Normandy, which might be attributed to English influence.

The Society of Science, Letters, and Art of London has awarded the gold medal of the Society to Mr. W. P. Buchan, Glasgow, for "Practical and Literary Contributions towards the Advancement of Sanitation."

* See illustration in *BUILDER* for Aug. 23, 1884.

NOTES ON THE ANCIENT CHURCHES OF LONDON.*

It is proposed in this paper to refer to the group of churches existing or formerly existing within the walls of the City, or so close to the latter as to cause them to be a portion of the City, to all intents and purposes; to make some observations upon their dedications and orientation; and finally, to describe the portions of the ancient buildings which have survived all the visitations of time, the accidents of fire, and the hands of the "improver," to our own times.

An ordinary passer through the streets of our great City, so crowded during the day, and so deserted at nightfall, is not so impressed as must have been our grandfathers with the great number of churches within the limited area of the City. A glance at any old view of London is sufficient to show what a fine effect was produced by the towers and spires of these buildings rising high above the houses, of lesser height which then formed London. To a greater degree is this so if the view we are inspecting is that of the City before the Great Fire of 1666, which levelled so many of the sacred buildings of the City which were not afterwards rebuilt. Now the number is still further diminished, while the lofty nature of the buildings erected from one end of the City to another, often higher than the church-towers themselves, has completely destroyed the relative scale of proportion between the churches and the other buildings, and the appearance is diminished accordingly.

The number of parish churches existing before the Great Fire was 109, of which number thirty-five were not rebuilt after that event. If we add to these the names of the four churches removed in the fifteenth and sixteenth centuries we have no fewer than 113 churches as having once existed in London, apart from the cathedral and the great monastic establishments. There is record, too, that there were in the twelfth century three or four old parishes incorporated in the new Priory of the Holy Trinity, Aldgate.

Although these figures are well known, attention has not been drawn to the very remarkable grouping of these buildings. They do not cluster around the cathedral as in many other Mediæval cities, such as in Paris, for example, but they are the closest together more to the east of the cathedral. A reference to any old map where the churches are marked (Vertue's, for instance), shows this at a glance.

Let us, however, be a little more precise, and render the result of measurement. Taking the statue of King William IV. as a centre, and striking a radius of only a quarter of a mile, we find that the whole of the following churches formerly stood within this small space, notwithstanding that a large portion of the half-mile circle is occupied by the Thames:—SS. Michael (Paternoster Royal), John Baptist, Mary Bothaw, All Hallows the Great and the Less, Laurence Pountney, Martin Orgar, Michael (Crooked-lane), Swithin, Mary Abchurch, Stephen (Wallbrook), Mildred (Poultry), Christopher-le-Stocks, Bartholomew, Benet Fink, Mary Woolnoth, Nicholas, Edmund the King, Peter (Cornhill), Michael (Cornhill), Allhallows (Lombard-street), Benet (Gracechurch), Gabriel (Fenchurch), Allhallows Staining, Margaret Pattens, Andrew Hubbard, Leonard (Eastcheap), Margaret (Monument-yard), George, St. Mary-at-Hill, Dunstan-in-the-East, Botolph, and Magnus,—or thirty-five in all.

This extraordinary group of churches has not its parallel in any other city of Western Europe, Rome itself not excepted; and the reason for their being so crowded together is a problem far more readily proposed than answered. Its solution is difficult, but we may at least be content to consider the fact. If we enlarge the radius of our circle, we shall find that proportionately the number of churches is increased up to a certain distance, but no more; but the small space noted is sufficient for attention to be called to the remarkable fact indicated.

Following the analogy of arrangements in other cities, we may reasonably conclude that these churches were erected where the population was the thickest, and where, in consequence, they were the more needed, a conclusion which receives some support from the fact that

* A paper by Mr. E. P. Loftus Brock, F.S.A., read before the St. Paul's Ecclesiological Society, in the Chapter House of St. Paul's, April 15th, 1885.

away from the centre indicated, the churches gradually dwindle away until but a few only are found, one at each of the gates of the city, fewer still away from the walls, and still less along the line of the ancient thoroughfares of Fleet-street and the Strand. It will be observed, however, by reference to Faithorne's map of the City as it was before the Great Fire, which shows generally the outline of all the churches, that the orientation of these buildings was fairly perfect, showing that it had been carefully and purposely studied. I conclude from this that whenever these buildings were founded space was sufficiently at command to admit of this being provided for, even although they were erected in what were then the most closely-populated portions of the then existing city.

The periods of the foundation of these buildings ought to be clear to us among the mass of documentary evidences of all kinds that have been handed down to us, and by the painstaking researches of so many generations of antiquaries from the time of Stow to the present day.

Such, however, is far from being the case. Stow speaks again and again of the building of churches, money being left by will, one citizen helping in this good work of building, another in some other, and the like. This occurs from end to end of his carefully-compiled history.

His numerous continuators and successors have not added much in addition, except of the same kind. When we examine more closely these evidences, we must come to the conclusion that the works named were but the ordinary works of rebuilding upon an old, and not the construction of a new foundation,—in fact, that churches had been on the sites long anterior to the works named. Thus, for example only, it is related that W. and John Otewich were the founders of St. Martin Outwich; but it is evident that the church existed before their time, since John, Earl of Warren and Surrey, was its patron, temp. Edward II. St. Stephen's, Walbrook, it is related, was built in the fifteenth century, but a new site being mentioned, it is evident that the parish was not a new one, and we find a reference to its existence temp. Henry I. Allhallows, Lombard-street, was built in 1516, but there is a reference to it before the Conquest. Augustine's Papey was founded in 1430, but the church is mentioned early in the preceding century.

We glean, however, the following from older records than Stow:—

The Church of Canterbury was the patron of many churches in London, called peculiar, thirteen in number, which appear to have belonged to that foundation from a very early period. I can find no reference to the actual dates when they were presented to Canterbury but from this circumstance, the date is likely to be an early one, and the more so since some changes of patronage and transfers of later date have been carefully recorded. St. Martin Orgar is stated to have been given by Odgarus in early times, and Allhallows, Lombard-street, by Brightmens, citizen of London, 1053 or 1054.

There is reference to the patronage of several churches in London being held by the Dean and Canons of St. Martin's-le-Grand. They were possessed of these anterior to the Conquest, since William the Conqueror, by a charter so early as 1068, confirmed them in their possession. One of these, the Church of St. Alphege, is mentioned by name. The following churches are known to have been in their patronage at a later time, and they are probably those to which reference was intended in the charter referred to:—St. Anne, Aldersgate; St. Botolph, Aldersgate; St. Katharine Coleman.

We are informed by Newcourt, in his *Reperitorium*, that several churches were collated to the Dean and Chapter of St. Paul's. No evidence is forthcoming as to when they were bestowed, but we find that in the time of Ralph de Diceto, dean from 1181 to about 1204, a survey was made, and we know from this that the following churches were then in existence, as they had been probably for a long time before:—SS. Anthony; Augustine; Benet, Gracechurch; Benet, Paul's Wharf; John Baptist, Walbrook; John Baptist (Zachary); Mary Aldermany; Mary Magdalen; Michael, Queenhithe; Michael-le-Quent; Olave, Jewry; Peter, Paul's Wharf; Peter-le-Poor; Stephen Coleman; Thomas Apostle; and that St. Nicholas Olave was given to the Dean and Chapter by Gilbert Foliot,

Bishop of London in 1163. Had the others been presented at a later date, I think that there would have been a record. As it is, their gift seems to be lost in the dim past.

Matthew Paris relates ("Lives of the Abbots of St. Alban's") that in the time of Paul, fourth abbot, 1077, there were many churches in London belonging to St. Alban's, of which St. Alban's, Wood-street, was one. It is said to have been originally a chapel erected by King Offa.

St. Botolph is said to have been founded about the time of the Conquest, and St. Mary-le-Bow was being built at the same time.

St. Botolph, Billingsgate, seems to have been of early foundation, for the gate was called Botolph's Gate *temp.* Edward the Confessor.

The body of St. Edmund rested for three years in the Church of St. Gregory.

There was certainly a church at St. Helen's before the foundation of the Priory, and called by the same name.

St. Margaret Moses was given to the Priory of St. Faith, Norfolk, in 1105, by the founder.

St. Martin, Ludgate, is said by Robert of Gloucester to have been founded by King Cadwallo, who was buried there in 677. This reference is, however, of more value to show that the church was there at the early date at which this author wrote.

St. Martin, Vintry, was given to the Abbey of Gloucester in the time of the Conqueror, and St. Mary Woolchurch at the same time to St. John's, Colechester; St. Michael's being given to Evesham by Another the priest about the same time; St. Nicholas Acon being given to Malmesbury in 1084.

The evidences of new parishes are clear enough, but they are not numerous. They are as follows:—St. Mary Woolchurch appears to have been one, since it is called a new church. St. Mary-le-Bow was built *temp.* William the Conqueror. St. Mary Monmouth was a small chapel at first attached to the House of the Monks, St. Leonard, Foster-lane, was founded between 1231 and 1241. Holy Trinity, Minorics, grew out of the Nunnery at the Dissolution, as did Christ Church parish at the same date, on the suppression of two smaller parishes, following at this later date what was effected when Holy Trinity Priory, Aldgate, was founded at an earlier one, when three or four old parishes were suppressed. St. James, Duke's-place, was founded 1622, on the dissolution of this priory; and St. Anne, Blackfriars, 1597, on the demolition of the old parish church with the conventual one.

This is a brief outline of the recorded history of the London parishes, and it justifies the remarks made with respect to its meagre nature. This does not apply to the foundation of the Norman and later monastic establishments, of which the recorded dates are ample, numerous in later times, but apparently very few in number anterior to the Conquest. The later histories of the parishes, too, are precise enough, and no work of building of especial note appears to be without its record. All this, however, points to the uncertainty which hangs over the foundation of the great bulk of the London parishes; for it will be apparent from what has been named that the early records for the most part speak of the parishes as then being in existence. Not a word is said to justify the belief that they were new creations of that exact period. Had they been so it would, we may naturally expect, have been stated. This was so, in fact, as we have seen, in the one case which has been referred to, of St. Mary Woolchurch, and of the new buildings, also at St. Mary-le-Bow and St. Giles, Cripplegate. We know also the circumstances which called the parish of St. Leonard, Foster-lane, into existence. Should we not have had records equally precise if the other parishes were even of but moderately early date?

We are forced, I believe, to the conclusion that the vast mass of the City churches, crowded together as they were, were founded in times anterior to the Norman conquest.

This is a conclusion somewhat startling, and it opens up to us a field of inquiry of no small interest. What were the forces at work to produce so great a number of churches in so small an area, and when it is but reasonable to conclude that the population must have been small comparatively for the space? How was it that the foundation of other churches ceased to so great a degree at the Conquest? When did it begin? How was it that other churches were not founded to keep pace with the increase

of the population and the growth of the City westward?

When we come to consider the dedication of the buildings we find evidence which points equally to an early rather than to a late foundation. Let us consider the names of the saints to whom the churches are dedicated.

St. Alban, the proto-martyr of England, occurs once; Allhallows, the old Saxon form of All Saints, no less than eight times; St. Alphege, the archbishop, murdered by the Danes, once; St. Andrew, four times; St. Anne, twice; St. Anthony, once; St. Augustine, once; St. Bartholomew, three times; St. Benet, three times; St. Botolph, four times (at three of the gates of the City); St. Bride, once; Christ Church (as a parish), once; St. Christopher, once; St. Clement, once; St. Dionysius, once; St. Dunstan, twice, once at each end of the City, east and west, in fairly corresponding positions; St. Edmund the King, murdered in 866, once; St. Ethelburga, once; St. Ewan, once; St. Gabriel, St. Giles, St. George, St. Gregory, St. Helen, once each; St. James, twice; St. John the Baptist, twice; St. John the Evangelist, once; St. Katherine, twice; St. Lawrence, twice; a like number to St. Leonard; St. Magnus, once; St. Margaret, four times; St. Martin, five times, apart from St. Martin-le-Grand; St. Mary, fifteen times; St. Matthew, once; St. Michael, seven times; St. Mildred, twice; St. Nicholas, four times; St. Olave, three times; St. Osyth, once; St. Pancras, once; St. Peter, four times; St. Stephen, twice; St. Swithun, St. Sepulchre, St. Thomas the Apostle, the Holy Trinity, and St. Vedast, once each.

There seems never to have been a change of dedication. The names by which the churches are known in early times are those recorded in later ones. St. Osyth, however, was called afterwards by the name of its rebuilder, Benedict Shore, *temp.* Edward II. There is also reference in a list of the churches under the patronage of Canterbury to one dedicated to St. Werburg. St. Agnes occurs as a double dedication with St. Anne.

The mention of these names will at once show that many of them are of saints who were popular in Saxon rather than in Norman or later times, and thus evidence of another kind is adduced in support of the foundation of a large number of the London churches in times anterior to the Conquest. The dedications to SS. Alphege, Benet, Botolph, Edmund, Mildred, Osyth, Ewan, Olave, Dunstan, Ethelburga, and Swithun, are so thoroughly Saxon as to render it far more probable that they would have occurred when Saxon influence was strongest, rather than when it was weak. The dedication to St. Pancras is likely to be very ancient, since it was introduced by Augustine at Canterbury. So are also those to SS. Bridget, Anthony, Augustine, Benet, and Dionysius. St. Martin was always popular in England as he was in Wales, Gaul, and Switzerland, and from the continuance of his popularity from early to later times, no safe deduction as to the age of the dedication can be drawn from the naming of a church after him. Still, of the number of churches so called in the City it is within the range of fair reasoning to believe that some of them are of remote antiquity. We must, in this respect, bear in mind that it was to this saint that Augustine, on his arrival, found the little Roman Church at Canterbury already dedicated. It is desirable also to note that, of the other dedications, there are none, not even to St. George, that might not have occurred in Saxon as well as in later times. St. Mary, St. Michael, and Allhallows were, in fact, as favourite dedications in the earlier days of the church in England as they were in later ones.

There is, however, another statement referred to by more than one of the older historians of London, and it appears, too, in the church itself. This is the foundation of St. Peter's-upon-Cornhill by the British King Lucius, in Roman times. This is the Lucius who, in the year 156, according to Bede (although I do not think that the statement is more than a compilation from other sources), sent a letter to Eleutherns, Bishop of Rome, "entreating that by his command he might be made a Christian." This statement occurs also, much in the same terms, in the Saxon Chronicle and in the Book of Llandaf. All these, of course, were compiled long after the event; probably it occurs also in the other records, after the usual manner of the times, one compiler following another frequently

in the same words. On the face of it the statement appears more like a pious fraud of the seventh century than a contemporary record of the second. At that early time evangelical doctrine would prompt a man to appeal to the Great Head of the Church rather than to a pope for direction in the spiritual life. In the seventh, it was not unimportant to show to the ancient Church of Britain, flourishing in the un-Saxon parts of the country, and still independent of Rome, that in the earliest times popes were appealed to by the British Christians. The statement will not bear investigation, for, as has been shown more than once, Eleutherns was not Bishop of Rome until at least twenty years after the date named. There are two emperors named in the statement, Commodus and Verus, as reigning together, which they never did; and to this may be added that King Lucius himself belongs so entirely to the realm of romance rather than history that we have no reliable evidence of the actual existence of such a personage. I believe fully in the existence of Christianity in Britain in ancient Roman times, in that of a Bishop at London, and consequently of churches in this remote period; but we may dismiss the record of the foundation of St. Peter's-upon-Cornhill at this time as being too uncertain for service in our inquiry. The relics of the existence of Christianity in Roman times which have come down to us consist of personal ornaments, some plates of metal marked with the Chi Rho, now in the British Museum, and the like. They are few in number, but are important in their evidence. The reference to St. Peter's may be the dim indication of a remote tradition, similar to that which points to the foundation of the earliest cathedral on the site of the present building beneath whose shadow we are gathered. There is another tradition worthy of passing remark. Stow relates that the descriptive "Staining" attached to the Church of Allhallows, Mark-lane, was in consequence of the building being erected originally of stone, when so many others were of wood. Stow could not have foreseen the discussions among ourselves as to the erection or non-erection of stone churches in Saxon times, and his record of what was thought in his day to be the reason for this name is of interest to us, as marking a state of things likely to have existed in the City, but only in early times.*

ARCHITECTURE IN THE NINETEENTH CENTURY.

This was the title of a lecture delivered by Mr. George Aitchison, A.R.A., on Thursday evening, April 16th, at No. 9, Conduit-street, Regent-street, at a meeting of the Society for the Encouragement of Fine Arts. Mr. Ewan Christian, President of the Royal Institute of British Architects, occupied the chair.

The Chairman, in opening the proceedings, said he had no doubt the lecture to be read that evening would be an interesting one. It was upon a very interesting subject, but he was told that it was upon architecture generally, and not upon that of the nineteenth century in particular. Architecture generally concerned all; it concerned them in their homes, and in their walks abroad, and in the character of the nation. It concerned them in their homes because, unless their homes were made comfortable and pleasant by their surroundings, a great deal of the pleasure of their lives must necessarily be curtailed. It concerned them very much in their walks abroad, because there was nothing more miserable than to see, as they were obliged to see in some parts of London, miserable designs most miserably carried out. One of the tortures of his life was to walk through some of the suburbs of London, where one could see street after street of houses, supposed to be for the working classes or mechanics, — people who ought to be instructed in the knowledge of architecture, and, at any rate, ought not to have things put before them that were miserable specimens of bad taste. If, however, one walked through streets where there were beautiful buildings designed by good architects, and where mind was clearly shown in every detail as well as in the main outline of the work, then they had something which was a pleasure to look upon, and which added to the charm of their walks through the streets. He often thought how little architects were properly considered in that matter. There was

* To be concluded in our next.

no greater benefactor than a great architect. He was a benefactor to every person who walked along the streets. What would London have been if such a man as Sir Christopher Wren had not been living at the time when the Fire occurred? Where would have been the beautiful towers and spires of London? Where would have been that wonderful view,—the most beautiful City view he knew of, and which he did not think was to be surpassed anywhere in Europe,—the view looking up Ludgate-hill, with the beautiful spire of St. Martin's, Ludgate, backed by the magnificent dome of St. Paul's as the culminating point? In the City of London there was as fine a collection of towers and spires as was to be seen in the world. However, such a man as Sir Christopher Wren did not arise in every century. In the present century, when the Houses of Parliament were burned, there was fortunately a Barry to come forward to produce that magnificent palace at Westminster. People might and did quarrel with it, still it was a magnificent building. Then, again, the completion of Somerset House, towards Wellington-street, was one of the most beautiful things done in this century, according to his idea. Then there was the beautiful building of the University of London, which was one of the finest Classical buildings of modern times. Having mentioned several other buildings, the Chairman concluded by saying that the subject of architecture was one of the most important that could be considered.

Mr. Aitchison in the course of his lecture remarked that Sir H. Wotton said that "Architecture can want no commendation where there are noble men, or noble minds." Architecture was looked upon in England with very different eyes to-day to what it was in the first quarter of the seventeenth century. The finest buildings never excited enthusiasm, rarely even gratitude. No fine art existed unless there was an effective desire for it; and for architecture there was the greatest indifference. If architecture was to be excellent there must be a general and passionate desire for it; and amongst the architects a keen desire for appreciation and honour, and "that last infirmity of noble minds," fame, must be the incentives. It was just possible some of the fine arts might be cultivated for personal delight. To find the materials to follow the pictorial arts was within the means of all; and a lump of clay for modelling was easily obtained by the votary of sculpture. But that could hardly be the case with architecture, because that was an especially costly art, and could only be indulged in by wealthy persons and States, but when once embodied it could be enjoyed by everybody for nothing. Man was a thoughtless, selfish, ungrateful creature, for many of his greatest benefactors had begged their bread. Homer to wit. Many of the different arts that made up architecture could to some extent be understood by the present luxurious, practical, and prosaic generation. For example, the public could understand the advantage of a building not falling down; that it was not deformed by cracks and bulging; that it was well lighted, and could be easily and thoroughly warmed. It was the appreciation of architecture and of its treatment that he wished to enlarge upon. There was no fear of the Englishman of to-day not being keenly alive to anything that would touch his pocket. Architecture meant the rhythmical arrangement of the exterior of a building,—the proper proportion of parts to each other and of parts to the whole, the proper alternation of light and shade, the impressiveness or picturesqueness of the whole outline from various points of view, the arrangement of the interior in proper proportions. When all this was done, and done well, or should have, its own peculiar ideal. So far as he could see, the civilised world for some time past has had no ideal, and consequently the architects could not produce it. The leaders of architectural criticism were like the political leaders in the sister isle, they did not know what they wanted, but they were determined to have it. Architecture had always sprung from something, a cave, a hut, or a tent, and had been but slowly modified, improved, and perfected. The hope dearest to his heart was to see the public loving and desiring architecture, and making up its mind what it would like,—simplicity, grandeur, or picturesqueness. The most important thing for architecture was for people to love it, and, to love anything

much, it must be understood. People nowadays who spoke of architecture spoke of it disparagingly, and said they knew nothing about it, and, they might well add, they cared less. A good idea of what is the fate of architecture in the present day is that people only ask if they can get their work done at current prices. They all knew the miserable pittance a grateful country paid Sir Charles Barry for a labour of twenty-five years, 40,000*l.* Few living architects were known by name outside their own profession, and he did not believe there was a knight among them, but if there were he obtained the title in return for political assistance. Few men who could afford to build a house did so; they bought or hired a ready-made one. The wretched leasehold system went some way to make London the most common-place capital in Europe, for who would give time, money, and thought to a place when it must lapse to a stranger? Styles were only the expression of what people liked at a certain epoch. Each generation of architects acquired more skill and endeavoured to keep closer to the changes of its day. They had had the Gothic revival, which had done excellent service, but it was doomed from the first to be but ephemeral. Whether they were to have good work, or whether they were to have bad work, must be left for the present or future generation to decide. Until the public knew what they wanted, and until they learned to like something, how was it possible to invent anything for people's delight? The public, by its ignorance and apathy, lost one of the tasteful pleasures of life. Music and Architecture both suggested to men thoughts, feelings, that might be more important than words. It was impossible to give a reason why certain proportions gave pain or disgust; why others raised no emotion, while others gave delight. There were many fine buildings in London. The much-abused National Gallery was beautiful in its central portion, and the Reform Club was, perhaps, the most perfectly proportioned building in Europe. To render architecture perfect it must be associated with sculpture and painting. St. Paul's and Westminster Abbey were the epitome of London; the Pyramids, of Egypt; St. Peter's, of modern Rome; and Sta. Sophia, of Constantinople. When the glory and greatness of a city had passed away, nothing so forcibly reminded people of its former magnificence than the architecture of its buildings. Architecture was one of the expressions of national life, but it seemed in the present day to be entirely overlooked. It could not be denied that the small villas lately built in London were more tasteful than they have been since Medieval days. The striking characteristic of modern buildings was their flimsiness. They appeared to be built for temporary use, and a few years would see them in ruins, were it not for the fostering hand of man. They all bore marks of having been built for one man's lifetime, after which they would pass away. As to churches in good Queen Anne's time, they were expensive structures, costing as much as noblemen's mansions; while nowadays they were little better than sheds of rubble. It was almost a desecration to call some of the present buildings churches, for they only offered a place for prayer, rest, and shelter for one day in the week. England was said to be richer than she ever was before; but one was inclined to doubt it under the circumstances. They heard of colossal fortunes being made in manufacture, but what did the rich do with their money? It took three years' income of a labourer to build him a good cottage; yet what millionaire could point to a house in London that had cost him three years' income? Then, again, this country had a national income of 80,000,000*l.*; but in the last fifty years had one year's income been expended per annum upon public buildings? In conclusion, the lecturer remarked that he was afraid they would say they had heard nothing about the nineteenth-century architecture; but they must blame the printer for that, and not him, as he never said a word about the nineteenth-century architecture, and never intended to say a word about it.

The Chairman observed that they had heard a very interesting lecture on architecture, and Mr. Aitchison had told them some home truths. Mr. E. P. Loftus Brock (Hon. Secretary), thought Mr. Aitchison had said a great deal about nineteenth-century architecture, and they might look forward much more hopefully as to what

the architecture of the next century would be. He was glad to find that the nation could do without architects. He fully endorsed what the lecturer had said as to the nature of a building of some of the churches in the country. No house was built now unless it was made to appear with some style, and shopkeepers vie with each other in making their shops look pretty. The result was there was an amount of display in some of them which angred very well for what would be done a little later on. If they contrasted old buildings that were erected at the commencement of the century with those of the present day, what a difference there was. Then, again, at the present day, good materials were used, and they were not content with cement and shabby marble and things of that kind, such as I remembered being used thirty years ago. Architects must be content with small things. They were not days for building cathedrals or grand mansions, so they must be content with little small fish that were floating about in the present waters.

The Chairman proposed a vote of thanks to Mr. Aitchison, which was seconded by Mr. Edmeston, and agreed to.

Mr. Aitchison replied, and the proceedings terminated.

Illustrations.

THE CATHEDRAL AND ALCÁZAR OF SEGOVIA.

THE subjects of the two double-page illustrations which we give this week,—the Alcázar, Segovia, and the Cathedral of the same city,—will be found described and commented upon at some length in the article entitled "Notes in Spain, Architectural and Historical," printed on a preceding page (See p. 377.)

BLOCK OF BUILDINGS IN GREAT TOWER-STREET, E.C.

This block of buildings has been recently erected by the City of London Real Property Company (Limited) in Great Tower-street and Mincing-lane for office purposes.

The premises are five stories in height, and have frontages to Great Tower-street and Mincing-lane of 147 ft. and 83 ft. respectively. The street fronts are constructed of red sandstone, supported on pilasters and plinths of polished grey and red Aberdeen granite. There are main entrances in both streets, and subsidiary entrances to the ground-floor offices in the Great Tower-street front.

The basements facing the streets are well lighted and used as offices.

The staircases are of ironwork with Craigleith stone steps and landings. The dado on the stairs and in the corridors is formed with glazed tiles of suitable pattern and colour. The building is roofed with Brunseley tiles.

There is a large amount of ironwork used in the construction.

There are lavatories in various parts of the building; and water and gas are laid on to almost every room. The building is well lighted in every part.

It has been constructed from the design and under the personal superintendence of Mr. Edwin A. B. Crockett; the contractors being Messrs. E. Lawrence & Sons, whose general foreman was Mr. Chandler.

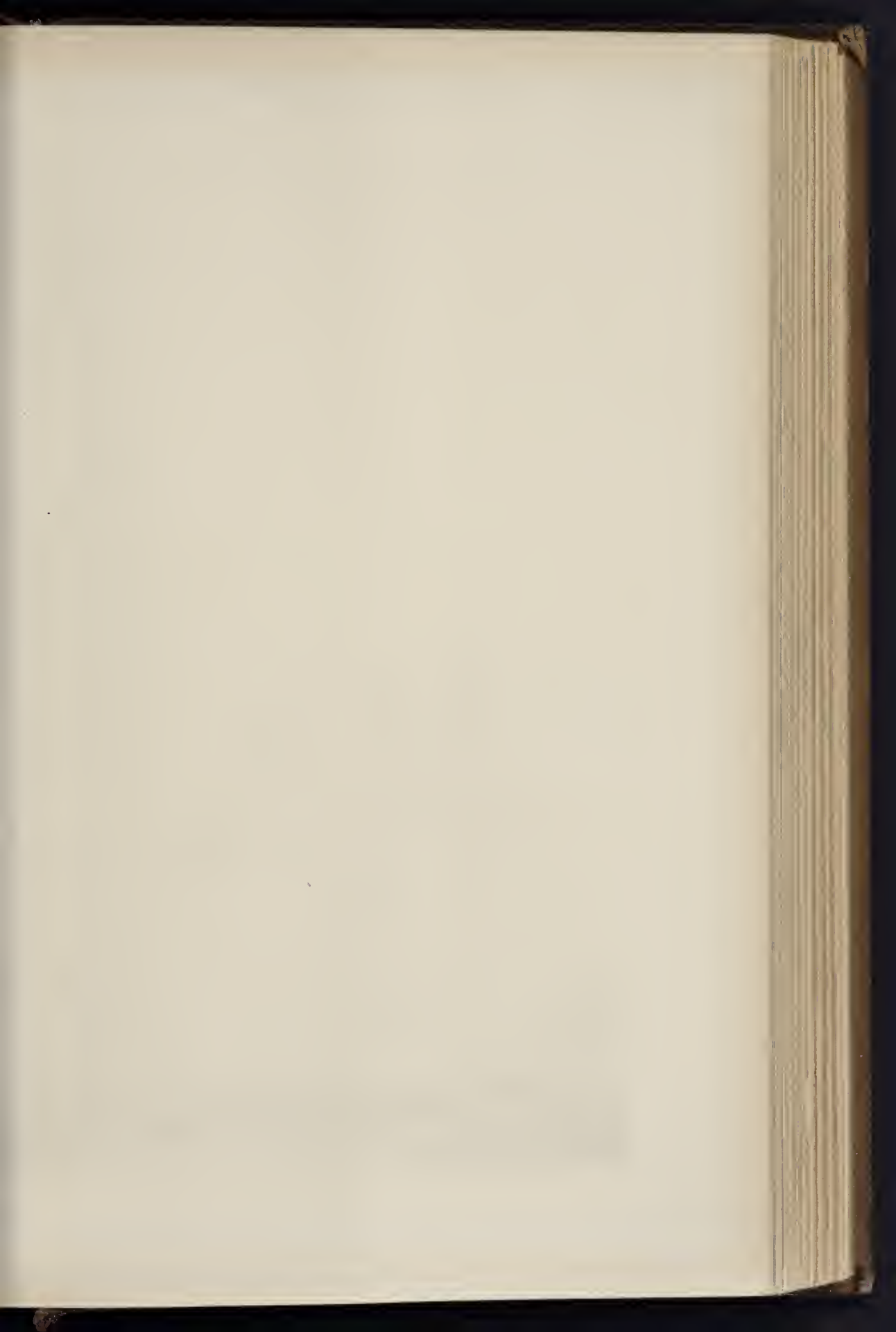
NEW SHOPS, GUN-STREET, READING.

THESE buildings, of which we give a geometrical elevation, have recently been erected from the design and under the supervision of Mr. Ravenscroft, of Reading; Mr. Searle, of the same town, being the builder.

The work has been substantially and satisfactorily carried out, and the street front, composed chiefly of red rubbing bricks and Luton bricks, has been very carefully executed; the whole of the moldings and carved portions being executed by hand.

Internally, these buildings are fitted with lifts and other business appliances; and the shops are warmed by means of hot water, and ventilated by shafts carried up in the chimney-stacks, &c.

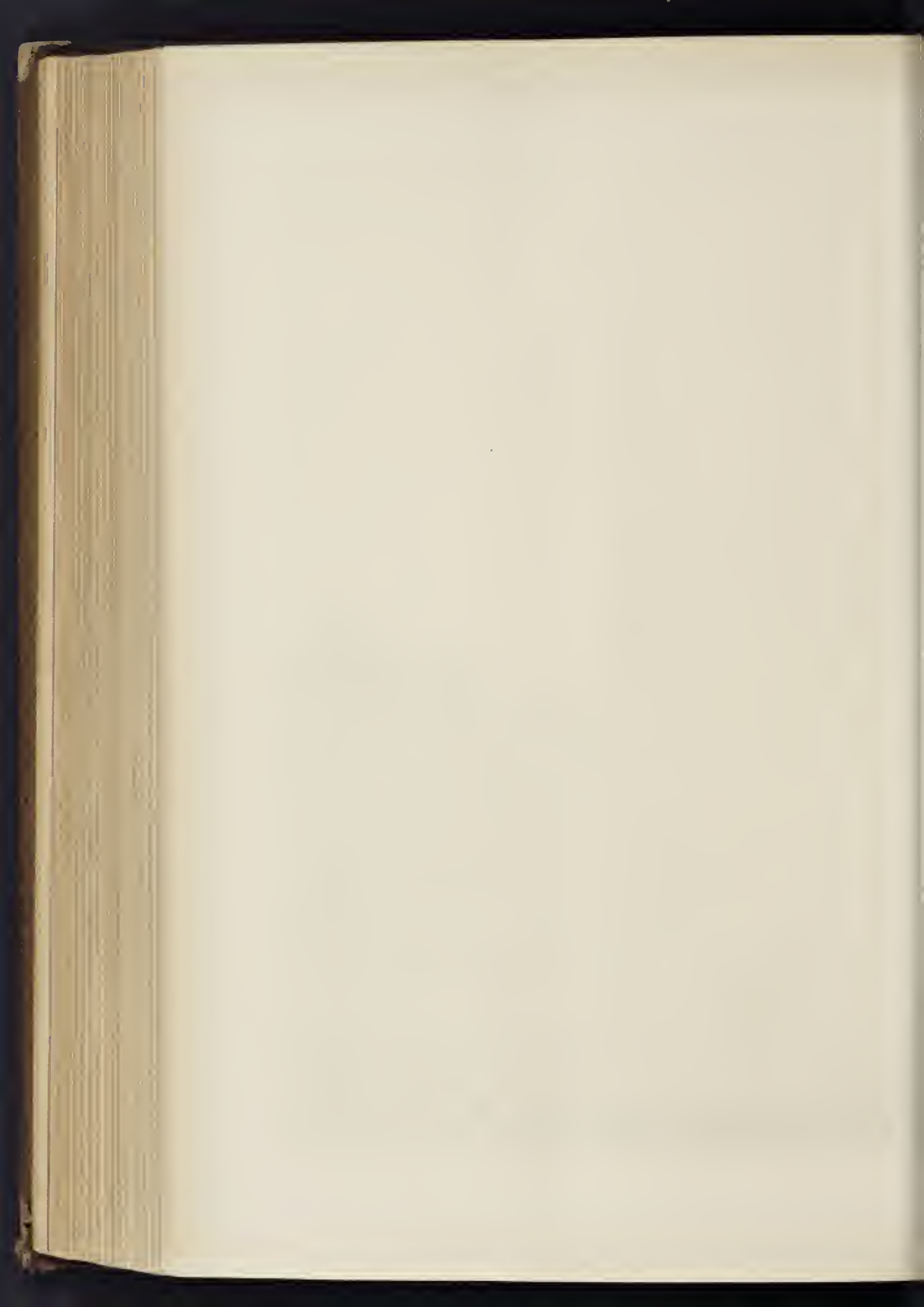
The total cost of the two shops amounted to just over 2,200*l.*

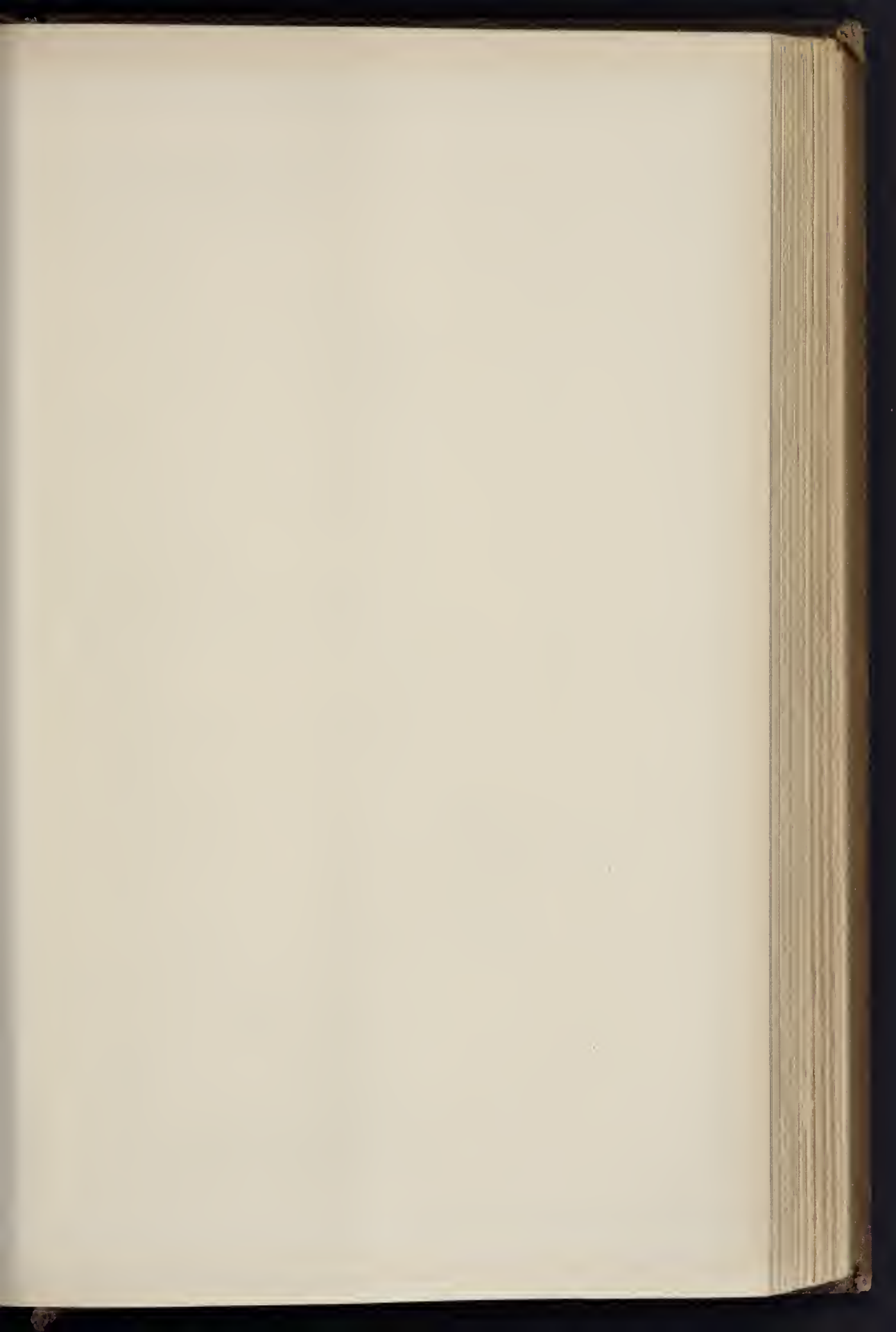




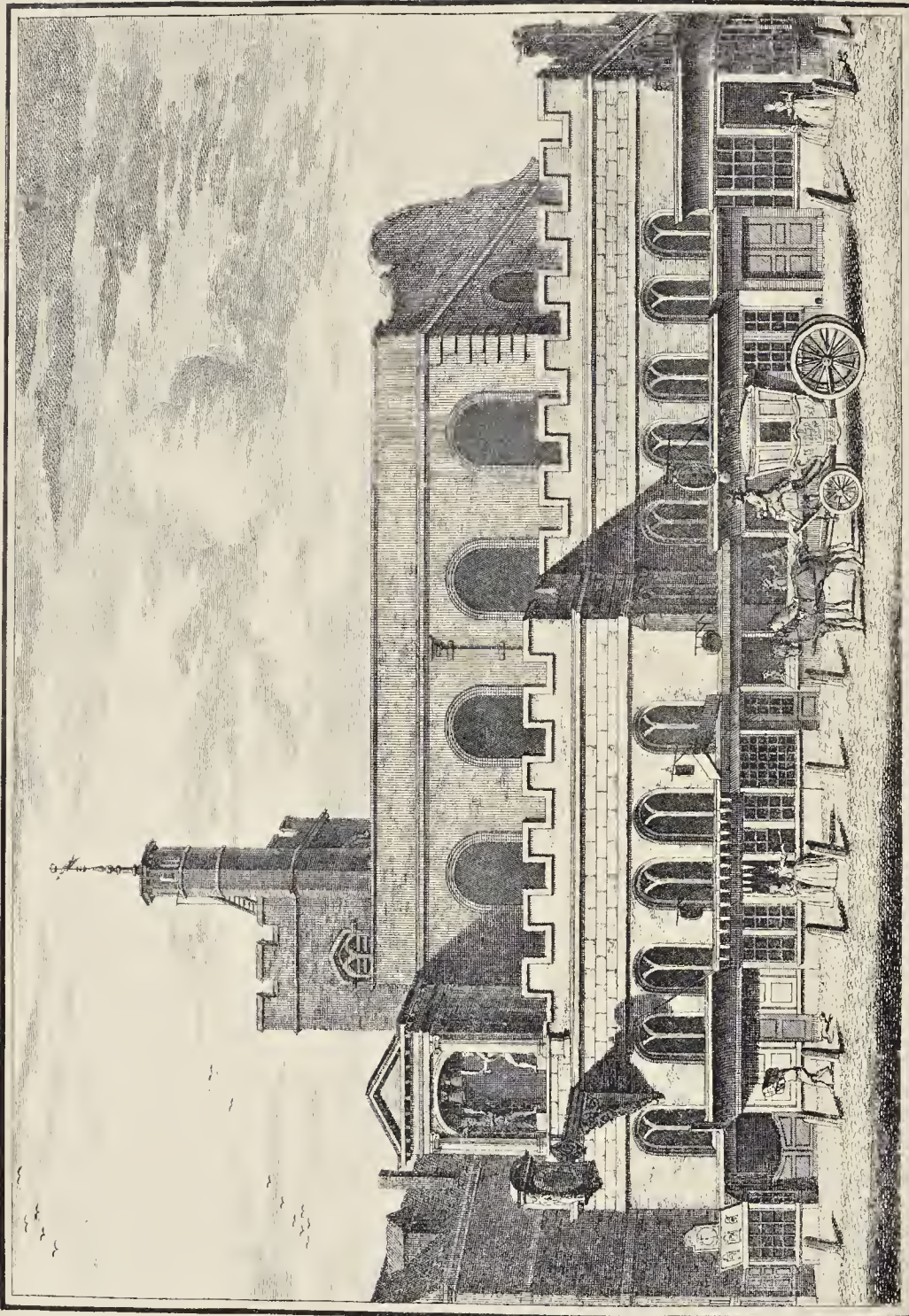
INK PHOTO, SPRAGUE & CO LONDON

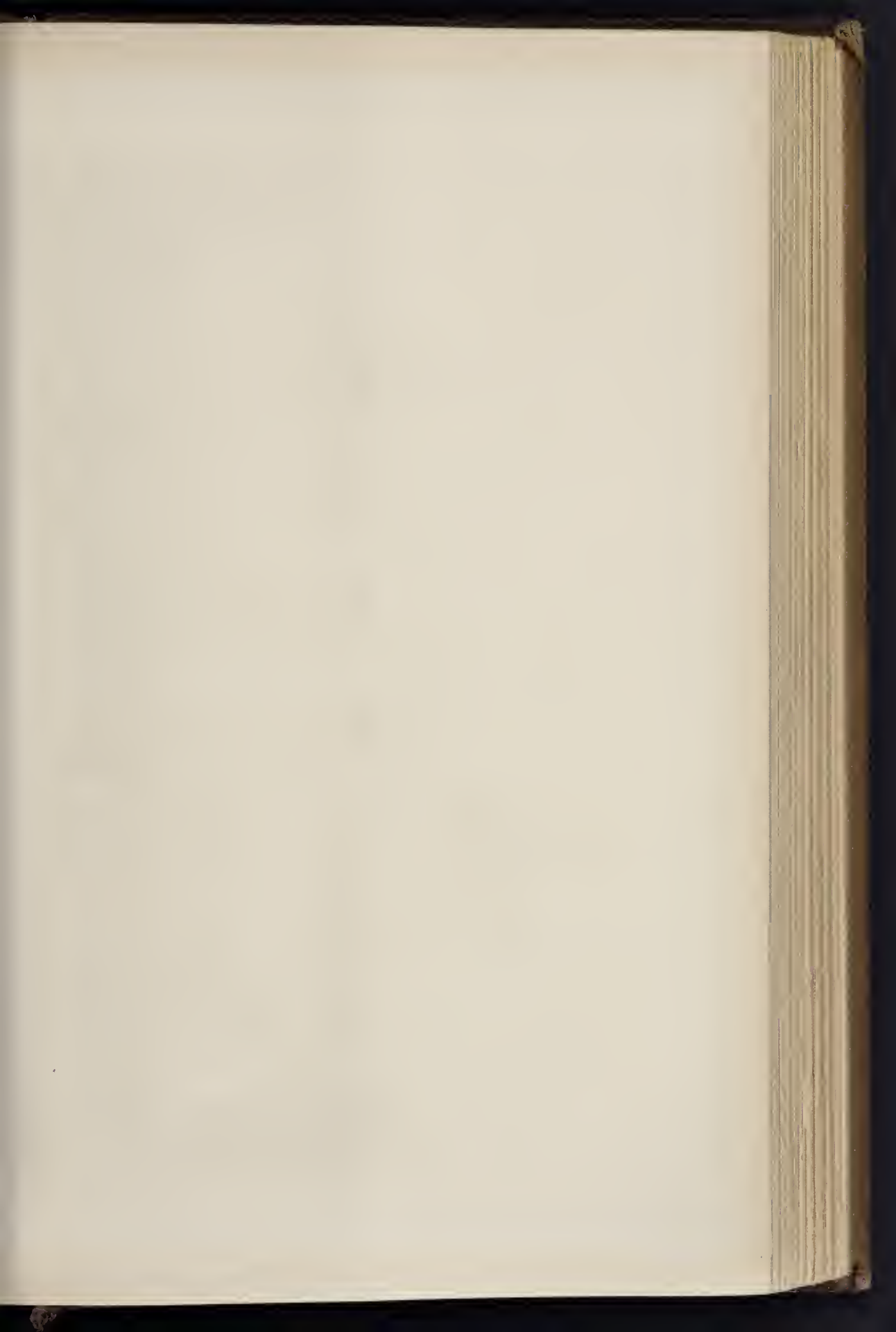






THE BUILDER. APRIL 25, 1885





THE BUILDER, APRIL 25, 1885.



Wymans & Sons, Photo. Litho.

BLOCK OF BUILDINGS IN GREAT TOWER STREET AND MINCING LANE, E.C.—Mr. EDWIN A. B. CROCKETT, ARCHITECT.

© Queen St. London, W.C.



Shops, Gun S^t; Reading.

W. Ravenscroft.
Architect
READING.

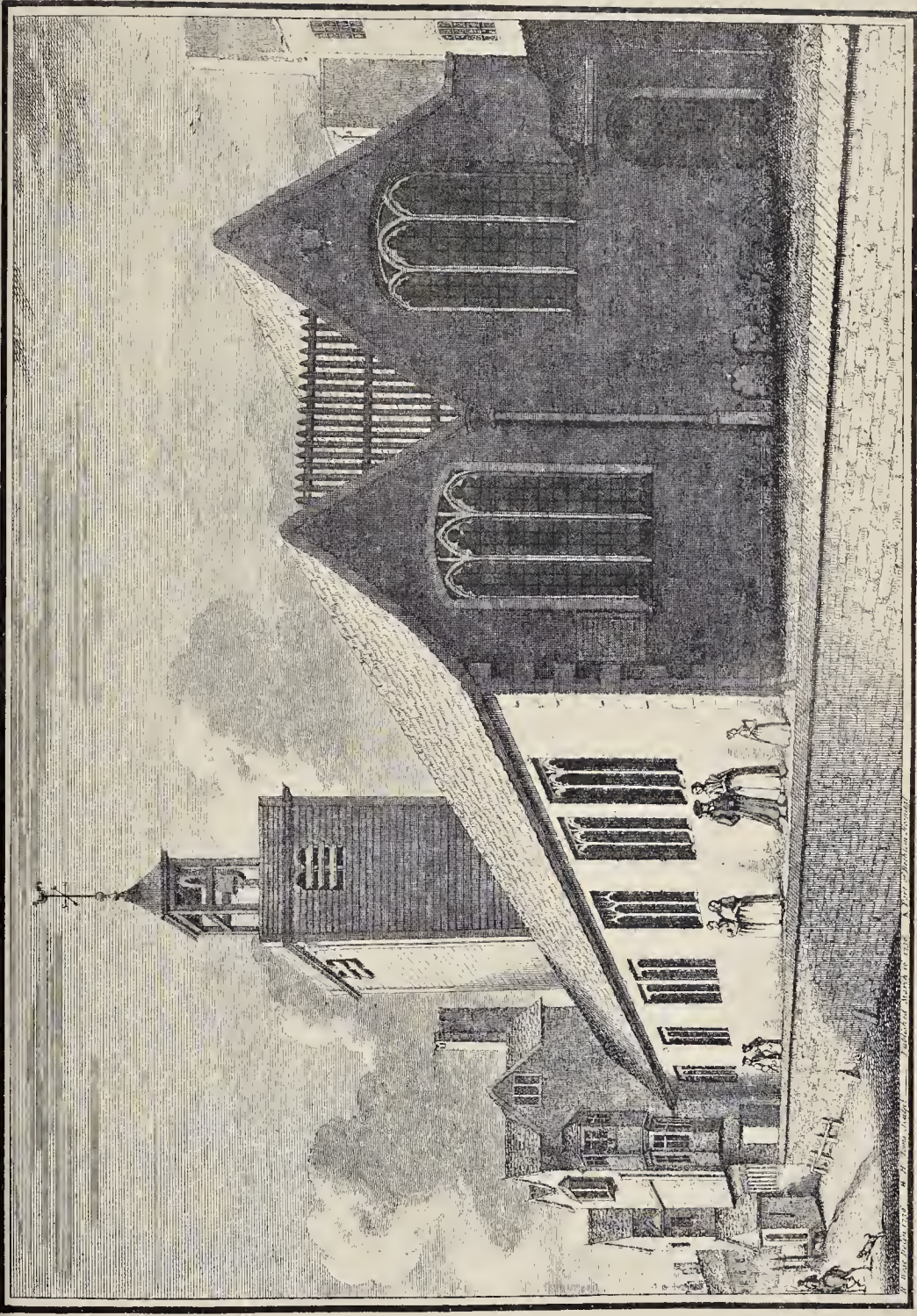
3^d FLEET

1st Queen S^t London, W.C.

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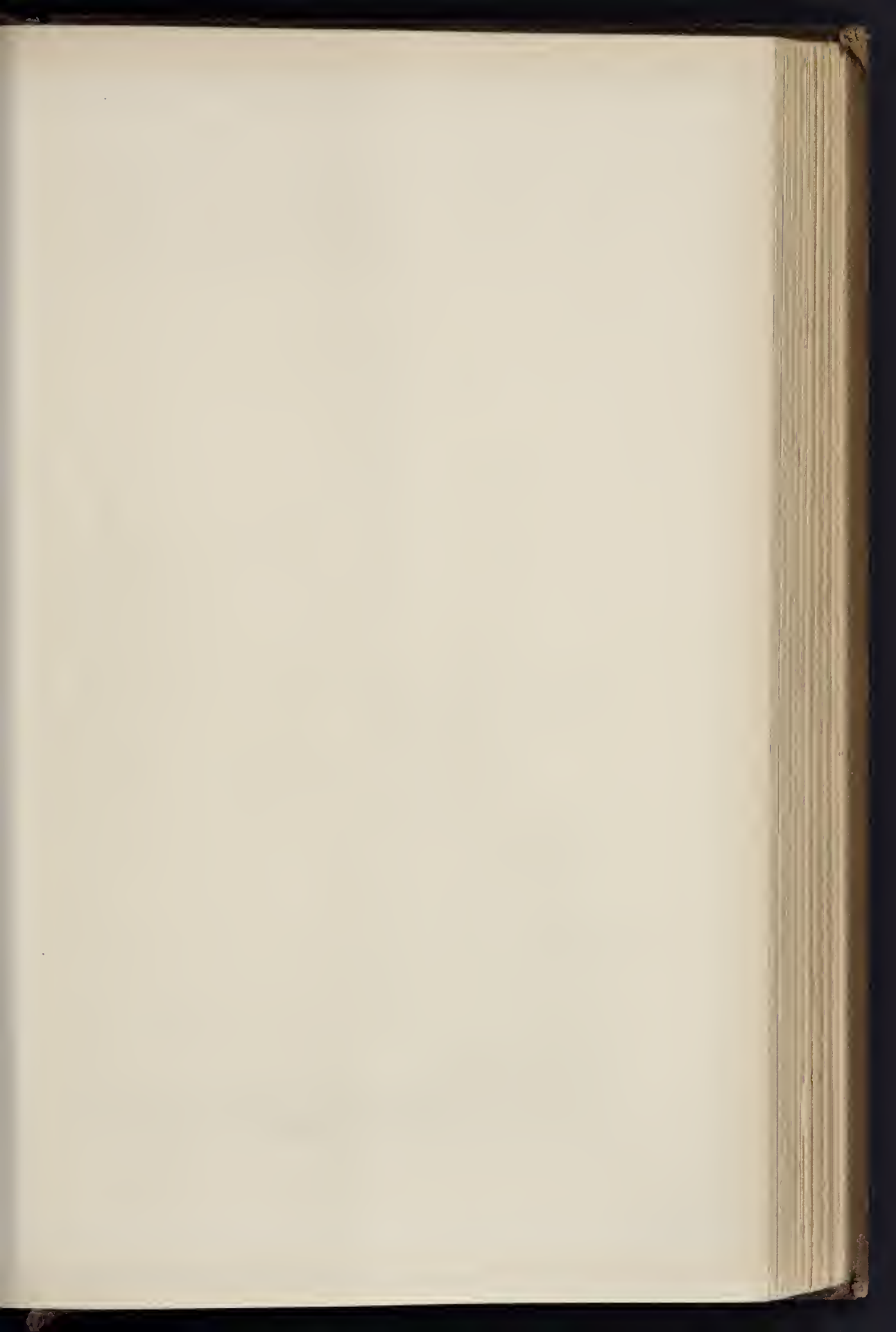
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Wyman & Sons, Photo-Litho



J. Bell, Engraver & Printer, 15, Abchurch Lane, London, E.C. 4.

OLD LONDON CHURCHES. All Hallows, London Wall.





INK-PHOTO, SPRAGUE & CO., LONDON



SEGOVIA.



OLD LONDON CHURCHES.

THE two views of Old London Churches are given in connexion with the paper on the subject by Mr. Loftus Brock, part of which is printed in this number [p. 580], and the remainder of which will appear in our next, accompanied by two other views of churches referred to, reproduced, like the present ones, from old engravings.

The view of Allhallows-on-the-Wall is taken from the series of engravings published in 1740, by R. West and W. H. Toms, and engraved by J. Poms. A tolerably full description of the church from Toms's book was quoted by Mr. Brock, in his paper, and for convenience we transfer it to this portion of our columns:—

"Allhallows-on-the-Wall. This church is so-called as being dedicated to All Saints, and is situated on the north side of London, a little easterly from Bethlem Hospital, and is in the ward of Broad-street, but the parish is in the wards of Broad-street, Bishopgate, and Lime-street. When it was first built I find not, but 1207. was laid out on it in the year 1627.

II. It is of the Gothic and Tuscan orders, and not having been consumed by the late Fire, is not so beautiful as those that are wholly new erected.

III. The church being pretty old and not large, the wainscot is not so considerable as some others, but it is well paved, and at the west end is a small gallery (whose front is adorned with shields and their compartments), elevated on small columns of the Tuscan order, which was newly beautified in the year 1639, at the charge of the parish. At the altar, the Ten Commandments, Lord's Prayer, and Creed are one in black, with Moses on the north and Aaron on the south side of the Decalogue, finely painted, all under a Cornish, in the middle whereof are the Queen's Arms, carved and put up at the charge of the parishioners, and the whole new beautified, in the year 1703. And a little sly [southerly] from this altar-piece is a piece of antiquity, being the Commandment one in an old character, with glass before them, in a triangular frame, nearly 5 feet high.

4. On the north side of the church is a large table of the benefactors to the poor, well done in gold upon black. Mr. Cromshaw gave 50*l.* Dr. Lewis, the late Rector, 40*l.*, and there are 24 others, many of whom gave near the last-mentioned sum. And close by this table is a very large piece of painting upon cloth in a strong frame, the Effigies of Queen Elizabeth lying on her Tomb with the Ensigns of Royalty and two golden Lyons, one at her Head, the other at her Feet, which piece was there placed in Memory of that Queen, as being (when alive) a nursing Mother to the Protestant churches.

Upon which piece are these lines:—

Read but her Reign, The Princess might have been
For Wisdom, call'd Nicaulis, Sheba's Queen.
Against Spain's Holofernes, Judith etc.
Dauntless gain'd many a glorious Victory.
Not Deborah did her in Fame excel,
She was a Mother to our Israel;
An Esther, who her Person did engage
To Save her People from the Publick Rage;
Glorious Patrons of true Religion,
In court a saint, in Field an Amazon;
Glorious in Life, deplored in her Death,
She was unparallel'd Elizabeth.

Yes, Mo. Davs. }
Born anno 1534 } Reigned 44 & 17.
Crowned anno 1558 } Dyed anno 1602.

V. The altitude of this church is about 21 feet; its length, 80; and breadth, 26. And the height of the tower is about 50 feet, wherein are bells to ring a peal, besides a small one, which is used to ringing the People to Prayers, & therefore called the Saints bell."

It goes on to give the name of the (then) incumbent, the tithes, the name of the then sturter, stating that here are prayers every wednesday, Friday, and holy day at eleven o'clock. It gives the composition of the vestry, mentions the names of the streets, alleys, and courts, and concludes by stating that the number of houses is 300.

St. Dunstan-in-the-West, the other church alluded to, was removed only about fifty years ago. It was taken down to widen Fleet-street, & Mr. Brock states that its foundations are still there.

Jambrian Archaeological Society.—This Society will make Newport its headquarters in its next. Lord Tredegar is to be the president, and Mr. T. D. Roberts the local secretary.

ON RENDERING WOOD FOR BUILDING PURPOSES NON-INFLAMMABLE.*

THE rendering of wood for house construction non-inflammable should be a subject of great interest to all. There is, however, little information obtainable from published works, though small hints on the subject may be sometimes met with in encyclopedias, &c. The preservation of wood from rot may be found treated of in several books, which contain also information on the physical construction of timbers, the various preservative solutions, and the methods of injection and impregnation. On all these points full information is necessary to enable us to take a comprehensive view of the matter.

Timber structures are often a necessary evil, either from fear of earthquakes or from scarcity of other material, either for the entire building or for the roofs only. I especially allude to Japan, China, South America, the Southern States of North America, and Jamaica, in which last the roofs are of shingles of willow, a very absorptive wood, and, therefore, easily treated with chemicals for resistance to fire. Let us see, then, how these wooden buildings may be preserved from destruction by fire in the best and cheapest manner, remembering always that though a single house so treated would not blaze, yet if in the midst of a large conflagration it would be carbonised and thus destroyed, so that it would be necessary to have a block of prepared houses together in order to stem the tide of fire in a large timber-built town. This might be done by Government order, by arrangement between the house-owners, or by a fire insurance company. The reduction in insurance rates alone would pay a handsome interest on the first outlay.

Let us, then, pass the various processes in review, with their advantages and disadvantages fully set out, and with their capabilities for preserving textile fabrics as well as timber from fire.

Should it be decided to impregnate the wood with chemicals this can be done, or a superficial coating over the wood may be applied of fire-proof and waterproof paint, or both, though many prefer the internal woodwork plain. Any preservative used in external situations should not be liable to be washed out by the rain. How far these non-inflammable salts which unite chemically with the nitrogenous matter in the wood are capable of resisting wet it is difficult to say with certainty, but there are some, which we shall proceed to give further on, which do effectually resist both water and soap.

Again, it must be a *sine quâ non* that, whatever the fireproofing material may be, it must be one which, when exposed to the action of fire, does not give off injurious or suffocating smoke. Also, if the impregnation of the timber is to be thorough, i.e., through the whole of the wood, it would be most advantageously done whilst the wood is green, and the sap uncongealed, otherwise the tubes become clogged, and the injection of the chemicals extends only to a certain depth in the wood if the latter is dry.

Impregnating the timber when green, and operating on large balks, would perhaps be more economical than upon smaller pieces when cut up, but the salts are said to cause shortness of grain, so that it might be difficult with the ordinary hand-saw to cut out the finer kinds of woodwork used for interiors. Lastly, if the woodwork is impregnated when green, the solution acts chemically on the sap, and destroys the germs of rot. Of course, the "shortness" of the wood caused by salts applies to balks, whether prepared when green or well-seasoned.

With regard to the construction of the tree itself, Dr. Boucherie considers that no connexion exists laterally between the vertical sap-bearing tubes, as is shown by applying a coloured solution under a moderate pressure to certain tubes at one end of a felled tree, when the same tubes at the other end of the tree, and only those, become coloured, and a pattern such as the name FARADAY so injected was found as perfect at any point of the tree where a cross section was made. Langton, however, points out that "in timber crosscut under pressure the creosote penetrates between 1 in. and 2 in.," showing that there is some lateral connexion, although so slight that if required to be done

thoroughly the injection should take place from the ends.

Although the solutions used generally for the preservation of timber from rot need not be the ones best suited for rendering the same fire-proof, yet the methods of application are similar.

The soft woods, such as Scotch pine and spruce, are usually best suited for treatment, their grain being coarse, the annular rings far apart, and the tissue soft and capable of great absorption, rendering them, when prepared, more lasting than closer grained woods, owing to the density of fibre not permitting the latter to be thoroughly impregnated. We are thus enabled to use the cheap quickly-grown woods, the processes for rendering them non-inflammable at once preserving them from rot and from the attacks of insects and worms.

The idea in the ordinary methods adopted for preserving timber from rot is to introduce into the pores of the wood some salt which, uniting chemically with the albumen of the sap, shall convert it into an insoluble compound. The best known of these methods are Burnettising, Kyausing, and Boucherising.

Burnettising consists in impregnating the timber with a solution of chloride of zinc of the strength of one of the salt to thirty parts of water.

Kyausing consists of impregnating with chloride of mercury (corrosive sublimate). The treatment by both these processes consists in immersion in open tanks or more thoroughly by pressure of 110 lb. to 150 lb. to an inch in closed wrought-iron cylinders; but it is questionable whether these methods are so good as Boucherising, as by them it is necessary to force the solution into the wood at right angles to its tubes thereby injuring its strength and letting the sap which is the immediate cause of decay remain, the coagulation of the albumen at any material depth below the surface being a matter of doubt, whilst the cost to obtain even that amount of saturation would, *ceteris paribus*, point to the *Boucherising* method of injection as most suitable to our purpose.

In this, newly-cut green timber (coarse-grained is most suitable), before the bark is removed, is exposed at the end (either end will do) to a slight pressure from a liquid column of sulphate of copper (1 lb. of sulphate to 5 gallons of water or 1 to 100 by weight, allowing 0.35 lb. of sulphate to 1 cu. ft. of timber) arranged in a tank 25 ft. to 50 ft. above the level of the log. The liquid drives the sap before it and forms chemical combinations which preserve the wood from decay. The sooner this is done after felling the better, as the resinous substances rapidly harden and prevent the movement of the liquid salt through the pores. The plant required is small and easily erected close to where the wood is cut, and can be quickly shifted to a fresh situation. The time for the appearance of the liquid at the top of the log is from two to twenty-four hours, when it drops into gutters placed to catch it, and is pumped up into the cistern to be used again. About three days are required for a 25 ft. log, and the process is complete when every portion of the top of the log is found to be saturated: this is known to be completed when a brown stain is left on timber by the application of a piece of potassium ferriocyanide. The cost of the process with sulphate of copper is about 2*d.* per cube foot for logs 25 ft. long. It has sometimes happened that the heartwood, which is more durable under ordinary circumstances, has, in Boucherised timbers, rotted, leaving the impregnated sap wood. Care should be taken to obtain the sulphate of copper as free as possible from iron, but as it is usually present in some degree it is as well to make a saturated solution, and allow it to remain exposed to the atmosphere as long as possible so as to allow the iron to deposit at the bottom of the vessel, after which it may be diluted. If the solution is too strong it is liable to contract the sap vessels and to crystallise at their ends. The water must be free from lime and perfectly clear. If it contains lime it is as well to add a little sulphuric acid to precipitate it, and either allow it to settle or filter the water through sand, for even the slightest cloudiness interferes with the injection.

All timber when treated by any of the preservative processes in general use becomes "short,"—that is, it breaks in two crosswise easily, and, when impregnated, its tensile strength becomes impaired. It loses when

* A paper by Mr. Thomas M. Rymer-Jones, Memb. Inst. C.E., F.R.G.S., and Mr. John Rymer-Jones, Memb. Inst. Tel. E., read before the Civil and Mechanical Engineers' Society on Wednesday, the 22nd inst.

dry a portion of its elasticity, but regains much of this when in a moist state. The shortness is easily tested, as, on trying to split with an axe a piece of dry preserved timber it will be found that the axe will not follow the grain of the wood. This seems a reason in favour of impregnating the wood, and especially the smaller pieces, after they have been cut and fitted into their several positions. No ungallanised iron should come in contact with wood impregnated with sulphate of copper (and the same point must be considered when using other salts), otherwise the copper of the solution will be reduced by galvanic action. The sulphur itself is injurious, not only attacking the galvanising of telegraph stay wires, but eating away the iron itself, showing that when salts are used for impregnating wood, some protection, such as paint say, must be used to preserve the iron fixings. Kyanising (chloride of mercury) is equally injurious. Another process of preserving wood from decay is by using borax to neutralise the decaying vegetable matter in the wood. This is also a very good non-inflammable solution.

We have entered thus fully into the methods of preparing wood with chloride of zinc, chloride of mercury, and sulphate of copper in particular, because whatever may be the non-inflammable solution selected as most suitable, some such method of injection will be necessary if the impregnation is required to be other than merely superficial. All these three being salts, will not only preserve the wood from rot, weather, insects, and worms, but will to a certain degree render it non-inflammable; but which solution is best, we shall be better able to judge later on. We may at once put chloride of mercury out of the question, as it is very expensive, and, when burned, is turned into vapour which is fearfully suffocating. Sulphate of copper is cheap, and free from this objection, but turns the wood a bluish colour when the surface is exposed to a damp air. Chloride of zinc and borax, the other two above-mentioned processes, preserve from decay and flame, and might be used for injecting green timber. But at present let us go through the information that can be gathered on the subject of non-inflammable compounds and solutions. Much of this relates to rendering fabrics non-inflammable, and this is done by steeping them in almost any saline solution. Thus, cotton and linen fabrics, prepared with a solution of borax, phosphate of soda, phosphate of ammonia, alum, or sal ammoniac, do not suffer active combustion, nor burst into flame. The salts act by forming a crust of incombustible matter on the surface of the fibres. They do not, however, prevent the carbonisation of the material at a sufficiently high temperature. For ladies' dresses, 1 oz. of alum or sal ammoniac to the last water used to rinse them is sufficient for safety from fire; a less quantity added to the starch would suffice. None of the above are used for fine muslins, as they render the fabric harsh, and destroy its beauty. Sulphate and phosphate of ammonia are efficacious, but interfere with the ironing. The salt which answers all conditions is tungstate of soda: steeped in a solution of 20 per cent. of this salt, muslin is perfectly non-inflammable when dry, and the saline film left on the surface is of a smooth and fatty appearance, like talc, easily ironed and adding a richness to the appearance of the material. The addition of a little phosphoric acid or phosphate of soda to the tungstate is recommended, as without this the tungstate is liable to undergo a chemical change, and become comparatively insoluble. For a solution of tungstate of soda of minimum strength dilute a concentrated solution of neutral tungstate of soda to a specific gravity of 1.14, and then add 3 per cent. of phosphate of soda. This solution is found to keep and answer its purpose well.*

Hatfield.—On the 10th inst. a public hall, a present to the town of Hatfield from the Marquis of Salisbury, was opened by Lord Robert Cecil. The hall is a building in the Queen Anne style, of red brick, with moulded terracotta ornaments. A portion has been fitted up and let as a restaurant, while another part has been converted into a Conservative club. In the remaining portion are two reading-rooms and a billiard-room, which are to be public, while a hall above is for entertainments. The building, which cost 2,000*l.*, is from plans by Mr. S. W. Shillito, of Hatfield.

* To be continued.

COMPETITIONS.

Proposed New Infirmary, Workington.—The plans submitted by Mr. Geo. Dale Oliver, of Carlisle and Workington, for the new Infirmary to be built at Workington, have been selected by the building committee. At a meeting of the Infirmary Committee held last week it was decided to adopt the plans recommended by the building committee, and Mr. Oliver was instructed to prepare working plans and specifications and get in tenders without delay.

Longton Board Schools.—The Longton School Board, having invited plans for two sets of schools at Normacott and Florence, each to accommodate 700 scholars, twenty-three sets of plans were sent in for the Normacott School, and eighteen sets for the Florence Schools. No professional referee was appointed. We are informed that the successful competitors were—For Normacott, Mr. T. P. Hulse, of Longton (motto "Education"); and for Florence, M. John Taylor, of Longton (motto "Fairplay").

ARTISTS' BENEVOLENT FUND.

The 70th anniversary dinner of the Artists' Benevolent Fund was held on Wednesday at the Freemasons' Tavern, Viscount Hardinge presiding. In proposing the toast of the evening, "Prosperity to the Artists' Benevolent Fund," the Chairman said that during the past year 54 widows and 14 orphans had received annuities, amounting in all to 1,141*l.*, and since the institution of the society 48,000*l.* had been distributed in relieving widows and orphans of artists whose circumstances rendered assistance necessary. He pleaded for increased support to the fund, so that the amounts of the annuities might be increased, and eloquently urged the claims of artists upon the public, who, however, were often so capricious as to disregard the merits of men who had deservedly made a name as artists.

The Rt. Hon. A. J. B. Beresford-Hope (President of the society), whose name was coupled with the toast, in responding dwelt upon the influence exercised by the artist, who, in the pursuit of his profession helped to civilise, to delight, and to elevate all that was human. Mr. Beresford Hope concluded by proposing the health of the Chairman.

Viscount Hardinge having briefly replied, the Secretary announced subscriptions (including 100 guineas from the Queen) amounting to nearly 500*l.*

Mr. Coomber, C.M.G., of Sydney, New South Wales, in proposing the toast of the Royal Academy, referred to the growing appreciation of art in Australia. Mr. C. B. Birch, A.R.A., replied.

Among the other toasts was, "The Artists' Annuity Fund," proposed by Mr. Forbes-Robertson and responded to by Mr. T. H. Maguire, who eulogised the services rendered to the public by the artists of the pictorial press in recent wars. Unearned, except with pencil and sketchbook, those artists braved the dangers of the battle-field in order that people at home might be able to realise the gallant deeds of our forces in action.

HEREFORD SEWERAGE WORKS.

The Hereford Town Council, at their meeting a few days since, increased the salary of the city engineer (Mr. John Parker) by 100*l.* per annum from the 1st January last, in consideration of the extra work performed by him in the preparation of the plans and bills of quantities of the proposed new sewerage works, the estimated cost of which is 20,000*l.* At the same meeting it was also resolved to allow him an extra assistant during the progress of the works.

Six miles of new outfall sewers will be required, and there will be erected at the pumping station engine and boiler houses, sludge-pressing room, coal and lime stores, &c., in addition to a covered reservoir to contain 550,000 gallons.

The average quantity to be treated will be 14 million gallons per day, and the settling tanks have a united surface-area of 15,000 ft., the precipitating agents being lime and other chemicals. The effluent water will be further purified after leaving the tanks by being passed over a limited area of land, which will, for that

purpose, be deeply under-drained. Eleven acres have already been purchased.

The sludge, which has ever been the bane of all defecation works as well as sewage farms, will gravitate by an underground conduit to a covered tank, and thence will be conveyed by compressed air to two of Johnson's sludge presses, which will at once deprive the sludge of 85 per cent. of its water,—the water passing back to the tanks for re-treatment. The residue will consist of pressed cakes, practically inodorous, and reduced to such a condition that it can be disposed of without nuisance to the neighbourhood on farms, upon which it will be used as manure, the sludge difficulty being in this way, at small cost, reduced to a minimum.

The contracts will be let in May, and the whole work is intended to be completed by the end of 1886.

Owing to an extensive bed of clean gravel underlying the site at a few feet below the surface, concrete will enter largely into the construction of the storage reservoir, the tanks, and other portions of the buildings.

There will be provided horizontal expansive condensing engines, with cylinders 16 in. diameter by 33 in. stroke, each driving 15 in. centrifugal pumps, vats, &c., the steam being generated by a pair of Galloway's steel boilers, 18 ft. by 6 ft. each.

A LAUDABLE EXPERIMENT.

On Monday afternoon last the new coffee tavern and workmen's dwellings erected by Messrs. Chubb in connexion with their works, Glengall-road, Old Kent-road, London, S.E., were formally opened by the Earl of Harrowby, acting for the Earl of Shaftesbury, who was prevented from attending by indisposition.

The buildings have been designed by Mr. E. Hoole, F.R.I.B.A., and consist of a large hall, coffee tavern, reading-room, kitchen, and retiring-rooms upon the ground floor. Above, three floors of dwellings have been constructed, consisting chiefly of single rooms, so grouped that they can be combined without alteration into two-roomed, three-roomed, or four-roomed tenements, according to the various requirements of the families inhabiting them. Water is obtainable, and a laundry is provided, on each floor; the flat roof furnishes an ample drying-ground. The various floors are reached by York stone staircases and landings, giving access to galleries situated behind an arcade of lofty arches, thus forming an airy verandah to each set of rooms. Every tenement is furnished with coal-bin, cupboard, and cooking-range.

Returning to the ground floor, the hall, named the Queen's Hall, is capacious enough to hold 300 people when used for meetings and concerts, and in the daytime it will afford dining accommodation for half that number; it has a dais at its upper end which will be serviceable when the hall is used for meetings or entertainments. The hall is 85 ft. in length, 23 ft. in width, and 16 ft. in height. Above the dado the walls are of red brick, with panels of plaster, upon which are some cleverly designed, and executed by Mr. James Allen, the subjects being illustrative of agriculture, the working of metals, &c. A panelled ceiling in pine completes the interior, which is lighted by a lofty range of semi-circular windows. The coffee tavern, which is immediately opposite the principal entrance, can be used in combination with the hall or not as may be desired. The reading-room, stocked with newspapers and other current literature, will, no doubt, prove very popular. The floors of the hall, reading-room, and coffee-bar have been laid with Mr. Roger L. Lowe's (of Farnworth) wood block-flooring. Provision is made for the extension of the buildings when necessary. The erection of this building was not undertaken before the firm had had a conference with the workpeople, and ascertained their wishes on the subject, and the management of the hall and coffee tavern will be intrusted to a committee of the *employés*. These premises, too, will be available for use by workpeople employed in other factories, and by residents in the neighbourhood. The various clubs and classes already formed in connexion with the works will, in future, have their headquarters in the new building.

Sir Richard Cross was amongst the speakers, and he suggested that the City Livy Companies would do well to devote some of their wealth in the provision of better dwellings for

the poor. It was also suggested by more than no speaker who took part in the proceedings that the laudable example now set by Messrs. (Whbb might very well be copied by other large employers of labour.

An inspection of the large works (covering wo acres of ground) followed, and much that was of interest to the visitors was to be seen. Among the jobs in hand is a large strong room or the National Bank of Scotland.

LINE OF FRONTAGE.

WILLIAM ELLIS was summoned at the Wandsworth Police-court by the Wandsworth District Board for building beyond the general line of frontage at St. John's Hill, Wandsworth, contrary to the 75th section of 25 & 26 Vic., cap. 102.

Mr. Young, solicitor, appeared in support; and Mr. Sheppard defended. Mr. P. Filitch, the Board's Surveyor, produced the plan of the Superintendent Architect, showing the line. He said the building, which was a shop front, projected 3 ft. 10 in. beyond it.

Mr. Sheppard called attention to a plan, and said here were bay-windows, but the shop-front did not project beyond them.

Mr. Shiel said the certificate of the Superintending Architect was conclusive. He made an order so much of the building as projected beyond the line to be pulled down, and also ordered the defendant to pay 5l. ss. costs.

ANCIENT LIGHTS.

In the Supreme Court, before Mr. Justice Day, the case of Crosby and Others v. The Glengal Workmen's Coffee Palace Co. and Another has been heard.

This was an action by the trustees of a Primitive Methodist Chapel in Manchester-road, Poplar, for an injunction to restrain the defendant Company and the builder employed by them from building on a piece of land adjoining the chapel so as to obstruct the ancient lights of the chapel and the schoolroom beneath it.

The wall of the building complained of had already reached a height at which it was alleged to darken the schoolroom windows, and an interim injunction was granted a year ago to prevent it being carried any higher. The rights of the plaintiffs were admitted, and the only question at issue was whether or not the plaintiffs' light was substantially interfered with, or would be so when the wall was completed.

The evidence was of the usual character in such cases, but the defendants endeavoured specially to rely upon the fact that it was intended to face the wall in question with glazed bricks, by which means any loss of direct light would be, to some extent at least, compensated by reflection, and counsel also contended that the question whether or not the diminution of light was substantial must be decided with reference to the use to which the schoolroom was put, classes being held there only twice on Sundays, and the defendants being willing to undertake not to carry the wall any higher nor to injure the chapel itself.

Mr. Justice Day, in giving judgment, held that the lights had been interfered with, and that the plaintiffs were entitled to the relief they asked for, and gave judgment accordingly without costs.

THE EARL OF HARRINGTON v. THE BUILDING SECURITIES COMPANY.

A MOTION for an interim injunction to restrain the defendants from continuing to build the Avenue Hotel, Northumberland-avenue, was heard before Mr. Justice Pearson, and the injunction was granted.

The surveyors on behalf of the plaintiff were Mr. Thomas Edward Cullcutt and Mr. Basilster Fletcher. The counsel were Mr. Cozens Hardy, J.C., and Mr. E. F. Buckley.

COOKING APPARATUS FOR LARGE INSTITUTIONS.

SIR,—I observe in your last issue [p. 566] an illustration of a patent "cooking apparatus recently patented up at St. Patrick's Workhouse. I enclose herewith to disclose the contract drawing of an identical apparatus designed by me (upon Captain Warren's principle) in 1872, which I fitted up at the new Lambeth Workhouse in 1873, and which has been at work there ever since. I am about to fit up similar apparatus at the new workhouse for the Wandsworth and Clapham Union, and the extension of the workhouse and infirmary of the parish of St. George-in-the-East.

THOS. W. ALDWINCKLE.

2, East India Avenue, E.C. April 23rd.

Board of Trade Surveyors.—The name of T. Chatfield Clarke, 63, Bishopsgate-street North, has been placed on the Board of Trade list of surveyors and umpires.

SOANE MEDALLION.

SIR,—The proofs of my drawing have just reached me.

I felt much surprise and disappointment on seeing the failure of the photo-lithography of my drawing in your paper; but it was with much greater surprise that I read your remarks in explanation of the failure.

You must be perfectly aware that the drawings were not made with a view to reproduction as photo-lithographs, and that photo-lithography is not, and never can be, the aim or the standard of such work. If the failure was unintentional and not anticipated, ought you not to have stopped the publication of the drawing altogether instead of endeavouring to throw upon me the responsibility of what was really the fault of the process employed? If, on the other hand, your original object was to illustrate the unsuitability of photo-lithography for a particular style of work, was it generous, or even consistent with common fairness, to apply for my drawings for publication under the pretence that they were to appear as ordinary illustrations, and without the slightest warning that they would be exhibited as a terrible example of what a drawing intended for photo-lithography ought not to be!

JOHN THOMSON.

** Mr. Thomson takes us a little too seriously, and is quite mistaken in supposing there was any "pretence" in the matter. We wished to give a good representation of his drawings, and found his method had rendered it impossible. As before said, we think the method itself a bad one; not true "line-drawing." Our experience is that the best line-drawings are also those which photolithograph best. But we did not call Mr. Thomson's drawings a "terrible example" or an "awful warning"; we only said "unfortunate,"—both for ourselves and him.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

APRIL 13.

C. D. FIELD & SONS.

Bermondsey—Nos. 54, 56, and 58, Tanner-street, freehold 21,025
Peckham—2 to 8 even, Ansdell-road, 89 years, ground-rent 16l. 1,055
Rotherhithe—23, 25, and 34, Swan-lane, freehold... 610
40, Swan-lane; and 90 and 92, Albion-street, freehold 280
90, Rotherhithe-street, freehold 280
Brixton—17, Bonham-road, 82 years, ground-rent 7l. 10s. 430

By DEARD & SON.

Bayswater—2, Monmouth-road, 55 years, ground-rent 7l. 15s. 525

By G. A. BICKERTON.

Stoke Newington—41, Kynaston-road, 60 years, ground-rent 6l. 300

By W. WALTON & WILKINSON.

Beckenham—1 and 3, Theesgar-road, freehold 600

APRIL 14.

By C. DAVENPORT.

One Third Share in the Hoxton House Lunatic Asylum, comprising freehold and leasehold houses, &c. 900

By H. N. NEWTON & CO.

Oxford-street—The lease of No. 4, term 91 years ... 1,450
Clerkenwell—10 and 11, Arlington-street, 26 years, ground-rent 12l. 12s. 640

By ROGERS, CHATMAN, & THOMAS.

Belgravia—3, Eccleston Houses, 39 years, ground-rent 14l. 2,100
Lower Newington—Ground-rent of 39l. a year, reversion in 83 years 745

By FERBER & SON.

Pail Mall—6 and 19, Crown-court, freehold 2,500
Hemel Hempstead—Two copyhold houses, with shops 750

By HARRIS, VAUGHAN, & JEMINSON.

Commercial-road, E.—35, Caroline-street, freehold 400
South Hackney—71, Lauriston-road, 57 years, ground-rent 6l. 10s. 650

By F. JOLLY & CO.

75 and 77, Lauriston-road, 57 years, ground-rent 13l. 1,600

By H. A. COX.

King's-cross—3 and 4, Canal-terrace, 57 years, ground-rent 8l. 575
Bermondsey—21 and 23, Ansdell-street, 77 years, ground-rent 8l. 575

By HOBSON, RICHARDS, & CO.

Hackney—The Residence, "Brunswick House," 81 years, ground-rent 24l. 1,000
Acton—6, Essex-road, freehold 600

By E. W. RICHARDSON.

Old Ford—4, Sutherland-road, freehold 350
By HUMPHREYS, SKITT, & HUMPHREYS.

Old Kent-road—36, 38, and 40, Kender-street, freehold 810
1 to 3, Kender-grove, freehold, and a ground-rent of 4l. a year 650
East Greenwich—43, Wardbridge-street, 32 years, ground-rent 2l. 120

APRIL 16.

By WALFORD & WILKINSON.

Anerley, Croydon-road—The Freehold Residence, "Gleeswood House," 84 years, ground-rent 2l. 2,110
Anerley-road—Ground-rents of 80l. a year, reversion in 91 years 2,070
Stodart-road—Ground-rents of 21l. a year, reversion in 84 years 545

By J. & R. KEMP & CO.

Camden Town—120, Arlington-road, freehold 900

By F. LAWS & CO.
Soho—160, Wardour-street, 45 years, ground-rent 18l. 17s. 2,410
14, Carlisle-street, a profit rental of 40l. a year, term 7 years 180

By INMAN, SHARP, & HARRINGTON.
Commercial-road, E.—21, Lucas-street, 7 years, ground-rent 5l. 45

By NEWBOW & HARRISON.
Notting-hill—132 to 142 even, Portland-road, 67 years, ground-rent 10l. 810

Holloway—1, Shakepeare-terrace, "The Lamh" Deer House, freehold 700
2 and 3, Shakepeare-terrace, freehold 2,530
7 and 8, Nicholay-terrace, freehold 620

2, Grenville-place, freehold 720
Hornsey-road—43, Regina-road, freehold 420
Highbury-crescent—No. 18, term 53 years, ground-rent 15l., with the reversion 2,600

APRIL 16.

By GLASSER & SONS.

Portland-place—28, Weymouth-street, 25 years, ground-rent 64l. 1,520
Putney—117, High-street, 83 years, ground-rent 20l. 63, High-street, 89 years, ground-rent 16l. 1,910

APRIL 17.

By MURRELL & SCORRELL.

West Smithfield, Peter's-lane—A freehold site, area 4,735 ft. 3,000
Bedford-row—8, Henry-street, 14 years, ground-rent 5l. 8s. 200

By CRISPIN, MOORE, & HOLBORN.
Piccadilly—No. 199, a profit rental of 225l. a year for 17 years 1,510
Leatherhead—3, Swiss Cottages, freehold 280
8 and 10, Poplar-road, freehold 393

By DARR & SONS.

Chelmsford, near—Chalk's Farm, containing 135a. Or. 6p., freehold 1,200
Tilbury, near—Part of "Brickhouse Farm," 91a. Or. 17p., freehold 3,200
An enclosure of land, 94a. 3r. 17p., freehold 3,750
An enclosure of land, 99a. Or. 29p., freehold 1,400
Enclosures of land, 99a. Or. 29p., freehold 3,115

By W. B. HALLATT.

Battersea—22 and 24, Grandfield-street, 95 years, ground-rent 10l. 280
King's-cross—10 and 12, Wynford-road, 39 years, ground-rent 43l. 200

The Student's Column.

DESCRIPTIVE GEOMETRY.—XII.

Find the distance which separates two parallel planes P and Q.

Simply intersect them by an auxiliary plane R, perpendicular to their horizontal traces; $\alpha \beta$ is the length required. (See fig. 61.)

Find the distance between two straight lines A and B not in the same plane.

The direct method of solving this problem is as shown in sketch, fig. 62. We carry through a point c of A a line D parallel to B. Through the lines D and A we carry the plane P. Through any point e of B we draw the line F perpendicular to the plane P, and through the point g, where the line F meets the plane P, we make line I parallel to B; we get thereby the point m on the line A, and then the line K, parallel to F, gives us m', the shortest line between A and B.

Nothing looks less formidable than the above sketch. We draw the above operations in plan and elevation below, and behold what a complex network of lines. (See fig. 63.)

As an exercise of drawing, the student could not do better than solve this problem as above, but in practice we shall want something simpler.

Second Solution.—We draw through the lines A and B two parallel planes, P and Q. For this, through a point d of the line A, we make a line C parallel to the line B; we get thereby P^d, the trace of the plane which contains the lines A and C; as for Q^d, trace of the plane which contains the line B, it is parallel to P^d, and we find the distance of the planes P and Q, as we have done before, $\alpha \beta$ is the distance they are apart, and it is also the distance required of the lines A and B. (See fig. 64.)

Third Solution.—We change the planes of elevation and plan so that A, one of the lines, be perpendicular to the plan. The plan of the line will then be a point A¹¹¹, and the distance from that point, A¹¹¹ to B¹¹¹, new plan of B, will be the distance required. (See fig. 65.)

Fourth Solution.—Here, as in the former solution, we get the projection of the lines on a plane P, perpendicular to the line A, but, instead of carrying this out by changing the projection planes, we find at once the projections of both lines on the plane P, and turn down that plane with the projections it contains, so as to measure the distance required. According to our system of notation, we indicate in this drawing the projections on the plane P, after turning it down by the sign ρ ;

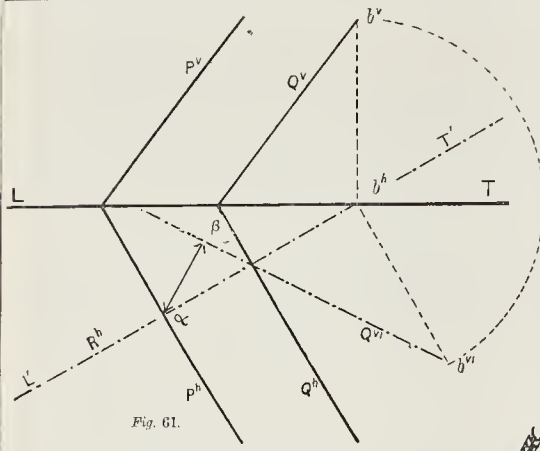


Fig. 61.

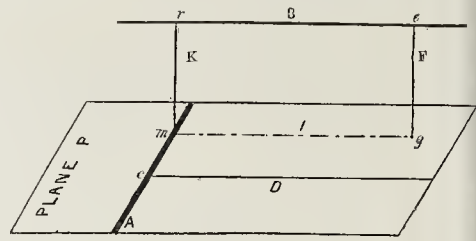


Fig. 62.

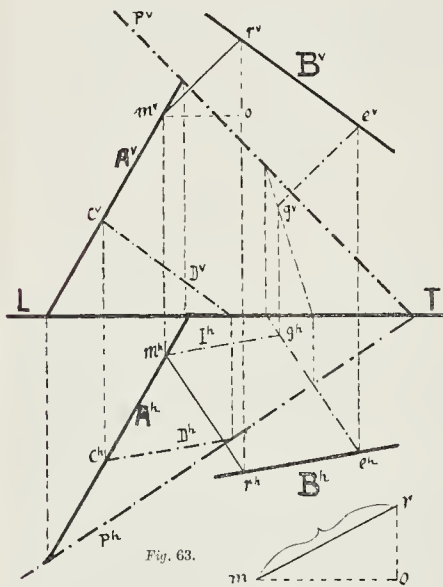


Fig. 63.

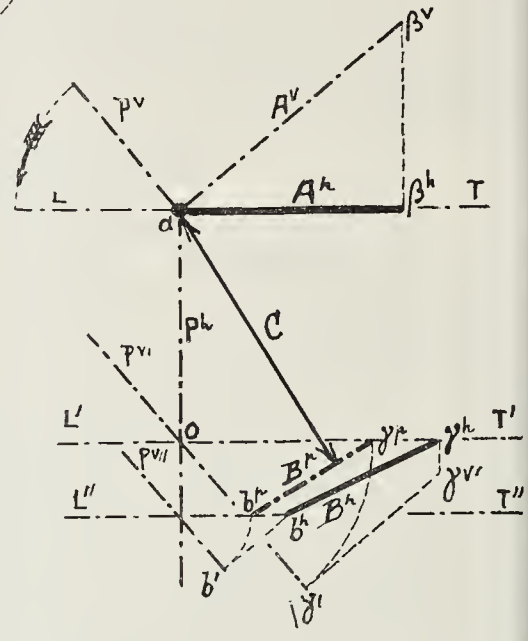


Fig. 66.

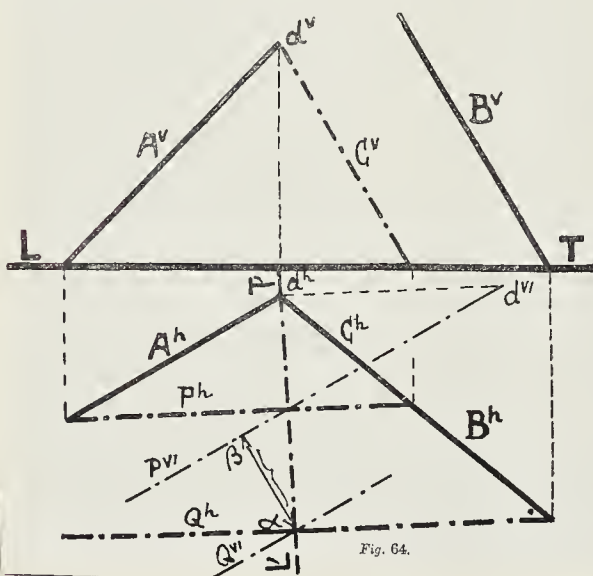


Fig. 64.

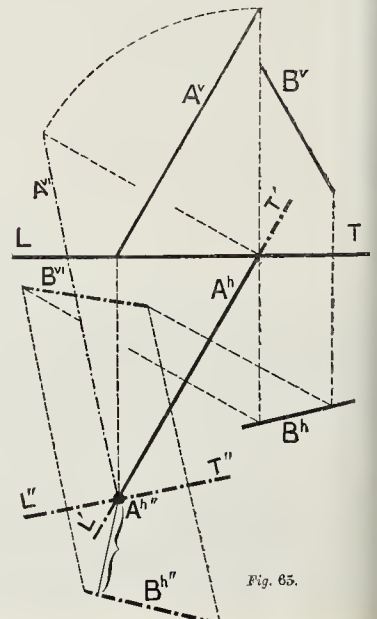


Fig. 65.

for instance, B² is the projection of the line B on the plane P.

In fig. 66 the lines A and B are given by their planes A¹ and B¹, their horizontal traces a and b and the height of a point of each such as B² on the line A and $\gamma^1 \gamma^2$ on the line B. If we make an elevation, and take our ground-line L T on A¹, the elevation plane contains the line A itself, which is identical with A¹; therefore the plane P perpendicular to the line A will have its vertical trace P¹ perpendicular to A¹, and its horizontal trace P² will be perpendicular to A¹. The whole of the line A is projected on the plane P in one point, a. To find the projection B² of the line B we get the projections γ^1 and γ^2 of two of its points as follows. We make an elevation on a plane parallel to one of the first elevation, and containing the point γ^1 ; such is the one on L¹ T¹. We see by the figure that P¹ is on the parallel to P², and from γ^1 , the real position of the point γ^1 , we draw a perpendicular to P¹, which gives us the point γ^2 . When we turn down the plan P, the point γ^1 comes to γ^2 by describing the arc of a circle of centre O. By a similar operation on the line L¹ T¹ we get b¹, and thereby B², the line C perpendicular from the point a to B² is the distance required. Note that in our drawing the point γ^1 is situated below the plane of the plan, for γ^1 is below L¹ T¹.

MEETINGS.

SATURDAY, APRIL 25.

Architectural Association.—Visit to the Church of St. Bartholomew-the-Great, West Smithfield. 3 p.m.
Association of Municipal and Sanitary Engineers.—Lancashire and Cheshire District Meeting at Burnley. 11.30 a.m.

MONDAY, APRIL 27.

Society of Arts (Caspar Lectures).—Captain Ahney, F.R.S., on "Photography and the Spectroscope." 11.8 p.m.
University College.—Mr. Barclay V. Head on "Greek Numismatics." 11. 4 p.m.

TUESDAY, APRIL 28.

Art Union of London.—General Meeting and Prize Distribution; Adelphi Theatre. 12 Noon.
Institution of Civil Engineers.—Special General Meeting of Corporate Members only. *To decide upon Proposed Alterations in the By-laws. 3.30 p.m. At the Ordinary Meeting, at 8 p.m., Professor H. S. Hele Shaw will read a paper on "Mechanical Integrators."

WEDNESDAY, APRIL 29.

Institution of Civil Engineers.—Annual Dinner in the Conservatory at the Horticultural Gardens (Inventions Exhibition). 6.30 p.m.

THURSDAY, APRIL 30.

Society for the Encouragement of the Fine Arts.—Mr. W. Cave Thomas on "The New Aesthetics." 8 p.m.
Society of Antiquaries.—8.30 p.m.
Institution of Mechanical Engineers.—Ordinary General Meeting. 3.30 p.m.

FRIDAY, MAY 1.

Lincoln Diocesan Architectural Society.—Bi-monthly meeting.
Institution of Mechanical Engineers.—Ordinary General Meeting continued. 7.30 p.m.

SATURDAY, MAY 2.

Edinburgh Architectural Association.—Visit to Ravenscrieg, Kirkcaldy, and Dysart House.

Miscellanea.

Birmingham Architectural Association.

The eighth ordinary meeting of this Association for the current session was held at Queen's College on Tuesday evening last. The Vice-President, Mr W. H. Kendrick, was in the chair. A paper was read by Mr. A. Reading, on "A Comparison between English and Continental Renaissance Architecture." The lecturer, with the aid of a powerful lantern, illustrated his remarks by views of some of the most important Renaissance buildings abroad and at home, and pointed out the successive waves of Renaissance expression, which differed very materially according to the country in which it was practised. The lecturer urged all admirers of this style to study the Early Italian Renaissance, as it was only to be found in that country in its simplicity and purity, and further strongly advocated, where the style was adopted in this country, the advisability of following in the steps of the Italians, and drawing from the pure Classic of ancient Greece and Rome, and adapting their forms to modern requirements, and thus in time forming a pure Renaissance of our own. A hearty vote of thanks, proposed by Mr. H. H. McConnell, and supported by Mr. Victor Scruton (hon. sec.), and the Vice-President, was unanimously accorded to Mr. Reading for his interesting paper. After a brief response from the author, the meeting terminated.

British Archaeological Association.—

At the meeting of this Association on the 15th inst., Mr. Thos. Morgan, F.S.A., in the chair, three crucifixes of thirteenth-century date were exhibited by Mr. W. H. Rylands. One of these was enamelled and set with turquoises and garnets, the others were enamelled, with blue colouring, similar to Limoges workmanship. A small representative collection of Persian art pottery was described by the Rev. S. M. Mayhew, some of the articles being of great interest and beauty. Mr. F. Brent, F.S.A., exhibited a bell of the time of Elizabeth, and, among other objects, an ancient triptych of Russian workmanship, from the Crimea, which was commented upon by Mr. Hodgetts. Mr. H. Watling sent a series of drawings of remarkable antiquarian objects, including a series of representations of St. Edmund, king and martyr, from churches in East Anglia; stained glass in Blythborough Church; and of the curious pewter vessels of Puritan times used in the Holy Communion at Imham Church. Mr. J. Willson described another of the Saxon crosses of which so many have been recently reported to the Association. It is in Hackthorne Church, and consists of a Latin cross incised on a large block of stone, the edges of the latter being ornamented with a cable moulding. Mr. Loftus Brock, F.S.A., exhibited three or four fragments of marble statues from Rome, including an arm of a Cupid, of excellent workmanship. A paper was then read by Mr. Maunde Thompson, F.S.A., on a hitherto unnoticed Saxon vocabulary compiled by Abbot Ælfric. It occurs on the margin of a Latin manuscript in the British Museum, written in a French hand of the tenth century. The Saxon words are neatly written, and of these fully forty in number do not appear in Anglo-Saxon dictionaries. An animated discussion took place, in which Messrs. Rylands, De Grey Birch, Hodgetts, and others took part.

Southampton.—

The foundation-stone of the new Clubhouse for the Royal Southampton Yacht Club was laid on the 9th inst. The building will occupy a site on the west side of Above-Bar-street, at its junction with Ogle-road and Manchester-street, thus giving the building frontages to three roads. The site contains in area about 4,400 square feet, and will be almost entirely occupied by the new buildings, a small space only being reserved in the rear for light and air to the south side, and the three principal fronts being kept back from the boundaries, but with sufficient space to admit of a broken outline, arcades, &c. The space between the boundaries and the building is to be paved with tiles and fenced in with a low ornamental iron railing. The building will be three stories in height, besides basement, and is to be faced with dark red local bricks, pointed with black mortar, the dressings being executed in red terra-cotta. The roof will be covered with slates, the ridges being furnished with crested-tile capping, with ornamental termination to gables and hips. The design is Domestic Gothic in character. The contractors for the whole of the works are Messrs. John Crook & Sons, of York Building Works, Southampton, the terra-cotta work being supplied by Mr. J. C. Edwards, of Ruabon. Mr. W. H. Mitchell, of Portland-street, Southampton, is the architect.

The Employers' Liability Assurance Corporation (Limited).—

The fourth annual report of the directors, to be presented at the annual meeting to be held on the 30th inst., states that though during the year the depression of trade has been intensified, and there has been no abatement in the severity of competition, the directors have continued to uphold rates, and they report a further increase of premium income, which now stands at 70,210*l*. The net unearned premiums, 21,999*l*, are reserved. After due provision for this and all charges there remains a balance of 3,737*l*. 19*s*. 7*d*., out of which the directors recommend a dividend of 2*s*. 3*d*. per share.

Death of Mr. Ansdell, R.A.—

Mr. Richard Ansdell, the well-known animal painter, died on Monday morning at his residence, Farnborough, Hants, from bronchitis, after three days' illness. He was seventy years of age. He was a native of Liverpool, and was educated at the Bluecoat School there. He was elected a Royal Academician in 1870.

Moscow.—

A new and large Anglican church, of considerable architectural importance, has just been completed and opened at Moscow.

Swanage.—

A new railway is about to be opened to Swanage, eleven miles from Wareham, and 125 miles from London, on the South-Western Railway. Swanage is a small, old-fashioned, stone-built town on the eastern coast of Dorsetshire, and promises to be a flourishing watering-place. It has a good bay and sands. The present town lies in a hollow between high sheltering hills, almost rivalling some of those in Wales, one side of the coast being entirely rockbound, and numerous legends exist of King Alfred, the Danes, and a spirit called "The Darl," which was supposed to inhabit the caverns in the rock now known as Darlston Head. Of late years Swanage has been reached by steamer from Bournemouth, which is about eight miles distant, the land route being twenty-five miles. It has a chureh with fine old pre-Norman tower, a new town-hall, of which the facade (an old one) was brought from London; an Institute, handsomely endowed by private generosity; a good hotel, at which Queen Victoria once stayed when young; and several other handsome buildings, public and private. The streets are quaint and in parts very narrow, all the buildings being of the native limestone. Corfe Castle, of historical renown, where is constructed a station on the new railway, is distant five miles. Swanage, hitherto difficult of access, has for years been the favourite resort of those few who were aware of its attractions and in search of retirement and repose. In the *Builder* for August 25, 1883, will be found an article entitled "The Fortune of Secluded Swanage," in which the aspects of the watering-place, present and future, are discussed at some length.

The East-End Dwellings Company.—

The second ordinary general meeting of the East-End Dwellings Company was held on Monday last at Toynbee Hall, Commercial-street, Whitechapel, under the presidency of Mr. Edward Bond. The chairman, in moving the adoption of the report, said that the block of buildings in Cartwright-street, which had recently been opened, contained 281 rooms, of which 167 had been let, 66 of which were occupied by tenants who had only one room. It would be remembered by those who were concerned in the early history of the company, that they looked forward to letting a number of their rooms to tenants of single rooms. He thought that they had every reason to be pleased with the way the buildings in Cartwright-street had been carried out. They were not so snugly as is expected in consequence of their desire to exercise economy. Mr. Crowder seconded the motion. In reply to a shareholder, the chairman said that unless there was a further application for shares they would have to call up more capital, but that would not be for four months yet. Mr. Rawlinson stated that there had been an enormous number of applications for single rooms rented at 1*s*. 6*d*. and 1*s*. 9*d*. to 2*s*., and it would be desirable to keep that in view when they erected their fresh block. The chairman said the suggestion would be taken into consideration by the Board. The motion was carried. [We gave some account of the operations of this company in our issue of March 28 last, when we published plans, sections, and elevations of the Cartwright-street buildings.]

The Temple Church, London.—

This interesting old church has lately been enriched by a stained-glass window in memory of the last acting Master in Chancery, Mr. Charles Beavan, M.A. It consists of three lights, is on the north side next to the organ, and contains as subjects seven miracles of our Lord in medallions as follows:—The sight of the man who was born blind restored; the nobleman's son cured; the widow's son raised to life; the lame man at the Pool of Bethesda healed; the demoniac boy cured; the woman with the issue of blood healed; and the ten lepers cleansed. The general ground-work of the window is formed of geometrical bands of colour and scroll ornament of tinted white glass. The window was executed by Messrs. Ward & Hughes, of Frib-street, Soho-square.

An Odd Fellows' Hall was opened at

Hythe on the 9th inst. The building has been designed and erected by Mr. W. J. Martell, of Hythe, and with the site has cost about 600*l*. It is built with red brick with stone dressings, and bears over the doorway a stone on which is inscribed the name of the hall. There are two rooms. The large lodge-room is 55 ft. by 20 ft.

Obituary.—We record with much regret the death of Mr. C. Clinton Hovey, which took place on Sunday last, in his fifty-fourth year, at his residence, South Hackney, after a long illness. Born near Dublin, he was intended by his parents for the architectural profession, and, with the view of attaining a good practical knowledge of construction, we believe he worked for some time at the joiner's bench, subsequently taking an appointment as Clerk of Works. A taste for literary pursuits led him to turn his attention to journalism, and he has been a valued contributor to the columns of the *Builder* for more than twenty years. We believe that for the last twelve years he has edited a professional journal published in Dublin, and that during the last few years he contributed articles on technical subjects to the *Evening Standard* and some local (Hackney) journals. He leaves a widow and one son to mourn his loss. He was hard-working, conscientious, and self-denying, and in him we have lost a contributor for whom we had great regard.

Gas as an Economiser of Coal.—The exhaustion of the coal supplies of the country has been the subject of discussion in some of the Manchester papers between Mr. Ellis Lever, of Bowden, Cheshire, and Mr. Thomas Newbigging, the President-elect of the Gas Institute. Mr. Lever laments the waste in getting the coal and in using it when got, whilst Mr. Newbigging is of opinion that the coal supply is not so close upon the point of exhaustion as many people suppose. Replying to this letter, Mr. Lever offers a sum of 20*l.* for the best paper or essay to be read at the forthcoming meeting of the Gas Institute in Manchester, on the subject of "Economising coal by the more extended or general use of gas for domestic and manufacturing purposes, and for the generation of steam." Mr. Newbigging, in his official capacity, has accepted this offer. *Gas and Water* says:—"The subject is one of vast importance, and must be carefully considered, and we question whether a premium of 20*l.* is a sufficient inducement to the preparation of an exhaustive paper. We shall, therefore, gladly supplement that sum by 30*l.*; or, alternately, we shall give a premium of 50*l.* for the best paper, and the 20*l.* offered by Mr. Lever might then be awarded as a second prize."

Measuring the Thickness of Boiler Plates.—An ingenious process for determining the thickness of iron plates in boilers, or places where they cannot otherwise be measured without cutting them, has been invented by M. Lebasteur. He spreads upon the plate the thickness of which he desires to find, and also upon a piece of sheet-iron of known thickness, a layer of tallow about 0.01 in. thick. He then applies to each, for the same length of time, a small object, such as a surgeon's cauterising instrument, heated as nearly as possible to a constant temperature. The tallow melts, and as in the thicker plate the heat of the cautery is conducted away more rapidly, while in the thin plate the heat is less freely conducted away, and the tallow is consequently melted over a large area, the diameters of the circles of bare metal around the heated point, bounded after cooling by a little ridge of tallow, will be to each other inversely as the thickness of the plates. The process is stated to have given, in the inventor's hands, results of great accuracy.—*Iron.*

Social Science Association.—The Council of the Social Science Association have, after due notice given, unanimously passed a resolution to the effect that, in prospect of a general election in the month of November, it is undesirable to hold a Congress during the present year. They have, therefore, been reluctantly compelled to decline the invitation received from the City of Bath to meet there in the forthcoming autumn, but they have expressed a hope that the invitation from the city may be renewed for the year 1886. It has, however, been referred to the Executive Committee for consideration and report whether a Conference of a more limited nature should not be organised in London on some special subject or subjects to which, in view of the opening of a new Parliament, it may be considered desirable to call attention.

Becker's Cooking Apparatus.—Mr. Becker writes to say that the consumption of coals per day for cooking for 500 persons by his apparatus is $\frac{1}{2}$ cwt., not $1\frac{1}{2}$ cwt., as stated in our notice of the apparatus. We gave the statistics as furnished to us and noted down at the time.

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New School Buildings	Cheltenham Gram. Sch.	100 <i>l.</i> and 50 <i>l.</i>	July 1st	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
New Police-Station	The Receiver, Metro. Police District	Official	April 27th	ii.
Retort House, &c.	Crays Gas Co.	F. Morris	April 28th	xix.
Water Vans for Road Watering	West Ham Local Bnd.	Lewis Angell	do.	xix.
Reparations, St. Oswald's Church, Filley	do.	W. S. Barber	April 29th	ii.
Furniture	Guardians of St. Pancras	Official	April 30th	ii.
Foundations for Station, &c., Bldgs, Bradford	do.	do.	do.	do.
Cleaning and Painting	Midland Railway Co.	A. A. Langley	May 1st	xix.
Repwork, &c., for Bridges	do.	do.	do.	do.
Painting and Repairs	do.	do.	do.	do.
Band-Stand	Bournemouth Com.	R. W. P. Birch	May 2nd	ii.
Broken Granite	Ramsay Local Board	Official	May 4th	ii.
Granite	United Land Co., Lim.	do.	do.	ii.
Enlargement of Post-Office, Landport	do.	do.	May 5th	ii.
Quebec Yellow Pine	Great Western Ry. Co.	do.	do.	xix.
New Passenger Station, Piling	do.	do.	do.	ii.
Boys' School, &c.	Alderley School Board	do.	May 6th	ii.
Cast-Iron Pipes, &c.	Swansea Town Council	B. H. Wyll	do.	ii.
Granite, Flints, &c.	Chiswick Local Board	Ramsden	do.	ii.
Hoardings, &c.	Mct. Board of Works	do.	May 7th	ii.
Gravities	Grav. District Union	do.	May 8th	ii.
New Post-Office, Guildford	Com. of H.M. Works	do.	do.	xix.
New Municipal Offices, Police-courts, &c.	Bursley Corporation	H. Holton	May 13th	ii.
Waterworks	Sherborne Local Board	J. Mansergh	May 18th	ii.
Wesleyan Chapel, School, &c., Bournemouth	Proprietors, Belmont Estate, Sutton	R. Curwen	Not stated	xix.
Erection of Six Small Houses	do.	E. S. & H. Boosey	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Conny Surveyor	West Suffolk	130 <i>l.</i> , &c.	May 10th	xvi.

TENDERS.

For constructing the High-street Arcade, Cardiff, Messrs. T. Waring & Sons, St. John's-square, and J. P. Jones, 27, Park-street, Cardiff, joint-architects:—			
	Without Spire.	With Spire.	
H. Foras, Bristol	£12,490	£12,750	
R. Fris, Cardiff	11,500	11,550	
A. Lewis, Cardiff	10,800	11,000	
Jones Bros., Cardiff	10,800	11,030	
Howell & Sons, Bristol	10,680	10,778	
D. Davies, Cardiff	10,550	10,570	
D. J. Davies, Cardiff	10,350	10,540	
F. S. Lock, Cardiff	10,180	10,370	
S. Shepton & Son, Cardiff	10,175	10,367	
C. Shephard & Son, Cardiff (accepted)	9,994	10,194	
For erecting a Congregational Church in London-road, West Croydon. Mr. W. D. Church, architect, 12, South-lane, Finsbury. Quantities by Mr. C. Stanger, surveyor, 21, Finsbury-pavement:—			
	Alternate Estimates.		
	£	£	
Colls & Sons	212,700	210,000	
Glasscock	12,700	12,750	
Higgs & Hill	12,140	12,220	
Dove Bros.	11,875	12,000	
Jerrard	11,900	12,000	
Hobbs	11,490	11,500	
Woodward	10,937	11,000	
Bovery	10,678	10,750	
Staines & Son	10,669	10,700	
Shurmer	10,581	10,600	
Goddard & Son	10,480	10,500	
Jas. Smith & Son	10,445	10,500	
Perry & Co.	10,430	10,500	
Felham	10,293	10,300	
Kilby & Gayford ..	10,231	10,300	
Holloway	9,973	10,000	
* If hearding and felt omitted to roof. † If yellow deal instead of pitch pine.			
For alterations and additions to house in Stroud Green-road. Mr. W. Smith, architect:—			
Durnford & Langham	£298	0	
Mattock Bros.	297	0	
J. O. Richardson	294	0	
Larke	289	0	
Hewitt	271	0	
Stevens Bros.	209	0	
For alterations and additions to 100 and 101, Archway-road. Mr. W. Smith, architect:—			
Wilson	£567	10	
J. O. Richardson	610	0	
Meredith	605	10	
Hewitt	605	10	
Anley	497	0	
Goodman	495	0	
Mattock Bros.	495	0	
Larke & Son	459	0	
Durnford & Langham ..	428	0	
Walker	398	0	
Hurst	380	0	
For alterations and additions to St. Matthias Church, Caledonian-road. Mr. W. Smith, architect. Quantities supplied by Mr. E. J. Pain:—			
Greenwood	£3,780	0	
Lawrence & Son	3,698	0	
Dove Bros.	3,360	0	
Stevens Bros.	3,283	0	
Grover	3,232	0	
Durnford & Langham	3,248	0	
Belly & Gayford	3,234	0	
Mattock Bros.	3,193	0	
Nightingale	3,071	0	
Larke	3,052	0	
Chesnut	2,927	0	
J. O. Richardson	2,967	0	
Morter	2,989	0	
Woodward	2,930	0	
For new stabling, &c., at Broad-street, Ratcliff. Mr. W. Dunch, architect:—			
J. S. Curtis	£1,416	0	
W. Shurmer	1,377	0	
F. & F. J. Wood	1,374	0	
M. A. Palmer	1,320	0	
J. Woodward	1,324	0	
J. A. Taylor	1,209	0	
For the erection of head quarters and drill hall, Adam and Eve Yard, High-street, Kennington, for the 4th Middlesex (West London) Rifle Volunteers. Mr. Alfred J. Hopkins, architect, 10, Berners-street. Quantities supplied:—			
Miller & Brown	£3,457	0	
Barlett & Gayford	2,803	0	
Hayward Bros. (Limited) ..	2,860	0	
Ashwell	2,777	0	
Mattock Bros.	2,693	0	
Lascelles & Co.	2,888	0	
Patman & Fotheringham ..	2,645	0	
Chappell (accepted)	2,429	0	
[Architect's approximate estimate, 2,500 <i>l.</i>]			
For forming roads and sewers in laying out Chatto's Estate, Clapham Common. Mr. W. Newton Dann, surveyor, and S. Buckerbury:—			
Trehearne & Co., Battersea ..	£3,190	0	
H. Knight, Gravesend	3,000	0	
Prosser & Green, Liverpool-street ..	2,740	0	
W. Williams, Wimbledon	2,400	0	
Cooke & Co., Hammersmith ..	2,215	0	
J. Clarke, Thornton Heath	2,215	0	
A. Oliver, Harlesden	2,200	0	
H. Lake, Croydon	2,169	0	
A. Blake, Sydenham	2,141	0	
H. Potter, Clapton	2,095	0	
Roland Bros., Blatchley	2,069	0	
R. Mays, Brixton	2,035	0	
A. T. Cadey, Lloyd-sqrs	1,970	0	
G. Bell, Tottenham	1,968	0	
Beadle Bros., Fitch	1,936	0	
W. Williams, Wimbledon	1,930	0	
J. Hars, Clapham	1,880	0	
W. Nicholls, Wood-green	1,815	0	
G. & H. Vest, Wandsworth-common ..	1,787	0	
F. Saunders, Fulsam	1,739	0	
C. Killingback, Camden Town	1,715	0	
Bath & Blackmore, Clapton	1,690	0	
G. Butler, Camberwell	1,630	0	
Pell & Son, Bromley (accepted) ..	1,480	0	

For alterations to the Nottingham Castle public-house, Nine Elms. Mr. W. T. Farthing, architect:—
 W. Royal £780 0 0
 B. & F. J. Woods 685 0 0
 W. Shurmar 617 0 0
 Gill 547 0 0
 Milson 519 0 0
 T. Head 492 0 0
 Spencer & Co. 475 0 0

For enlargement of schools, Dempsey-street, for the London School Board. Mr. T. J. Bailey, architect:—
 J. Goodman £1,802 0 0
 F. & F. J. Woods 1,773 0 0
 H. L. Holloway 1,700 0 0
 J. Reading 1,650 0 0
 J. K. Hunt 1,591 0 0
 J. Outwaite & Son 1,618 0 0
 M. A. Palmer & Co. 1,612 0 0
 E. C. Howell & Son 1,594 0 0
 G. S. Pritchard 1,583 0 0
 W. Shurmar 1,569 0 0
 Perry & Co. 1,563 0 0
 Lathey Bros. 1,589 0 0
 Kirk & Randall 1,580 0 0
 J. K. Hunt 1,575 0 0
 Holloway Bros. 1,571 0 0
 J. Grover & Son 1,555 0 0
 Albertson & Latta 1,495 0 0
 S. Pritchard 1,470 0 0
 Stimpson & Co. 1,469 0 0
 C. Cox 1,447 0 0

For removing and re-erecting iron building at Halford-road, for the London School Board. Mr. T. J. Bailey, architect:—
 S. J. Jerrard £250 0 0
 Albertson & Latta 245 0 0
 W. Shurmar 227 0 0
 W. Johnson 200 0 0
 W. Oldrey 170 0 0

For removing and re-erecting iron buildings at Langford-road, for the London School Board. Mr. T. J. Bailey, architect:—
 G. S. Pritchard & Son £115 0 0
 W. Shurmar 388 0 0
 W. Johnson 335 0 0
 W. Johnson 308 0 0

For new residence, London-road, Luton, for Mr. F. J. Brown. Mr. J. R. Brown, architect, Luton:—
 T. Neville £1,345 0 0
 Smart Bros. 1,309 15 0
 F. White 1,300 0 0
 D. Dunham 1,290 0 0
 Cox Bros. 1,270 0 0
 Slough Bros. 1,227 0 0
 A. H. Lissaman 1,225 0 0
 W. Dunham 1,216 0 0
 Rance Bros. (accepted) 1,181 0 0

For alterations and additions to Lea Villa, New Bradford-road, Luton, for Mr. W. Lye. Mr. J. R. Brown, architect, Luton:—
 D. Dunham, Luton £420 0 0
 Smart Bros., Luton 413 0 0
 T. Neville, Luton (accepted) 375 0 0

For villa residence, Cardiff-road, Luton, for Mr. G. M. Johnson. Mr. R. Brown, architect, Luton:—
 Smart Bros., Luton (accepted) £1,048 17 0
 D. Dunham, Luton 1,069 0 0
 T. Neville, Luton 970 0 0

For the erection of a dwelling-house at Bishopstoke, for Mr. H. Wheeler. Mr. A. W. Galbraith, C.E., architect. Quantities by Mr. R. S. Wardle, a Middle Temple-lane, London. The whole of the bricks for the job to be delivered on to the site by the building owner, free of cost:—
 Franklin, Southampton £1,825 0 0
 Bull, Son & Co., Southampton 1,684 0 0
 Sanders, Southampton 1,660 0 0
 Sealey Bros. & Boscum, Waltham 1,560 0 0
 White, Bishops Waltham 1,390 0 0

For the erection and completion of St. Emmanuel's Church, Harrow-road. Quantities by Mr. William Thornbair:—
 Dixon £5,590 0 0
 Raymond 5,750 0 0
 Longmire & Barge 5,300 0 0
 Axford 5,293 0 0
 Colls & Sons 5,218 0 0
 J. Borey 5,027 0 0
 Wm. Oldrey 4,890 0 0
 Parmenter 4,958 0 0
 Goddard & Sons 4,916 0 0
 Dove Bros. 4,920 0 0
 Simpson & Sons 4,780 0 0
 Nightingale 4,821 0 0

For rebuilding the King's Head Public-house, and for four houses and shops in Church-street and Church-street North, West Ham, for Messrs. Harrington & Co. Mr. John Hudson, architect, 80, Leman-street. Quantities by Mr. C. Stanger:—
 F. & F. J. Woods, Mile End £7,416 0 0
 Outwaite & Son, Upper East Smith's field 6,777 0 0
 T. Little, Whitechapel 6,522 0 0
 G. & E. Cooks, Mile End 6,145 0 0
 T. Norton & Son, Stratford 6,068 0 0
 J. Bentley, Waltham Abbey, Essex* 5,923 0 0
 * Accepted.

For Compton Gifford Drainage Works. Contract No. 1. Mr. Edward Appleton, engineer:—
 Thomas & Sons, Dartmouth £9,500 0 0
 Hawkins, Dawlish 9,450 0 0
 Good, Plymouth 8,540 0 0
 Norris, Bolton 8,560 0 0
 Shaddock, Plymouth 7,736 0 0
 Parley & Son, Plymouth 7,194 0 0
 Mackay, Bradford 6,780 0 0
 Hatley, Plymouth 7,133 0 0
 Parley, Plymouth 5,984 0 0
 Shillabeer, Plymouth 5,989 0 0
 Hill, Becclesham 5,994 0 0
 [Engineer's estimate, 5,268.]

For the supply and erection of a boiler 7 ft. diameter and 30 ft. long with two internal flues, and all necessary mountings and fittings in connection therewith, for the Sewage Works at Leicester. Specification and conditions by Mr. J. Gordon, C.E., Borough Surveyor:—
 Jos. Adams & Co., Hyde £430 0 £435 0
 W. F. Coleman, Loughborough 365 0 370 0
 Death & Ellwood, Leicester 4 0 35 0
 W. J. Galloway, Manchester 385 0 395 0
 Gimson & Co., Leicester (accepted) 315 0 315 0

For the supply and erection of two boilers 7 ft. diameter and 30 ft. long, with two internal flues to each boiler, and all necessary mountings and fittings in connection therewith, for the Borough Lunatic Asylum, Leicester. Specification and conditions by Mr. J. Gordon, C.E., Borough Surveyor:—
 Jos. Adams & Co., Hyde, near Man. plates. Of boiler plates. Of steel plates.
 W. J. Galloway & Sons, Manchester £775 0 £795 0
 J. Adams & Co., Hyde, near Man. chesters 762 0 752 0
 Death & Ellwood, Leicester 757 10 757 10
 W. F. Coleman, Loughborough 620 0 630 0
 Gimson & Co., Leicester (accepted) 615 0 615 0

For alterations, reseating, &c., at Commercial-road Baptist Chapel. Mr. H. T. A. Chidgey, surveyor, 1, Vine-street, Minorities. Quantities supplied:—
 New gallery New coping.
 Calnan £1,273 0 £105 0 £70 0
 Holland 1,233 0 85 0 29 0
 T. Neville 1,189 0 65 0 15 0
 Falkner 1,175 0 82 0 18 0
 Nixon 1,174 0 93 0 27 15
 Hewitt (withdrawn) 957 0 54 0 12 0

For alterations and additions to Shord Hill, Kenley, near Caterham, Surrey, the residence of Mr. E. Hienkinson. Mr. Robert W.iley, architect, 66, Indagater-hill, London:—
 Clarke & Breece, London £1,040 0 0
 J. Woodward, London 1,020 0 0
 D. Waller, Croydon 835 0 0
 Smith & Son, South Newwood* 68 0 0
 * Accepted.

Accepted for the erection of a house in the Hamilton-road, Ealing, for Mr. A. H. Johnson. Mr. Robert Willey, architect:—
 T. Nye, Ealing £2,650 0 0

For new board schools and master's house at Chel-field, for the Chesham School Board. Mr. St. Pierre Harris, architect. Quantities by Mr. G. Stanger, 21, Finsbury-pavement:—
 J. Taylor & Son, Bromley, Kent £2,407 0 0
 F. Wood, Chislehurst West, Kent 2,373 0 0
 A. Sykes, Catford 2,469 0 0
 W. A. Grubb, Bromley, Kent 2,417 0 0
 Neave & Neave, St. John's Wood, Brough 2,412 0 0
 W. Wright, Chesham 2,396 15 0
 J. C. Araud & Son, Bromley, Kent 2,396 0 0
 W. Clark, Bromley, Kent 2,379 15 3
 C. H. Deane & Son, Queen-street, Dover 2,350 0 0
 J. Bingham, Headcorn, Kent 2,347 0 0
 W. & F. Croaker, Great Dover-st., Brough 2,335 0 0
 G. H. Lay, Bromley, Kent 2,335 0 0
 Diss 2,330 0 0
 Lee & Hooker, Blackfriars-road 2,298 0 0
 Staines & Son, Great Eastern-street, Dover 2,288 0 0
 Hunter & Bryant, Waringham Station 2,281 0 0
 T. Crossley, Bromley, Kent 2,273 0 0
 G. Parker, Beckham 2,180 0 0
 Brand, Eltham 2,143 0 0
 W. J. Adeock, Ladywell, Dover 2,128 0 0
 F. Warr, Croydon 2,122 0 0
 H. Bolding, Bromley, Kent 2,014 0 0
 * Accepted subject to the approval of Education Department.

For the completion of two houses, South Hill Park Estate, Bromley, Kent. Messrs. Baxter, Payne, & Lepper, surveyors. Mr. St. Pierre Harris, architect:—
 No. 1. No. 2.
 T. Crossley £775 0 £1,060 0
 W. Cooper 793 0 859 0
 W. Clark (accepted) 575 0 796 0

For constructing additional lavatories, bath-rooms, and relief offices at the Workhouse, Tanner-street, Bermondsey, for the Guardians of the Poor of St. Olave's Union. Messrs. H. Saxon Snell & Son, architects, London:—
 W. Bamford £2,209 0 0
 Wall Broe 2,218 0 0
 C. Batcheider 1,997 0 0
 A. White & Co. 1,989 0 0
 J. Bullers 1,978 0 0
 Foster & Dickson 1,885 0 0
 Harris & Wardrop 1,883 0 0
 S. Chafen 1,817 0 0
 G. Roberts 1,802 0 0
 H. L. Holloway 1,700 0 0
 W. T. Brockwell & Sons 1,539 0 0

For new mill, Limehouse, for Hirsch's Copenhagen Oil Mills, Limited. Messrs. Wilson, Son, & Aldrich, architects, 2, West India Avenue, Leadenhall-street. Quantities supplied:—
 Estimate Estimate Extra for
 A. B. glazed bricks.
 Hall, Beddall, & Co. £3,254 £13,644 4,390
 Perry & Co. 8,000 13,090 555
 Richens & Mount 7,190 12,580 520
 Bywaters 6,925 12,335 540
 Womers & Co. 6,980 12,930 529
 Ashby & Horner 6,673 11,790 590
 Kirk & Randall 6,085 11,747 466
 C. Cox 6,030 11,371 500
 Bress & Son 6,363 11,273 544
 Peto Bros. 6,452 11,165 398

For the erection of five houses, Colden-road, Norwood Junction. Messrs. Canna, Foulton, & Co., surveyors, Ryelane, Peckham, S.E.:—
 Wm. Dean & Son, South-pl., Wexham £1,300 0 0
 Saunders & Co., 268, Frieri-road, East Dulwich 1,235 0 0
 T. Barton & Son, Whitehorse-road, 1,206 10 0
 F. Warr & Co., Neville-road, Croydon 1,177 0 0
 Hubble & Trot, New Cross 1,172 0 0
 Conans & Co., 66, Boyson-road, Camberwell 1,155 0 0
 J. Holden, Harringay-road, Tottenham 1,115 0 0
 W. Holt, Limes Estate, Croydon 1,100 0 0
 Lee & Gieves, Thurston-pl., Croydon 1,025 0 0
 John Moody, Woodside-green, Croydon (accepted) 1,050 0 0
 Horro, Fern, & Co., 35, Lugard-road, Peckham 1,003 0 0
 G. A. Taylor, Nunhead, Surrey 648 0 0

For classroom, alteration, and extension to the Beckland and Towar Hamlets Wesleyan Sunday Schools, Dover. Quantities supplied. Messrs. Crosswell & Newman, architects, Dover:—
 J. Parsons, Dover £1,217 10 10
 J. Stiff, Dover 901 8 2
 J. H. Bushell, Dover 817 0 0
 H. Stiff, Dover 847 10 0
 [Architect's estimate, 850.]

For erecting Wesleyan Chapel and School at Tern Colliery, Gateshead. Mr. William Thompson, architect and surveyor, Chester-le-Street:—
 Thos. Ruck, Low Fell, Gateshead £765 0 0
 John Jennings, Chester-le-Street 675 0 0
 John Reid, Low Fell, Gateshead 377 10 0
 Wakefield & Robson, Gateshead 230 10 0
 Watson & Robson, Wreckenton and Washington (accepted) 311 0 0

For the erection of a parsonage house at Tannington, Framlington, for the Rev. W. W. Tyler. Mr. W. T. Lowdell, architect, 9, Great James-street. Quantities by Messrs. Francis & Robinson, 1, Farnival's Inn:—
 Honse, Stables. Total.
 Allen & Sons, London £1,910 £190 £2,100
 Bell Bros., King's Lynn 1,854 173 2,027
 Bell & Son, Safron Walden 1,709 170 1,879
 W. & H. Castle, London 1,688 179 1,867
 Grimwood & Son, Harleston 1,810 140 1,950
 Thoday & Son, Cambridge 1,598 160 1,758

Accepted for the Keith Institute Buildings, Fiffe Keith, N.B. Mr. F. D. Robertson, architect, Fife Keith:—
 Thomas Stewart, Keith (mason's work).
 G. R. Cameron, Keith (carpenter's work).
 J. Taylor, Fife Keith (slater's work).
 J. Paul, Huntly (plasterer's work).
 R. K. Kathie, Keith (plumber's work).
 Morrison McDonachie, Keith (painter's work).
 [Total amount of contracts, exclusive of clock tower, slightly over 2,000.]

For houses, farm buildings, and lodge at Sealy Bridge, Scarborough, for Mr. Edwin Lodge. Messrs. W. Sugden & Son, architects, Leek:—
 T. S. Bromage £3,145 0 0
 James Bland 2,135 0 0
 Septimus Bland 189 15 0

For altering shop-front and fittings to shop adjoining the Rock House Hotel, Battersea Park-road, for Mr. E. Purchess. Mr. H. L. Newton, architect, 17, Queen Anne's Gate, Westminster:—
 Beales £236 0 0
 Cowdry & Eaton 196 0 0
 Walker 189 15 0

For the erection of warehouse at Under-the-Cliffe, Maidstone, for Mr. George Wakefield. Messrs. Ruck, Son, & Smith, architects, Maidstone. Quantities supplied:—
 Thos. Elmore, Maidstone £680 0 0
 J. H. Bridge, Maidstone 679 0 0
 E. Vaughan, Maidstone 657 0 0
 Cox Bros., Maidstone 625 0 0
 George Gray, Maidstone 625 0 0
 Wallis & Clements, Maidstone 615 0 0
 R. Avarid, Maidstone (accepted) 610 0 0

For alterations and additions to business premises, West Brough, Maidstone, for Messrs. A. F. Style & Co. Messrs. Ruck, Son, & Smith, architects:—
 Thos. Elmore, Maidstone £460 0 0
 Wallis & Clements, Maidstone 458 0 0
 Cox Bros., Maidstone 437 0 0
 E. Vaughan, Maidstone (accepted) 417 0 0

For entrance lodge at Kent-street, Mereworth, for the Right Hon. Viscount Palmouster, Mereworth Castle, Kent. Messrs. Ruck, Son, & Smith, architects, Maidstone. Quantities supplied:—
 William Wallis, Watlingtonbury £231 0 0
 Wallis & Clements, Maidstone* 412 10 0
 * Accepted.

For reconstruction of wharfs on the St. Bartholomew's Hospital Estate at Chatham Dock, Kent, for Messrs. W. T. Ashenden, Woodham & Levy, and John Dunstall. Messrs. Ruck, Son, & Smith, architects. Quantities supplied:—
 No. 1. No. 2. No. 3. Total.
 £. s. d. £. s. d. £. s. d. £. s. d.
 Callend & Son, Rochester 490 0 340 0 1089 0 1029 0
 Ball & Gammon, Strood 125 0 282 0 180 0 887 0
 Hocking & Co., Strood 395 0 276 0 169 0 838 0
 Jas. Thompson, Chatham 387 0 270 0 165 0 814 0
 Jas. Farrow, Maidstone* 377 12 268 0 151 10 795 11 0
 * Accepted.

For reconstruction of Farningham Lees (Swing) Foot-bridge, Dartford, Kent, for the Justices of the county of Kent. Mr. Frederick W. Ruck, County Surveyor, Maidstone. Quantities by Messrs. Ruck, Son, & Smith, architects:—
 Ball & Gammon, Strood £275 0 0
 James Clements, Maidstone 619 0 0
 James Farrow, Maidstone 490 10 0
 Hocking & Co., Strood (accepted) 485 7 0

For addition to infirmary wards and new west boundary wall, railing, and gates, at the Great Yarmouth, Workhouse for the Guardians of the Poor of the parish of Great Yarmouth. Messrs. Bottin & Olley, architects.—

Table listing contractors and amounts for the Great Yarmouth Workhouse project, including items like 'Rand & Cooper', 'J. Leggett', 'J. S. Cooper', etc.

For the erection of new malting at Ware, Hertford, for Messrs. H. A. & D. Taylor, Messrs. Davison, Inskip, & Mackenzie, architects, 54, Leadenhall-street. Quantities by Messrs. R. L. Curtis & Sons:—

Table listing contractors and amounts for the malting project at Ware, Hertford, including items like 'F. Hitch', 'T. Hunt', 'J. Morley', etc.

For the extension of Abbey-road Schools, West Ham, for the West Ham School Board. Mr. J. T. Newman, architect, 2, Fen-court, Fenchurch-street. Quantities by Messrs. Curtis & Sons:—

Table listing contractors and amounts for the extension of schools at West Ham, including items like 'Caley', 'Gregor', 'Hoskings', etc.

For the restoration of premises, 376, Mile End-road, for Mr. S. Saxby. Mr. J. B. Wall, architect:—

Table listing contractors and amounts for the restoration of premises at Mile End-road, including 'F. Head, South Hackney'.

For the erection of three houses and shops on site of 54, Essex-road, Islington, for Mr. A. Clifford. Mr. J. B. Wall, architect. No quantities:—

Table listing contractors and amounts for the erection of houses and shops at Islington, including items like 'Bridgman', 'Sabey & Son', etc.

For alterations and repairs to the Rising Sun public-house, Anerley-road, for Mr. C. Davey. Mr. J. B. Wall, architect:—

Table listing contractors and amounts for alterations to the Rising Sun public-house, including 'H. T. Adams' and 'John Flynn'.

For erection of billiard room at the Deptford Conservative Club, New-cross, for the Deptford Conservative Club Company (Limited). Mr. J. B. Wall, architect:—

Table listing contractors and amounts for the billiard room at the Conservative Club, including 'H. L. Holloway'.

For the erection of vicarage house, stabling, &c., at Sheffield, Hants. Mr. E. H. Lingen Barker, architect, Hereford:—

Table listing contractors and amounts for the vicarage house at Sheffield, including items like 'Groom, Rowland & Co.', 'Knight, Wickham', etc.

For the erection of warehouse, for Messrs. Dandridge, Church-street, Deptford. Mr. J. J. Downs, architect:—

Table listing contractors and amounts for the warehouse at Deptford, including 'Jerrard', 'Redman', etc.

For alterations to the Northumberland Club, 40, West Strand. Messrs. Hooker & Hemings, architects. Quantities by Messrs. J. & A. E. Bull:—

Table listing contractors and amounts for alterations to the Northumberland Club, including 'Longaire & Burgess', 'W. J. Hack', etc.

For labour only in the erection of two shops and cottages, Crawborough, Sussex, for Mr. Thomas Peerless. Mr. C. Edwards, surveyor:—

Table listing contractors and amounts for labour in the erection of shops and cottages, including 'Bricklayers, Slater's, and Plasterer's Work', 'J. Mackellow', etc.

For sundry alterations and additions, Belvoir Cottage, Grange Hill, Chigwell. Mr. A. Ashbridge, architect. No quantities:—

Table listing contractors and amounts for alterations to Belvoir Cottage, including 'Read', 'M. Calnan & Co.', etc.

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All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing 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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The Builder.

Vol. XLVIII. No. 2264.

SATURDAY, MAR 2, 1883.

ILLUSTRATIONS.

Selected Design for New Vestry Hall, Chelsea: South Elevation, Details, and Sections.—Mr. J. M. Brydon, Architect	618, 619, 622, 623
The Pines, Midhurst.—Mr. Frank T. Baggallay, Architect	626
South Aisle, Thorp Chapel: Church of St. Michael, Coslany, Norwich.—Drawn by Mr. E. Preston Willins, Architect	627
Old London Churches: St. Olave, Southwark; St. Botolph Without, Aldersgate	630, 631

CONTENTS.

Architecture at the Royal Academy	607	The Church of St. Michael, at Coslany, Norwich (Illustrated) ..	616	Building in Private Ways	655
The History of Freemasonry.—By Wyatt Papworth	608	Old London Churches	616	The Tilbury Docks Contract	656
The Grosvenor Gallery	609	The National Liberal Club	616	Builders' Plans on the "Eire Purchase System"	656
Notes	610	"A Pium for Architecture": Architectural Association	633	Mr. Edwin Chadwick, C.B., and Tubular Drain-Pipes	658
Notes on the Ancient Churches of London	612	The Albert Exhibition Palace, Battersea Park	634	Cooking Apparatus for Large Institutions	637
Royal Institute of British Architects: Annual Report of the Council	613	Architectural Association's Visit to St. Bartholomew-the-Great, Smithfield, and to the Charterhouse	634	"Architecture in the Nineteenth Century"	637
On Rendering Wood for Building Purposes Non-Inflammable ..	615	The Art-Union of London; Annual Meeting and Prize Distribution	635	Recent Patents	637
Election of a District Surveyor	618	Competitions	636	The Student's Column; Descriptive Geometry.—XIII.	638
Chelsea Vestry Hall	618	Obituary	638	Recent Sales of Property	640
The Pines, Midhurst	618			Meetings	640
				Miscellaneous	640

Architecture at the Royal Academy.



ARCHITECTURE has now for the first time a gallery of her own in the great art show at Burlington House. Though designed by Mr. Norman Shaw, it has none of the characteristics of that rare artist, and is far less ornate than the twin Water-colour Gallery by the same hand. The room is not large; but it will serve. In plan it is an irregular octagon, a figure which is better adapted to the display of pictures than a rectangle, with its comparatively obscure corners. The canted sides are carried up some 10 ft. in height, and the enclosed triangles afford the means of admitting fresh air à la Tobin. The floor area is less than in the old room; but as there is only one door instead of two the available wall-length is about the same. The height has, however, been very considerably reduced, being now only some 13 ft. or 14 ft. from floor to cornice. The walls will, therefore, accommodate four tiers of pictures at the most. This is, on the whole, a gain. Architectural drawings should be placed where architectural detail can be seen, and it is better that they should be rejected outright than contemptuously "skied" as of yore. In future the larger the drawing the less its chance of acceptance. Inordinate size alone has this year, it is believed, led to the exclusion of a great number of important and meritorious works. Intending exhibitors will thank us for the hint. It is better that the drawings should be rather choice than numerous. If every good architect would annually put his strength into one good drawing, instead of sending half a dozen indifferent ones on the chance of one getting hung, the Architectural Room would prove as attractive as any other in the building. Architecture is every year appealing to wider audiences, and meeting with a more intelligent appreciation. It remains for the architectural profession to turn the newly-awakened interest to the best account. As to which one word of warning may here be not inaptly spoken. The old room was a thoroughfare, and could not be altogether ignored; the new one is a *cul-de-sac*, and may be. Whether it shall be or not depends upon ourselves. *Verbum sap.*

The present exhibition consists of 220 drawings, and the majority of them possess very considerable merit. The line centres of the three sides are respectively occupied by

Mr. Waterhouse's New Liberal Club in Whitehall-place, of which we shall give a fac-simile next week; by Mr. Aitchison's Royal Insurance Offices, Pall Mall; and by Messrs. Aston Webb and Ingress Bell's premiated drawings of the proposed Admiralty and War Office buildings. It is noted,—not without surprise,—that, with the exception of a small sepia study by Mr. Marvin, this is the only representative of that quite recent and most exciting competition. Mr. Waterhouse's and Mr. Aitchison's designs are each flanked by careful drawings by Mr. Pearson,—one showing his proposed spire at Peterborough, and the other his proposed additions to Westminster Hall. Mr. Norman Shaw sends nothing this year, and his absence is sorely felt. Mr. Brooks sends a couple of churches marked by that masculine treatment which always distinguishes his designs; and Mr. Sedding has several ecclesiastical studies, which are both artistic and original. The Badminton Club in Piccadilly, and a very small portion of the new Conservative Club, are all Mr. Edis contributes this year. Mr. Blomfield has an elaborate drawing of his proposed work at Chester Cathedral, and Mr. Jackson several drawings showing his perfect mastery over that picturesque Early English Renaissance which he knows so well how to employ. It is needless to say that Messrs. Ernest George & Peto are as captivating as ever with a long series of domestic works, designed in the finest manner and piquantly set forth in brown line and wash. Why is it that, notwithstanding all this artistic cleverness, there is on paper, and on paper only, a forlorn look about their works? The "family" invariably out of town and slatternly servants for ever idling in picturesque lassitude in the dark recesses of the open doorways? Mr. Colcutt's "Business Premises in Oxford-street" is sent up aloft in company with Mr. J. O. Scott's design for a reredos for Canterbury Cathedral. The latter is a brilliant water-colour drawing, and gains perhaps by this enforced remoteness, but the other is in the (too) fashionable pen-and-ink manner, and is absolutely a blank. Mr. Ernest Newton, Mr. E. J. May, and other architects of their school, send the usual crop of clever designs which differ only in their titles from the previous works of the same artists. The timber gables, the bargeboards and finials, the oriel windows, the cramped doorways, the doggy little summer-houses and pavilions, nay, the very trees which garnish their designs, are all old favourites, and greet us with familiar looks. Mr. Halsey Ricardo repeats this year that severe and dignified manner which was noticeable in his house for Mr. Justice Bowen last year; comfortable, modest, English homes

are these; and Mr. Coad shows us in several brilliant drawings what he is doing at Lanhedrock. A design for a Military Hospital (in a hot climate), by Major-General Sir Andrew Clarke and Mr. Ingress Bell, is an important and novel contribution. It is not so much a building as an assemblage of buildings of enormous extent and, apparently, costly character, carefully designed, and grouped impressively along the summit of an almost barren rock.*

There is a perplexing ambiguity about some of the subjects exhibited. "St. Saviour's Church" is all that we are told about one design. Of another we cannot be sure whether it is simply a study of an old church, or an old church restored, and the restored portions not distinguished from the rest; or a new church drawn in such a way as to simulate the stains and scars of time. Still more bewildering is a drawing of a sixteenth-century hall, known and dear to us, coupled with the name of a living architect. We have sketched it more than once, and our sketches upon comparison tally with the drawing. In what relation, therefore, does the modern architect stand to the ancient hall? There is a good deal of merely representative draughtsmanship in the exhibition, and its presence leads to the suggestion that some distinction should, if possible, be made between drawings which are merely transcripts from old work and architectural designs. We should have some means of knowing in what capacity the author in each case is supposed to figure,—that is, of course, where there is reasonable room for doubt. Tom Pinch may sign all his drawings of Salisbury Cathedral and no one will for a moment accuse him of taking a liberty; but there are cases in which the little abbreviation, "del.," would make matters much clearer.

In brilliant and beautiful draughtsmanship the exhibition is particularly strong. Nothing of the kind has ever been better done than Mr. Barratt's Ruskin-like Italian studies, or Mr. Reginald Blomfield's tender pencilings, or Mr. Raffles Davison's poetic rendering of Miss Kate Greenaway's charming country-house, which looks as if it had stepped bodily out of her own pretty pages. Mr. Horsley and Mr. Flockhart and Mr. H. W. Brewer send drawings which, in their several manners, have never been surpassed; and the unusually numerous studies in decoration and designs for stained glass are also this year of unusual excellence. In subsequent articles we intend to take up the consideration of the several

* This also will be represented in our illustration pages next week. We purposely avoid giving any illustrations of the architectural work at the Academy until the exhibition is open to the public.

designs in detail. Meanwhile, without ignoring the very obvious amount of youthful talent which is pressing forward and every year making itself felt, we cannot but note regretfully the losses we have lately suffered, and feel more and more how great our losses really are.

THE HISTORY OF FREEMASONRY.*

BY WYATT PAPWORTH.



CHAPTER XIV. is reserved for the further consideration of Ashmole's "Diary," the entries in which relating to Freemasonry "are of the greatest importance in our general inquiry, since, on a close view, they will be found to supply a quantity of information derivable from no other source, and which, together with the additional evidence I shall adduce from contemporaneous writings, will give us a tolerably faithful picture of English Freemasonry in the seventeenth century." The first entry, the account of his initiation in 1646, has been carefully investigated, and "the composition of the Lodge" thoroughly overhauled by Mr. W. H. Rylands, through whose researches "a flood of light was suddenly shed on the subject, and who has so far proved the essentially speculative (or non-operative) character of the Lodge, as to render it difficult to believe that there could have been a single operative mason present on the afternoon of October 16th, 1646." Mr. Rylands has looked up the history of each of the seven brethren present,—one of whom was the warden,—who admitted Ashmole and Colonel Mainwaring on that eventful day:—

"Concurrently with this there is the valuable evidence of the MS. Charge in the Sloane Collection, No. 3,843, which bears the attestation of one of the seven members, with the same year, 1646, month, and day. . . . Thus we should have speculative, and, it may be also, operative masonry, co-existing with the actual use, by Lodges and brethren, of the scrolls or constitutions, of which this Sloane MS. affords an illustration in point. . . . We continue to direct our course up the stream of Masonic history, the evidence of manuscript constitutions successively dating further and further back, until the transcripts are exhausted, without apparently bringing us any nearer to their common original, may well leave us in doubt at what point of our research between the era of the Lodge at Warrington, 1646, and that of the *loge* at York, 1355, a monopoly of these ancient documents by the working masons can be viewed as even remotely probable."

Why this *loge* at York should have been brought in here is somewhat puzzling. The lodge at Warrington may have been only a speculative one, but certainly the *loge* at York was only a practical one, confined to the operative masons at York Cathedral, and meaning their workshop. To the entry of 1682 in Ashmole's Diary, a similar careful scrutiny is applied, with the interesting result that of the six new members then admitted into the "Fellowship of Freemasons," two were members of the Masons' Company in London, the nine others present were members of that body (the Masons' Company), and then there remains only Ashmole to make up the sixteen present "at the noble dinner prepared at the charge of the new-accepted masons."

We need not discuss the several coats of arms granted to the "Hole Crafte and Fellowship of Musons" in 1472-73 to the Masons' Company of London, confirmed 1520-21, and entered in the Visitation of London in 1634. Two existing MS. Charges, both dated 1686, have the coat of arms as figured by Stow in 1633 (*i.e.*, the chevron plain, not engrailed), and "are associated with the arms of the City of London, proving beyond doubt that both these rolls, which are handsomely illuminated at the top, were originally prepared for London Lodges of Masons or Freemasons," writes Mr. Gould; but this passage appears to be somewhat vague, and, to prevent error, it is suggested that they were originally prepared

for the Guild of Masons, or, perhaps, for two members of the Guild or Company of Masons of London. We may both mean the same, but the wording differs.

Further on Mr. Gould records how he has discovered that "Robert Padgett, Clerk to the Worshipful Society of the Free Masons of the City of London in 1686," whose name appears appended to the MS. Constitutions in the possession of the present Lodge of Antiquity, was not the Clerk of the Masons' Company, which company possesses an "Accompte Book," and under the date 1687 occurs: "Mr. Stampe, Clerk." . . . which establishes the fact that the "Worshipful Society of the Free Masons of the City of London" and the "Company of Masons" in the same city, were distinct and separate bodies. Mr. Gould is to be congratulated on making this very decisive discovery, proving, as it does, that there were two co-existing bodies of Masons and Freemasons as "distinct and separate sodalities." It is also assisted by the investigation into the persons attending at Masons' Hall in 1682 as just narrated. Mr. Gould, after stating that by all writers alike no adequate distinction between the Freemasons of the Lodge and those of the Guild or Company has been maintained, notes that the above-named "Accompte Book" specifies that from 1620 to 1653 the members were styled Freemasons, and then goes on to quote numerous later instances of the use of the term, but to the reviewer he appears either to mingle the uses of the term, or wishes to show that although a man was an operative mason he could become a Freemason by joining a Company of Trades, as at Oxford and Newcastle; yet he candidly admits that in the Gateshead register the two terms are taken as words of indifferent application. This might very likely be the case at the present day, even with the full knowledge of the presence in the town of a Lodge of modern Freemasons, and probably for that very reason! The archives of the City of London were searched in 1879 by one of Mr. Gould's friends for early instances of the terms, "Mason and Freemason." But apparently only the already known example, dating 1376-77, was found for the latter term, with "Mason" in Norman French, and "Cementarii" in Latin, previously. He remarks on the earliest use of the expression as yet found in connection with actual building operations, that is, in 1396, in the document in the Sloane Collection, No. 4,593, p. 50 (which fact was published by the reviewer above twenty years since, who lately communicated the full reference to one of Mr. Gould's friends who was assisting him), and then follow many later examples of the uses of the word. But surely the word used in 1376 in connexion with the Guild of Operative Masons is as good as the other reference of twenty years later, and both are Freemasons by trade. It would require a long research to ascertain whether these terms given by the author from tombstones, registers, and documents, after, say, 1700, relate to the Guilds or to the Society. The question for solution is, "Is there any instance of the term Freemason being put into a register or on a tombstone when the person has not been a mason by trade?" The more modern letters R.A., F.S.A., and so on, are often seen on tombs. The derivation of the term "Freemason" from Freestonemason, Freemanmason, and Freemason, or free of a Guild or company, will, he thinks, "afford satisfaction to every class of theorist," and "lies within the category of Masonic problems."*

Another use of the word "Freemason" of the date of about 1363, or a little later (fitting in between the two dates above referred to), was accidentally discovered by me only at the end of last September; it is used by no less a person than the Reformer Wiclif, in the following treatise:—"The Grete sentence of Curs expounded," printed in Arnold's edition of

"Select English Works," by Wiclif, 8vo., 1869-71, iii., 333, cap. xxviii. :—

"Alle false conspirators ben cursed of God and man. . . . Alle new fraternytes or gildis maad of men. . . . Also men of unel crafte, as fre masons and others, smen openly cursed bi this sentence. For thei conspir togidres that no man of her craft schal take lesse on a day that thei setten, though he schulde bi good conscience take moche lesse, and that noon of hem schal make save trewe work to lette othere mennes wyning of the craft, and that noon of hem schal do ought but only beve stone, though he might profit his mastir twenti pound bi o dages work bi leggyng on a wal, withouten harm opening himself. See hou this wickid peple conspireth agens truthe and charite, and comyn profit of the lond, and ponyschith hem that helpen frely here neigeboris."

This was written probably in 1383, the year before Wiclif's death, but possibly may be by a somewhat later hand. The MS. is stated to be in Corpus Christi College, Cambridge. This extract is interestingly illustrative, and confirmatory, if that be needful, of the popular outcry against many of the trades, and of the masons in particular, necessitating the Statutes of 1350-1, 1360-1, and later years, the inquiry into which has formed a valuable chapter in the previous volume;* it also proves the application of the word Freemason to the practical man, and not to the speculative, *i.e.*, Society of Freemasons. Mr. Gould points out fairly the non-use of the term Freemason, among the masons employed at York Minster, even when quoting one instance as late as 1522-3, qualified by his previous statement that "it is sufficiently clear that in the fiftieth year of Edward III. (1376-7) there was a use of the term Freemason, and that the persons to whom it was applied were a section or offshoot of the Masons' Company, though in either case probably reabsorbed within the parent body," which, he goes on to say, was effected, as may be proved by the words of Stow in 1633, "the masons otherwise termed Freemasons," and the existing tomb of William Kerwin, Freemason, of 1594, having the original coat of arms of the Masons' Guild, or Company, cut on it. "My contention is," writes Mr. Gould, "that the class of persons from whom the Freemasons of Warrington, Staffordshire, Chester, York, London, and their congeners, in the seventeenth century derived the descriptive title which became the inheritance of the Grand Lodge of England, were free men, and Masons of Guilds or Companies"; and a note seems to explain that he means that they possessed the freedom of the city. And further, "as cumulative proofs that the Society of Freemasons has derived its name from the Freemeu-masons of more early times, the examples in the Scottish records have an especial value." From this statement the reviewer presumes he means that a "free-gentleman" (that is, one free of the town) joining a lodge or guild of Masons, becomes a Freemason, and hence a member of the Society of Freemasons!

He then reverts to Ashmole to discriminate between his *undoubted* testimony and the opinions which have been ascribed to him. A very interestingly written research, but one which it is needless to revert to here, is therefore "taken as read." Dr. Plot's account of the Freemasons, 1686, follows; he, Plot, observed "that St. Amphibalus by judicious persons is thought to be rather the cloak than the master of St. Alban," a suggestion which is not so modern as has been supposed. Mr. Gould is not inclined to admit it, and writes,—"All accounts concur in representing St. Amphibalus as a priest or missionary from Rome. To suppose that this personage was merely the cloak of St. Alban. . . . is the ridiculous assumption of self-opinionated critics," is his severely-worded comment. He refers to Antoninus Bassianus being called "Caracalla" (a short Gaulish cloak); and that "Amphibalus would signify a long ample garment, such as a pilgrim might naturally carry with him." But Dean Stanley, in the *Contemporary Review* February, 1875, p. 480, states that "the caracalla, a long overall, was corrupted into casacalla, casaco, and cascock; it had a hood, and was called in Greek *amphibalos*, and as

* The History of Freemasonry: its Antiquities, Symbols, Constitutions, Customs, &c., derived from Official Sources. By Robert Freke Gould, barrister-at-law, Past Senior Grand Deacon of England, 4to. London: Thomas C. Jack, 1884. Vol. iii., 249 pages. See p. 674, ante. ↑ See p. 66 of vol. i. of this "History."

* I cannot help still believing that my discovery, about twenty years since, of the document of 1366, showing that the Latin term "*lathomas*" was rendered "*fre masons*" in the same line, is indisputable. The Latin words "*lathomi*" and "*ceamentarii*" are used previously. I had also referred at the same time to the list of 1376-7, as above stated.

* The Statutes relating to the Freemasons, ii., 328-380.

such appears in the account of the persecution of St. Alban (Bede, H. E., i. 6), where by a strange confusion the name of Amphibalus has been supposed to represent the name of a saint. Who shall decide when such learned men disagree so entirely? Then follows the inquiry into Dr. Richard Rawlinson; and into the three Randle Holmes with the *Académie of Armory* in 1688, in which occurs the term "Free Masons—Stone Cutters." I do not make out from the text of our author whether he considers the "Fraternity, Society, Brotherhood, or Company," &c., to use the words of Randle Holme, applies to a Guild or to the Society of Freemasons, which it is now to be recognised as in existence in 1688, or whether one of the Holmes has himself muddled up the two together. Mr. Gould desires to prove, however, that "the author of the *Académie of Armory*," the Freemason of Chester Lodge, and the copyist to whose labours we are indebted for the form of one of the Old Charges, now the Harleian MS. 9054, was one and the same person"; and this MS. is wished to be dated 1625, 1650, or about 1665, which latter would be midway between those of 1646 and 1686. In the same volume of MSS. in the British Museum, is a form of oath to be taken by a Freemason about "several words and signs"; and the next leaf contains MS. entries relating to it, supposed to be the Chester Lodge, which are considered with great scrutiny by the author, rendered easy by the labours of his friend Mr. Rylands, who has obtained from the Chester Register if Willis some verification of the twenty-six names contained on the leaf above mentioned, four of whom were actually "Masons," and the whole number in the list may have belonged to a "Society of Freemasons" of Chester.

Our author next groups the several versions of the Old Charges or Constitutions into six classes or divisions, to show the relative estimation in which,—according to his judgment,—they should be regarded as authoritative or credited writings. Then follows the description of the two plates of coats of arms of English and foreign companies of masons, carpenters, and other trades given for comparison, in which it is only needful to notice that the scalloped chevron in the coat of arms granted 172-3 to the London "Guild of Masons, otherwise called Freemasons," became a plain one, as noticed by Stow in 1633. Was the latter assumed by the Society Lodges, and (Stow) did not observe the difference? Chapter XV. is devoted to Old Charges, the legend of the Craft, Light and Darkness, Gothic additions. These "Old Charges," Mr. Gould states, are "the title deeds and evidences of inherited Freemasonry"; they would amply ward the closest and most minute examination." This cannot here be given to them, he, however, found it necessary to give a mere scrutiny to the "Harleian MS., 1,942" (1), dating seventeenth century, and the Roberts MS. (4) of the same period, the latter being, in his opinion, a reproduction or counterpart of the former, and "both parent and progeny stand on the same footing of utility." They are interesting as differing from all the other Charges known, in that the former contains "new articles," which form its distinctive feature; and the question arises then, if No. 1,942 "is an authorised and credited reading which has come down to us through a legitimate channel": "the Roberts et . . . stands upon the faith of the compiler . . . 27th December, 1663, when the regulations were made, of which only the first are given" in No. 1,942, though all are duly given in Roberts's. No exact date can be given No. 1,942 . . . its age, I think, "cannot be fixed any later than 1670. (Mr. Bond, principal librarian of the British Museum, estimates it as of "the beginning of the seventh century.") "These 'New Articles' I do not explain [he says], nor in my judgment an explanation material; it also contains the Apprentice Charge, which is peculiar to the versions only." But the reviewer would say: Is the oath more than the affirmation taken by a newly-elected Livyman on entering a London Guild? and would submit for Mr. Gould's consideration that this

1,942 Charge may have belonged to an independent Lodge in town or country, knowing nothing of other Lodges. The history of the Society itself is only now being thoroughly elucidated through the comprehensive grasp of mind of Mr. Gould and his friends, and, as before observed, it is not known to whom belonged these thirty-one copies of the "Old Charges or Constitutions,"—perhaps some to the Guild, some to its members, and some to the Society, the Lodge, or member of the Lodge. As before observed, the City arms, and the Masons' coat of arms, appear on some, as the latter does in No. 29, of about 1714, in my possession. It is known that a "parchment book containing an 113 annals of the antiquity, &c." was, before 1839, in the possession of the Masous or Guild or Company of London, and is classed by Mr. Gould as one of the number. Mr. Gould quotes "the Masonic tradition that prior to 1567 the whole of England was ruled by a single Grand Master," but does not state of what, and also seems to concur with his friend that "the Grand Lodge MS. Constitution (4) 'dating 1583,' or a previous draft originated all Constitutions (except 3 and 23), whether in Yorkshire, Lancashire, Scotland, or South Britain."

Among other subjects considered in this elaborate "History," as a necessary part of the inquiry, are the Mysteries,—of Egypt, the Ritual of the Dead, the Profession of a Benedictine Monk, Degrees, Symbols, Metaphors, and Emblems of the Freemasons; Lodge Elements and Appointments (but when invented?), Vehmic Tribunals, Dr. Armstrong and his Notions and Opinions, and the Opinions of "Dr. Leeson, Most Puissant Sovereign Grand Commander 33," read before the Royal Naval Chapter of Sovereign Princes of Rose Croix in 1662" (!) also Fort's work, mentioned above, of which our author writes, "he has succeeded where all his predecessors have failed,—that is, in rendering the study of our antiquities an attractive task. . . . He does not wish to say that Fort has withheld information from his readers; but having clearly established in his own mind certain facts, these appeared so incontrovertible as to justify the exclusion of the details by which they were supported. But no one, I am sure, would more heartily concur in the golden rule of criticism, that *truth* is the great object to be sought, and not the maintenance of an opinion, because it was once expressed." Mr. Gould remarks further on:—"Indeed, many of the Rites, Symbols, and Beliefs now prevalent among Masons, correspond with or are analogous to those supposed to have been common to the members of earlier and distinct societies." In a future chapter we may read when they were invented or introduced among the moderns. He, however, does add:—"To what extent these or any other portions of the existing Lodge ceremonial are survivals of more ancient customs, cannot be very accurately determined." But could they not all have been *invented* or *manufactured* as necessity required at or after 1717.

We are promised in the next volume (of which three more are due) an examination into the character of the Freemasonry which existed after the era of Grand Lodges; the proceedings of the few Lodges that can be traced between 1686 and 1717; as well as a comparison of the Masonry of Scotland with that of England; and also the question of degrees. During the careful perusal of this volume it has appeared very desirable that, besides an elaborate index to the whole work, a chronological list should be added of the dated facts laid before the readers, facts which Mr. Gould has shown that he knows well how to use and work in, in all their bearings one with another.

Turnstiles at the Inventions Exhibition.—Messrs. C. Isler & Co. have received orders from the Executive Council of the Inventions Exhibition to fix eleven more of their turnstiles, making a total of twenty-six. Fourteen are to be fixed in the subway (these are so arranged that they will register the number of persons going in and coming out) and twelve at the Exhibition entrance.

THE GROSVENOR GALLERY.



HERE have certainly been finer exhibitions at the Grosvenor Gallery than the present one, though it contains works of great interest, and some of the highest artistic power. The absence of Mr. Burne Jones deprives the exhibition to some extent of the peculiar *cachet* which has usually seemed to mark the Grosvenor collections as distinct in tone and feeling from other exhibitions of the day; and some of the most powerful works exhibited would have found their place as naturally at Burlington House as in Bond-street,—a fact which will be rather welcome than otherwise to those who look doubtfully upon affectation in art, even when it is the affectation of genius. Among those works which appeal to us by genuine and straightforward power none can rank higher than Mr. Millais's splendid portrait of Mr. Gladstone (54), a strange and remarkable contrast to that other portrait of the Premier which was in the Academy some little while back, and which has become the most popular and widely-accepted representation of the eminent Statesman. That three-quarter length portrait, in standing attitude with the hands clasped, represented the contemplative, it might even be said the pathetic aspect, of Mr. Gladstone's character; the present one, in which he is represented seated and in scarlet robes, with the face turned towards the spectator, is eager and energetic in expression. The other was all dark in colour; this is all brightness, but the artist has been quite successful in the difficult task of harmonising the face with the mass of warm colour in the costume, without unduly heightening the flesh tints,—how successful may be the better understood by contrast with the similar attempt made by Mr. Barrett Browning, in his portrait of his father in similar robes of collegiate dignity, where the great poet, in order to assimilate him to the costume, is represented with a countenance suggestive of much libation to Bacchus. So many-sided a man as Mr. Gladstone (to return to the immediate subject) could never be represented by a single portrait; but it is remarkable that one painter should succeed in realising, with equal power, two such different phases of character in the same person; or it would be remarkable, if the painter were not Mr. Millais.

Mr. Watts's "Love and Life" (30), if it he really meant, as has been affirmed, as a companion to "Love and Death," is far below that great work in artistic power and feeling. "Life" is represented by a thin figureless female, ascending a rocky step, and ready to faint, as her countenance expresses, unless upheld by the winged figure of love at her side. The allegory is well brought out; the picture is pathetic in a sense, but it is weak; "Love" is not strong or dignified, "Life" is painfully limp and feeble, even Love can hardly do much for such a Life. It is a very high aim, of course, and let us be grateful to a painter who always aims so high that it is no wonder if he sometimes comes short of his ideal. The opposite end of the room is occupied by a remarkable work by a painter not as yet known to fame, Mr. Mitchell, who has chosen for his subject that terrible moment when Hypatia, as described in Kingsley's semi-historical romance, stood on the steps of the altar making one last appeal for mercy to the mob of bigots who were bent on her destruction. The painter omits the monkish throng, however, showing us only Hypatia herself on the altar-steps,—a figure thoroughly studied in drawing and execution, and very pathetic in expression: perhaps the countenance does not convey all the terrors of the situation; but this, as well as the omission of her blood-thirsty persecutors from the scene, may have been intentional, in order to avoid a lapse from the pathetic to the purely painful. At all events, the painting is one which will make every one look with interest to the future productions of its author. The third central picture of the large room is Mr. Richmond's "An Audience in Athens during the Representation of the Agamemnon" (69), at the moment when Clytemnestra recounts how she

slew her husband. The spectator faces the audience, the scene being behind him. The idea of representing the play of feeling in the faces of the spectators at this stage of the tragedy is a very fine one, and there is much in the various countenances that is expressive and worthy of careful attention; but the picture is not life-like; the men and women do not appeal to our sympathies much. The composition is backed by a double Ionic colonnade skirting the circumference of the auditorium,—a scenic addition which has a good effect on the composition, but for which, as a portion of a Greek theatre, there is no architectural authority.

The charge of unreality cannot at least be brought against the two other much smaller antique subjects on the same wall, the two brilliant little works by Mr. Alua Tadema, entitled "Who is it?" (57) and "Expectations" (81). In these works the realisation of antique life, not only in the accessories but in the figures, is so complete that we feel as if the lapse of time was annihilated for us,—as if we really beheld that old-world life in its reality. In "Expectations," in which a young woman sits on a marble seat overlooking the dark Ægean sea, shading her eyes with her hand to look at a boat in the distance, the artistic effect and feeling is the most clear and complete of the two; but both are remarkable works, such as none of the artist's now rather numerous imitators have in the least degree approached. The perfect drawing and perspective of all the architectural details is as noteworthy in these as in other more elaborate works by the same hand.

In the East Gallery Mr. Walter Crane exhibits one of the largest and finest paintings he has produced,—*"Freedom"* (157),—illustrating a splendid passage from Swinburne's "Songs before Sunrise." A nude figure in the foreground, who has been fettered by the influence of priest and king on either side of him, is hailed by the winged genius of freedom, at whose call his fetters drop off. We are not over fond of allegorical paintings, but this has the merit of thoroughly telling its story and producing a remarkably fine decorative ensemble at the same time. Mr. Crane's other work, *"Pandora"* (16), is hardly a success; the attitude of the figure is rather painfully contorted, and the drawing of the head, hewed forward so as to hide the face, is not quite successful.

After these, the remaining portraits are the most noticeable works. Next to those already mentioned, perhaps Mr. Holl's "The Late Lord Overstone" (33) is the finest work; with just a suspicion of *chic* in the sparkle of the high lights, this is nevertheless a wonderfully solid and real portrait of which the face is painted with splendid finish and expression. Mr. Watts's "Miss Rachel Gurney" (62) is a beautifully-refined and characteristic portrait, a half-length, showing the lady in black half-leaving against a wall or screen behind her. Mr. Lehmann's portrait of Mr. Browning (10), hung as a pendant to Mr. Barrett Browning's painting before alluded to (with unhappy result to the latter) is an excellent likeness, and a good example of simple and unaffected portraiture. Among other portraits may be named Mr. Watts's "Mrs. F. Myers" (140*), a beautiful hit of colour; Mr. Collier's "Lady Loraine" (19); Mr. Stuart Wortley's "Miss Maud Waller" (161), an admirably-painted portrait of a young girl; Mr. Richmond's "Mr. A. Lang" (191) and "Lady Lloyd Lindsay" (174); and Mr. C. E. Halle's portrait of Mr. Chas. Halle (209), more remarkable as a likeness than for artistic effect, but certainly excellent in the former sense.

Mr. Nettleship, the animal-painter *par excellence* of the Grosvenor contributors, sends a very large painting,—*"Refuge"* (195),—of a lion and family who have got into a safe place from a jungle fire, joined by one or two more harmless animals which have forgotten their fear of the lions in the common danger. The big lion is a very fine beast, but his body seems rather lengthened out in perspective, considering the angle at which he is seen. In his peculiar faculty of conveying animal character, the painter is more completely

successful in his smaller work, "Bruin" (134), which is about the most bearish bear we remember to have seen on canvas.

Landscape is seldom very strong at the Grosvenor, and is less so than usual this year. Mr. Kocley Halswelle's "Kilchurn Castle" (8) is the most important work, and is remarkably effective in a sense; but the effect, with the hard-looking steel-like surface of the lake, is of the theatrical kind. Mr. Henry is less successful than usual in two rather large works; in "Homeward" (26), one of his favourite class of works, the water seems somewhat solid and un-watery. In "A Kerry Pastoral" (41) Mr. Mark Fisher's unfortunate tendency to what may be called dirty tones and consequent want of light reaches a climax, and it is impossible to accept this as a representation of outdoor effect. Mr. Henry Moore's "Queen of the Night" (120) is a really fine effect of moonlight on the sea. Mr. Watts sends a remarkable study of dark mountains, under the title "Ararat" (172).

Among the portraits we should not have omitted Mr. Tadema's "My Doctor" (1), obviously a portrait, where the doctor sits by a bedside feeling the pulse of a patient whose face is not shown. Mr. Holman Hunt contributes a head of a woman under the title "The Bride of Bethlehem" (14), a singularly unhappy-looking bride, whose face is finished with that hard and over-wrought minuteness of detail which has been the artist's great stumbling-block, and seems to petrify all the life out of his faces. Reverting to the absence of Mr. Burne-Jones from the exhibition, it may be observed that Miss Pickering seems to have regretted this in anticipation so much as to have endeavoured to fill the gap by producing a Burne-Jones painting herself, in the shape of "A Dryad" (43), and really with no had success.

NOTES.

THE result of the Archbishop's charge in reference to Peterborough Cathedral, on which we commented last week, seems to have been wonderfully pacifying. It is understood not only that the first part of Dr. Benson's advice, to reconstitute the committee, is to be acted upon, but that his licence to then reconsider the whole question, independently of his judgment, will not be accepted, and that the rebuilding of the tower on its old lines will be adopted in accordance with his opinion. Even Sir E. Beckett, that champion of the modern architect against the errors and superstitions of archeology, has given no open sign of rebellion against "the Archbishop's most fatherly rebukes," and might, perhaps, express his attitude in a slightly altered version of the words of the Psalmist,—*"I kept silence, even from had words, but it was pain and grief to me."* So we are all going to be good boys, and do as we are told. Let not a word be said here to disturb such an unexpectedly harmonious state of things. Perhaps, when the work is done, there may arise in some minds a qualm of conscience,—a dim perception that a great opportunity has been missed. A Mediæval architect would have felt so, at all events. But then, of course, we are not Mediæval architects: Q. E. D.

THE meeting held at Willis's Rooms on Friday last, "inaugurated" (to use the Chairman's expression) a new departure in land-holding. "The Small Farm and Laborers' Holding Company, Limited,"—a cumbersome title for a simple undertaking,—has been started with something more than expressions of goodwill on the part of its aristocratic backers. Sir R. Loyd Lindsay offered the company, on its own terms, a suitable estate of 400 acres in Berkshire, and the Duke of Argyll, in his interesting and somewhat autobiographical speech, indicated the county of Essex as a very eligible field for the company's operations. Some reference was made by Lord Ripon to an experiment of a similar kind made at Ralahueen, in Ireland, some fifty years ago, and also to what Mr. Bolton King has set on foot with no little success in Warwick-

shire, but none of the speakers said a word about what Mr. Gordon had effected by co-operative farming on his estate at Assington. His plan would seem to suit the temper of the times better than that of Lord Tollemache, where the feudal principle is still maintained, though tempered with so much justice, liberality, and common-sense as to win the approbation even of Mr. Chamberlain. The Peckforton estate is probably the only one in England on which are to be found no less than 270 cottages, with *three acres of land attached to each*. These Cheshire cottagers are, however, exceptionally fortunate, not only in their landlord and in their holdings, but in having good markets close at hand for the disposal of their produce and, above all, grass land suitable for dairy purposes. The cow is to them what the pig is to the Irishman,—a source of income and an object of interest. But, of course, these favourable conditions are not to be found in all parts of England, even where the landlord is as well disposed towards his tenantry as Lord Tollemache has shown himself to be. The country clergy, who are often at a loss how to let or to cultivate their glebes, might do much to encourage peasant proprietorship, and in so doing regain the influence over the labourer which has been largely lost. Co-operation would unite classes which have been getting wider and wider apart, and a new link would be forged which would attach the labourer to the soil and prevent him from injuring his fellows by seeking work in our already over-stocked towns.

IN the Annual Report of the Institute of British Architects, the substance of which will be found in another column, one or two facts are noted which will be received with regret by those who wish well to the Institute and to the higher interests of the profession. One of these is in regard to the non-appearance of any competitors for the Grissell Gold Medal for the last two years. This medal is really one of the most valuable offered by the Institute, being, as it is, especially designed to encourage the detailed study of construction. The neglect of it by the students and younger members implies that they care more to excel in competitions in draughtsmanship and in the external appearance of buildings, than in matters relating to scientific construction. This is putting the cart before the horse, and is not the way to raise the future profession of architecture in public confidence. The failure of the essay prize, though a matter of much less importance, is also to be regretted, as the faculty of logical and clear literary expression certainly requires more development among architects. The Report comments also on the unsatisfactory state of the case in regard to competitions; many architects having banded themselves together not to compete except where a professional assessor is employed, while a considerable number hold aloof in the apparent hope of thereby finding easier running in competitions not guarded by an assessor. The want of *esprit de corps* in such a mode of acting is anything but creditable; and we hope those who pursue these tactics will have their reward in being made ducks and drakes of by irresponsible competition committees. In regard to those who support the principle of an assessor, however, it must be remembered that it is a matter of proper loyalty to abide by the decision of the assessor. Some gentlemen seem always desirous to call it in question, whenever it goes against them. They should remember that in all games it is considered very bad form to question the decision of the umpire.

PUBLIC opinion has seldom had a more marked effect than in the case of the Railway Rates and Charges Bills. It is very doubtful whether Mr. Chamberlain would have promised to use his influence against the measures had it not been for the energetic action of the various Trade Associations, and the consequent flood of petitions against the Bills which poured in from all quarters; in fact, it is very probable that, at the outset, the Railway Companies reckoned upon the hon. gentleman's support. The statement made by Sir Joseph Pease on Friday in last week proves

that the Companies are at length convinced that it is useless for them to persist in a second reading. Sir Joseph said, that, as far as his Company (the North-Eastern) were concerned,—and he understood that the other Companies adopted the same views,—the matter would either be allowed to rest or an application would be made to the House for leave to formally move the discharge of the order. It is to be hoped that the latter course will be taken, as such an application would be accompanied by some explanation of the attitude of the Companies in the matter, and this would be very acceptable. It is a singular fact that the most practical outcome of the affair should be the thorough ventilation of a point not dealt with in the Bills at all, viz., the Preference Rates question. This, as we have before mentioned, will certainly not be allowed to drop, and a Government measure dealing with the subject may be confidently expected.

SIR SPENCER WELLS made a very powerful appeal in his lecture last week on behalf of cremation, mainly on practical, in part also on sentimental grounds. "What," he asked, "might St. Paul's and Westminster Abbey be if, instead of the coffins with their corrupting contents, occupying large space, and a source of danger to the living, we had the ashes only admitted, arranged in the urns along the sides of the cloisters or in chapels or crypt, or beneath memorial windows, slabs, or brasses? We should have the same change in graveyards and cemeteries, from danger and disgust to health and beauty, when the overcrowded cemeteries of to-day were converted into the God's Acre of the future." But surely we might go a step further and say, if it is false sentiment to keep the remains of the dead for slow decay, is it not equally so to keep in an urn the ashes remaining from their combustion? What can be the satisfaction in the possession of such relics? Sentiment is really best left out of the question. We are unable to understand the enthusiasm displayed by the advocates of this or that new system of disposing of the remains of the dead. To hear some of them talk, one would suppose they had discovered the elixir of life instead of a new form of treating the dead. The subject is a painful and unattractive one, take it as we will, and is best regarded from the practical or sanitary point of view. In this respect there is no doubt that with all who understand the circumstances the coffin system must be condemned, though it will probably take a long time to eradicate it unless Government see their way to special legislation on the subject. Whether Mr. Seymour Haden's "earth-to-earth" system, which we have always been disposed to favour, may not be extensively used without danger, is a point which has not yet received sufficient practical consideration. Our matured impression is that on sanitary grounds cremation is the best method; but we can quite understand the feeling against it on the part of many, not so much in regard to their own remains as to those of others, as Sir Joseph Fayer frankly expressed it in the discussion that followed the lecture.

THE case of Mellis and Pym v. The Shirley Local Board of Health, which was recently decided by Mr. Justice Cave, will probably find its way to a higher tribunal. It decided two important points which may here be shortly noticed. The first was that, where one Local Board makes a contract not under seal and a subsequently elected Board ratifies it with the seal of the Board, it is then a binding contract, even though a subsequent Board endeavours to set it aside. Of course it is imprudent of any person who contracts with a Local Board not to take care that the contract is under seal. The several cases, especially Hunt v. The Wimbledon Local Board, on which we have more than once commented, should have made this a matter of public knowledge. It is quite right, however, that a ratification under seal should be binding, otherwise even original contracts under

seal might be set aside by subsequently elected Local Boards, for there is no doubt that a *bona-fide* ratification is as binding as a valid contract in the first instance. The second point in the case may or may not have been rightly decided; looking to the words of section 193 of the Public Health Act, 1875, we are, if we may say so, in accord with Mr. Justice Cave. The contract for plans for a scheme of drainage for the Local Board was made with two persons, one of whom was the surveyor of the Board. It was contended on behalf of the latter that the contract was therefore void. But the judge held that this was not the result of the section which, in so many words, fixed the penalty for an infringement of it. That penalty is the payment of a sum of 50*l.*, and incapacity in future for holding any office or employment under the Act. There can be no doubt, we think, that Pym, the surveyor in this case, had incurred these penalties, but it is so obviously contrary to the public interest that any surveyor to a local Board should enter into a contract to do work for it, that we should like to see any such contract made void by the Legislature. In some cases it might be worth while to incur the above penalties, and make a large sum directly and indirectly out of a contract with a Board, and the public will not be fully secure against the mischief till the operation of the above section is enlarged, if the law as laid down by Mr. Justice Cave is correct.

THE reading a second time, without a division, of the London Street Tramways Extension Bill marks the advance made in public opinion with reference to this method of communication. It is probable that no modern invention has met with more opposition than the tramway. The first American tramway was the New York and Harlem line; a section of which was laid through the main thoroughfares in 1832, but which proved unpopular, and was for a time suppressed. The lines laid down in the Bayswater-road, in Kennington, and in Westminster in 1861, by Mr. Train, were also pulled up. Yet in spite of the opposition of Mr. Gregory and Sir H. Selwin-Ibbetson, the decision of the Committee which rejected the Bill last year has been overruled; and the arguments that "tramways are a great benefit to the public," and that they are "of special advantage to the working-classes as enabling them to get where there is pure air and cheap dwellings," were tacitly accepted. The movement of urban and suburban building can hardly fail to be affected by this change in public opinion. Being purely home industries, tramways pay, and this is so exceptional a case, with regard to investments in business, that the customers and the tramway-makers pull comfortably together.

THE authorities have at length recognised the necessity, which we have frequently pointed out, of some immediate communication at the Law Courts between the great hall and the northern corridor on the court floor, which is the most important space among the courts, forming as it does a kind of centre of communication. A small staircase is now being constructed on the west side of the passage into the great hall from the north up to a point by the side of the gallery, which overlooks the hall. It will soon be possible, therefore, to gain a comparatively direct route from the hall to the courts without wending a devious way through the crypt, among lavatories and refreshment-halls. It is to be regretted, however, that the authorities have not adopted a holder remedy, by making a staircase from the gallery overlooking the central hall. This is quite useless as it is at present; whereas if it had formed the landing to a flight of stairs it would at once have been made of practical use, and a fitting approach would have been made to the courts. We can scarcely regard the new side staircase as other than a temporary remedy, for it is most unfitting that the chief avenue of approach to the principal courts from the central hall should be by a winding staircase, which more resembles the servants' staircase in a large mansion than anything else.

THE determination of the Decoration Committee of St. Paul's to abandon the project of decorating the dome *sine die* is not one that causes us either surprise or regret. Some very fine work was, undoubtedly, done by Mr. Poynter for the purpose, but the experimental exhibition of the cartoons only proved that such painting was thrown away in that position, and none of the various schemes, as general schemes of decoration, recommended themselves as ideal methods of treating a domical surface in a decorative manner. In commencing anew on the choir, which is understood to be now the intention, the committee and their artistic coadjutors will have a better chance of feeling their way towards the realisation of a suitable style and scheme of decoration for further development, as they proceed to the larger spaces and more difficult problems presented by the crossing.

THE Exhibition of the Society of Painters in Water-Colours is a remarkably good one, most of the leading members being very well represented, and some, who have been rather defaulters of late, have re-appeared in force. Among these is Mr. Boyce, whose delicately finished paintings of old buildings in the midst of equally delicate and truthful landscape are a delight to the eye, "Brougham Castle" (103) being, perhaps, the finest. The exhibition contains an unusual number of architectural subjects; Roman studies by Mr. H. Rivière, Mr. A. Glennie, and Mr. Collingwood Smith; "Calais" (48), by Mr. S. J. Hodson; "A Suppressed Monastery" (95), by Mr. Goodwin; Venetian studies, by Mr. Callow, mannered certainly, but in a very effective manner; "The Gate of Justice, Jerusalem" (161), by Mr. Carl Haag; "Amalfi" (98), by Mr. Naffel; and "Flagstaff, St. Mark's" (70), by Miss C. Montalba, are among these. The recent member, Miss Forster, now Mrs. Mary Forster Lofthouse, shows still further powers in her two views of "Pembroke Castle" (234 and 244). Mrs. Allingham is at her very best (which is saying much) in "A Basket of Clothes" (17) and "Lessons" (181); the girl pupil in the latter drawing is a lovely child; the whole scene, an interior, is perfect in its way. The landscapes by Mr. Eyre Walker are notable for power and breadth of style. Among other specially fine things are Mr. W. Field's "Hamstead Heath" (59), Mr. Powell's "The Opalescent Sea" (254), Mr. Goodwin's "Abingdon" (97), and Mr. E. Waterlow's "Village by the Sea" (180), than which nothing more full of bright clear atmosphere could well be seen. The exhibition is a little more restricted than usual numerically; the screens are filled on one side only, but the quality of the exhibition generally is very high.

WE fear the same cannot be said of the much larger exhibition,—larger both as to numbers and as to the average size of the drawings, in the rooms of the Institute. The strongest member, Mr. Linton, contributes only two figures, "Waverley" and "Rose Bradwardine" (444, 464), not in his best way; the strongest landscape artist, Mr. Collier, has a fine work, "Near Burley" (734), in his usual broad and powerful style. But there is a lamentably large array of uninteresting and even coarse work, the coarseness of quality arising in some instances from painting up to the size of the rooms. Of Mr. Fulleylove's various contributions, "The Great Avenue, Hampton Court" (1,066), is the finest; but there is nothing equal to his splendid Versailles pictures of last year. The most important work, and a very clever one, is Mr. C. Green's large drawing of "Nellie and her Grandfather at the Races" (627), a scene crowded with figures, forming a remarkable study, not only of character, but of the costume and manner of a bygone period. The two principal figures form a very fine realisation of Dickens's most pathetic creation. Two humorous pictures, by Mr. Frank Dadd, especially "The Boy,—what will he become?" (412), where a loutish lad is examined by a phrenologist in the presence of his loutish father, are most successful in their way.

Among other prominent works are "How we Caught a Shoal of Pilchards" (192), by Mr. Napier Hemy; "South Harting, Sussex" (306), by Mr. Aumonier; "Hoveringham Ferry" (369), by Mr. Orrock; "The New Dress" (392), by Mr. Small, a figure of a lady, of exquisite grace and refinement; "Cuckmere Haven" (451), by Mr. G. H. Hine; "A Dartmoor Stream" (802), by Mr. Syer; "Sunset, West Coast of Ireland" (823), by Mr. Arthur Severn; "Finale Furioso" (867), a masterpiece of "still life," by Mr. B. W. Spiers; "An Old Song" (294), a large, but carelessly executed work, by Mr. Ahley, who has not done himself justice. We should be curious to know what hunting men think of Mr. R. Caldecott's "The First Flight" (438). His leaping horses do not look as if any of them would get clear over the fence.

AT the dinner of the Institution of Civil Engineers, on Wednesday evening, Lord Sudeley proposed the health of the President, Sir Frederick Bramwell, with such allusions to the great work of the engineering profession as were both true in themselves and suitable to the occasion. The Chairman, however, was hardly content with this, and amplified on the text to the extent of proving that engineering, which employed the sources of powers in nature for the benefit of man, was the most noble pursuit imaginable. In fact, the salvation of our souls seems to be due to it, for without the steam printing-press we could not have had cheap Bibles; the Bible itself being a minor incident of a preparatory nature, apparently, in the chain of events as viewed by Sir F. Bramwell. We certainly think the engineering profession a noble one, but the interests it serves are primarily material ones, and philosophers hold that mental and spiritual interests are even higher than these. We should be glad if we could now and then see on the part of engineers any perception that the universe may possibly be regarded from other than an engineering point of view.

NOTES ON THE ANCIENT CHURCHES OF LONDON.*

ATTENTION has already been called to the extreme attention that has been paid to the orientation of the London churches, for, although four are now built north and south, namely, St. Martin's, Ludgate; St. Edmund the King; St. Peter-le-Poor; and St. Botolph, Aldgate; yet Faithorne's map shows us that this was not the arrangement prior to 1666. This is also the case in the two little ancient Roman churches of Canterbury, St. Martin's and that now known as St. Pancras. It is the case, too, with some few very ancient churches which I have pointed out in Wales. It is worthy of observation that this custom, so remarkably characteristic of our London churches, while it has continued in England for so many centuries, does not appear to owe its origin to Papal Rome. A comparison of a map of Rome with that of London shows the curious fact that, while all our churches were fairly well orientated, notwithstanding all the difficulties of site, yet in Rome itself no attention has been paid to any such arrangement. The great basilicas point in all directions, St. Giovanni Laterano being due west instead of east; Sta. Maria Maggiore, north-west; St. Croce in Gerusalemme south-east; many of the churches north or south, or any other point indifferently, while St. Peter's itself has its main entrance at the east and its choir altar to the west. These arrangements are of early as well as more recent date, and indicate clearly enough that there never was any rule of orientation observed in Rome. The cities of Italy, in like manner, for the most part follow what we find in Rome, but across the Alps orientation begins to show itself, and at Paris and in most of the other cities of France the rule is observed as in England and Wales. These facts are curious and, perhaps, unexpected, for it raises the inquiry.—From what people did the ancient Roman Christians of Britain derive the practice, and how did it come about that the

Anglo-Saxons followed the older practice rather than that which was observed in Italy?

The churches which escaped the Great Fire of 1666, included in the area under discussion, were twenty-two in number. These were, doubtless, fairly typical examples of the whole; so far, at least, as one group of churches can resemble another, each building having, in fact, its own characteristics not to be found in another. The resemblance, therefore, of the churches which survived can be but a very general one, and nothing more, to those which perished in the terrible calamity referred to. Of these, no fewer than twelve have been since rebuilt, and two have been demolished, leaving but eight in number of those which survived. These latter have been so frequently described that their bare enumeration here will be sufficient. They are as follow:—Alhallowes, Barking; Andrew Undershaft; Ethelburga; Helen; Katherine Cree; Olave, Hart-street; Bartholomew the Great; and St. Giles, Cripplegate.

Our attention to the churches which have been rebuilt since the Fire may be more interesting and profitable than any further consideration of the buildings which still exist, and the more so since so little attention has hitherto been directed to the references to them which have come down to our time from the last century, when their rebuildings took place. These notices are, indeed, more exact and definite than many may be aware of. They consist not only of pictorial illustrations in a very complete form, but there are descriptive references in many old histories and magazines. The pictorial illustrations give us views of every one of the churches which have passed away, also—not very exact in several cases, and with the usual differences of proportion to be found in most English topographical prints more or less, one view giving a very different form, let me say, to the windows or doors, a different design to the window tracery, and such like. Still, there is sufficient to show what the general design were, and a critical eye will speedily detect what appears to be in good proportion, and what is distorted. The views by R. West and W. H. Towns, engraved about 1740 by the latter of these two artists, are by far the best. Then there are separate views of several of the removed buildings in the early volumes of the *Gentleman's Magazine*, as well as some now scarce tracts treating of separate churches. As to the descriptive evidences, it may be of interest to say that there are very ample and complete notices of each of these churches in a valuable little treatise on London generally, and particularly on its churches. This is "The New View of London, or an ample Account of that City," London, 1708,—a work which really should be better known than it appears to be, and which is certainly seldom referred to. It contains brief notices of each of the London churches, of its foundation, design, capacity; of its monuments, services, and in some cases of interesting points of ritual and church furniture.

It may be well to pass these churches rebuilt since the Great Fire briefly in review, and to afford an idea of the scope of the "New View of London," let us extract in detail the notice of one of these buildings, as a sample of the remainder. I have taken the description of Alhallowes-on-the-Wall, since it is short, and since I am able to accompany it by one of Towns's views.

St. Alphege was a church of poor design. The old steeple remains, and by the removal of the surrounding buildings it was recently visible. There are also an archway and some fragments of walls remaining.

St. Andrew, Holborn, still preserves its old western tower, heightened by Sir Christopher Wren. There is a plain Perpendicular window in its west front, and a plainer doorway below. The tower of the rebuilt Church of St. Bartholomew-the-Less still remains, with some good internal arches.

St. Botolph, Aldersgate, is shown in one of Towns's views. The present tasteless building, now the ugliest church in London since St. Martin Outwich has been pulled down, contains no portion of the picturesque but plain country church shown in the view referred to.

St. Botolph, Aldgate, had a good embattled fifteenth-century tower, with some picturesque buildings before it. It is shown by a scarce print in the Grace collection, as well as in that of Mr. Gardner, and in some others.

St. Botolph, Bishopsgate, is well described in the "New View of London."

St. Dunstan's-in-the-West, having been re-

moved only about fifty years ago, there are several engravings extant, showing the old building, with its tower at the north-west corner, its curious clock, &c. There is also a book of views showing the interior, and all the monuments. Being taken down to widen Fleet-street, its foundations do not appear to have been removed, for I saw them a few months ago only just under the modern paving, when some repairs to the road were being effected.

St. Olave, Southwark, is included in this survey, since some of the houses of the parish were on Old London Bridge. I know of no record of the old building, except that in the "New View," but there is a very good view by Towns.

St. Martin Outwich is shown by several old views, as well as by Wilkinson's pamphlet, which contains plans and views. It was a picturesque but plain and irregular building. In its rebuilt form, it had nothing whatever to recommend it, being probably the most miserable design for a church possible to be produced. The demolition of this building revealed the existence of a single Perpendicular window, of good design, on the south side. This remained visible for many months, and was only removed on the erection of the secular buildings on the site. The old monuments are now in St. Helen's Church.

St. Peter-le-Poor is well illustrated by old views and plans. It was not unlike, in the irregularity of its plan and design, the preceding church.

Holy Trinity, Minorities, was always a small plain church, now rebuilt in a poor, tasteless manner.

Of the two churches which escaped the Fire, but since removed, it will suffice to say that St. James's, Duke's-place, was a very plain building, of brick, with four wooden pillars internally; and of Alhallowes, Staining, the curious tower still survives, thanks to the care of the Clothworkers' Company.

Old London, prior to the Great Fire, must have had a picturesque aspect, with its forest of towers and spires, not clustering around the massive central tower of the cathedral, but following the indications already recited, thickest to the east of the cathedral, right and left, so to speak, of the northern end of Old London Bridge. Old views of London,—Hollar's and one or two others,—afford some indications of the designs of these perished churches. Thus we know that St. Mary-le-Bow had a steeple of open arches something like the present steeple of St. Dunstan's-in-the-East. That St. Lawrence Pountney had a lofty wooden spire, and such like. An inquiry has, however, never yet been made as to whether or not any fragments of the buildings which have passed away still remain to our time.

This inquiry I now propose to begin, and with it to conclude this paper. I cannot say that it can be considered at all as a complete one, yet since there is no other extant known to me, it will have the merit, at least, of some originality. Here let me indulge in the lament that the principles of church reparation which many of us are striving to enunciate,—that is, to preserve as much as possible of every old church requiring repair, and to destroy nothing,—was unknown to the builders who set to work after the Great Fire; would that it were thoroughly known even to the men of our own day. Were this so, we should not have to lament the loss of several interesting works and the mutilation of others at the present time.

The builders after 1666 found several of the ancient churches with their towers and walls standing. Their rubble facings did not accord with the well-wrought Portland stone then considered to be the correct style of building, and either a clean sweep was made, or the old walls were cased, in every instance the whole of the old materials being re-used as backing to the new walls, and hardly any attempt was made to preserve the monuments. We can show that this was as stated by the recent results of the demolition of some of these churches, which will be recorded further on.

There are remains of ancient work in the following churches, or there were so until the recent period of the removal of the buildings:—St. Stephen's, Coleman-street. There is a plain western tower, the walls of which are for a great portion those of the old building. The old masonry is visible on the north side. Above, the wall has been faced with Portland stone.

St. Vedast, *alias* Foster. On the south side

* A paper by Mr. E. P. Loftus Brock, F.S.A., read before the St. Paul's Ecclesiological Society, in the Chapter House of St. Paul's, April 16th, 1885. See p. 630, *ante*.

there are bases, and a good portion of two or three of the buttresses still remaining, as well as the connecting portions of the south wall. There are bold fifteenth-century plinth mouldings carried along and mitred around the buttresses, while the wall is original to a fairly good height, some of it without any casing. The old steeple remained after the fire until 1694, when it had to be rebuilt. St. Vedast was Bishop of Arras at the end of the sixth century. His death is recorded as having taken place A.D. 399. There is no sufficient recorded reason for the "alias Foster" after the name of this church, but in the register of Canterbury already referred to the name Amand occurs.

St. Nicholas, Cole Abbey. The whole of the south wall of this church is original. Before the formation of the Metropolitan Railway it was very distinct, being formed of squared Reigate stone, and having the remains of a moulded string course high up just below the parapet. The portion exposed bas, since the formation of the railway, been faced with modern ashlar with false windows. There were no signs of any windows along its whole extent, showing that old buildings had come close up to it.

St. Stephen's, Walkbrook. The south wall of this church is very similar, with the peculiarity that at the south-east end there were remains of a domestic building, one of the windows of which had its iron saddle bars remaining. More to the west were remains of another cross wall with a fifteenth-century doorway. To the east of the east end, going east and west, there is a wall of finely-squared masonry, going down to a great depth, entirely buried beneath the accumulated earth.

St. Mary Aldermay. The great bulk of the side walls of this fine church are ancient, as well as nearly the whole of the finer tower. This tower was finished in 1629, having been founded 120 years before by Sir Henry Keeble. Robert Pierson gave 200 marks on condition that it should be built to follow the ancient pattern. The cost was 1,000*l*. We are told by Newcourt that this "steeple, notwithstanding the church was burnt in the late dreadful fire, is still standing firm and good." Indeed, it may safely be said that the side walls and tower as we now see them are practically the same as before the fire.

The tracery of the windows was renewed after that event, and doubtless altered more or less, but the openings are almost entirely original. At the recent "restoration" of the church the ancient nature of the walling was very apparent. The walls of the vestry on the north side were also original, as well as its window, then laid open for the first time, perhaps, since the Fire, but all bas now been scraped, and the marks of the original surface obliterated. The tower, being a new one, was therefore in sound condition to resist the Great Fire.

St. Alban's, Wood-street, is another church which is almost the same as before the Great Fire. Its walls are, for the most part, original; the tracery even of one or two of the windows is also original, notably the north window of the tower at the ground level, where even the old saddle and stanchion-bare remain. It is expressly stated in the continuation of "Stow's History" that the walls were merely repaired. Would that we could still see in this church of most ancient foundation some of the curious capitals and Roman brick which Stow himself speaks of. The rebuilding, however, which he mentioned as being about to take place, did happen, and the remains of the church anterior to the Great Fire referred to are of that structure, erected in the seventeenth century. Here was another new church to meet the ravages of the Fire.

St. Mary-at-Hill possessed a large quantity of ancient work until a comparatively recent period. There were many old buttresses and some fairly good Perpendicular windows, but these have fallen, so far as outside observation goes, before the hand of recent builders.

St. Dunstan-in-the-East preserved almost the whole of the ancient side walls until the rebuilding in 1816. There is a view in Smith's "Antiquities of London" showing a portion of these, and, notably, a window with geometrical tracery of about 1260. The present east window is said to have been copied from an ancient one.

St. Christopher-le-Stock was almost entirely the ancient church repaired only after the fire. Old views show it with a Gothic tower with pinnacles, with poor inserted windows. It was removed to enlarge the Bank of England.

St. Bartholomew by the Exchange had a

curious octagonal turret on the north side, rising above the height of the north aisle. This, and a large mass of the walling, was original work. This church was removed about forty years ago.

The south wall of St. Benet, Gracechurch, was that of the original church. It existed until quite recently, after the removal of the church a few years ago. Indeed, a portion of it may still be seen doing duty as a party-wall between the block of shops erected on its site and the shop to the south now in course of erection.

The east wall of St. Magnus, London Bridge, is original, and it used to extend above the height of the present north aisle, where the old masonry was visible, but it was cemented over a few years ago. The tablet to Myles Coverdale is upon a portion of this wall.

When St. Michael's, Queenhithe, was removed a few years ago, it was found that the whole of the bases of the walls were original; a part of the old wall, indeed, was always visible on the north side. The mode adopted by the Mediaeval builders to raise their fabrics through the accumulated earth of centuries to the then level was very apparent. The foundations had been carried down to the solid earth, and this necessitated the building of thick solid walls up to the level required. These, for the most part, remain, having been utilised for the new clergy-house, &c., erected on the site.

The piling to pieces of the beautiful steeple of St. Antholin's Church, a very characteristic work of Sir Christopher Wren, so ruthlessly and needlessly done a few short years ago, made it appear that the great bulk of the walling had been formed of the former church demolished by the fire. There were evidences of fine work,—masses of neatly-wrought freestone, fragments of carving, and the like, the former in great abundance. These were of fifteenth-century date, doubtless fragments of the church rebuilt in the fifteenth century. The destruction of the fine steeple will be a subject of regret for all time, but the evils of disturbing an ancient burial-place were grievously shown in this case. After careful search had been made and every internment removed, as was supposed, five or six shells were hardly sufficient to contain other bones which were found by the excavators when the present shops were erected on the site; most of these bones were blackened by age. It was a wretched sight!

The foundations of St. Benet Fink, under the modern paving, are almost entirely those of the old church. They are just to the west of Peabody's statue.

There is an interesting paper by Mr. J. E. Price, F.S.A., in a recent volume of the *Journal of the London and Middlesex Society*, on the discovery of a large portion of the south aisle of the nave of Christchurch, Newgate-street. This was burned in 1666, and never rebuilt, the present church being on the choir of the old one. Mr. Price has also read a paper on the results of the excavations on the site of St. Dionis Backchurch, subsequently to the removal of that building. The little crypt discovered by Mr. Street, R.A., many years ago, was hermetically sealed at the closing of the graveyards, but doubtless reopened at the demolition. Mr. Price's paper is not yet published.

The old foundations of St. John the Evangelist, Friday-street, were recently cut through by the underground railway extension. Some old fragments of monumental work were found some years ago in making a sewer close to the site of St. John's, Zachary, and were deposited in the churchyard, but they are not now visible.

St. Laurence Pountney. A large mass of the walling of the north side of this church still remains incorporated in the houses forming the south side of the churchyard.

St. Leonard, Eastcheap. The site of this church was completely excavated a few months ago, and it now hangs in air, the level of the railway being many feet below it. Only a small piece of the old burial ground remains. The foundations showed a long chancel and a nave, the latter having masonry of great antiquity on its north side, made up with fragments of Roman brickwork.

St. Martin, Ludgate. Much of the old masonry of this church is incorporated in the buildings to the east of it.

St. Martin Orgars. The old tower of this church remained until about 1850, when it was removed to make way for the present rectory-

house. It was a plain low structure of fifteenth-century date, having angle buttresses and poor detail. It was built of chalk walling, and the marks of the Great Fire were very visible on its demolition, which I witnessed.

The fine old Norman crypt below St. Mary-le-Bow, the oldest piece of Norman work in any church in the city, needs only passing reference here, for the completeness of this list.

The old east wall of St. Mary Monmouth formed the wall of the burial-ground in Labour-in-Vain Hill, until the whole neighbourhood was remodelled.

St. Mary Woolnoth was one of the churches like St. Christopher-le-Stock, which were only repaired after the Great Fire. It was removed to make way for the present building. The "New View of London" gives fair details.

A small crypt belonging to St. Mary Magdalen, Monument-yard, was found a few months ago, and reported at the time in the newspapers. It was covered over, unfortunately, before I could see it.

St. Matthew, Friday-street, just demolished, was a brick building. There was much evidence that its ancient predecessor was also of brick. The removal showed a large mass of wrought stone belonging to the fifteenth century windows.

St. Michael, Cornhill, preserved its ancient steeple for a long period after the rebuilding of the church. Not being strong enough, however, for the fine peal of bells, having been weakened by the fire of 1666, it was rebuilt by Sir C. Wren as we now see it. The design is preserved in some old engravings.

On the removal of Gerard's Hall crypt, it was apparent that the south wall of St. Mildred's, Bread-street, was that of the ancient building. There was a private door of approach, now walled up, which probably still remains.

St. Peter, Paul's-ward. A mass of the ancient walling of this church was to be seen recently on the north side of the little burial-ground which forms its site in Thames-street.

The concluding church to refer to is that of St. Sepulchre, which preserves its ancient tower, its pretty south-western porch and the parvise over, as well as the mass of old walling of the north and south aisles. The design of the old windows has recently been brought back to the church, by the removal of the plain, large, semicircular openings, introduced in the middle of the last century. The church presents again much the same aspect that is shown in engravings of the period, one of which I exhibit.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

ANNUAL REPORT OF THE COUNCIL.

The annual report of the Council of the Institute, to be presented and considered at the fifty-first annual meeting, to be held on Monday next, contains the following passages:—

The Council have much regret in recording the retirement from office of the senior Vice-President, Mr. David Brandon. At the same time Mr. Fraser, of Leeds, Mr. Honeyman, of Glasgow, and Mr. Paley, of Lancaster, have intimated their intention to make way for other non-Metropolitan representatives; and Mr. Blomfield has resigned, with an expression of regret at being obliged to relinquish the duties of his post.

The number of members in 1884 compared with that of the two previous years is here stated:—

	1882.	1883.	1884.
Fellows.....	427	478	412
Associates.....	682	1196	655
Hon. Associates.....	112	107	103
Hon. Fellows.....	15	15	14
Hon. Members and Hon. Corr. Members.....	69	74	57
	1270	1272	1276

The losses by death have been considerable, namely:—William Pettit Griffith, Matthew Ellison Hadfield (Sheffield), John Middleton (Cheltenham), Edwin Nash, Richard Makilwaine Phipson (Norwich), John Holloway Sanders (Derby), William Thompson, and John Whiohcord, Past President, among the Fellows; Alfred Bevan, Henry Blackwell, Frank Johnson (Bodmin), Charles Marriner, William Paice, and Herbert E. Tijou (Manchester), among the Associates; Charles Henman (formerly a Fellow), Henry Andrewes Palmer, and Sir Erasmus Wilson, among the Hon. Associates.

One foreign Member, Professor Lepsius, of Berlin, who received the Royal Gold Medal in 1869, is also deceased and at a very advanced age.

A comparison of the income derived from subscriptions (exclusive of arrears) shows 3,145l. 16s. in 1884 as against 3,069l. 1s. in the previous year, and 3,059l. 12s. in 1882. A similar comparison between the ordinary disbursements and receipts for the three years shows:—

	1882.	1883.	1884.
Ordinary annual income	23,423	23,757	23,768
Ordinary annual expenditure	3,910	3,99	3,554

[The estimate of income and expenditure for the current year, 1885, exclusive of all trust funds, entrance fees, arrears of subscriptions, special receipts and disbursements, shows a total of 3,735l. on the side of income, and of 3,515l. on account of disbursements, leaving a balance of 220l.]

Special disbursements will be required, during the year, in connexion with the Charter and the new Library Catalogue, and also for the purchase of the furniture in the Arbitration Room.

An Examination in Architecture was held at Manchester, during the week commencing the 23rd of February, 1885, under the auspices of the Manchester Society, assisted by the Chairman of the London Board of Examiners, Mr. Arthur Cates, who at the request of the Council attended at Manchester. Five candidates presented themselves and passed, namely:—

Benson, George, 10, Gray-street, York.

Ogden, Paul, Corporation Chambers, Corporation-street, Manchester.

Spencer, Norman, The Knoll, Fulshaw Park, Wilmslow, Cheshire.

Willink, William Edward, M.A. Cantab., Dingle Bank, Liverpool.

Wood, Edgar, Salford-street, Middleton, Manchester.

An Examination in Architecture was held in London, during the week commencing the 23rd of March, 1885, when nineteen candidates presented themselves, twelve of whom passed, namely:—

Berney, Henry, 61, North End, Croydon.

Cox, Alfred Arthur, 16, St. George's-terrace, Queen's-gate, S.W.

Bagshaw, John, Town Chambers, Ayr, N.B.

Ellison, Archibald Taylor, 4, Queen Victoria-street, E.C.

England, Robert William, Christchurch, New Zealand.

Farrow, Frederic Richard, 32, Craven-street, Strand, W.C.

Misty, James Andrew, 5, Lanhill-road, Paddington, W.

Nisbett Norman Clayton Haslow, 7, Euston-square, N.W.

Pink, Samuel Perkins, 3a, Gartholton-street, Leicester.

Watt, John, 14, Collyer-road, Upper Norwood, S.E.

Yates, Thomas Charles, 24, John-street, Bedford-row, W.C.

Young, George Penrose Kennedy, 24, Marshall-place, Perth, N.B.

Of the twenty-four gentlemen who thus presented themselves for examination at Manchester and London seventeen have received notice that they are qualified to become candidates for the Associateship; * four have been relegated to their studies for one year, and two for two years, with permission to present themselves again for examination after the prescribed period without further payment and without submitting probationary work. The Council have also to report that, in the opinion of the Board of Examiners, the merits of the candidates generally were not such as to warrant the presentation of the Ashpitel Prize, which has not been awarded for two years. The Council trust that the work of future candidates will be of a character sufficiently good to prevent a recurrence of these results.

The recommendation of the Institute that the Royal Gold Medal for the current year be awarded to Henry Schliemann, F.S.A., Hon. Corresponding Member (Achens), D.C.L., Hon. Fellow of Queen's College, Oxford, has received the gracious approval of the Queen, who has notified, through Sir F. H. Ponsonby, that Dr. Schliemann's services are well known to her Majesty. . . .

Among the donations to the library, the Council desire to make special mention of the present of a coloured copy of the great work collated, under the auspices of Napoleon, by the Institut de France, as a memorial of the expedition to Egypt at the end of the last century. For this the Institute is indebted to Mr. James Fergusson, who describes the work as the most magnificent of its class ever produced, and one without which no architectural library, like that of the Institute, can be considered complete.

Proofs of regard and interest from foreign

* Fifteen of these qualified candidates were nominated as Associates at the meeting of the Institute held on the 23rd ult.

† The Description of the Egypt, consisting of ten volumes of text and thirteen volumes of plates, and dealing not only with the antiquities of Egypt, but also its natural history, botany and geology, and other subjects.

Governments, from members of the architectural profession in various parts of Europe and America, continue to be received, and donations of works to the library from these sources have been numerous and gratifying. . . .

The Council have to express their regret that only one essay was submitted for the Institute Medal (with ten guineas), and that it was not of sufficient merit to warrant their recommending it for the prize. The same subject, "Pediments and Gables," has been set for next year, and in accordance with the general wish, expressed at the special meeting for the award of medals and prizes held last March, the sum of 25 instead of 10 guineas is offered as a premium to accompany the Institute medal for essays in 1885-86. They have further to report that neither in this nor in the preceding year have any designs been received in competition for the Grissell Gold Medal for construction, and they are compelled to believe that the principal reason for this marked abatement is the unwillingness or inability of architect-students to touch the important subject of iron construction,—a subject which was set in 1883, repeated in 1884, and is again set for the current year, with the addition of a premium of ten guineas to be given with the medal.

The list of modals, studentships, and other prizes for the current year is one of increased and unusual importance. The foundation of a new studentship, to be held, under conditions, for two years, for the study of architecture, more especially in regard to ornament and coloured-decoration, and the present of a special studentship, to be held in 1886, for the encouragement of the study of Classic architecture and of Classical Renaissance architecture in the kingdom of Italy, are welcome additions to the rewards in the gift of the Institute, for which the Council desire to record their warm thanks. With reference to the former, styled the Owen Jones Travelling Studentship, it will probably be remembered that the late Mr. Whichcord, at the opening meeting of the session 1880-81, stated, after the delivery of his presidential address, that it was the generous intention of the two sisters of the late Owen Jones to bequeath to the Institute a sum sufficient to endow a studentship in remembrance of their brother. Since then one of these ladies has died, and Miss Hannah Jane Jones, in pursuance of her deceased sister's most earnest desire, has transferred the sum of 1,250l. Midland Railway 4 per cent. stock to the Institute, for the purposes of the studentship. With respect to the special studentship of 50l. for the encouragement of study in Italy, the Council have only to add that it is the generous gift of an architect, although not a member of the Institute, namely, Mr. Thomas W. Aldwinckle, of London.

At the General Conference of Architects, held in May last, the following Papers, which form part of the volume of Transactions, 1883-84, were read and discussed, viz.—The duties, obligations, and mutual relations of architect, client, and contractor, with reference to English and foreign practice, by Arthur Cates, Member of Council; the Tenure of Land for Building Purposes, by Thomas Blashill, Fellow; the late George Edmund Street, R.A., President, by the Rt. Hon. A. J. B. Beresford Hopo, M.P., Past-President; the late William Burgess, A.R.A., Fellow, by George Aitchison, A.R.A., Member of Council; the late Eugène Emmanuel Viollet-le-Duc, as Architect and Art-historian, by Mr. Charles Wethered; the French *Diplôme d'Architecte* and the German System of Architectural Education, by R. Phené Spiers, F.S.A., Fellow; English Architecture Thirty Years Hence, by Professor Kerr, Fellow. A full report of the work of the conference appeared in the *Builder*, and an official record of it is preserved in the Journal of Proceedings, 1833-84, p. 161. An account of the same, * communicated by Charles Lucas, Hon. Corr. Member to the Société Centrale des Architectes, Paris, at a Conference of French Architects held in July of last year, is also published by that Society, with a commentary note by M. Paul Wallon, the Secretary and Director of the Paris Conference.

The Special Conference on the sanitary con-

* La septième Conférence générale des Architectes britanniques (Londres, 5-9 Mai, 1884).—Notes de Voyage et Extraits divers. See Conférences faites au siège de la Société Centrale des Architectes, 1884, pp. 59-81. See also the *Bulletin Mensuel*, No. 2, Feb., 1885, pp. 71-79, of the Société Centrale des Architectes, Paris, for an analytical report upon the two last volumes of the Transactions, 1882-83 and 1883-84, by Charles Lucas, Hon. Corr. Member.

struction of houses, which was held under the auspices of the Institute during three days in July last, at the International Health Exhibition, elicited some interesting discussions. A full report of the work of that Conference has been published by the Executive Council of the Health Exhibition and the Council of the Society of Arts, and it forms part of volume ii. of the "Health Exhibition Literature." An official record of it is also preserved in the Journal of Proceedings 1883-84, page 177. . . .

The Council have pleasure in stating that the Compositions Committee have made considerable progress in the work that lies before them. In the course of the year a circular-letter, setting forth the objects and aims of the architects who have signed the undertaking, has been sent to all the mayors and other public functionaries throughout the United Kingdom, as far as their names and addresses could be procured; and a letter, with the same intention, has been addressed to the editors of the leading metropolitan journals. The reason for this step was to acquaint those addressed, and the public generally, with the views of the large number of architects who had signed the undertaking; that they will not take part in any public architectural competition, unless an architect of established reputation is appointed to advise the promoters upon the relative merit of the designs submitted in that competition; and so to impress upon promoters the advisability of an assessor being appointed as the initial step. At the present time the number of adhesions from architects exceeds 1,400. From March, 1884, to the present date, the committee have been in correspondence with the promoters of forty-six competitions, and have been mainly instrumental in procuring the appointment of assessors in fourteen cases, over thirty per centum of the entire number applied to, a result which may be considered on the whole satisfactory, considering the short time the scheme has been on foot, and the long time it takes to reform any abuse. The greatest drawback to success lies in the fact that a large number of architects will still compete, no matter what the conditions are, so that promoters can easily procure architects to send in designs, without the condition of an assessor being appointed. Were support given by those who have not yet signed the undertaking reform would be very soon secured. The committee appeal to all those who have the honour of the profession at heart to aid them in their endeavour to procure fairness in the conduct of architectural competitions.

In respect to the Charter, the Council have carefully considered a memorial presented in November by more than 450 Associates, as well as representations received from non-metropolitan members, and, having availed themselves of the services of a solicitor who had large experience in advising on such matters, they are now in a position to consult with the Associates' Memorial Committee and with delegates from non-metropolitan societies. The Council therefore hope to be able shortly to lay the result of their inquiries before a special general meeting of the Institute, for the consideration of the general body of members.

The Professional Practice Committee have held four meetings, at which subjects of much importance have been considered and dealt with. An application to be admitted into the class of Fellows, which was received from an officer of the Royal Engineers, has been carefully considered by the Council, but it was found that no power existed under the Charter to admit as professional members such military officers, who, so long as they remain in the service, and whatever their particular employment may be, are eligible only for admission to the class of Honorary Associates.

The resignation of some non-metropolitan members having occurred at the close of 1884, on the sole plea that they are resident at too great a distance from London to attend the Institute meetings, the Council venture to urge that the corporate body of British Architects exists for a higher purpose than that of a general meeting, or for the maintenance even of a library. It exists for the advancement of architecture as a profession, as well as an art and a science, and in this country where the State remains neutral, academies, institutes, and such learned societies, depend entirely upon the support and co-operation of individuals, a matter, the Council think, of as much importance to architects throughout the country as to those of London.

ON RENDERING WOOD FOR BUILDING PURPOSES NON-INFLAMMABLE.*

TOMLINSON says that out of forty salts tried, four only were applicable to light fabrics, viz., phosphate of ammonia, chloride of ammonium (sal ammoniac), sulphate of ammonia, and tungstate of soda. The sulphate of ammonia is the cheapest salt, but causes brown spots on the muslin when ironed, and dissolves in water, so that it has to be renewed after every washing; tungstate of soda is, therefore, usually adopted. The oxides of tin withstand both water and soap, but render fabrics yellow; consequently their use is restricted to canvas, sails, and other coarse materials, but this would not affect their use with wood. This is also the case with borate and phosphate of protoxide of tin and arseniate of tin. These last are some of the attempts which have been made to fix some of the non-soluble compounds in textile fabrics.

The method of rendering sail-cloth permanently non-inflammable is to soak the canvas for two days in a protochloride of tin solution of the strength of two parts of the salt to one of water, and to leave it for a day in a concentrated solution of stannate of soda or carbonate of soda. The canvas is dried, and is then ready for use. So much for fabrics. Many of the objections to which the above solutions are liable would not affect their use for wood, and they may be well added to our list to help us to the selection of the most suitable one hereafter. The English Cyclopaedia says "many methods have been devised for making wood more or less fireproof. The substance which is most attracting notice now is silicate of soda." Mr. Abel, chemist to the War Department, England, and Mr. Hay, chemist to the English Admiralty, made experiments with this salt in 1857 on a wooden hut, painted three times inside and out with a solution of silicate of soda; but, unfortunately for the fairness of the experiment, the building (erected to try other experiments with) was constructed with a double boarding, so that it was only possible to coat or impregnate each plank on one side, but the value of the silicate was established beyond a doubt. A flame from a large heap of shavings played against the building for some minutes, but only succeeded in catching the end of one plank, and even that did not blaze, but only smouldered a short time. By the heat of the fire the salt was drawn to the surface of the wood, and formed a glaze upon it. Subsequently, when the whole hut was destroyed by fire, although the fierceness of the flame was such that few materials could have withstood it, yet several planks remained of the exterior coated portion. Upon examining the planks, the unprotected surfaces were found to be charred, but the charring only extended to those parts which had not been touched by the silicate. Asbestos paint has been used with nearly similar results. So far as experiment has gone, silicate of soda appears the most convenient and effective known for the purpose. Spon's "Workshop Receipts" says, respecting silicate of soda.—Deal boards become almost incombustible when painted with a diluted solution of silicate of soda, called glass water. The glass water is generally sold as a thick fluid like honey. This may be thinned out with water six or seven times its own bulk, the water must be soft, or boiled water will do, and apply the solution warm. In about twenty-four hours apply a second coat, and perhaps a third; use a new brush, and wash the brush clean after using, or it will become soft. Avoid grease or fat on the boards before painting them." In the same book is another receipt, as follows. The timber to be soaked four or five days in a solution of 1 lb. of alum and 1 lb. sulphate of copper to 100 gallons of water, in a tank sufficiently large to allow of the timber being kept immersed. The wood to be allowed to thoroughly dry before using. This would be a good plan to adopt with the large upright timbers after having injected them whilst green by the Boucherising process. Though owing to the blue tinge given by sulphate of copper that salt could hardly be suitable for interiors where the lighter woodwork was plain, yet chloride of zinc might be used for every part of the wood in a house,

injecting it while the wood is green, as it acts chemically on the sap and is white. Sir W. Burnett says, "Salt water only increases its efficacy. It is perfectly innocuous, and cannot endanger health. All the timbers and ceilings of a ship may be impregnated with the solution without the slightest prejudicial effect on the crowded inmates. It prevents the oxidation of metals, as has been proved repeatedly on copper and iron bolts with the most satisfactory results, and articles prepared with this solution resist combustion in proportion to the strength of the solution." By Maughan's process dry wood is saturated with an aqueous solution of phosphate of soda and muriate or sulphate of ammonia; a decomposition ensues, followed by an evolution of ammoniacal vapour, and the formation of an incombustible coating on the surface of the wood. Jackson's patent consists in the application of salts of zinc and ammonia. Mr. Payne's process of rendering wood fireproof is by pressing a solution of sulphuret of calcium or barium into the wood in a confined tank and allowing it to remain at a pressure of 110 lb. to 140 lb. per square inch for an hour, then drawing off the solution and treating the wood in a similar manner with an acid, or a solution of some substance such as sulphate of iron, which will unite with the barium or calcium and set the sulphur free. When the wood is to be impregnated with a large amount of solid matter it should be dried before the application of the two fluids. By this means an insoluble sulphate of lime or sulphate of barium is formed in the body of the wood, which is thus rendered nearly as hard as stone. Wood so prepared is now largely employed on English public works and railways. The most porous, the softest, and, of course, the cheapest woods, are rendered equal in point of usefulness, durability, and strength to the hardest and best descriptions of timber, and are susceptible of a high polish.

Professor Fuchs invented a solution of ten parts of potassa or soda, fifteen parts of fine silicious earth, with one part of charcoal mixed with water. This composition applied to the surface of the wood forms a vitreous coat which effectually resists the action of fire. Decisive experiments have fully established the efficacy of this plan, and the Royal Theatre of Munich was protected by the application of it. The surface covered was upwards of 400,000 square feet, at an expense of 200l., or 100 square feet for 1s.

A somewhat similar English composition consists of one part by measure of fine sand, two parts of wood ashes, and three parts of slaked lime, ground together with oil and laid on with a painter's brush, the first coat thin and the second thick. This forms a strong adhesive compound, both fire and water proof.

Saloman's patent consists in an application of two solutions to the surface of the wood. The first consisting of sulphate of alumina, glue, and water, the second of chloride of calcium, glue, and water.

In Spon's "Workshop Receipts" a wash composed of lime, salt, and fine sand or wood ashes, is recommended to be put on in the ordinary way of whitewash; it renders a shingle roof fifty-fold more safe from fire from falling cinders in case of fire in the vicinity. It has also a preserving effect against the weather, and the older and more weatherbeaten the shingles, the more benefit derived. Such shingles are generally more or less warped and cracked, and the application of the wash to the upper surface restores them to their original form, thereby closing the space between the shingles, whilst the lime and sand by filling up the cracks prevent them from warping. By the addition of a little lamp black the wash may be made of the same colour as the old shingles, and thus remove the offensive glare of a whitewashed roof.

Such is the information we are able to glean so far, and before offering any suggestion of our own, let us remember that to season timber in the ordinary way requires seldom less than three years', often six or eight years', exposure to the air freely. Whereas, by the Kyanising (chloride of mercury) process, rendered unfit for our purpose by the suffocating fumes thrown off on exposure to great heat, the Boucherising (chloride of zinc), the Boucherising (sulphate of copper), and the Bearing (borax) systems, the destructive principle (sap) is of all kinds, willow, birch, elm, beech, ash, poplar, &c., of considerable value for durable purposes.

We would suggest the following, giving pro-

ference to the solutions recommended in the order named:—

For houses already built, apply several washings of silicate of soda, sulphate of copper, or borax, to the fixtures of every description, and let all movable lighter wood, roof shingles (when used), mats (as used in Japan), &c., soak several days in the same solution.

Where shingle roofs are used let them be afterwards coated with lime, salt, and fine sand or wood ashes.

Where houses are to be built, impregnate the main or thick timbers thoroughly with chloride of zinc, sulphate of copper or borax, by pressure obtained as in Boucherising, whilst the timber is green, allow it to dry thoroughly before fixing, and paint the outside with silicate of soda three times when in position.

The lighter woodwork, shingles, &c., can be cut from large balks thus impregnated, and afterwards washed superficially with silicate of soda, or this woodwork may be saturated by steeping in silicate of soda, chloride of zinc, or borax, but with a coat of silicate of soda outside all.

By the use of the above comparatively simple and inexpensive remedies all complicated steam-pressure paraphernalia, vacuum pumps, &c., are avoided. The area of fires would be greatly reduced, whilst the insurance companies would be able to take risks which at present they refuse to do, even on stone buildings if the roofs are of shingle. In Jamaica and other parts this is much felt. The general application of these precautions in many towns would permit of a sufficiently large reduction on insurance premiums to, of itself, pay the interest on the initial cost of thus treating the timber used in our dwellings. We say nothing of the daily risks to life and property. In the foregoing paper we have freely borrowed from every authority we could meet with, but the occurrence of fires in timber-built towns, destroying areas up to one square mile and a half at one fell swoop, must be our plea.

Messrs. Jessop & Co., of 43, Mincing-lane, have kindly given us the following quotations, subject, of course, to fluctuations of the market and reductions in the price on taking large amounts:—

Borax crystals.....	443 0 0	per ton, for large quantities.
" " ground.....	46 0 0	" "
Alum crystals.....	6 0 0	" 2l.
" " ground.....	6 15 0	" "
Phosphate of soda.....	55 0 0	" "
Silicate of soda.....	75 0 0	" "
Phosphate of ammonia.....	27 2 2	per lb.
Chloride of ammonium.....	0 0 9	" "
Sulphate of copper.....	1 0 0	per cwt. 24.
Bichloride of mercury.....	0 2 4	per lb. 24.
Sub. ".....	0 3 0	" "
Chloride of zinc, cake.....	0 1 4	" "
" " sticks.....	0 2 0	" "
Sulphate of iron.....	3 0 0	per ton, 21.
Sulphate of Alumina.....	8 0 0	" "

ELECTION OF A DISTRICT SURVEYOR.

At the meeting of the Metropolitan Board of Works on the 24th ult., the first business was the election of a District Surveyor for East Kensington. There were thirty-one candidates, viz., Messrs. A. Ashbridge, T. Batterbury, H. H. Bridgman, C. W. Brooks, H. Cheston, S. F. Clarkson, J. S. Edmeston, G. Edwards, J. M. Ferguson, R. F. C. Francis, W. Grellier, J. Hamilton, W. J. Harcastle, A. Harland, E. Haslehurst, G. Inskipp, G. Jackson, G. A. Lean, H. Lovegrove, H. McLachlan, E. Marsland, T. E. Mundy, R. C. Murray, W. H. Nash, O. Renton, W. Smallpeice, L. Saloman, W. L. Spiers, W. H. Stevens, H. W. Stock, and E. Street.

In the preliminary voting, for reducing the number of candidates to six, the successful ones were Messrs. Ashbridge, Clarkson, Harcastle, McLachlan, Marsland, and Street. The subsequent voting was as follows:—

	2nd	3rd	4th	5th	Final
	Vote.	Vote.	Vote.	Vote.	Vote.
Ashbridge.....	21	13	—	—	—
Clarkson.....	16	15	16	—	—
Harcastle.....	24	22	16	10	—
McLachlan.....	14	—	—	—	—
Marsland.....	33	34	34	35	34
Street.....	24	21	29	22	10

* This tie was decided in favour of Mr. Harcastle. Mr. Marsland was therefore declared elected.

The Westminster Hall Restoration.—

On Monday the Select Committee on Westminster Hall restoration held their last sitting, under the presidency of Mr. Shaw-Lefevre, and agreed upon their report.—Times.

* A paper by Mr. Thomas M. Rymer-Jones, Memb. Inst. C.E., F.R.G.S., and Mr. John Rymer-Jones, Memb. Inst. Tel. E., read before the Civil and Mechanical Engineers' Society on Wednesday, the 22nd inst. See p. 659, ante.

Illustrations.

CHELSEA VESTRY HALL.

WE publish this week the selected design in this competition. The architect is Mr. J. M. Brydon, and the work is to be proceeded with at once. As will be seen from the drawings, the large hall is placed in the line of the present offices, and is reached by three entrances from King's-road. Corridors (lighted from the ceilings) on each side give access to the principal hall. Its dimensions are 51 ft. by 45 ft., and 35 ft. 6 in. high. A gallery is formed over the reception-lobby at the north end, and so does not project over the floor of the hall. Accommodation is provided for about 550 people in the area, and 150 in the gallery, or a total of 700 in all. The hall is lighted from the sides and ends, and has separate access to the platform at the south end. The retiring-rooms are on each side of the central corridor, which joins the reception lobby.

On the west side of the Vestry-hall is the secondary hall, lighted from the south and west. Its dimensions are 50 ft. by 31 ft., and 22 ft. high. Service-rooms adjoin it on the north side. The committee-room is in the corresponding wing on the east side, and measures 28 ft. by 27 ft., and 22 ft. high. Adjoining it is lavatory, &c., accommodation for the platform. Access is also provided to the corridor leading to the platform from Mauor gardens by the haement. There is a basement under the whole of the building, consisting of cellarge, heating-chamber, kitchen offices for public entertainments, spare room, lavatory, &c.

The style is English Renaissance, freely treated. Externally the buildings are to be faced with red bricks, with Portland stone for pilasters, cornices, window dressings, &c. Internally the halls and committee-room are to have dadoes and doors of wainscot or American walnut, and the walls above finished in plaster. The pilasters of the Vestry-hall are to be in marble or scagliola, but the question of further coloured decoration is reserved for future consideration, when the work will be thoroughly dry and in a fit state for painting. The estimated cost is 15,000l.

THE PINES, MIDHURST.

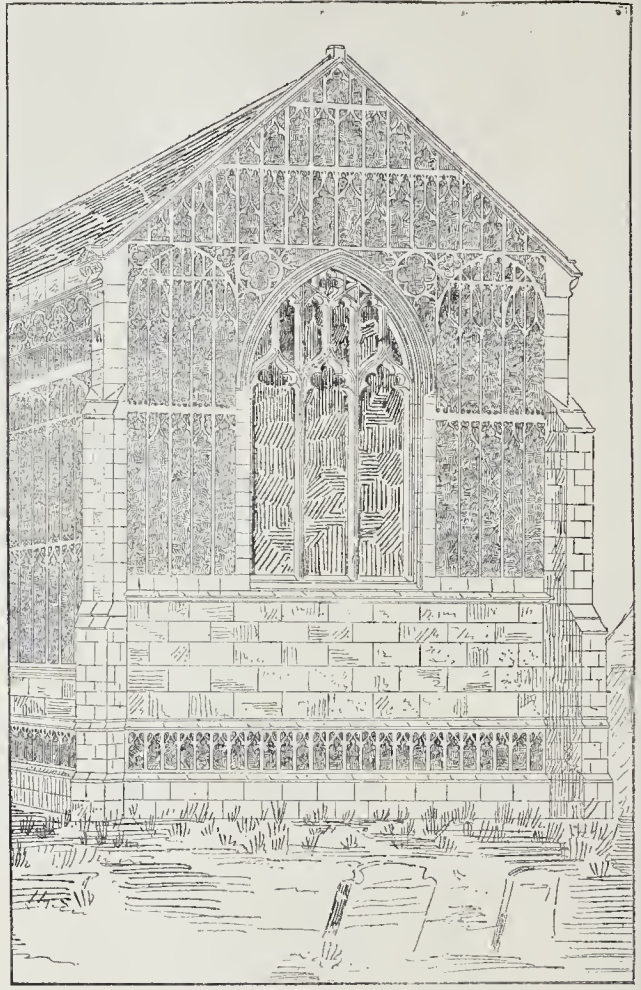
This house, the residence of Mr. John Costeker, stands in a prominent situation on the brow of a hill about a mile from Midhurst, overlooking the Chichester-road, and commanding extensive views of the South Downs.

It is built and finished in wood, no plaster being used internally either for walls or ceilings, and the foundations and chimney-stalks only being of brick. Mr. Frank T. Baggally was the architect, and Mr. T. Gregory, of Clapham Junction, was the builder.

THE CHURCH OF ST. MICHAEL, AT COSLANY, NORWICH.

The church is a good example of the Perpendicular Period; has nave, north and south aisles, a chantry chapel to St. John the Baptist, and chancel and fine tower with eight bells. The south aisle known as Thorp Chapel has on the exterior one of the most remarkable specimens of flintwork in the kingdom. The following extract is quoted from the parish books:—

"At the East End of this Isle, is a Chapel of beautiful workmanship made with Freestone and black flints: this is the Chantry Chapel of the Virgin Mary, which was built and endowed with lands and houses in Norwich, Barnham Broom, Huntingham, Sprowston, Heigham, and Wood-Dallyng, by Robert Thorp, the Founder, in the time of Hen. VII. He lies buried here under a stone which hath his own Effigies, and those of his three Wives and three boys, and two girls, but the inscription is lost, though the most part of it is preserved by Mr. Weever, folio 503. It had the Arms of Thorp. Arg. 3 Crescents Arg. on the first shield, and the same Arms impaled with those of his three Wives, his second wife's Arms remain, viz., a Tress nebuled between 3 wolves heads (erased). Pray for the soul of Robert Thorp Gentleman Citizen and Alderman of Norwich Founder of this Chappyll and He, with a Chantry prest, he to sing perpetually for the soul of Robert Thorp, the sowls of Elizabeth, Emme, and Agnes, sowls his Wyffs; the soul of



Chancel of St. Michael's Church, Coslany.—New Flint Tracery and Restored East Window.

John Thorp his kindry sowls and all Christen sowls, the which Robert . . .

The several Chantry priests that serv^d here are buried in this Chapel the first of which was Sir Richard Wallourne or Waller.

Anno 1524 Robert Long citizen of Norwich and Agnes his wife gave to Gonville Hall in Cambridge, the perpetual donation to this Chantry, on condition they constantly nominated an honest priest, or Fellow of their College, to reside constantly in the house belonging to Thorps Chantry priest in Norwich, and daily to serve the said Chantry."

It will be noticed that every compartment of the tracery is of a varied character, and the whole presents an excellent study of harmony and beauty in design. The south and east walls of the chancel consisting only of rough flint walling, and presenting a sad contrast to the Thorp Chapel, the opportunity was taken by Mr. H. Bullard to have the chancel walls faced with tracery flint-work. The east window was found built up inside the wall, and had for some centuries been blocked up. A new window on the old lines was therefore inserted, and the tracery on each side designed in proportion. The panels between the tracery are filled with black cut and squared flints, and laid so close (as in most good Norfolk flint-work) that the point of a knife can hardly be passed between the joints. The work has been executed by Mr. W. Hubbard, contractor, of East Dereham.

In the interior of the chancel the old choir seats have been removed, the floor of which has

been raised, and, with the sacarium, laid with a design of encaustic tiles by Messrs. Maw & Co.

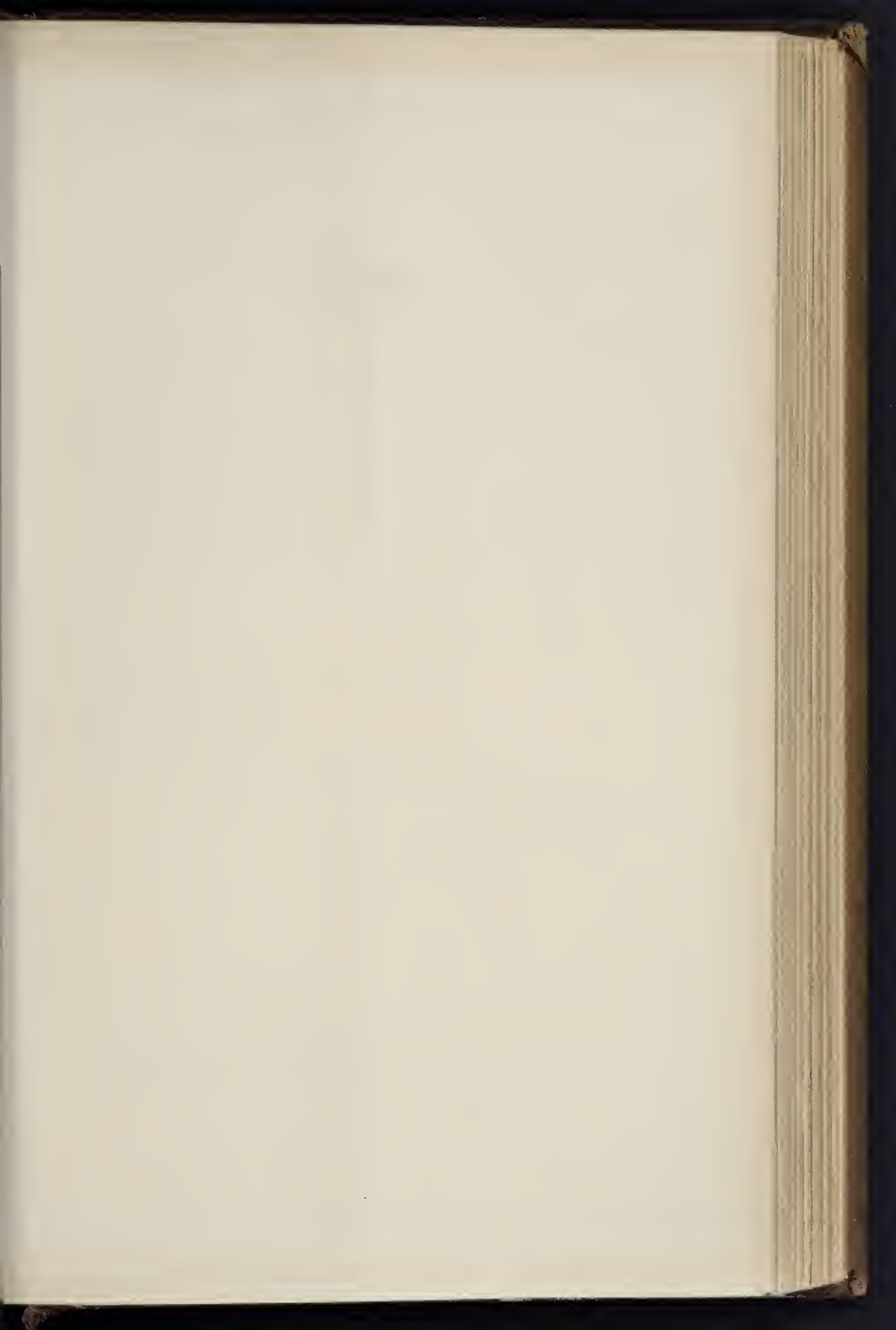
New seats for thirty choristers, and reading-desk in pitch pine, have been provided, and a new organ has been built by Messrs. Norman & Co., of Norwich.

The whole of the works have been carried out from the designs, and under the superintendence of Mr. E. Preston Willins, A.R.I.B.A., Norwich. The ancient work is illustrated in the lithograph, from measured drawings furnished by Mr. Willins, and the accompanying cut illustrates the new work in the same style which has been added.

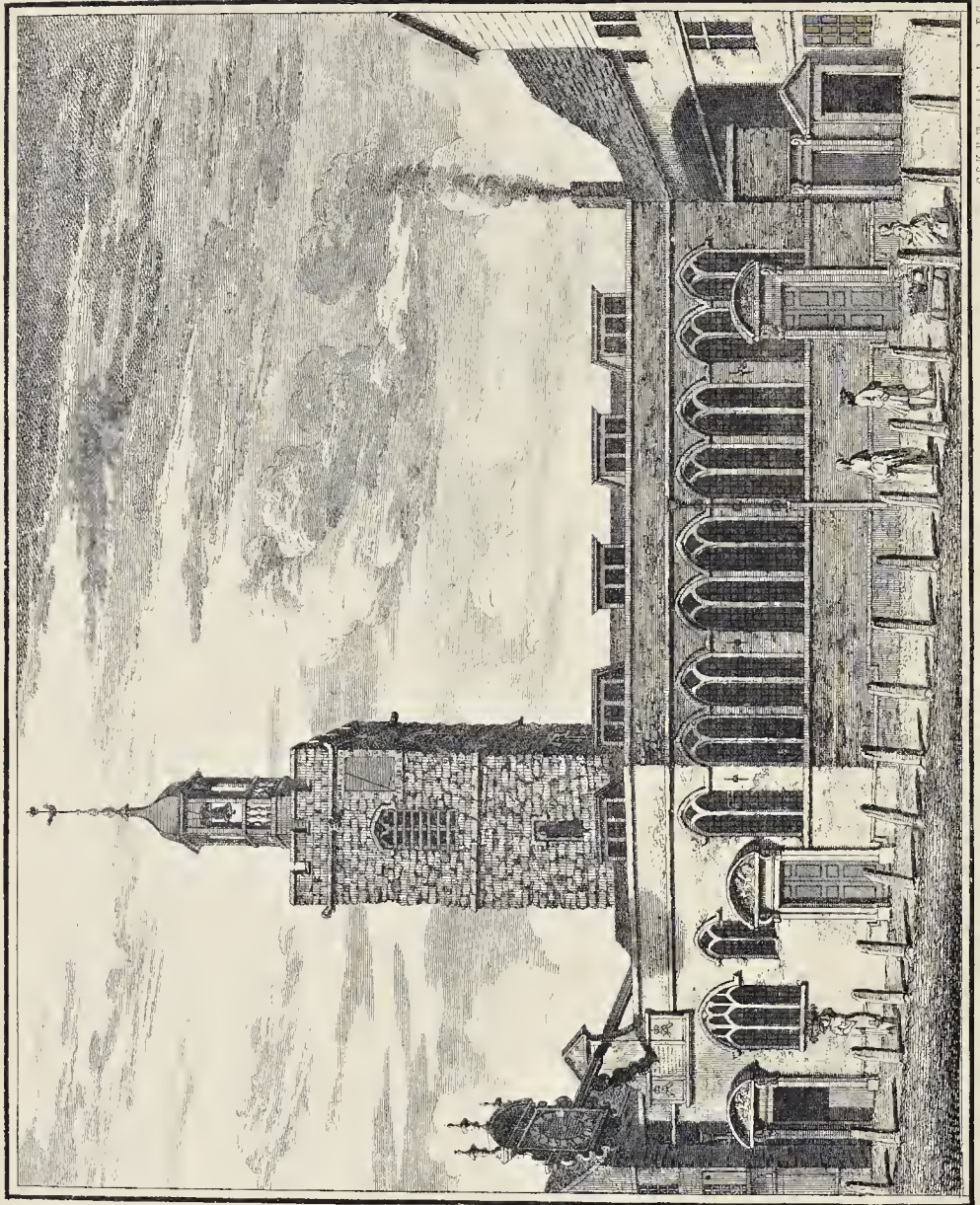
OLD LONDON CHURCHES.

This week we give views of two more of the churches referred to in Mr. Loftus Brock's paper, for which see pp. 580 and 612.

The National Liberal Club.—It may be remembered that in the latter part of last year some correspondence took place in a daily paper, and was noticed in our columns, to the effect that Mr. Waterhouse's original design for this building had been spoiled by official interference on the part of a Government office. Mr. Waterhouse's explanation of the matter, showing that this charge has been unfounded, will appear in our next. We have been requested to mention this in advance, as it is desirable that the misunderstanding should be removed.

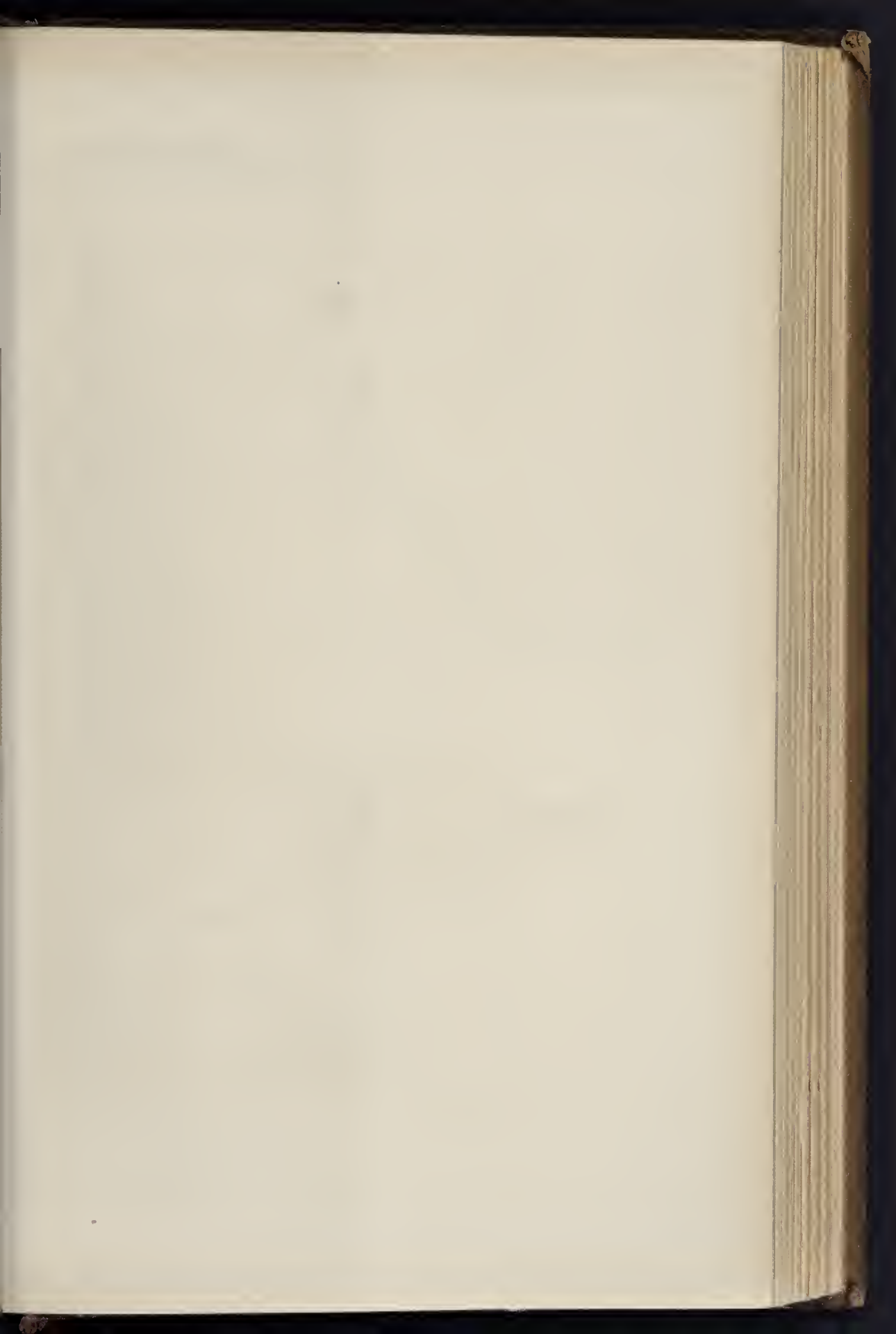


THE BUILDER, MAY 2, 1885.

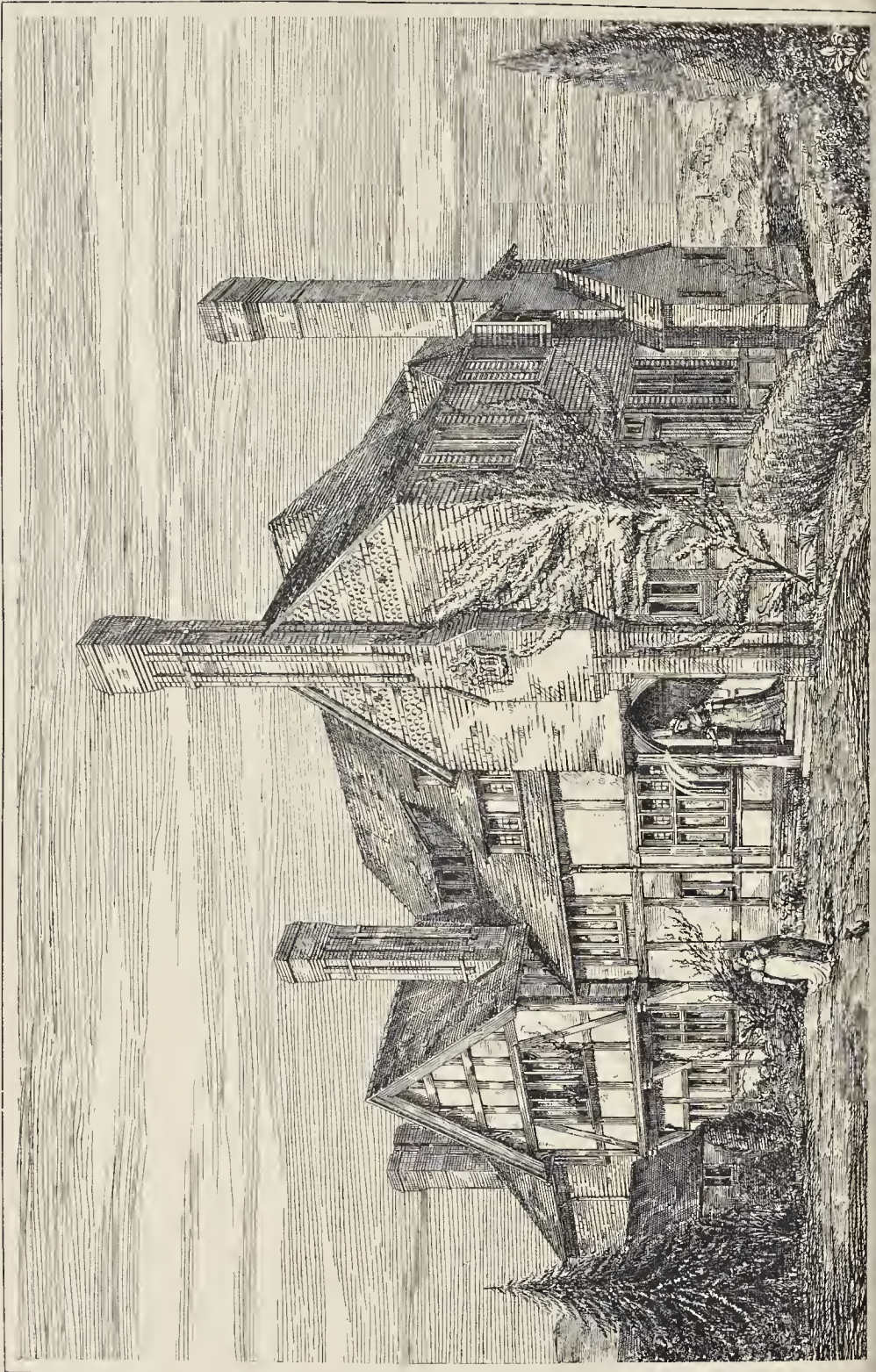


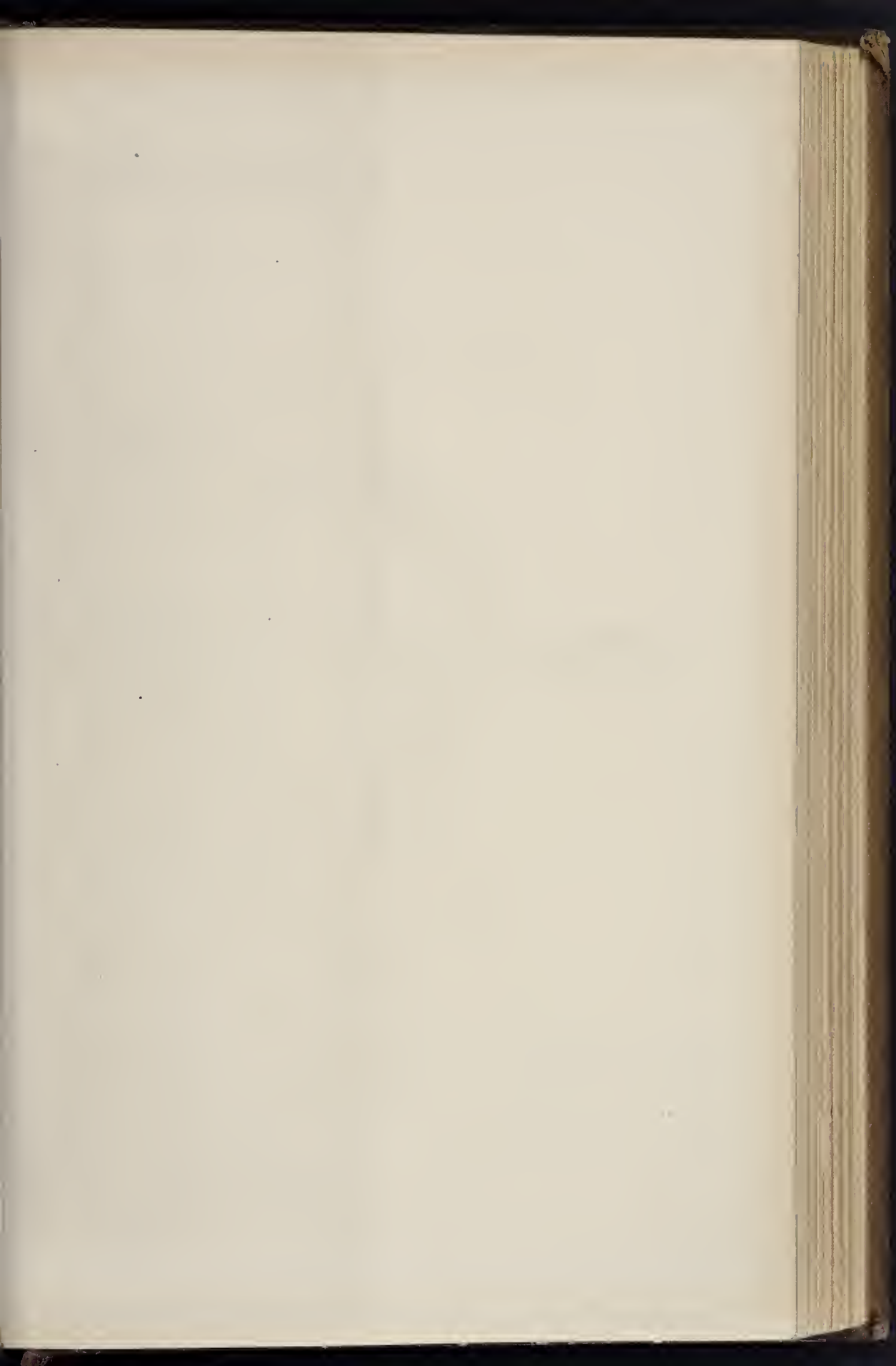
C. F. Hall Photo-Litho London E.C.

OLD LONDON CHURCHES. *St. Olave, Southwark.*

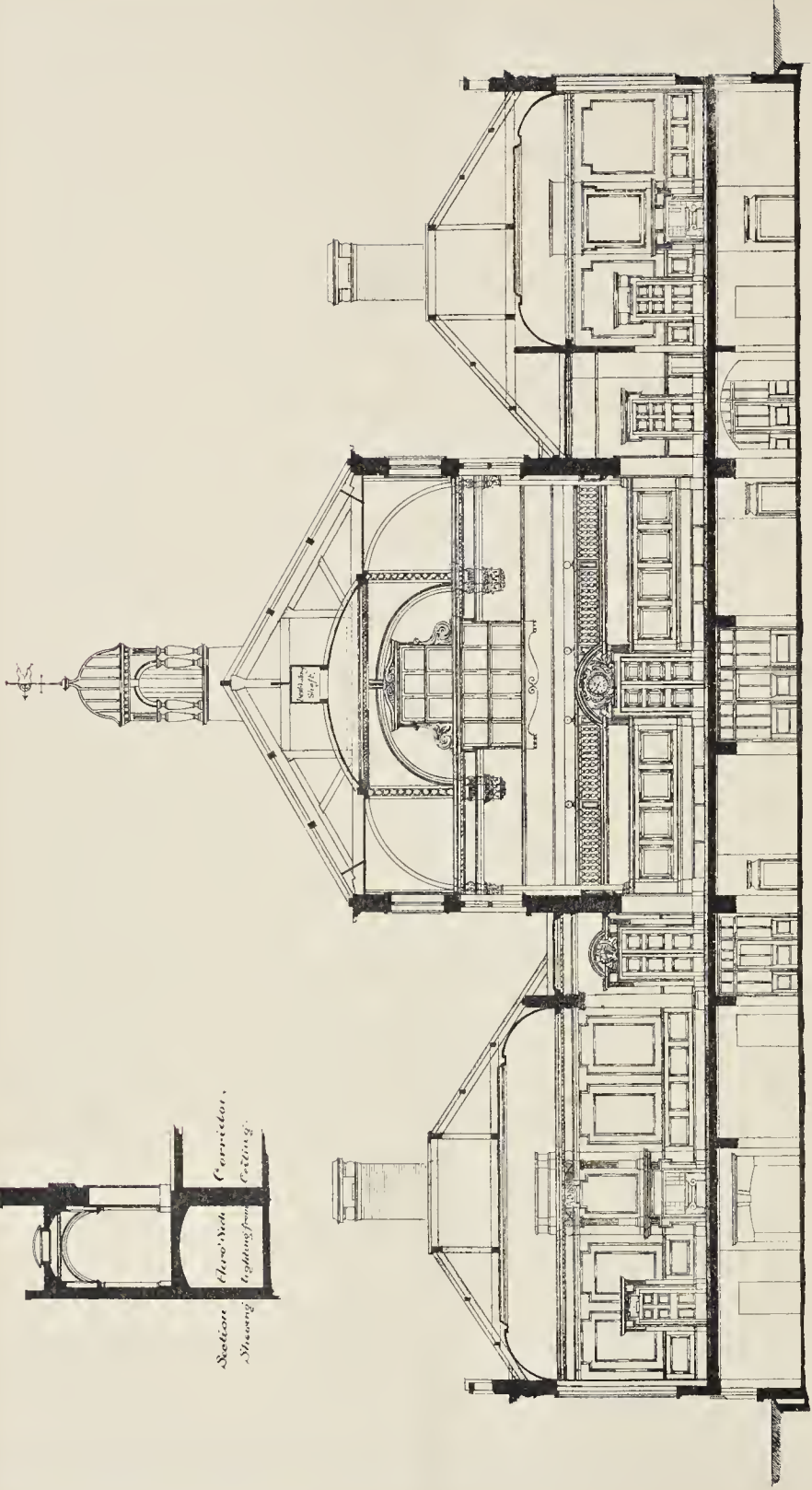
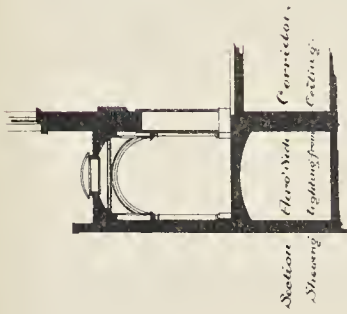


THE BUILDER, MAY 2, 1885.



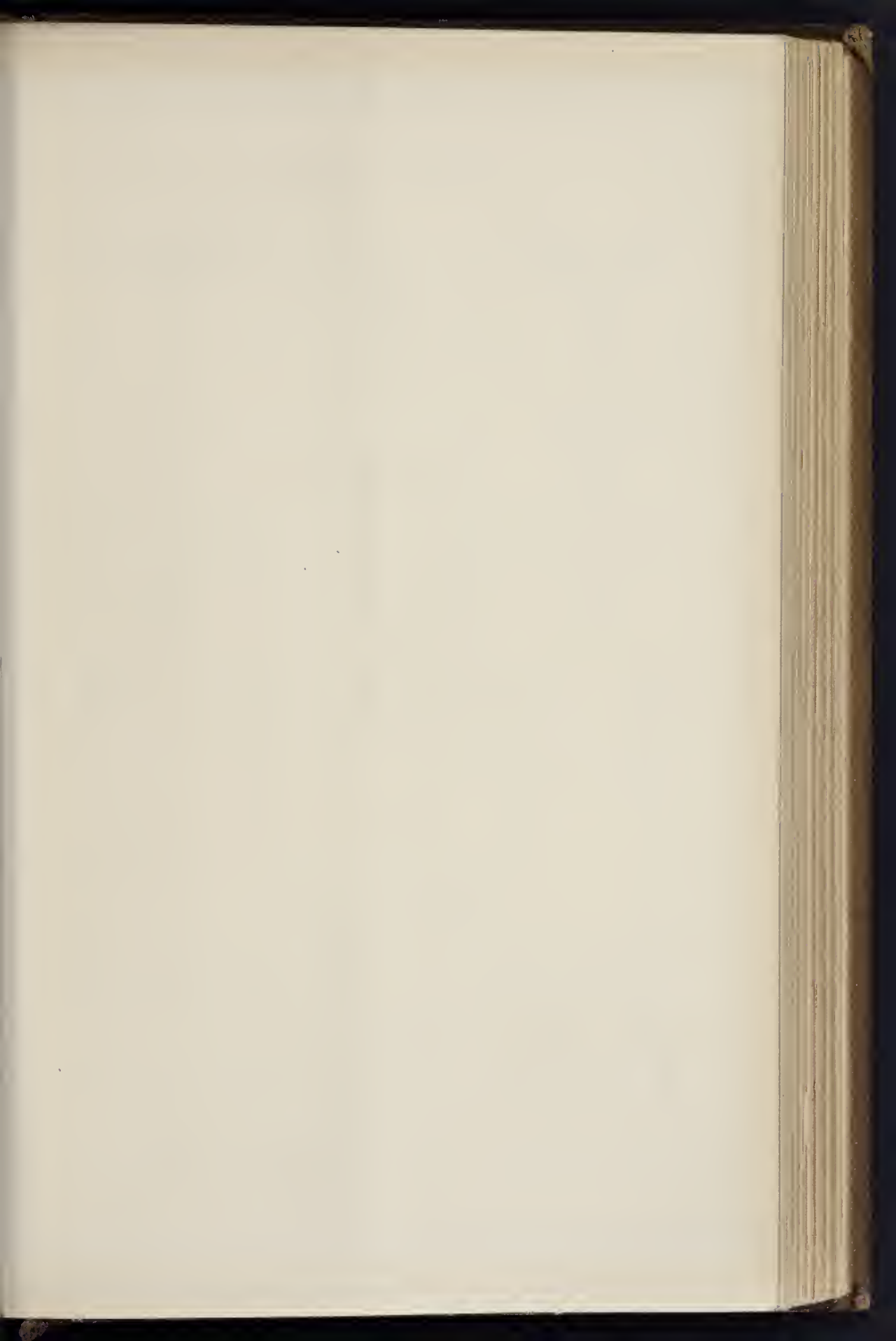


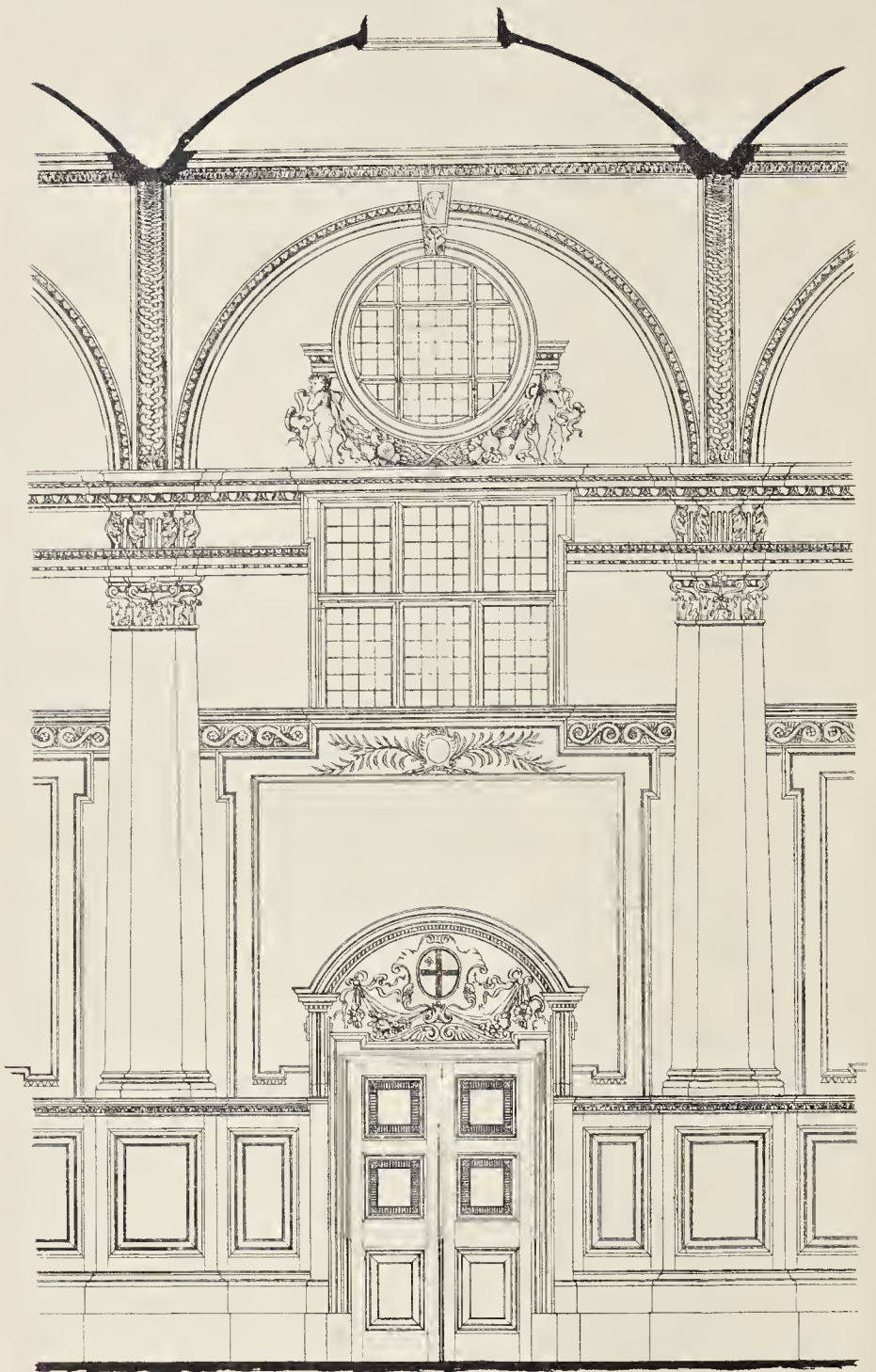
THE BUILDER, MAY 2, 1885.



Section on line A-B:

Scale of 1/4" = 1' 0" 2' 0" 3' 0" 4' 0" 5' 0"





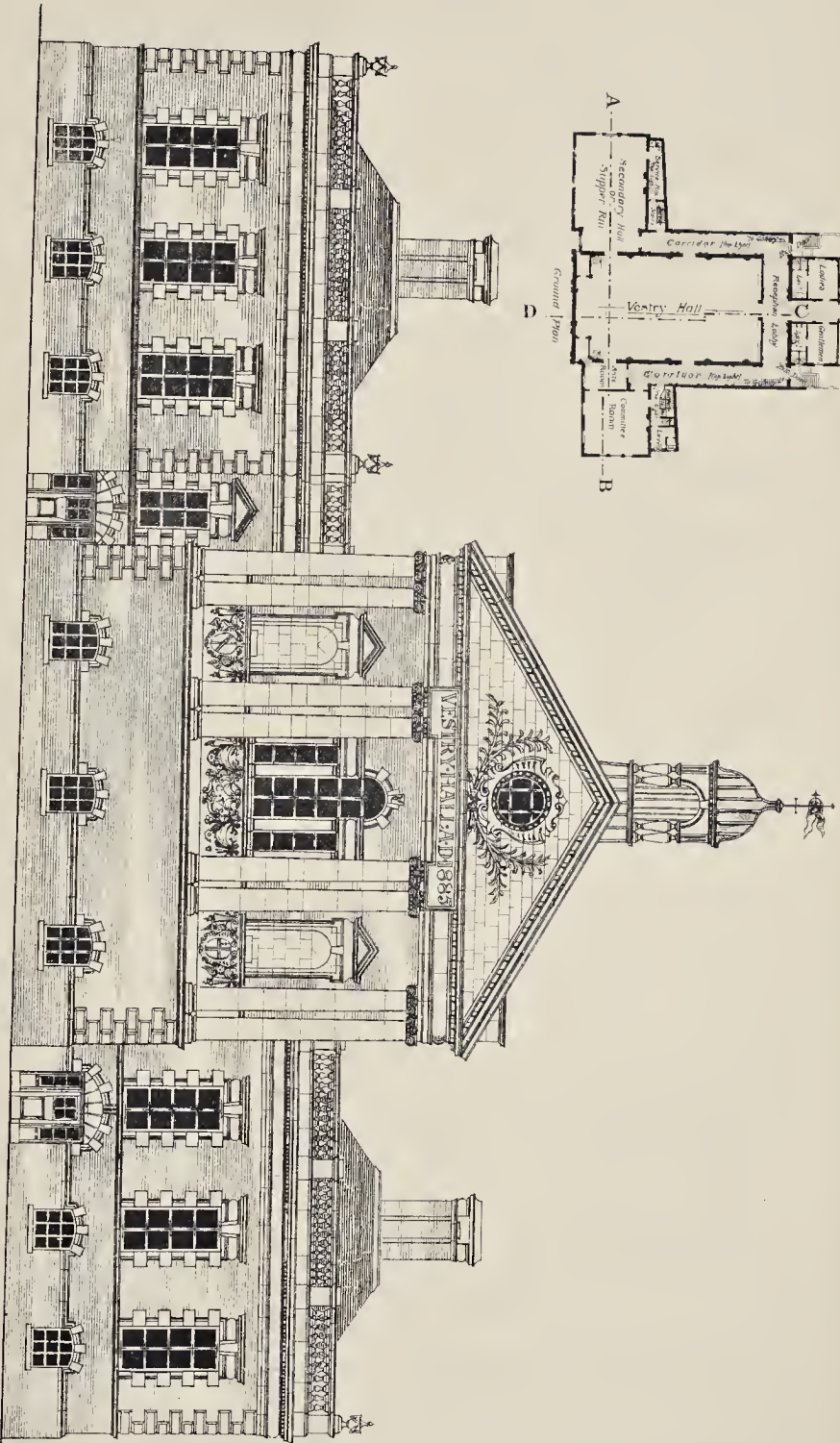
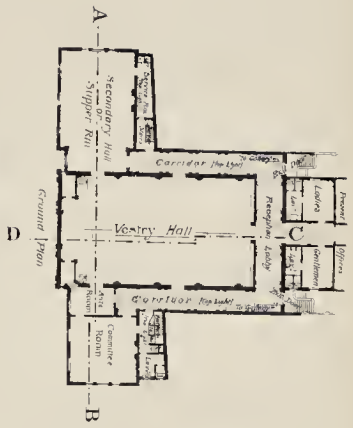
Detail of One Bay of Vestry Hall.

Scale of Feet 1 2 3 4 5 6 7 8 9 10 Feet

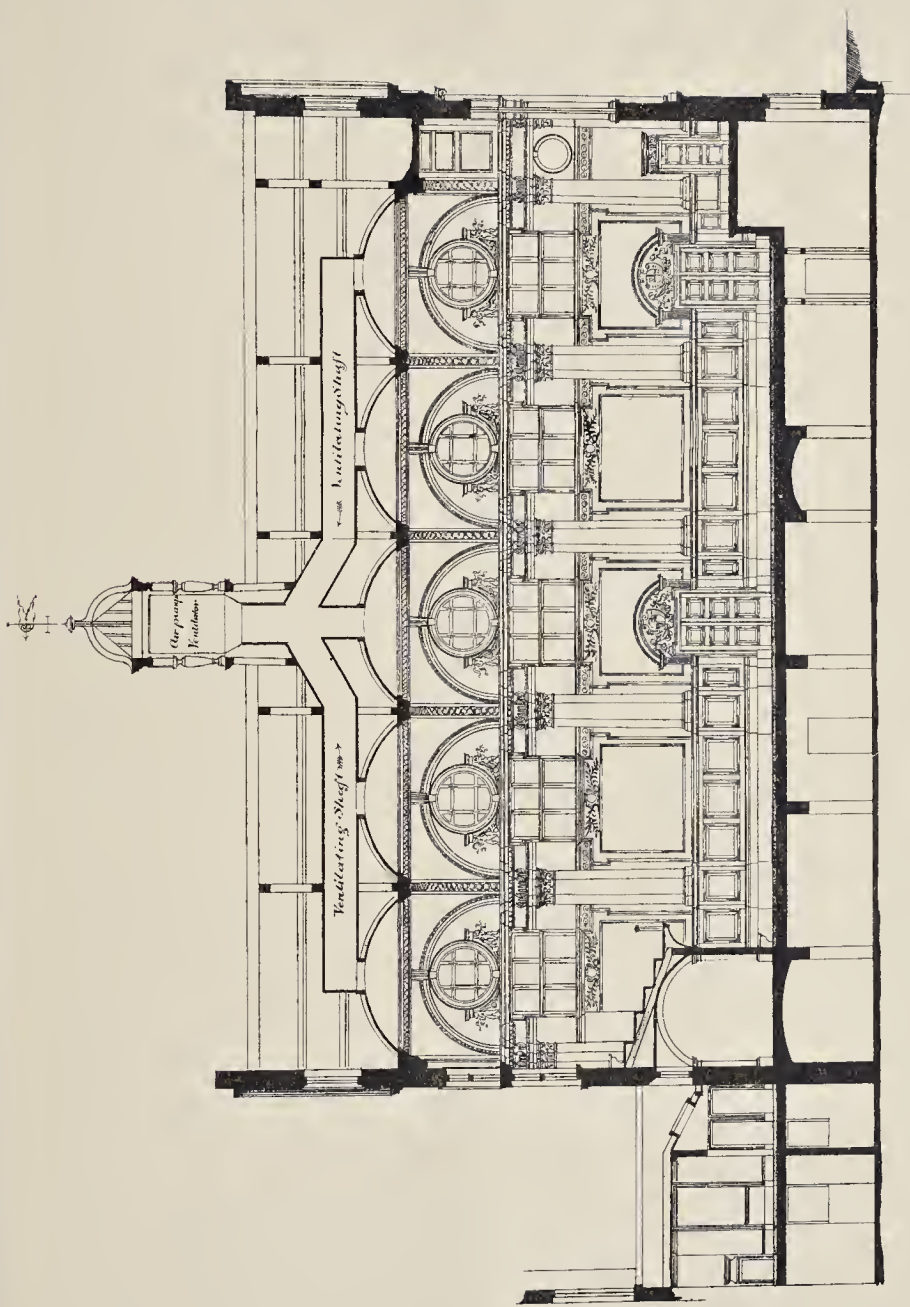
C. F. Kelly Photo-Lith. & Printer, 5, Castle St., Holborn, London, E.

SELECTED DESIGN FOR NEW VESTRY HALL, CHELSEA.

By J. M. Estlin, F.R.I.B.A., Architect.



Scale of 1" = 10' 20' 30' 40' 50' feet

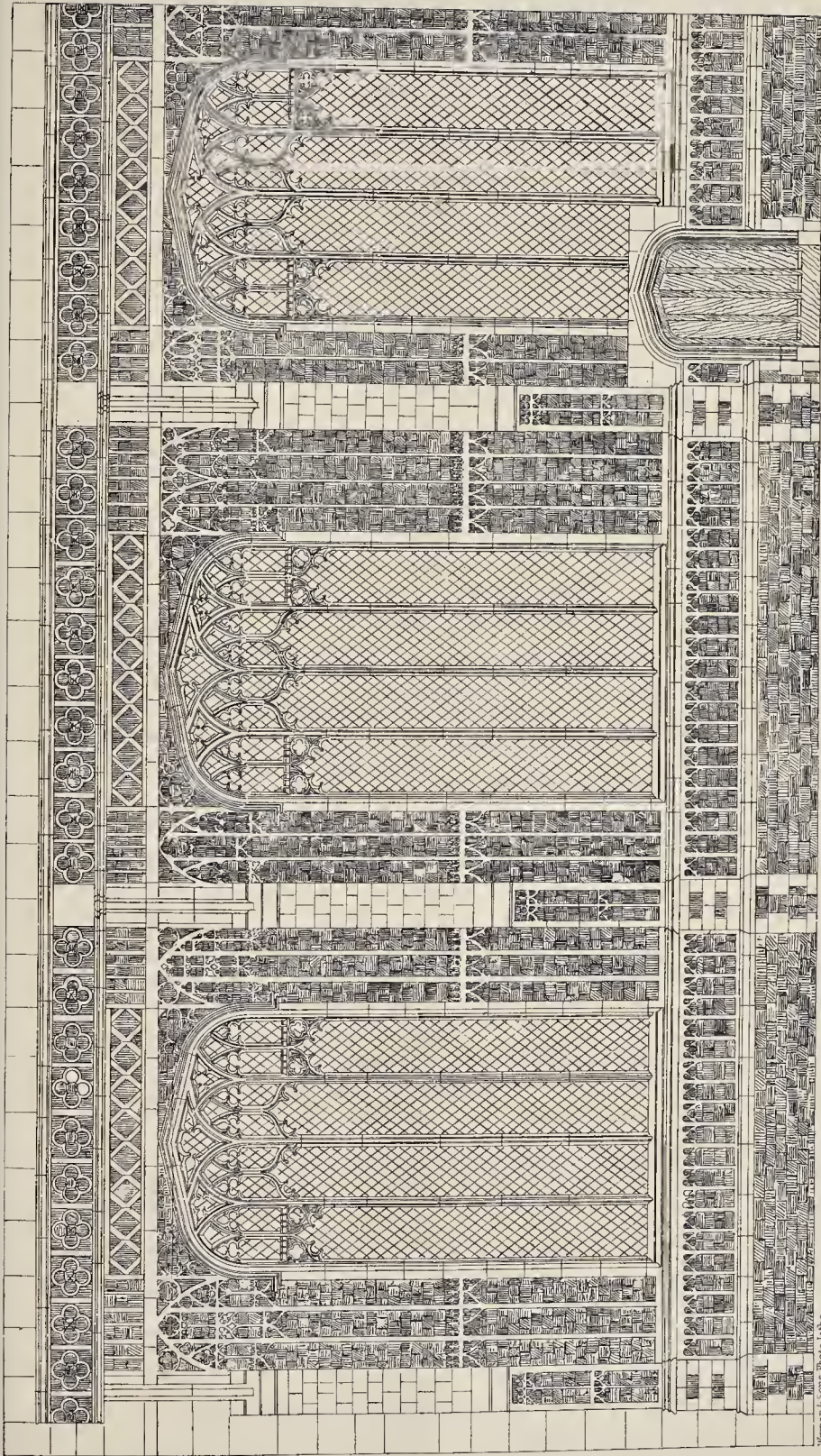


Section on line C-D:

SELECTED DESIGN FOR NEW VESTRY HALL, CHELSEA.

MR. J. M. BRYDON, F.R.I.B.A., ARCHITECT.

C. F. Hill Photo-Lith & Printer 6, Great St. Helen's, London, E.

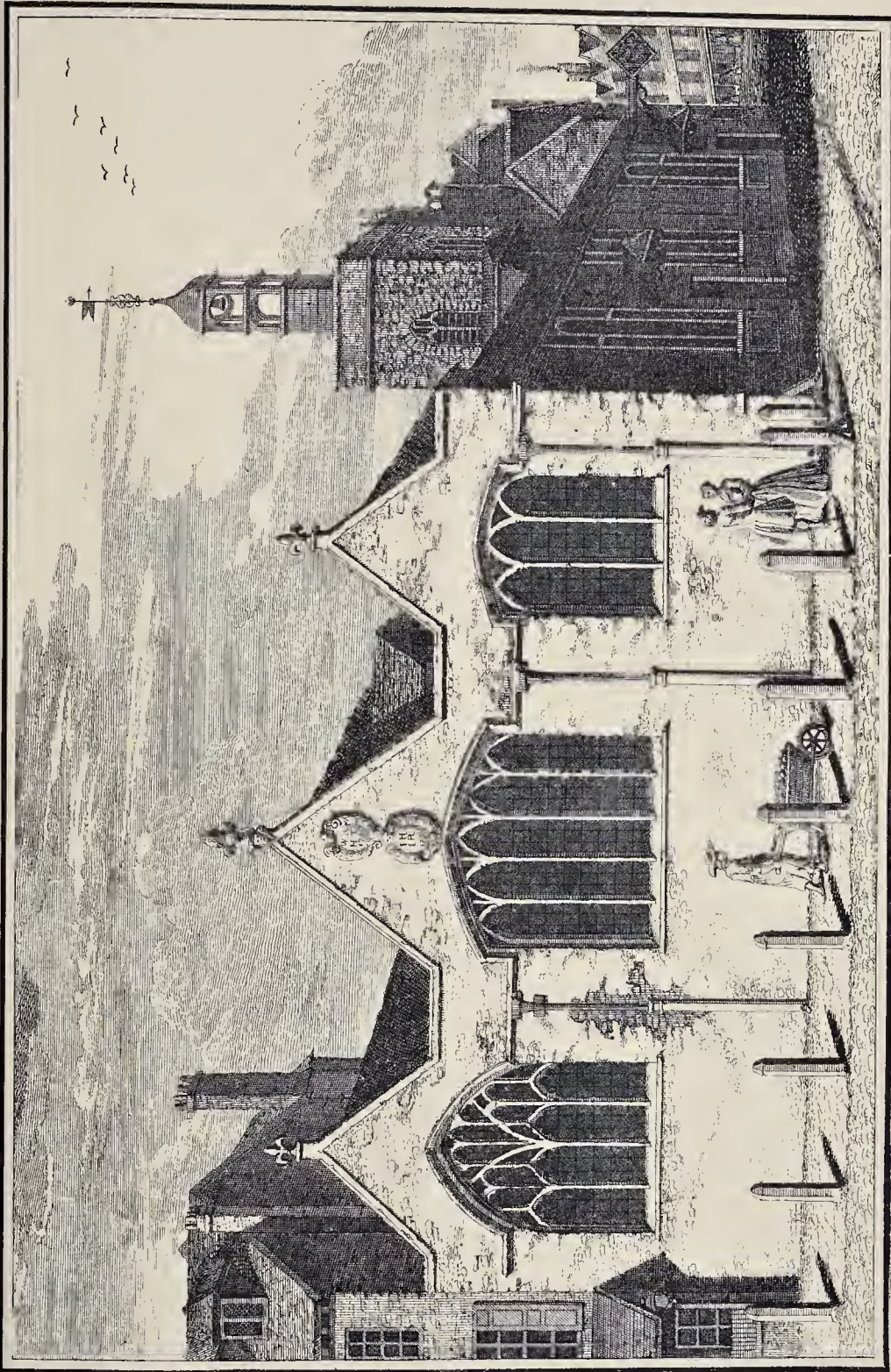


Wyman & Sons, Photo Litho

C. Patten, St. Ives, W.C.

SOUTH AISLE, THORP CHAPEL: CHURCH OF ST. MICHAEL, COSLANY, NORWICH.

DRAWN BY MR. E. PRESTON WILLIAMS, A.R.I.B.A.



of Hall. Photo-litho London. E.C.

OLD LONDON CHURCHES. *St. Botolph Without, Aldersgate.*



"A PRISM FOR ARCHITECTURE."
ARCHITECTURAL ASSOCIATION.

The ordinary meeting of the members took place on Friday, the 24th ult., Mr. Cole A. Adams, President, in the chair.

A vote of thanks was passed to Messrs. Isaacs & Florence, the architects of the Northumberland-avenue Hotel, for permitting the members to visit the building. Votes of thanks were also accorded to the Clerks of the Merchant Tailors' and Fishmongers' Companies, and to Mr. W. Hilton Nash, Surveyor to the former Company, in connexion with the late visits.

The following nominations for officers for next session were announced:—For President, Mr. C. R. Pank; and for Vice-Presidents, Messrs. J. A. Goteb and W. H. Atkin Berry.

Professor T. Roger Smith then gave an address entitled "A Prism for Architecture." He said that if a cylinder were pared down into a polygonal straight-sided figure, triangular or square, the result would be a prism, and if made of a transparent substance it produced certain results on the rays of light falling on it, spreading them out into different hues. This was what he had in view when he talked about the prism, which latterly had become a remarkable instrument of analysis in the hands of scientific men. The spectrum, and the distinct rays of light thrown out by the prism were then described, and the results to be deduced from its investigations. Besides the coloured rays of the spectrum, there were also a certain number of rays which were invisible, termed the dark rays. The question had therefore suggested itself to him some time ago, whether it were possible to do for architecture,—or, at any rate, for building,—something like what the prism had done for rays of light. Could they hit upon some simple method of spreading out the different constituents of building, so that they might be examined one by one; and that instead of having a series of whole buildings, they might be cut into pieces? His prism was really a system of analysis by which the different parts of a building could be taken to pieces and examined. Its merit, if it had one, was that it provided a place for everything. He would not attempt to go farther than the material part of the building, although it was possible to find a parallel to the dark, as well as the light rays, of the spectrum. As in the case of the seven colours of the rainbow, so building fell under seven heads or categories. The first was the floor,—perhaps the most important part of the building. The whole purpose of a building, unless it were simply a monument, was to provide a floor, to protect it with walls, to cover it with a roof, to let light in by windows, and to provide access by doors and staircases. But the floor was the object of the care of all the other constituent parts. It was physically and intellectually the basis of the building, and might be simple in its outlines, as in the Pantheon; or complicated in shape, as in the plan of Westminster Abbey; or composed of an exceedingly large number of parts, like the Baths of Caracalla. It might be square or round, but whatever it was, it was shaped to meet the requirements and also the structural necessities of the case. They were in the habit of recognising the importance of plans, and in doing that they were to a large extent talking about the floor. The object of a plan was quite as much to define the floor as the walls, and practically the floor was the basis of the whole structure. The Professor here referred to the plan of an Egyptian temple, a large building containing a good many subdivisions, the part which produced a grand interior being the perfect forest of columns necessary to carry the roof. Assyrian temples were also complicated, there being an arrangement of long narrow rooms, arranged in or at round quadrangles. The next great building people, the Greeks, had structures far simpler in plan, and as a rule smaller. The Greeks also introduced the curved line, for the first time in architecture. Roman plans were at once varied and complicated, and the consequence was that their buildings were of almost every shape, and of the utmost degree of perplexity and complexity. Nothing could be a grander or more applicable plan than that of the great Baths of Caracalla. Christian architecture again depended largely for its plan on what the Romans had previously done. The first new departure in the Christian architecture of the West was the introduction of monastic buildings; but there

was no remarkable innovation in the way of planning until the Renaissance, when the plans began to resume the complexity of the Roman plans. As regarded the actual construction of the floors, no part of the building was so simple. There was not much in the way of ornament to be done, the only grand ornamental floors being the Roman mosaic floors, and the sometimes magnificent tiled pavements of the Middle Ages. Westminster Chapterhouse possessed one of the finest of these tiled pavements, and the Abbey itself had a specimen of Alexandrian mosaic on a large scale. The art of designing floors, and the walls connected with them, was necessary, and at the same time fascinating and interesting. The placing of all the columns and features of a building, and especially connecting together the various leading features in a complicated structure, was a thing requiring a great deal of imagination and skill, and in which the mind could exercise itself in the same way as in any other part of the design. The second feature was the walls, the object of which might be stated to be three-fold: first, to enclose the floors; secondly, to carry the roof; and, thirdly, to form an object to be looked at outside and inside. The shape of the floor dictated the length of the wall, whether it should be curved or straight, and its position; but beyond that, the builder had to exercise his ingenuity in the height, thickness, outline, and the simplicity or complexity of it. Perhaps the most important matter in connexion with this was the sky-line. In the majority of early building this was straight, as in the case of the Egyptian temple at Deudera, and this was the general outline in the majority of those temples, varied to some extent by the increased height given to the pylons. As far as was known, the Assyrian buildings were also straight-topped, but when they came to those of the Greeks, a remarkable innovation was introduced, viz., the pediment or gable. The gable once introduced was never abandoned; it was sometimes flat, and sometimes steeper in its arrangement, but it had remained as one of the most interesting features connected with the wall of a building. The next thing, introduced after the gable, was the tower, and this was almost, if not quite, a Christian introduction. There were some tower-like buildings in Assyria, but it was not until Christian churches began to be built that the tower was a usual element in the composition of a building. The lecturer here pointed to Romanesque, English Romanesque, German, and French towers, explaining that the tower developed into the turret, and also into the slender turret or minaret. One notable point with regard to the wall was its thickness, and this became less at those periods when structural skill was greatest. Construction was an element of great importance in wall building, and was a matter which deserved the utmost possible attention, as any mistake was sure to tell afterwards, and at a time when remedying it was almost impossible. The structure of a wall varied very much, as it had to be built in most cases of the materials ready to hand. It consumed so much material that, if brought from any distance, the expense was so great that men were generally content to use something within their reach; therefore, the geology of the world had a good deal to do with dictating what materials should be used for the purpose. Reference was then made to the Roman walls, and to the interesting methods by which these remarkable structures were built. In the Middle Ages brick went greatly out of use, especially in England and France, little else being used except stone in the Gothic period, after which came the omnivorous use of everything in the Renaissance. Another important matter was the compound construction of many walls, they being faced with other materials, more precious, or specious-looking, than what the heart was composed of. Almost every wall had a base, a body, and a top. In the case of the Greek temple the base might be said to be the steps; then there was the body; the top being the overhanging screen. A feature of Mediæval wall-building was the buttress. The Romans were in the habit of making the piers inside rather than outside, but the Gothic architects introduced a new feature in the buttress, a feature cultivated with most success in countries where the sunlight and the light during the greater part of the day were level, so that the best effects of shade were produced by the piers which projected from the wall. The third division was naturally the roof. In many countries, where the climate

was hot, people wanted to get on the top of the roof for coolness; therefore a roof that would serve as a terrace was frequently to be met with. One reason why the gable made its appearance among the Greeks was, he imagined, that the climate was sufficiently temperate for people not to trouble about having a terrace roof to all their buildings. Then the roof got sloping, and there were two or three other things which had to do with the pitch. In countries where rain, snow, and inclement weather were experienced, the roof was generally found to be steep, in order to throw off the snow, as in the steep-pitched roofs of Central and Northern Europe. This, again, was complicated by one or two considerations, there being some countries where in the summer it was hot, while in the winter there was much snow, and where this was the case, there was a disposition to keep the roof comparatively flat, and to extend its eaves; Switzerland being a good example. Lastly, the nature of the roof-covering made a considerable difference, there being always a tendency to take the most economical pitch. The highest development of the external steep roof was the spire. The speaker here referred to drawings of the magnificent spires of Lichfield Cathedral and Angoulême Cathedral, and of the roof of Westminster Hall, the masterpiece of European carpentry.* The vault began with the Roman use of the arch, and passed through the series of the wagon-headed vault, the cross vault, leaving the architect free to deal with the wall and space beyond. In the Middle Ages the vault developed through a series of wonderful transformations, until it reached its acme in such structures as Henry VIII's Chapel, Westminster, and King's College Chapel, Cambridge. Another kind of roof grew out of the vault, viz., the dome, invented by the Romans, and, after being largely developed by them, taken to Byzantium, the architects there producing magnificent domical structures, the climax of which was found in Santa Sophia. Western Christian architecture neglected the dome, and down to the Reformation there was no important domed Christian church except the Duomo at Florence. At the Reformation the Christian architects went back to the original Roman dome, and produced the great series of domical structures, of which St. Peter's was the largest, and St. Paul's incontrovertibly the finest. The dome was taken up by another offshoot of Roman architecture, the Saracenic, and treated in an entirely different, and at the same time exquisitely beautiful, manner. In addition to these, there were all the endless varieties of ceilings, timber and plaster, and combinations of domes with them, which came under the head of roofing. The fourth essential for building was the openings. Buildings, till the invention of iron girders, which had their openings covered with the lintel, had square-shaped and narrow openings. The moment the arch was introduced it began to be found that openings could be of almost any size and shape. The Egyptians had to carry their roofs by means of lintels, as in the case of the Great Hall of the Temple of Karnak. When the arch came in the whole system of construction and arrangement was altered, and the next great step was when the arch passed from the Roman to the Mediæval builders. The lecturer here referred to a section of Durham Cathedral, showing the arched openings occurring in the interior, and their grouping; also to an elevation of the Coliseum at Rome, showing that the grouping of openings in the design had begun to be of importance in the design of the architect. The filling up of openings in Mediæval times led to most magnificent results, as in the case of a drawing of the Ducal Palace at Venice, showing tracery for filling in the openings of the upper arcade. A drawing of part of Carlisle Cathedral showed one of the most elaborate tracery windows in England. There were other ways of filling openings which the circumstances of Eastern architecture required. In Arabic architecture they would find marble buildings, and that the openings were filled with beautifully-constructed grilles of simple and effective woodwork. Penetration began to be an important matter in design, and to take the place of the grouping of columns. These were the four most important elements of construction, and the remaining three were really architectural features. The first and most important

* An interior view of this roof, from a drawing by Mr. P. F. Dollman, appeared in the *Builder* for April 4 (see pp. 490-491, ante).

of these were the columns. A great number of buildings existed without columns, and were they not a beautiful architectural feature they would be absent in many cases where they are now to be seen. The column was divided like the wall into three parts, the base, shaft, and cap. In the columnar styles, viz., those where the column played an important part, there was infinite variety. The Greeks grouped their columns into three periods, or rather, into two, the Doric column with a moulded cap, and the Ionic column with an ornamented cap, these two being the parents of nearly every class of capital in use since. As soon as the arch came in the column sank from being an integral part of the structure to the position of an ornament. The sixth element was the ornamentation, which, leaving out colour, might be classed into two particular groups,—mouldings and sculptures. Mouldings had two different objects, one being to produce a profile, a Roman cornice being a good example, with its projection and shadow; the other object, and the most general in Gothic mouldings, being to draw a line, or series of lines, in the building. Mouldings in the hands of the architect were the same as a brush with dark colour in the painter's hand. An important matter for the artist was the size of mouldings relatively to their position. A moulding which was right when near the eye would be too small if placed high, and would also probably be in had proportion. In the same manner a moulding which seemed all right when one looked up at it would be too large when brought down near the eye, and would require correcting in its profile that the amount of foreshortening might be obviated. The relation of the profile of mouldings to the material was well worth consideration. In order to get light and shadow in stone mouldings, the features must be well defined, the projections considerable, and the hollows large. In the thirteenth century stone mouldings were undercut in the most extraordinary degree. White marble, again, was a material of exquisite surface, which was more easily got thin than thick, and the mouldings for it were comparatively flat, though producing, perhaps, a finer effect than the bold stone mouldings. Then there was wood, which had not the lustrous colour of the marble, and accordingly the mouldings appropriate for it were midway between those for stone and marble. Sculpture was sometimes included in the architecture, and sometimes added as an ornament, and framed in the architecture. Greek architects supplied examples of both modes of treatment. The seventh and last element was colour. It seemed that where there was the most sunshine there was found the greatest desire for colour. In Assyria, Persia, and Greece there was a large use of colour; while at Pompeii, again, there was a specimen of the brilliant Græco-Roman coloring. In Arabic buildings they found a finer feeling for colour and more success in its use than in the Western style. In Byzantine architecture it was largely used, and it was difficult to say how much colour was used in Gothic work. He believed a great many of our Medieval buildings were coloured, though not brilliantly. But as a compensation for that there was the most brilliant of all the inventions of the colourists, viz., stained glass. No invention in architecture had possessed the beauty of this, and possibly the reason why many of the buildings were not highly coloured was because they were so full of this brilliantly-coloured glass. He would remind them that no architectural work was perfect without colour, and, though they had to study it under great imperfections, it seemed as if things were a little more hopeful than they used to be. Having gone, then, through all the colours of his prism, he might be asked if he had anything to say about the dark rays. There was a side of architecture which could not be called bricks and mortar, but it was none the less as real and great a part of architectural success as anything he had referred to. This must be left for them to study elsewhere, or to be talked about another time. He would only say in conclusion that as he had referred to something which was, perhaps, a parallel to the seven hues of the rainbow, the other part of the spectrum had been brilliantly treated by one of the greatest masters of criticism the world had seen in "The Seven Lamps of Architecture."

The Chairman, in opening the discussion, said that there must be only one opinion as to the lecture they had heard. Its whole object

was to arouse their thinking powers. Speaking of roofs, when they looked at the drawings of Westminster Hall by Viollet-le-Duc and Dollman, they could only be grateful that the diabolical attempt a short time ago had not damaged to any appreciable extent this magnificent work of art.

Mr. Slater, in proposing a vote of thanks to the Professor, congratulated him on his lecture. At the same time, such an enormous ground had been covered that it was impossible in the discussion to follow him. The Professor had stated that the Egyptian temples were extremely complicated, but he could not quite agree with this, as they seemed to be simply reduplications of form. It had been also said that the fact of the buttress being used in Medieval buildings was accounted for by the desire to get shadows cast by the sunshine. This seemed to him to be rather far-fetched, and it appeared more likely that in the Medieval churches there was a desire to hear and see, so that they got rid of all the interior projections, and so put the buttresses outside. He would like to know why the Persepolitan base had not been perpetuated? What a curious thing a prism for architects would be, and if their rays were passed through it; for besides the bright lights, some of those gentlemen who dubbed themselves surveyors, &c., might cast a large number of dark rays.

Mr. Blagrove seconded the vote of thanks, which was very cordially received.

Professor Roger Smith, in replying, said that he could not throw much light on the base of Persepolis. The more ornamental one appeared to have given rise to the Ionic base, but why it was lost sight of by the Greeks afterwards he could not tell. One reason must be that the Attic base, which was in common use, was very suitable for the purpose, and was seldom departed from. There were, however, a good many eccentric varieties of bases in Greek architecture, and especially in Asia Minor. He agreed that the Egyptian temple was a simpler building than the Roman bath; but the step from Egypt to Greece was one he believed from complexity to simplicity. He did not quite like to give up his development of the buttress. Angle buttresses at the corners of towers were often introduced where they could well have been spared, and had England and France been countries like Italy or Egypt, we should have had thicker walls, like those in Italian Gothic, with the buttresses seldom beyond little strips. He therefore believed that the artistic effect had a good deal to do with the matter.

THE ALBERT EXHIBITION PALACE, BATTERSEA PARK.

We have from time to time mentioned the progress of this building, and its practical completion was celebrated by a luncheon given in the building on Saturday last to a large number of gentlemen interested, commercially or socially, in the success of the undertaking, which is one that has our best wishes. It overlooks Battersea Park, being divided therefrom only by the roadway which skirts the Park. The site of the Albert Palace and its grounds is held on lease from the Crown, and special mention was made of the facilities which had been afforded to the company by Mr. Shaw-Lefevre and the Office of Works, the Department preferring to let the ground for a place of wholesome recreation combined with an open space of considerable area rather than to let the land on ordinary building leases. The building, as will be known to many of our readers, is the glass and iron structure first erected in Dublin, and re-opened by H.R.H. the Duke of Edinburgh in 1872, with an Exhibition of Arts, Industries, and Manufactures, under the direction of Sir Edward Lee. The building as re-erected at Battersea Park consists of a nave 60 ft. high, 473 ft. long by 84 ft. wide, and with a gallery all round. There is an apse at the centre of the nave, 50 ft. by 84 ft. The annex, known as the "Connaught Hall," 60 ft. high and 157 ft. long by 118 ft. wide, with a double gallery all round, is adapted for musical entertainments of a high class, and it is in this hall that the grand organ is erected. This organ, one of the largest in the world, is the celebrated "Holmes organ."

The entire roof of the nave is covered with amber-coloured cathedral glass, in order to obviate the use of unsightly awnings or blinds. With the assistance of Dr. C. Dresser the interior of the structure generally has been deco-

rated in colour. In the decoration of the rooms appropriated to the refreshment department there is an entire absence of the "looking-glass and glitter" style of decoration which is so general in such places. On either side of the large dining-hall are some handsome white marble columns which came from Baron Grant's mansion at Kensington. The external masonry of the buildings consists largely of the masonry of the Old Law Courts at Westminster.

The gardens are being laid out by Mr. Frazar from plans prepared by Sir Edward Lee, and under his immediate supervision and direction.

The picture-gallery, extending nearly the whole length of the building, is excellently lighted. Nearly an acre and a half of the Palace ground has been set aside for a lawn tennis court. The conformation of the area renders the nave better adapted for promenade concerts than, perhaps, any other place in the metropolis, and here an orchestra, capable of accommodating 150 instrumentalists, has been erected.

The building is warmed by hot-water pipes from four large boilers of the Trentham Cornish type, fitted with smoke-consuming doors and every modern improvement. The pipes in the Palace are on the low-pressure principle, are 4 in. in diameter, and arranged in channels containing nine rows of pipes, the channels being so constructed that a supply of air is constantly brought up under, over, and between the pipes, and comfortably warmed, previous to passing through the gratings. The gas-lighting arrangements are very extensive. There are three large meters,—one 2,000-light meter for the main building, which weighs between eight and nine tons when charged with water,—one 1,000-light meter for the concert-hall, and one 300-light meter for the picture-gallery and side building. There are about eight or nine miles of mains and wrought-iron gas-pipes in the building. The building generally is lighted by groups of lights on large brackets, and the galleries are mostly lighted with star-lights. There are over 3,000 gas-burners in the building, and the whole of the work has been very well carried out by Messrs. Struce & Co., of Osnabrugh-street and St. Paul's Churchyard, E.C. The sanitary fittings are by Mr. George Jennings.

Seeing that the "Palace" is situate in the midst of a large population, and that it is easily approachable from all parts of London by three railways and by tramways, as well as by steamboats in summer, it ought to be a success, and no doubt will be, if well managed.

ARCHITECTURAL ASSOCIATION.

VISITS TO ST. BARTHOLOMEW THE GREAT, SMITHFIELD, AND TO THE CHARTERHOUSE.

The seventh afternoon visit this year of this Association was an archeological one, and was made last Saturday, the 25th of April, to what remains of the very interesting old Norman Church of St. Bartholomew the Great, West Smithfield. The members assembled at three p.m., and were received by the Rev. W. Panckridge, the rector, and Mr. Aston Webb, architect for the proposed restoration. Mr. G. H. Birch, architect of "Old London" at the Health Exhibition, was also in attendance. The Rev. W. Panckridge commenced by detailing the history of the ancient church and priory, from its foundation, in 1103, by Rahere, the founder of St. Bartholomew's Hospital, close by, down to the years 1863 and 1866, when it was restored to its present condition by Professor Hayer Lewis. He also pointed out the chief features in the church, and directed attention to the two chief monuments: one the tomb of Rahere, the first prior, on the north side of the choir; and the other, a large mural monument to Sir Walter Mildmay, Under-Chancellor of the Exchequer temp. Queen Elizabeth, 1558, and which is fixed in the south aisle. The tomb of Rahere, and the pulpit, &c., can be distinctly seen in the illustration we recently published of the north aisle and arcade.

Mr. Aston Webb next described some plans which were exhibited; one, which was drawn with the assistance of Mr. Birch, showed the exact condition of the church, and its nave and cloister, &c., as they existed in 1530; another plan, shown by way of contrast, of the church as now existing, was virtually the same as that published by us on March 28th. Mr. Webb explained what was proposed to be done if

funds were forthcoming, viz., the purchase of the fringe manufactory at the east end, and which partially overhangs the altar supported by an iron girder, as shown in our "Interior looking East," and on the small plan we published at the same time. These buildings, Mr. Webb said, may probably have been latterly used as a Prior's house, but in his opinion were undoubtedly first erected as a Lady-chapel. The north transept was now a blacksmith's forge (as they could bear). The total length of the church formerly was 280 ft. by 60 ft. wide, with apse, transepts, choir, and nave.

The visitors then perambulated the church, and the fringe factory, and also the crypt under the same, every corner of which was minutely examined, particularly its external walling, which appeared to consist of massive masonry of large stones, lately used as coal cellars and wine-hins, and which will require a good deal of excavation and clearing away of internal brick divisions, to form an adequate opinion of its former uses. Many of the members also mounted the old brick tower and belfry, from the summit of which a good view was obtained of the walls of the factory and other adjacent buildings, showing the extreme probability of the plan of the church as it was in 1530.

The members then departed under the leadership of the Rev. W. Panckridge and Mr. Aston Webb to the Charterhouse, through Cloth Fair, and noticed, en passant, the old Whittington Inn, which owes its preservation to the intercession of the London and Middlesex Archaeological Society, and a view and description of which were given in the *Builder* of January 14, 1882, under the name of the Stingo Tavern. The Charterhouse (a corruption, as every one knows, of Chartreuse) was so called from a monastery of Carthusian monks, founded in 1371, on a peat-horse field, by Sir Walter Manny, knight. The last prior was executed at Tyburn, May 4th, 1535. The Priory was then dissolved and was afterwards given by Henry VIII. to Sir Thomas Audley, Lord Chancellor. Queen Elizabeth granted it to Thomas, Earl of Suffolk, who sold it to Thomas Sutton, May 9, 1611, for 13,000*l.*, and he endowed it as a charity by the name of the "Hospital of King James." He died Dec. 12, 1611, before his work was complete, and was buried in the chapel of the hospital, beneath a monument, the work of Nicholas Stone and Mr. Jansen, of Southwark. The chapel and the tomb of Sutton, and other ancient portions of these interesting premises, having been inspected, the visitors departed.

THE ART-UNION OF LONDON.

ANNUAL MEETING AND PRIZE DISTRIBUTION.

The annual meeting of the Art-Union of London was held in the Adelphi Theatre on Tuesday last, Mr. James Hoggood, Member of the Council, in the chair, in the absence of Lord Houghton, the President, who is now in Italy.

Mr. Hallett, Member of Council, read the annual report, from which we extract the following paragraphs:—

The subscription of the year amounts to 8,768*l.* 8*s.*, and the Council would have been well pleased had they been able to announce a more favourable result, but, in face of the continued universal depression, they cannot but feel that the amount collected is more than could be reasonably expected. The accounts of the year have been audited by Messrs. Geddes and Hicks.

The following is a brief summary of the receipts and expenditure.

Amount of subscriptions.....	8,768 <i>l.</i> 8 <i>s.</i> 0
Allotted for prizes	£2,265 0 0
Set apart towards providing works of art for accumulation payments	561 0 0
For print of the year, almanac, exhibition, report, and reserve	2,538 12 2
Agents' commission and charges, advertisements, printing, postage, rent, &c.....	5,687 12 2
	3,118 15 10
	£8,768 8 0

The Council have lately had an opportunity of acquiring the copyright of a very faithful portrait-bust of the late General Gordon, by Mr. E. B. Stocks, a Gold Medalist of the Royal Academy, — and they have to express their acknowledgments to Sir Henry and Lady Gordon for having much time and trouble to the superintendence of the work with a view to obtain a satisfactory likeness. It has been pronounced a great success. The amount to be expended on prizes will be thus lotted:—Original paintings, "Vanguard," 21*l.*; 1 work of art, 15*l.*; 2 at 60*l.* each; 3 at 45*l.*; 3 at 35*l.*; 4 at 30*l.*; 5 at 25*l.*; 7 at 20*l.*; 12 at 15*l.*; 21 at 10*l.* In addition there were 6*l.* terra-cotta busts General Gordon; 8*l.* sets of designs from English story; 50 portfolios of 24 plates of animal life; these

making, with the prizes given to unsuccessful members, 515 prizes.

In our report for 1884 we noticed the death of Mr. Thomas Holloway, one of the most munificent patrons of art in late years. Mr. H. has left behind him an institution unparalleled in its philanthropic intention at this day. Some years before his death he called a meeting of persons interested in the higher education of women. It was well attended, but led to no practical results, and shortly afterwards he determined to take on himself the whole burden of building and endowing a college, on such a scale of liberality and magnificence, that we must go back to the time when kings and cardinals endowed colleges at Oxford and Cambridge to find any parallel to it. A splendid site, abut on a mile beyond Egham Station, on the South-Western Railway, was begun, from designs by Mr. W. H. Crossland, a pupil of the late Sir Gilbert Scott, — in whose earlier work for Mr. Holloway, the Gothic Sanatorium, at Virginia Water, the influence of his master is conspicuous. The building at Mount Lee, so the place is called, covers more ground than any college at Oxford or Cambridge except Christ Church, Trinity, and St. John's.

The purchase of several pictures of the English school by Mr. Holloway excited much attention at the time, and it is now known that these works will find their resting place at the new college, — it is expected that the whole institution will be ready in a few months to begin work, and then England will be in possession of the most magnificent endowment ever made in this country by a private individual. Taking the cost of the Sanatorium, and of the college, and the pictures placed in it, the total amount of Mr. Holloway's gifts to the nation reaches, if it does not exceed, a million sterling. It may be mentioned that the contract for some pictures of the college was signed in July, 1883; that the work was finished within the stipulated time; and that there was not a shilling of extras on the contract sum, — 267,000*l.*

There are not many vacancies in the ranks of the votaries of art to record during the last year.

In the early part of 1884, Mr. W. L. Leitch, V.P. of the Royal Institute of Water-Colours, died. Mr. Leitch began his artistic life as a scenic painter in a provincial theatre in Scotland, of which he was a native, at a few shillings a week, — but his perseverance was not to be mastered, — and the number of his sketches was so large as to form a few months ago the last part of the 700 lots offered for sale after his death. Soon after his removal to England he became instructor of painting to the Queen and her children. — An interesting biography has been written of him by Mr. A. McGeorge.

In the latter part of last year died Mr. F. W. Hulme, a landscape painter of repute.

Early this year the Royal Institute of Painters in Water Colours lost Mr. J. W. Jopling, who worked in a broad and striking manner.

On the 24th of February last died Mr. E. W. Wyon, the youngest and last surviving son of Mr. W. Wyon, chief engraver of the Seals to George III., an artist who flourished at a period when seal and medal engraving was considered to be a branch of fine art, and duly recognised as such by the Royal Academy, when designs in metal were made the subject of prizes awarded by that body. Mr. E. W. Wyon assisted his brother Benjamin in many of his works, and at a later date produced several statues. He was a frequent exhibitor at the Academy since 1831. With the Art-Union of London Mr. Wyon had an intimate connexion for some time. In 1841 it was determined by the Art-Union to endeavour to establish the production of artistic statues in bronze. So little was then known of the art in this country that Mr. Wyon (to whom was entrusted the selection and casting of the Society's first work, the beautiful Michael and Satan of Flaxman) had the greatest difficulty in finding workmen able to undertake the task, and he had actually to personally superintend and aid in building the furnace necessary for the purpose. However, by dint of perseverance, a very satisfactory copy in bronze of the above group was produced, and it was the inauguration of that series of bronzes to which we can point with satisfaction, as not yielding in excellence to the work produced by any other foreign house. Of the works of this kind in England this Society was undeniably the originator.

In Mr. J. J. Jenkins, the Royal Society of Painters in Water Colours has lost one of its most accomplished members. Born in London in 1811, he died on the 9th of March last, having for a considerable time suffered ill-health. To Mr. Jenkins the press owes that great accommodation, the present treatment of Exhibitions, which was instituted at the old Society, and rapidly followed by the Royal Academy and other bodies. Mr. Jenkins bequeathed to his Society 1,04*l.* and nine of the best of his collection of drawings by past and present members.

In November last died Mr. H. S. Leitchfield, sculptor. Mr. Louis Hazeb, Honorary President of the Institute of Painters in Water-Colours, died on the 9th of March, at the age of 79.

The death of Mr. Richard Ansdell, R.A., the well known animal painter, occurred at Collingwood Tower, Farnborough, Hants, a few days ago.

In a record of matters artistic during the year, it would be ungrateful to pass without a word of praise the reproduction of an old London street by Mr. Birch, in the International Health Exhibition.

A very interesting art-union exhibition was opened at Brighton in November last, — 139 works were exhibited, — almost without exception by eminent masters. There was also a series of rooms intended to illustrate seventeenth and eighteenth century interiors, — containing some quaint furniture and utensils. At Guildford, in July, was opened an exhibition of works derived from local sources which is worthy of notice. The county survey of the rich and historical elements of hygone days, which go back to a date long antecedent to the Conquest. The stripes on the tower of its most ancient church savour of a happy landing. It was done by the West side of the fair Elaine Basted. Guildford Castle, with its ancient hering-bone brickwork, has traditions of Alfred, and the spot is identified with the Aetolus of the poet. In the neighbourhood are the historical sites of Wotton, still held by an Evelyn; Sutton, with its whole chapel; Loseley, with its Elizabethan windows and its memorials of the Moors. The monuments, plate, pictures, &c., and other works of interest from houses such as these, made this loan exhibition worthy of a visit.

For the second time within seven years a fine collection of pictures, drawings, and other works was formed at Norwich, and was on view last year in the old ecclesiastical building called St. Andrew's hall. The exhibition contained a large number of old masters, many modern pictures, and a fair gathering of fine pieces of old plate and old French coins and miniatures by Cosway and his

contemporaries. The chief attraction was the remarkable display of pictures by what is known as the Norwich School.

Sixty years ago the University of Bonn founded a museum of casts from ancient sculpture for the use of students of classical archaeology. Cambridge has, as we followed this example, at a cost of 12,000*l.*, and no archaeologist will tax her with any undue forwardness in the matter. A museum of casts is as necessary to the teacher of art and archaeology as a chemical laboratory to the teacher of chemistry. As soon as Cambridge decided that the subject should be taught she was sufficiently logical to provide the proper means of teaching. Coming from the East Museum at Berlin, the largest and most complete in the world, which has grown by the accretion of years, it must be confessed that, for beginners at least, the Cambridge museum is the better place for study. Every cast museum must, to a certain extent, be a compromise between ideal arrangement, on the one hand, and the exigencies of space, on the other; but at Berlin constant new acquisitions have pushed this compromise to a point that is perplexing to the unaccustomed eye. Here are gathered together, from sheer want of space, representatives of schools and periods the most diverse. This is rather pleasant than otherwise to the expert, but the eye of the novice is unduly troubled. At Cambridge classification, beginning where material was far more copious, has had full and easy scope. In the matter of mere chronology he who runs may read.

Following the inauguration of the gallery of casts at Cambridge, an important addition to the many attractions at South Kensington Museum must be noted in the remarkable collection of casts in the new gallery which was opened last August. Here the visitor is enabled to see before him at a glance the progress of Greek sculpture, from the rude efforts and native expression of its childhood to the magnificent development, under Phidias, of an art perfectly balanced, intellectually and physically, and representing the strict ideal of humanity in the persons of heroes and divinities humanly represented.

It is a satisfaction to know that we have so many productions of the great age of the art left to us, as an eternal possession, now reproduced and multiplied in so many ways that we need never fear their loss, and may consider our leisure in what way we can best turn to account the lessons to be derived from them. The Art-Union may point to the busts of "Clytie" and "Apollo Belvedere," the "Ajax," and the "Townley" vase, to show that we have done something to make known to the public of this day and to put within easy reach of many a home these emblems of some of the finest specimens of ancient art. The proximity of this series of casts to the late Art-Union Exhibition, showing the beauty of the physically healthy body, and comparing it with some of the cases into which the human figure has been forced, as exhibited both in the historic dresses and in some of those seen near the altar in the building, suggests an appreciation of Shakespeare's remark, "What a deformed time this fashion is."

Thanks to a majority of more than 100 on the debate in the House of Commons, the references to the purchase of the Blenheim pictures, the equestrian Charles I. of Van Dyck and the Ansdell Raffinello, our National Gallery is no longer open to the reproach of containing no first-rate Raphael, and no great Van Dyck. These two new acquisitions place it at once on a level, in this respect, with the greatest foreign galleries.

It has been suggested to the Council, in several quarters, that an illustrated work, in continuation of the series of the "Norman Conquest," "The Ancient Mariner," and others, all of which are still in constant demand, would be acceptable to the subscribers, — especially as such productions are popular from not involving the additional expense of framing. The Council having been much impressed by the beauty of certain drawings by Mr. Percy Macquoddy, R.I., — exhibited some time since at Messrs. Cassell's, — and by two subjects which he contributed to the volume of "Animal Life," produced by the Art-Union, as well as several very merituous works exhibited by him at the Royal Academy, applied to him to prepare, in reply to some designs, and Mr. Macquoddy having suggested, in Walter Scott's poem of the "Bridal of Triermain," as a theme supplying abundance of material for illustration, the work was put in hand, and a set of fourteen subjects reproduced by the photorevue process, bound up with the text of the poem, will be the annual presentation work for next year. It may be well to state that these designs are not to regard the highly elaborate drawings, but the broad sketches, somewhat after the manner of the Spanish painters, Fortuny and Mad-zotto, and representing the modern school of black and white. General effect and powerful handling are aimed at rather than minute accuracy.

In concluding this report we would draw attention to an address, delivered at the Birmingham Social Science Congress last September by Mr. P. H. Rathbone, with a view to showing the importance of considering the economical value of art, independently of its ethical and scientific value. Mr. Rathbone called attention to the necessity of improving the art of our manufactures and infusing into them a large amount of esthetic element. He pointed to the remarkable development of our potteries under the auspices of Josiah Wedgwood, and to the fact that an extensive export trade in his manufactures has been developed since sound art entered into their manufacture. "Cultivate," the speaker said, "the taste of our population by galleries and museums, by concerts and lectures, and they will not only patronise them, but they will crave to possess as their own such forms of art to decorate their houses as may be within their means. The very plates and cups in daily use will be, not dearer, but in better and purer taste than has hitherto been the case. Taste will be elevated and purified till a demand for artistic work is created that will overflow the limits of the country and create an export trade which will do much to counteract the loss of supremacy in cheapness, hitherto our mainstay."

The Chairman, in proposing the adoption of the report, said he thought that they ought to be thankful, on looking around them, that they had been able to collect something like 9,000*l.* for the purposes of pure art, and for gratifying those tastes which might, under other circumstances, be smothered. The report had touched on the death of Mr. Holloway. There were thousands of men who hoarded their money to the last moment, and then when they could not

* Printed in the *Builder* at the time. (See p. 451 of our last volume.)

take it with them left it for some great purpose; but the man who applied it to such a purpose during his own life was a true man, and deserved their gratitude. The report also referred to the death of several artists. This was a matter of regret, but at the same time they must congratulate themselves that the vacant places were being taken by rising men, and that though artists died, art was living and flourishing.

Mr. E. E. Antrobus seconded the resolution, which was carried.

Mr. Francis Bennoch proposed a vote of thanks to Mr. E. E. Antrobus and Mr. Zouch Troughton, the Hon. Secretaries, for their continued efforts for the advancement of the Society's progress.

Mr. Hallett seconded the resolution, which was also agreed to.

The Chairman next moved a vote of thanks to Messrs. A. & S. Gatti for granting the use of their theatre for the meeting.

The resolution was seconded by Mr. Hallett, and cordially received.

On the motion of Mr. Bennoch, a vote of thanks was passed to Miss Jessels and Miss Higgins for their kind assistance in drawing the prizes, and to the scrutineers and auditors.

The drawing for the prizes then commenced, the principal prize, Mr. Briery's picture of "The Vanguard Attacking the Spanish Armada," valued at 210*l.*, falling to Mr. John Fore, of Monte Video.

COMPETITIONS.

The Three Cups Hotel, Colchester.—In the competition for the Three Cups Hotel, Colchester, the assessor, Mr. C. F. Hayward, F.S.A., has awarded the first premium to Mr. R. Stark Wilkinson; the second premium to Mr. R. F. Vallance, of Nottingham; and the third to Mr. E. B. Panson. A second competition between the above three is to be proceeded with on amended instructions.

Presbyterian Church, Whalley Range.—We learn that the drawings submitted by Messrs. Mangnall & Littlewoods, architects, 29, Brown-street, Manchester, in competition for the proposed New Presbyterian Church of England at Whalley Range, have been awarded the first premium.

OBITUARY.

Mr. G. Packham.—Mr. George Packham, architect, Exeter, died after a few days' illness (the result of cold), on the 23rd ult., at his residence, Exmouth. He was only forty years of age, and leaves a wife and six children to mourn his loss. He succeeded the gentleman to whom he was articled, Mr. Henry Cross, architect, of Exeter, who died from injuries received whilst skating in 1867. Some few years ago, Mr. Packham took into partnership Mr. Croote, formerly one of his own pupils, and since then, until the present time, the firm has practised under the title of Packham & Croote. Although not essentially a church architect, Mr. Packham restored the parish churches at Thelbridge and Venn-Ottery, in a very conservative and careful manner, and his schools in Exeter, Colebrooke, Okehampton, Heavitree, Woolfardisworthy, Whipton, and other places exhibit thought and skill, whilst farm buildings were a speciality with him, some of the most successful in the county having been erected under his supervision. Mr. Packham was also the architect for a number of building estates in the county of Devon, and was, in conjunction with his brother, the architect for various warehouses and business premises in the main thoroughfares of Exeter. He was hurried on the 28th inst., at the Exeter New Cemetery, the Mayor (Mr. Brown) and Corporation, together with a large number of the principal citizens, attending the funeral.

Mr. E. Martin.—The death is announced of Mr. Edward Martin (of the well-known firm of Martin, Wells, & Co., builders and Government contractors, Aldershot), which took place on the 16th ult., after a short illness. The business will be carried on by the surviving partners (Messrs. Henry Wells and George Wells), under the same style as before, viz., "Martin, Wells, & Co."

Mr. William Ward Lee.—The death is announced of Mr. William Ward Lee, architect, late of Finsbury-circus. He was for some

years architect to the Improved Industrial Dwellings Company (Sir Sydney Waterlow's), and several of the blocks of buildings erected by that company are from his plans.

BUILDING IN PRIVATE WAYS.

A GREAT many buildings of the Artisan class have lately been, or are about to be, erected in the Metropolis, and we think sufficient attention has not been called to the Act of 45 Vic., cap. 45, which was expressly passed by the Metropolitan Board of Works in 1882 to meet buildings of the above character; section 7 of the Act providing that no road, passage, or way should be thereafter formed or laid out for building as a street, either for foot or carriage traffic, without the consent of the Board, if the same did not afford direct communication between two streets. Section 8 of the same Act also provides that no footway should be thereafter laid out without the consent of the Board being first obtained. The first case tried under the above sections was the one of *The Board v. Hampton*. Hampton had erected a cluster of buildings of the above class in a way of less width than 20 ft., and without any outlet, and gates were placed at the entrance, and the way was proposed to be a private one, and was, therefore, supposed by the builder to be out of the provision of the above Act. On the hearing at the Lambeth Police Court he was convicted under the above sections, and, upon appeal to the Surrey Quarter Sessions, the conviction was affirmed, subject to a special case to the Superior Court; but the defendant did not avail himself of this, and has since made the way 20 ft. wide, and given two entrances. Another case of the same character and closed by gates was heard at the same time, and upon the decision in the above case the defendant pleaded guilty, and was fined 20*s.* on each of the summonses. Notwithstanding the above decisions, large blocks of buildings have been formed in Camberwell, Chelsea, and Poplar. All these buildings are to be closed by gates, and are alleged to be private ways, and proceedings are now pending against them, and, under these circumstances, we think the sections of the Act should be carefully considered before erecting buildings in a carriage or foot way which does not afford direct communication or forming a footway without first obtaining the consent of the Metropolitan Board of Works, as otherwise the builders may sustain very heavy losses while the proceedings are pending, as well as heavy penalties which may now be sued for at any time, and the more especially as we do not think the above sections can be evaded either by putting up gates or other obstructions against ordinary user by the public.

THE TILBURY DOCKS CONTRACT.

KIRK AND RANDALL V. WALKER AND ANOTHER. THIS was an action for libel, involving important matters of interest in connexion with the East and West India Dock Company and their new docks at Tilbury, and tried before the Lord Chief Justice on Monday last.

The plaintiffs, Messrs. Kirk & Randall, are contractors, and for some time previously to the publication of the libel now complained of were employed in the construction of the Tilbury Docks on behalf of the East and West India Docks Company. The defendants are the proprietors of the *Bullionist* newspaper, in which, on October 25th, 1884, the following paragraph appeared:—"Work at the Tilbury extension of the West India Docks Company, which has been interrupted by the failure of the original contractors, Messrs. Kalk & Rendell [meaning thereby the plaintiffs] will be actively resumed on Monday next. The new contractors are Messrs. Lucas & Aird." The publication of the libel was admitted, but the defendants alleged that in publishing it they had acted without actual malice and without gross negligence. They further pleaded that at the earliest possible moment, viz., November 1, 1884, they had inserted a full apology according to the provisions of Lord Campbell's Act (6 and 7 Vict., c. 93), and they had paid into court a sum of 1*l.* 1*s.*, alleging that to be sufficient to satisfy the plaintiff's claim.

Mr. Webster, Q.C., in opening the case for the plaintiffs, said that the libel complained of was necessarily of a character to do great injury to persons in the position of the plaintiffs. They had proceeded with the work under their contract with the East and West India Docks Company at Tilbury under which they were to be paid some 700,000*l.* up to June, 1884. The work had been found to be

vastly more difficult than had been anticipated (the soil proving to be quite different from what was expected); that upon the plan, originally estimated to cost only 50,000*l.*, the plaintiffs had, in fact, expended upwards of 200,000*l.* They had claimed to be paid by the Dock Company upon a basis which the engineer of the latter had refused to acknowledge. The result of the dispute had been that the Dock Company had taken the work out of the hands of the plaintiffs. There had been no sort of question as to their solvency and stability, and the dispute between the plaintiffs and the company had been solely due to the fact that the parties had taken totally different views of their rights. The plaintiffs' claims against the dock company were the subject of an arbitration now taking place.

The jury gave a verdict for the plaintiffs, assessing the damages at 250*l.*

BUILDERS' PLANT ON THE "HIRE-PURCHASE SYSTEM."

IN RE BARNETT—EX PARTE REYNOLDS AND CO.

THIS case was before the Court of Appeal on Tuesday last, before the Master of the Rolls and Lords Justices Baggallay and Bowen.

The case involved the important question whether a county court judge, sitting in banc, Reynolds & Co., brought an action by injunction an action in the High Court of Justice. It appeared that one Barnett, a builder, was adjudicated a bankrupt in October, 1884, in the Croydon County Court, and a trustee was appointed. At the time of the bankruptcy Barnett was in possession of certain machinery, which he had got from Messrs. Reynolds & Co., Acorn Works, Edward Street, Blackfriars-road, London, on "the hire-purchase system," part only of the purchase-money, which was payable by instalments, having been paid. This machinery the trustee claimed as having been in the order and disposition of the bankrupt at the time of the bankruptcy. Thereupon Messrs. Reynolds & Co. brought an action of injunction in the High Court against the trustee. The trustee applied to the county court judge for an order to stay proceedings in that action, and that he should determine the question of ownership of the machinery. The County Court Judge refused the application, but a Divisional Court, consisting of Mr. Justice Cave and Mr. Justice Wills, reversed the decision and granted the trustee an injunction restraining Reynolds & Co. from proceeding in the action until further order, on an undertaking by the trustee to be answerable for damages and to proceed with the motion in the Court below with due diligence. Messrs. Reynolds & Co. now appealed, and it was stated that the result of the action in the High Court would be of great importance to the trade, as it would be sought to set up a hiring custom in respect of machinery of the kind in question so as to take it out of the reputed ownership clauses, as has been done in the case of hotel furniture and pianos.

At the conclusion of the arguments the Court gave judgment allowing the appeal.

MR. EDWIN CHADWICK, C.B., AND TUBULAR DRAIN-PIPES.

SIR,—Statements have repeatedly been made as to the origination of the tubular system of house and drainage which implied that I had taken it from some one without acknowledgment. I wrote to the late Mr. John Roe for his account of the first order given on the subject, and the following is a copy of his answer, which I should be greatly obliged if you will insert in the *Builder*. EDWIN CHADWICK.
East Sheen, April 25.

9, Albert Villas, Clifton-road, South Norwood, Sept. 18th, 1868.

Dear Sir,—I have some thoughts of having an account printed of some of the various improvements introduced into sewage matters during the time I was acting under the Commissioners of Sewers in the metropolis. If I should, the salt-glazed stoneware pipe would be amongst the number named. The history is as follows:—

In 1842 Mr. Chadwick was taking evidence for the Poor Law Commissioners' Report on the Sanitary Condition of the Labouring Population of Great Britain. During the course of the inquiry Mr. Chadwick suggested to me the forming tubular pipes of small size for drainage with cement, and to ascertain the cost and efficiency. This I caused to be done at intervals during the years 1843, 1844, and 1845. On seeing Mr. Chadwick thereon he expressed a desire for a smoother surface than the cement or tile pipes presented.

Talking the matter over with some of my clerks of works one of them (Mr. Medworth) said he had a friend who was a manufacturer of glazed stoneware, and no doubt he would try and make me glazed pipes if I sent him models. I said we would try him, but I wrote at intervals during the year 1845, and sent to Mr. Northern, who was Mr. Medworth's friend, and to Mr. Davis, whose works were distant from Mr. Northern's.

The pipes were duly completed, and, singularly enough, they arrived at the Holborn and Finsbury Office of Sewers, in Hatton Garden, on the same day (Sept. 26th)

5). Mr. Francis Wigg, one of our Commissioners, afterwards our Chairman, coming into the office, I seeing the pipes, recommended them strongly for such was the commencement of salt-glazed stoneware, and such I should state in any particulars I might wish.

Will you kindly give me your experienced advice on this matter, and I shall feel obliged—I am, dear Sir, yours truly,
JOHN ROSS,
Edwin Chadwick, esq., C.B.,
Park Cottage, East Sheen, S.W.

COOKING APPARATUS FOR LARGE INSTITUTIONS.

Sir,—In reply to Mr. T. W. Aldwinckle's letter which appeared in your journal [p. 601, ante], with reference to the article of the 15th inst. [p. 566] on Becker's Patent Cooking Apparatus, I beg leave to state the following:

I have been since 1868 well acquainted with Captain's apparatus, and I am also in possession of patent; nevertheless, I was induced to inspect the apparatus which is in use in Lambeth Workhouse. I could find there neither a Warren nor an Aldwinckle apparatus; there was only to be seen an apparatus of the firm of Messrs. Benham & Sons, which I, therefore, take as the apparatus in question. This apparatus has nothing whatever in common with my invention, because it is nothing else but ordinary steam cooking apparatus, such as there have been in use on the Continent for the last forty years. I contest that this apparatus is possessed of any of those fine qualities, specified and protected by the letters patent which I have taken out, and I declare that neither in this nor in the Warren apparatus is the slightest trace of the peculiar effects of my invention. My apparatus is based on scientific principles which have been discovered, not by me, but some time ago by men like Von Liebig, Sir Henry Thompson, &c. It would take too much of your valuable space to go into the details of my invention, but I am prepared to put up in the Lambeth Workhouse one of my apparatus in order to enable an impartial commission to compare the two.

CARL BECKER.

12, Finsbury Pavement, E.C.
April 25th, 1885.

P.S.—To facilitate matters, I would gladly take your gentleman, appointed by such commission, to the Finsbury Workhouse, where one of my apparatus used, and prove to him by ocular demonstration superior merits.

ARCHITECTURE IN THE NINETEENTH CENTURY.

Sir,—I shall feel obliged by your correcting a slight error in the report of my lecture "On Architecture in the Nineteenth Century," published on the 15th, p. 582, middle column, lines from the bottom. The words "perannum" should be omitted.
G. AITCHISON.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

153, Cement. R. Stone. The improvements here consist in a form of grinding-mill, and also in the form of the moulding-chine, and the prevention of clogging by vibrating as under first grinding contact.

198, Opening and Closing Casements and Ventilators. J. Bruce. A slotted bracket secured to the window has a ring in its ends a screwed bar which can be acted by an endless cord over a pulley. A nut acting with a screwed bar has guides to enable it slide in the slots without turning, and a lug which works in the slot on a plate screwed to the window. When the window opens outwards inwardly the plate, a bar may be pivoted to it and nut. The invention is also applicable to louvre ventilators.

26, Combined Measuring Tape and Compass. Whitaker. The compass is let into the centre of those tapes that are worked by a spring. The tapes operated a handle have the compass affixed in the knob between the tapes.

200, Fireproof Floors, Ceilings, &c. P. Oles. Slabs of concrete or other fireproof material are divided with related edges, by which they rest in the joints. When the concrete floor is to be laid with boards a space is left between the slabs, which is filled up with a strip of wood. In cases the slabs fit in flush between the joints rest upon fillets nailed to them. For ceilings slabs may be either of a dish shape or flat, and rest upon fillets of wood or iron angle-pieces, and iron joints are used upon the lower flange.

587, Transportable Building. W. H. Dunlop. The building is composed of several separate structures, each standing on its own set of wheels,

arranged to be connected together to form a complete room for exhibitions or other entertainments. The windows are fitted with shutters sliding on friction rollers and connected together by rods, so that they may, by a handle conveniently placed, be simultaneously closed for the purpose of showing dissolving views. For standing on sloping banks the sections forming the building are without wheels, and are dorelled into a slanting base frame.

1,793, Ventilating or Chimney Frame. H. A. Phillips. A shaft is fitted with a curved collar which supports a number of vertical, radial, flat, or wedge-shaped bars. These are surmounted by a cover and support louvres to exclude the wind and the rain.

2,829, Drain Scrapers. J. Birch. The scraper consists of a long handle formed in lengths which can be screwed together when it is inserted in the drain, and of two spade-like heads, either of which may be attached according to the kind of work to be done,—whether the removal of solid, semi-solid, or liquid matter. Another kind of scraper may also be used for withdrawing paper, rags, straw, and such like material.

13,021, Door Spring. A. McMillan. A groove is made in the top edge of the door, and a spiral spring placed in it; one end of the spring is locked to a plate in the outer end of the groove. The door will swing both ways, but the tension of the spring will cause it to close at once.

1,224, Combined Lock and Lifting Latch. G. H. Bratt. The lifting latch is cut out in the lock case and the staple of the lock bolt and the catch of the latch are fastened to the front plate. A projection is formed on the outer end of the latch, so that it cannot be raised when the bolt is shot. A light spring presses down the latch, which may be raised either by a knob or a thumb-piece, both of which are attached to it.

2,640, Artificial Marble. A. Quattara. This is made from any variety of gypsum. The first method is without decomposition, the gypsum is dehydrated by heating to a specified temperature for each variety; then immersed in a bath containing a specified silicate solution for each variety, dried, reheated to a higher temperature, replaced in a bath and dried in the air. The various colourings to produce various tints are described. In a second method the gypsum is first reduced to small pieces, then dehydrated, soaked, dried twice, burned and cooled, and finely powdered. The powder is made into a paste with a silicate solution, pressed in moulds, and dried. Other and similar methods, with slight modifications, are also given.

2,764, Entrenching Tool. W. F. Blakeney. A pick has a broad end formed with a shoulder so that it can be used as a shovel, and a wooden handle fits into a socket, which is cased with hard metal at its end, so that it may be used for tearing down bricks.

5,211, Louvre Bricks or Blocks. J. C. Bothams. The bricks are made with slanting passages through them for building into walls where louvre openings are required. Several forms of brick are described, which are useful in ventilation, either together or separate. Bricks are also made with slanting recesses in them into which tiles, formed for the purpose, are inserted to be built into the wall for louvre filling.

APPLICATIONS FOR LETTERS PATENT.

April 10.—4,429, T. Redman, Fixing Sunburners or Ceiling Lights.—4,438, A. Oakden and W. Sharpe, Improvements in Cooking Ranges.—4,440, S. Wilkins, Burglar or Fire Alarm.—4,441, W. Tapp, Improved Construction of Tiles for Stairs.—4,444, D. Menzies, Ventilation of Houses and other Buildings.—4,449, T. Emsley, Improved Casement Stays.—4,469, B. Hewetson, Securing Slates used to replace damaged slates on roofs of houses.

April 11.—E. Ormerod, Apparatus for Making Paving Slabs, Blocks, Sinks, Manholes, Roofing Tiles, and other similar Articles in Concrete, Terra Cotta, &c.

April 13.—J. Davidson, Ventilation of Soil and Waste Pipes.—4,621, H. Yull, Water-waste Preventer.—4,539, H. Haddan, Improved Roof Covering.

April 14.—4,564, J. Corcoran and Others, Shaping and Reducing Timber.—4,566, J. Barwick, Improved Ceiling Ventilator.—4,582, G. Grace, Describing Ellipses in various Sizes and Proportions.—4,614, A. Clark, Bolts or Fastenings for Shutters, Blinds, Doors, &c.

April 15.—4,627, J. Watt, Door Springs or Automatic Closing Apparatus.—4,629, J. Miller, Improvements in Ventilators.—4,630, R. Roberts, Opening Doors from the Inside.—4,643, G. Ellis, Portable Dry-earth or Carbon Closet.—4,646, E. Showell, Improvement in Sash Fasteners.—4,663, E. Bowdley, Automatically Opening and Closing Ventilators.—4,668, W. Wilson, Improved Process of Ornamenting Wall and other Papers.

April 16.—4,681, J. Barwick, Improved Ventilating Pipe and Cap.—4,700, G. Blane, Apparatus for Closing Gates.—4,721, J. Fell, Pneumatic Door Check Spring.

April 17.—4,726, R. Jones, Improved Window

Sash Fastener.—4,727, M. Bouafield, Trilled Fire Front for Ranges and Stoves.—4,749, E. Palmer, Apparatus for Flushing Sewers and House Drains.—4,750, A. Elford, Improvements in Paving Blocks.—4,751, J. Garrett, Earth Closet Apparatus.—4,754, G. Osborn, Apparatus for Printing on Wall Paper, &c.—4,759, W. Luther, Sash Bars or Astragals.

April 18.—4,813, J. Dower, Bel-plates for Brick moulds.—4,819, J. Baker, Disinfecting and Deodorising Apparatus for Water-closets, &c.—4,827, E. Newton, Self-cleaning Cisterns or Tanks.

April 20.—4,851, F. Brown and S. Guiney, Locks and Latches.—4,869, R. Duncan, Improvements in Domestic Fire Grates.—4,873, W. Leggott, Window and Door Fastening Bars.—4,875 and 4,878, W. Lake, Manufacture of Nails.—4,886, J. Eaton and F. Morris, Improvements in Window Sashes.—4,888, T. Lownds, Urinals and Drainage Traps.

April 21.—4,891, R. Stoffert and T. Dykes, Construction of Girders.—4,901, W. Pinkerton, Improvements in Spring Hinges.—4,926, G. Wells, Water-closets and Appliances connected therewith.

4,921, W. and E. Murdoch, Improvements in Pavements.—4,927, J. Hopkinson and O. Gibson, Facilitating the Raising and Lowering of Windows.—4,943, F. Humphreys, Improved Joint for Pipes.—4,958, W. Lake, Decoration of Walls and Ceilings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

2,057, S. Cowan, Improvements in Drain Traps.—2,412, J. Tulloch, Improved Sash Window.—2,788, E. Prince, Adjusting and Fastening Windows.—3,183, H. Ransom, Apparatus for Setting Saws.—3,186, W. Royston, Ornamentation of Woodwork.—3,227, E. and A. Marples, Construction of Spokeshafts.—3,714, C. Portway, Improvements in Fences, Dividing Walls, &c.—3,757, W. Miller, Improvements in Washhand Basins or Lavatories.—3,772, C. Anger and P. Gerlach, Improved Cooking Stove.—3,836, W. Brown and H. Clayton, Construction of Sinks and Traps.—3,840, H. Heron, Ventilating Closet, Soil-pit, or Privy, applicable also to Dust-bins.—3,897, J. Johnson, Manufacture of Artificial Stone.—8,174, J. Lamb, Ventilating Appliances.—1,915, C. Stewart and R. Colquhoun, Electric Bell Indicators.—1,366, W. Thiechen, Ventilating Rooms, and Excluding Draughts therefrom.—3,177, G. Collings, Ventilators for Dwelling-houses and other Structures.—3,802, W. Johnson, Improvements in Walls, Roofs, Partitions, &c.—3,884, H. Haddan, Window Fastenings.—3,916, E. Ormerod and J. W. Horne, Rendering Ceilings Luminous and Damp-proof.

2,803, E. Robbins, Manufacture of New Concrete Materials.—3,251, G. and E. Hammer, Writing Surfaces for Walls of Schools, &c.—3,488, G. Stephens, Ornamenting Glass.—3,932, J. Homan, Fireproof Floors.—4,067, C. James, Latches or Fastenings for Doors, &c.—4,081, A. Mackie, Improvements in Heating Appliances.—4,125, Sampson Low, jun., Apparatus for Producing Upcast Draught in Ventilation.—4,131, H. Walker and G. Clark, Improvements in Dust Bins.—4,150, J. O'Callaghan, Securing Door Knobs or Handles to their Spindles.—4,164, W. Stobbs and E. White, Preventing Down Draught in Chimneys, &c.—4,169, G. Holloway and H. Steaning, Window Fasteners.—3,970, J. Garrett, Heating and Ventilating Flues, &c.—3,656, F. Rogers, Improved Vane and Indicator.—3,723, J. Barrett, Apparatus for Opening and Closing Doors in Connexion with Hoists.—3,801, R. Keates, Dies for Tiles, Bricks, &c.—3,945, D. Patzeys, Alarm Extincteur of Fires in Chimneys.—3,956, H. Stevan and W. More, Spiral and Other Stairs.—4,205, F. Vorgard, Stoves and Fire Grates.—4,512, J. Powell, Cramps for Flooring, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

8,434, J. Garrett, Apparatus for Heating Apartments, also applicable for Preventing Draughts.—6,918, F. and J. West, Building Slabs for Concrete Construction and Method of Manufacturing and using same.—3,228, J. H. Taylor, Improved Method of Constructing Pipe Joints.—3,921, T. Tobitt, Sliding Window Sashes.—3,993, H. Lake, Machines for Crushing Lime, Cement, &c.—12,907, E. Smith, Improvements in, and in Opening and Closing Windows.—15,036, E. Goodson, Manufacture of Cement and Making Articles therefrom.—15,875, W. Leiper, Electric Bell Pushes, Contact Makers, and Indicators.—623, E. Bailey, Securing Door and other Knobs and Handles.—3,021, J. Quirin, Parallel Vices.—3,371, J. Hughes, Rack Pulleys for Window Blinds.—3,383, W. Soutter, Improvements in Water-slide Gaseliers or Gas Chandeliers.—3,405, W. Lake, Improvements in Pavements.—3,174, J. Lamb, Ventilating Appliances.—8,256, B. Reynard, Improved Plates for Building in Concrete.—8,675, W. Middleton, Improved Method of Slating Iron Roofs.—8,683, W. Symons, Floors or Covering for Floors.—9,670, W. Fyfe, Improvements in Ventilators.—9,699, S. Frankenberg, Damp-proof Ceilings.—10,830, J. Gosling, Manufacture of Brass Hinges.—10,457, S. Gosling, Flushing Cisterns, &c.—2,181, A. Bout, Appliances for Cleaning Water-closets, Sinks, &c.—8,825, W. Baylies, Self-adjusting Pulley for Window Blinds.—9,888, L. de Liebhauer, Colouring Stones for Building, &c.—1,683, A. Clark, Improvements in Lathing.—2,319, T. Normanton, Improvements in Water Pipes and Flushing Cisterns to Prevent Bursting by Frost.—3,711, J. Krietschmann, Improvements in Water-closet Valves.

The Student's Column.

DESCRIPTIVE GEOMETRY.—XIII.

Through the point *c* draw a straight line passing at given distances from the points *a* and *b*.

THIS problem will test the student's capacity of realising in his imagination what our drawings mean in space, for unless he succeeds in doing this, it is hopeless for him to try to follow our diagram.

We must first consider that all the points that are at an equal distance from a given point, *a* or *b*, belong to the surface of spheres of which the points *a* and *b* are the centres, and the given distances are the radii. We conclude therefore that the line we have to draw will be tangent to both these spheres. The lines passing through a point and tangent to a sphere form the surface of a cone; the line required is therefore at the intersection of the cones, which have *c* for apex, and envelope respectively the spheres round the centres *a* and *b*. (See fig. 67.)

If we make two auxiliary elevations, the one by taking the line $a^h b^h$ for $L^1 T^1$, the other with $b^h c^h$ for $L^{11} T^{11}$, we shall have on these elevations the sections of the two spheres; and the tangents to these circles, such as $c^h m^h$ or $c^{h11} m^{h11}$ are the outlines of the cones we have spoken of above; c^h and c^{h11} are the two elevations of the same point *c*, therefore, if we make $c^{h11} m^{h11}$ equal to $c^h m^h$, when the lines in space *c m* and *c m* rotate round their respective axes *a c* and *b c* the points *m* will meet. The point m^{h11} rotates in the plane *P* perpendicular to *a c*, the point m^{h11} rotates in the plane *Q* perpendicular to *b c*, therefore the point *m*, where they meet, will be on the line *d e* intersection of the planes *P* and *Q*. The meeting of the traces P^h and Q^h gives us d^h ; thanks to auxiliary horizontal sections *I* and *K* by plane

R we find e^h ; we know that d^h and e^h will be on P^h . If we turn down the plane *P* round its trace P^h we shall get the circle described by the point *m* in rotating round the axis *a c*, and also the line of intersection $e^h d^h$ of the

vertical plane, which contains the trace P^h . The intersection of the line $e^h d^h$ with the circle gives us the points $x^h y^h$; we find the projections of these points in $x^h x^v$ and $y^h y^v$, and both the lines which join *c* to *y* or *c* to *x* satisfy the conditions of our problem, which has in this case two answers. The student can easily see also that there would be but one answer, if the spheres were tangent, and no answer if the spheres did not touch one another. (See fig. 68.)

Draw a line through a point *O*, and passing at given distances from two lines *a b* and *c d*.

The students who will have been able to master the preceding diagram will find no difficulty with this problem. If we suppose two cylinders having respectively *a b* and *c d* as axis, and the distances given as half diameters, the line required is bound to be tangent to both those cylinders, and, therefore, it is the line formed by the intersection of two planes, *R* and *S*, passing through the point *O*, and tangent to the above cylinders.

In the diagram fig. 69, we have assumed the points *a* and *c* to be in the plan, and the heights of *b* and *d* to be known. We take $a^h b^h$ as $L^1 T^1$, and draw the traces of a plane *X* perpendicular to *a b*. We project the point *O* on that plane *X*, which we turn down on the plan with the projection of *O* thereon, which comes in O^x (this operation is identical to the one we have already seen in fig. 66). We make $o^x t^x$ tangent to the base of cylinder round axis *a b*; the plane *R*, which contains the line $O O^x$ and $O^x t^x$ is tangent to the cylinder, we get its trace, R^h , by joining β trace of the line $O O^x$ with a trace of $O^x t^x$, which is, of course, in the point where the line $O^x t^x$ crosses X^h . In the same way we find S^h the trace of the plane tangent to cylinder round axis *c d* and the point *m*, where the traces X^h and S^h meet, is a point of

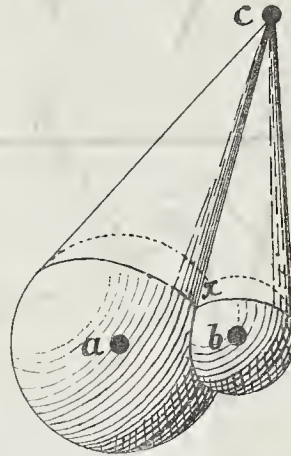


Fig. 67.

planes *P* and *Q*, in which the distance $e^h m^h$ is equal to βe^h , and $d^h m^h$ is equal to $d^h \beta^h$, for both the plane *P*, which contains the points *c* and *d*, and the plane of the plan, which contains the projections e^h and d^h , are perpendicular to the

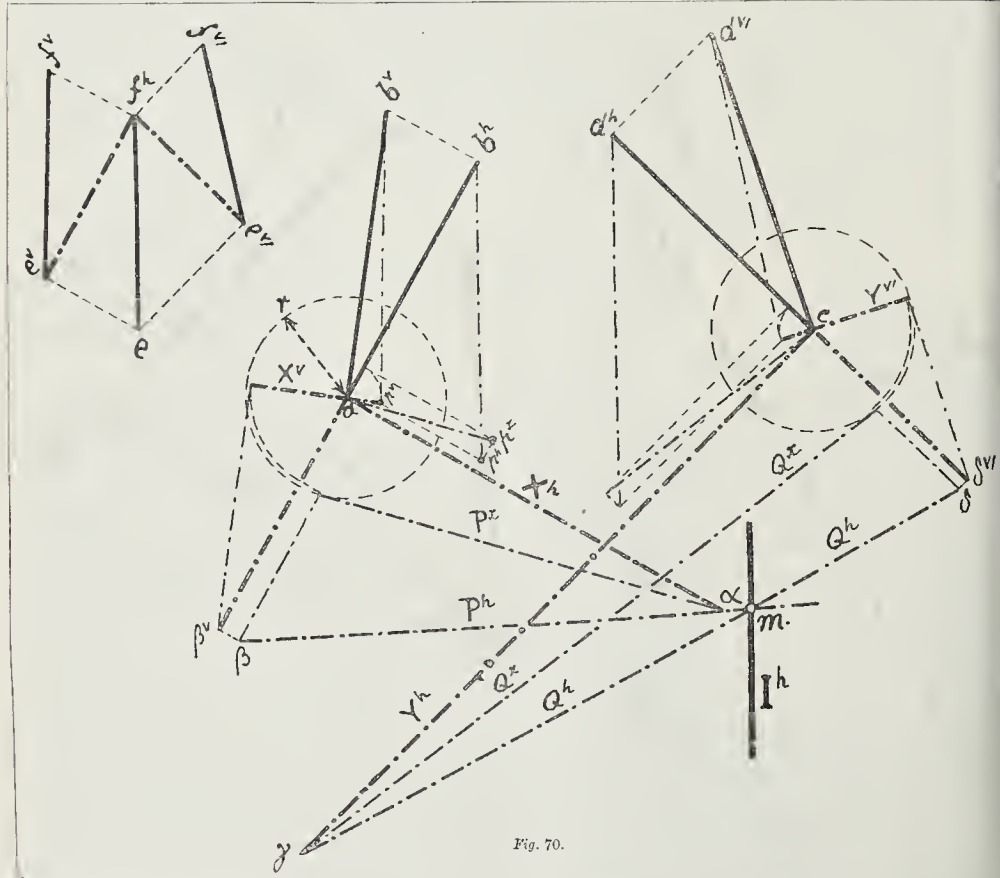


Fig. 70.

the line required, which is, therefore, the line *cm*.

Draw a line parallel to a line *ef*, and passing at a distance *a* from the lines *a b* and *c d*.

We project the cylinder of axis *a b* and radius *a r* on the plane *X*, perpendicular to *a b*. Taking *a b* for *L T*, we draw *X c* and *X d* the traces of the plane *X*, and then turn down the plane *X* so as to have the circular base of the cylinder *a b* drawn thereon. Through the point *b* we draw a line *b p* parallel to *ef*, the point *p* where this line penetrates the plane *X* will be found on the turned down plane in *p'*. The plane *P*, tangent to the cylinder and parallel to *ef*, will be parallel to the plane which contains the lines *a b* and *b p*, of which *a p'* is the trace on the plane *X*; where *P'*, the trace of the plane *P* will be parallel to *a p'*. *P^a*, the trace of the plane *P*, on our plan passes through *β*, trace of the line of the cylinder along which the plane *P* is tangent, and passes also through *a*, where *P^a* cuts *X b*. By a similar operation on cylinder round axis *c d* we get *Q^b*, the trace of the plane tangent to the second cylinder. The point *m* at the intersection of *P^a* and *Q^b* belongs to the line *l* required. *l* is parallel to *ef*, and the elevation of *l* will be parallel to the elevation of *ef*, whatever elevation plane be selected. (See fig. 70.)

RECENT SALES OF PROPERTY.

Table with columns for property address, agent name, and price. Includes entries like 'Maida Vale-15, Clarendon-gardens, 63 years, ground-rent 10s.' and 'Hammersmith-11 and 13, Chapel-street, 29 years, ground-rent 6s.'

Table with columns for property address, agent name, and price. Includes entries like 'Stoke Newington-17, Gainsborough-road, 74 years, ground-rent 6s.' and 'Marylebone-36, George-street, 9 years, ground-rent 12s.'

MEETINGS.

Table listing various meetings and societies. Includes 'St. Paul's Ecclesiological Society - Visit to Merton Abbey and the Churches of Merton and Morden. Papers by Mr. S. W. Kersey, F.S.A., and Mr. Arthur J. Style.' and 'Royal Institute of British Architects - Fifty-first Annual Meeting.'

Miscellaneous.

Newbatle. - Two Munich stained-glass windows have just been erected in Newbatle Church, Dalkeith, in memory of the late Mr. Craig, and representing the two acts of Charity, Feeding the Hungry and Teaching the Young. The artists are Messrs. Mayer & Co.

Shortcomings of the Factories Act. - While it is not to be expected that the business of factories and workshops will go on without a measure of danger from accident and illness, the last return presented to the Home Office on this subject shows that the minimum of avoidable mishap is still far from being attained. A large percentage of reported cases of accident is evidently due to carelessness on the part of employers and employed. Among these are such as arise from insufficient fencing of machinery, from hurry in piece-work, and from the regrettable practice of entrusting the cleaning of machinery to young boys or girls. A part of the report of special interest to the sanitarian is that which deals with the atmosphere of work-rooms. Interesting facts are communicated with respect to overcrowding, and the varieties of trade phthisis which are apt to follow the inhalation of many kinds of dust-laden air. Of equal or even greater public importance are the statements contained in this return with reference to the condition of the class known as "sweaters," who supply the market, particularly in the clothing trade, with work done in their own homes. A house-to-house visitation by the Factory Act inspectors during 1884 has further proved the powerlessness of that Act either in controlling working conditions or in improving unhealthy domestic surroundings. The Act, indeed, was not meant to extend to the above-named body of operatives. We find, accordingly, that of 1,478 such workrooms visited by the inspectors, 734 were exempt from their jurisdiction in all respects, while 367 were equally free from their sanitary control, though subject to that of the local authorities. - The Lancet.

Crown Lands and Street Improvements. At the last meeting of the Metropolitan Board of Works a report was presented by the Works and General Purposes Committee, reporting, for the Board's decision on the subject, the circumstances relating to the claim of H.M. Office of Works, &c., in respect of Crown property in Hemming's-row and St. Martin's-place, required for the Charing-cross to Tottenham-court-road improvement. Mr. F. H. Fowler, in bringing up the report, stated that for this property H.M. Office of Works demanded 57,000l., but the Superintending Architect had valued it at 53,000l., which he considered a liberal valuation. The Commission of Works had refused to allow the matter to go to arbitration. Mr. Driver, as an independent authority, had been called in by the Board, and had put the value on the land at 50,000l. It was well that the public should know that the Government was standing in the way of this important improvement being carried out. Mr. Shepherd moved an amendment to the effect "That the solicitor be authorised to settle this matter on the terms specified in the committee's report, or on the best terms that he can obtain for the Board." Mr. J. Jones seconded this amendment, which was carried by twenty-five votes against fourteen, and subsequently put as the substantive motion, and adopted.

Southampton. - The new Primitive Methodist Chapel in South-front, Southampton, was opened on the 7th ult. The style of the building is Early English. It is built in red brick with stone dressings, and is lighted from the front and back walls. The front elevation has buttresses with pedimental cappings, with roll mouldings, and filled in with trefoil sinkings, and the front gable is finished with splayed stone coping and pointed stone turrets and ornamental metal terminals. The front is also filled in with a large four-light pointed and cinque-folled window, having hollow splayed mullions and jambs and tracery. This window has on each side of it one long two-light window, with moulded tracery jambs and mullions, and is relieved in length with intermediate stones with sunk panels and quatrefoil sinkings. The window arches are of stone, with hood-mouldings and carved terminals. The designs were prepared by Messrs. Korridge & Sons, architects, of Wisbeach, and the building has been erected under their superintendence, assisted by Mr. Butt, who has acted as clerk of the Works. Mr. Henry Wyeth, of St. Andrew's-road, Southampton, was the contractor. The contract price was 2,500l.

Twiggworth (Gloucestershire). - A three-light Munich stained glass window has just been erected in the parish church of Twiggworth, Gloucestershire, representing Our Saviour Preaching on the Mount. The artists are Messrs. Mayer & Co.

The "Black Autocopyist."—This apparatus, which has lately been considerably improved, affords a very simple and cheap means for the reproduction of documents, circulars, plans, sketches, designs, music, &c. The work done is similar in appearance to lithography, but neither stone nor press is required. The apparatus is light, and, therefore easily portable, and by it from 100 to 150 good black copies can be obtained in lithographer's ink of anything written or drawn with an ordinary pen on ordinary glazed paper, using the special ink provided, which is not only as fluid as the usual writing-ink, but also quite adapted for the use of etching or ruling pens, &c. Tracing-cloth is likewise exceedingly suitable for use. The *modus operandi* is as follows:—One of the prepared parchment sheets is moistened by simply spreading it on the frame of the apparatus and pouring some water on to it. After a few minutes the water is poured away, and the sheet fastened down on the frame and stretched perfectly tight by simply displacing two rollers which are underneath. The original is now placed on the sheet, on which an absolutely correct negative will at once appear. When passing the printing roller over the sheet the latter will, similar to the lithographic stone, remain quite clean, with the exception of the negative, which will immediately take the printing ink, and, in its turn, render it to the sheets of paper placed upon it, thus producing clear black copies of the sketch or handwriting, with a precision only to be equalled by that of lithography.

Liverpool Engineering Society.—The usual fortnightly meeting of this Society was held at the Royal Institution, Colquhoun-street, on the 22nd ult. The President (Mr. W. E. Mills) in the chair. A paper by Mr. W. Goldstraw, entitled "The Relation between Engineering and Architecture," was read by the author. The relations between engineering and architecture are, on a reduced scale, the relations between science and art. Engineering may be said to be that entire system of knowledge and skill which comprises all mechanical pursuits so far as they supply the material wants of men. Architecture, or the art of ornamental and ornamented construction, as applied to buildings, is the development and refinement of an important branch of engineering. They were both formerly practised by the same persons, but have become separate pursuits on the modern principle of the division of labour, and the requirements of science have made it difficult to follow both professions at once with success. It is desirable that the engineer should be more of an architect and the architect more of an engineer. At the same time the two pursuits should be kept even more distinctively separate than at present. But whilst the engineer or the architect practices his special calling only he should have a considerable knowledge of the other profession. Indeed, as both avocations are concerned with building, it would probably be a successful arrangement sometimes for an engineer and an architect to join in partnership. By this means if the work done were of good quality, they might get many commissions which either of them by himself would fail to secure, or would imperfectly carry out. In such cases the competing professions and the public would be mutually benefited.

York Architectural Association.—On the 23rd ult. the concluding meeting of the Association took place in the saloon of the Victoria Hall, Mr. Wm. Hepper, V.P., in the chair. There was a large attendance. The first subject which came under consideration was the scheme for decreasing the number of churches in York, and Mr. Geo. Benson, Grad. R.I.B.A., moved a resolution to the effect that the Association strongly protested against the proposed demolition of ancient ecclesiastical buildings as scheduled by the City Ecclesiastical Parish Boundaries Committee. Mr. W. Hepper seconded the motion, and it was agreed to unanimously. Mr. B. Priestley Shires, honorary secretary, afterwards delivered an able address on "Theatres, their Planning and Construction." A discussion followed, and a hearty vote of thanks to Mr. Shires for his address was adopted.

Female School of Art.—We are asked to mention that Her Royal Highness the Princess of Wales has graciously consented to be present at the Bazaar in aid of the Extension Fund of the Female School of Art, Queen-square, on the 26th of June next.

Overhead Telephone and Telegraph Wires.—The evidence that is now being placed before the Select Committee of the House of Commons engaged in inquiring into this subject points conclusively to the necessity of legislation for the control of the wires. The rate at which the number of overhead wires has been increasing was shown in the evidence of Col. Haywood, Engineer to the Commission of Sewers, who said that the increase had already become so great in the City that the wires now constituted a grave public nuisance. To show the number of wires stretched across the streets, he stated that there were 320 over Moorgate-street; 40 over Coleman-street, 312 Leadenhall-street, 240, Fenchurch-street, 160; and Queen Victoria-street, eight cables and 408 wires. At one spot in Fleet-street, viz., at Ludgate-circus,—there were to be counted two cables and 142 wires; across King-street there

were six cables and seventy-four wires; and over Cannon-street seven cables and 360 wires. Over some of the streets of the City there were something like from 1,200 to 1,500 lines a mile. With such evidence as this before us, and from the certainty that telegraph and telephone wires will be still more numerous in the future, it seems absolutely necessary to put them underground. We cannot, however, agree with the proposal that the expense of carrying out this work should be borne partly by the local authorities; in other words, by the ratepayers. The public might just as well be expected to contribute towards the expense of replacing level crossings on railways by bridge because the former are dangerous. What appears to be necessary to be done in the overhead wire case,—and done quickly, too,—is to pass an enactment forbidding private companies to erect any more such wires.—*Iron.*

CONTRACTS AND PUBLIC APPOINTMENTS:

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Painting Barracks, &c.	The Sec. of State for War	Official	May 5th	ii.
Paving	Mile End Vestry	J. M. Knight	May 6th	ii.
Sewer Work	do.	do.	do.	ii.
Cast-iron Pipes, &c.	Swansea Town Council	R. H. Wyrill	do.	ii.
Erating Works	Met. Board of Works	Official	May 7th	ii.
Gravitate	Grds. Dartford Union	do.	May 8th	ii.
Completion of Additions, Western Hospital	Met. Asylums Board	A. & C. Harston	May 8th	ii.
Staining Rooms	Wandsworth Bd. of Wks	Official	May 12th	xiii.
Wood-Paving Works	St. Mary Abbots, Kensington, Vestry	do.	do.	ii.
Infant School, &c.	Llanelly School Board	E. H. Lingen Barker	do.	xiii.
Fitting New Post-Office, Kidderminster.	Com. of H.M. Works	Official	do.	ii.
New Post-Office, Guildford	do.	do.	May 13th	ii.
Medical Superintendent's House, &c.	Grds. Paddughn Parish	A. & C. Harston	do.	ii.
Repairing Roads, &c.	Met. Board of Works	Official	May 14th	ii.
Construction of Road	South Acton Estate	C. N. Lalley	do.	xiii.
Erection of Houses	G. Morris, Esq.	do.	do.	xiii.
Masonry for Viaducts	Great Western Ry. Co.	Official	May 19th	ii.
Asphalte and Wood-Paving	Parish St. James's Vest.	do.	May 21st	xiii.
Cottages, Watch-room, &c.	Admiralty	do.	May 22nd	ii.
Drainage, &c.	Kingsbridge E.S.A.	H. Lidstone	do.	xiii.
Sewerage Works	Colne, &c., Local Board	H. Bancroft	May 25th	ii.
Gas Works	Grds. Holborn Union	H. Saxon Snell & Son	May 27th	ii.
Erection of Organ Factory	Christchurch Union	E. H. Burton	May 28th	ii.
	A. Monk	do.	Not stated	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor and Inspector of Nuisances	Gds. Wallingford Un.	100l.	May 11th	xviii.
City Architect	Norwich Corporation	200l., &c.	May 20th	xviii.

TENDERS.

For the erection of shops and mansions at White Rock-place, Hastings. Mr. Arthur Wells, 27, Chancery-lane, and Hastings, and Mr. Mark J. Lansell, A.R.I.B.A., Bedford-row House, Great James-street, joint-architects. Quantities by Mr. Arthur Wells—

Louley, Gray	£20,300 0 0
Andrews, Margate	19,402 7 0
Perry & Co., Bow	19,100 0 0
J. Howell & Son, Hastings	18,850 0 0
Sawle, Worthing	18,429 0 0
Staines & Son, Easterhay, London	18,400 0 0
Jarvis, Tunbridge Wells	18,400 0 0
Peters, Horsham	18,200 0 0
Adcock & Dorer	17,483 0 0
E. C. Howell & Son, Lambeth	17,470 0 0
W. J. Rodda, St. Leonards	17,275 0 0
Taylor Bros., Hastings (accepted)	16,985 0 0

For additions to Gunnersbury House, Spring Grove, Isleworth, for Mr. A. H. Johnson. Mr. Geo. Asby Lean, architect and surveyor, Ealing—

T. Nye	£623 0 0
F. Adamson & Sons (accepted)	615 0 0

For the erection of a cottage at Crowborough, near Tunbridge Wells. Mr. F. V. Stokes, architect, 3, Essex-road, Acton. Quantities by Mr. A. F. Wrightson, 26, Budge-row—

Cheesman & Co., Uckfield	£1,540 0 0
Baile & Son, Tunbridge Wells	1,437 0 0
Norman, Burgess Hill	1,343 0 0
Pannett & Sons, Tunbridge Wells	1,270 0 0

* Accepted.

For the erection of a boundary-wall, and additions to other walls, at the Workhouse School, Hornsey-road, for the Guardians of the Poor of St. Mary, Islington—

Turner	£213 0 0
Morden	209 10 0
Hales & Brooker	181 0 0
Ward & Bramble	175 0 0
Clard	170 0 0
Wood, Harris & Co.	170 0 0
Dutton & Graham	168 0 0
Hales & Son	164 0 0
Holding	160 13 6
King	160 10 0
Dyer & Pain	155 0 0
Higgs	152 0 0
Stevens	141 0 0
Killingback	115 0 0

For building the Chance Memorial Church, Malvern. Mr. Lewis Sheppard, architect, Worcester—

John Inwood, Malvern (accepted)	£1,240 0 0
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For the erection of lace factory, Lenton Boulevard, Nottingham, for Messrs. T. & W. Sampson, Mr. J. Bindon Carter, architect, 3, Clarendon-street, Nottingham—

W. Bailey, Great Alfred-street, Nottingham	£13,632 0 0
Frank Jay, Colliace-street, Nottingham	13,763 0 0
G. Underwood, Talbot-street, Nottingham	13,200 0 0
J. J. Adams, Colliace-street, Nottingham	13,000 0 0
Wool Bros., Curzon-street, Nottingham	12,870 0 0
G. Fillett & Son, Ropewalk-street, Nottingham	12,515 0 0
F. Messon, Talbot-street, Nottingham	12,137 0 0
G. Brower & Son, London-road, Newark	12,000 0 0
R. Middleton, Grayfriar-gate, Nottingham	12,000 0 0
T. Knight, Martin, near Lincoln	11,885 0 0
O. Baines, Applegate, Newark	11,765 0 0
Thos. Fish & Son, Fitcher-gate, Nottingham	11,720 0 0
H. & W. Butler, Lenton, Nottingham	11,650 0 0
J. Greenwood, Mansfield	11,620 0 0
E. Hind, Edge-rise, Nottingham	11,577 0 0
Bell & Son, Sherwood-street, Nottingham	11,550 0 0
H. Vickers, Wilford-road, Nottingham	11,616 0 0
R. Dennett & Co., Station-street, Nottingham	11,365 0 0
S. & J. Cargill, New Basford, Nottingham	11,250 0 0
Bott & Wright, Great Alfred-street, Nottingham	11,247 0 0
J. F. Price, Beeston	11,079 0 0
R. Keeling, New Radford, Nottingham	10,914 0 0
Wheatley & Maule, Sherwood-street, Nottingham	10,914 0 0
Lynam & Kidd, Brewhouse-yard, Nottingham (accepted)	10,360 0 0

For the erection of a new malthouse for Messrs. H. A. & D. Taylor, Ware, Herts. Messrs. Davison, Insip, & Mackenzie, architects, No. 62, Leadenhall-street. Quantities supplied by Messrs. Curtis & Sons—

Hitch, Ware	£7,683 0 0
Hunt, Ware	7,498 0 0
Morter, Stratford	7,243 0 0
Brown, Son, & Blomfield, London	6,600 0 0
T. Wontner Smith & Son, London	6,437 0 0
Grinwood & Son, Sudbury (accepted)	6,420 0 0

For widening the north end of North Bridge, constructing a storm-water sewer from Alexandra-street to the River Soar, through the North Bridge abutment, and widening Woodgate along Mr. A. E. Hawley's premises, for the Corporation of Leicester. Mr. J. Gordon, C.E., Borough Surveyor:—

Thos. Smart, Nottingham	2814	2 10
S. W. Pilling & Co., Manchester	794	19 2
J. G. Jewsbury, Leicester	789	9 8
W. H. Kelleter, Leicester	697	11 0
T. & H. Herbert, Leicester (accepted)	695	4 1
[Borough Surveyor's estimate, 720.]		

For the repairing of the carriageway and portions of the footways of Chelsea Bridge, for the Metropolitan Board of Works:—

Nowell & Robson	£1,895	0 0
Bransick Rock Asphaltic Company	1,450	0 0
Improved Wood Paving Company	1,270	0 0
Mowlem & Co. (accepted)	1,216	0 0

For the maintenance, cleansing, watering, &c., for three years, of the Victoria Embankment, for the Metropolitan Board of Works:—

A. & F. H. Culverhouse, Camden Wharf, Camden Town	£8,592	5 1 1/2
E. & H. Bevers, Union-road, Boro'	6,575	4 3
J. S. Gabriel, Belvedere-road, Lambeth	6,397	5 6 1/2
Williams, Son, & Wallington, 122, Shepherd's Bush-road	6,225	8 9 1/2
Aspinall & Son, Crown Wharf, New North-road	6,149	7 11
W. Webster, 8, St. Martin's-place	5,669	17 11
Nowell & Robson, Warwick-road, Kensington	5,410	19 10
Mowlem & Co., Grosvenor Wharf, Milbank	5,311	13 11
Turner & Son, Stanley Bridge Wharf, Chelsea	5,235	7 0
G. G. Ratty, Bromley-by-Bow	4,929	10 8

* Accepted.

For the erection and completion of a dwelling-house, No. 7, Ford-street, Glid Ford, for Mr. H. Roberts. Mr. G. A. Dunsage, architect:—

Oldrey	£485	0 0
J. G. Richardson	465	0 0
Steel Bros.	458	0 0
Johnson	441	0 0
Stewart	383	0 0

For alterations to bar-fittings at the Perseverance Tavern, Lupus-street, Pimlico, for Mr. McCallingham. Mr. Geo. Treacher, architect, 23, Carter-lane, St. Paul's:—

Ellis & Co.	£236	0 0
Turtle & Appleton	270	0 0
G. T. Williams	260	0 0
J. Beale	259	0 0

For rebuilding the Rum Punchon Public-house, Upper Whitcross-street, for Mr. Cain. Mr. Geo. Treacher, architect, 23, Carter-lane, St. Paul's:—

Lidstone	£2,625	0 0
Waddington	2,323	0 0
Turtle & Appleton	2,274	0 0
Schurmer	2,069	0 0
Jackson & Todd	2,045	0 0
J. Beale	1,920	0 0

For the erection of wind-screens, Bournemouth Pier, Bournemouth, Hants, for the Bournemouth Improvement Commissioners. Mr. R. W. Perrigne Birch, engineer. Quantities by Messrs. Curtis & Sons:—

Crook, Southampton (accepted)	£2,088	0 0
Jakes	£8,650	0 0
Benham	6,200	0 0
Berry	6,250	0 0
Fraser & Fraser	6,159	0 0
Hent & Son	5,975	0 0
May	5,800	0 0
Kirk & Randall	5,120	0 0

For reinstating premises damaged by fire, adjoining the Crooked Biller Tavern, Shadwell, for Messrs. Drew & Son. Mr. William C. Livermore, architect and surveyor:—

Nicholls	£210	0 0
England & Thompson	183	10 0

For repairing and decorating the Public Hall, Hastings, for the Hastings Assembly-room Company. Mr. Arthur Wells, architect, 27, Chancery-lane, and at Hastings:—

F. Foster	£136	0 0
A. Vidler (accepted)	120	0 0

For alterations and additions to stabling, fern buildings, &c., at Houlshelm, Bromley, Kent, for Captain Finch. Mr. Alfred J. Hopkins, architect, 10, Berners-street, London:—

G. & F. Penn, Pembury	£268	15 0
M. Tully, Tudeley, Kent (accepted)	229	0 0

For the restoration of the parish church at Oldbury-on-Severn. Messrs. Waller, Son, & Wood, architects, Gloucester:—

D. C. Jones & Co.	£2,289	0 0
J. Roach & Sons	1,944	0 0
A. King	1,888	0 0
B. Burton	1,663	0 0
J. Wilkins	1,640	0 0
Restall & Son	1,639	0 0
Wall & Hook	1,640	0 0
J. E. Davis	1,495	0 0
T. H. Lewis	1,447	0 0
C. Gyde (accepted)	1,421	0 0

For painting and decorating interior of Constitutional Club, Bedford-street, Exeter, under superintendance of Mr. Getavius Ralling, architect:—

Jno. Algar, Gandy-street	£145	0 0
Edwin Algar, South-street (accepted)	119	0 0

[Architect's estimate, 145.]

Congregational Church, Croydon.—Messrs. S. Belham & Co., of 155, Buckingham Palace-road, write to point out that the list of names for this building, in last week's Builder, by some mistake their name appeared as "Pelham, 10, 293/," &c. It should have been Belham, S., & Co.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

R. B. Paris.—C. & C.—A. I.—F. J. C.—M. & C.—A. N. & C.—T. E. K.—C. E. G. H.—R. R. B.—T. R. H.—E. J. T.—E. & W.—C. B.—A. F.—C. J.—W. & C.—W. (Bank)—B. & W.

All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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We cannot undertake to return rejected communications.

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The Builder.

Vol. XLVIII. No 2255.

SATURDAY, MAY 9, 1883.

ILLUSTRATIONS.

The National Liberal Club.—Mr. A. Waterhouse, A.R.A., Architect.....	654-655
Design for a Military Hospital for a Hot Climate (Plans, 666).—By Sir Andrew Clarke and Mr. E. Ingress Bell	658-659
Sketch of Front of Circular Ward of Same	662-663
Elevations for the National Liberal Club, July and November, 1884	667

CONTENTS.

The Inventions Exhibition	643	Preliminary Designs for the National Liberal Club	669	"Decoration of St. Paul's Cathedral".....	673
Architectural Style.—By Edward J. Raver	644	Sensuous Capitals in the Castle of St. Aljferia, Saragoza	669	Cooking Apparatus for Large Institutions.....	672
The Royal Academy Exhibition	645	A Projected Military Hospital.....	669	The Albert Palace	672
Architecture at the Paris Salon	647	Removal of House Refuse and Sewage	670	Provincial News	673
Notes	648	The Hungarian National Exhibition	670	Church-Building News	672
Architecture at the Royal Academy	650	Clerks of Works Association	670	Recent Patents	673
Letter from Paris	650	Association of Public Sanitary Inspectors	671	The Student's Column; Descriptive Geometry—XIV.	673
Royal Institute of British Architects: The New Council	651	The Chancery-lane Safe Deposit.....	671	Recent Sales of Property	675
Competitions	651	Building in Private Ways	672	Meetings	675
The National Liberal Club (with Plan)	652	The Reform of the Institute	672	Miscellaneous	676

The Inventions Exhibition.



UCH remains to be done before the exhibition can be called complete, and probably its term of existence will be considerably advanced before all the now vacant spaces are filled with the exhibits which they are intended, and all which is now in process of arrangement has been marshalled into complete order.

In one sense this is, perhaps, hardly a disadvantage to the undertaking. Public interest, when it has exhausted its first phase and the novelty of the collection is beginning to wear off, will be kept up and stimulated by fresh developments. It must not be supposed, however, that the exhibition is by any means, even now, in so incomplete a state as some may have been led to suppose by the graphic accounts which one or two daily papers gave of the state of things a day or two previously to the opening. The great central avenue, devoted to fire-arms, railway plant, and "prime movers" is complete in its general arrangement, and so are a good many other portions. Our old friend, the London Street, has its shops full of goods, and, in some cases, busy with workers, and its appearance is wonderfully improved in regard to realism by the substitution of a paved roadway for the unfortunate boarded floor, of which we complained last year, and which gave to the whole so much the appearance of a built-up scene in a theatre. The cobble-stones are not there, it is true, in their uncompromising reality; a merciful consideration has been given to the feet of thin-booted visitors; but it is, at all events, a veritable street, with a gutter down the middle, not, fortunately, put to the practical uses of an open sewer, which it probably served in the time intended to be represented. The Old Street, however, is one of the lighter attractions of the show, which we are glad to see once again, but which has no relation to the real object of the collection, any more than the lanterns and fountains in the garden.

The first cursory inspection of the Exhibition will probably produce on many, as it did upon us, the impression that a great deal is there which has only a very doubtful apparent right to come under the head of inventions. Such classes of exhibits as the carriages, the musical instruments, and some others, appear in the main to be merely examples of good workmanship in the several classes of objects illustrated. A second inspection, however, somewhat

corrects this impression. A considerable number of articles which at first glance present nothing but what one is accustomed to see every day, turn out to have claims in the way of improvements, sometimes only apparent on investigation, which give them a right to the general title applied to the whole collection. And apart from this, we think it will be found by those who go there to take their pleasure sadly, and not for mere lounging, that the exhibition, like other good things, grows upon one as it is better known. There are great opportunities for becoming acquainted with the principle and the working of many things which, though in every-day use, few persons who are not specially concerned with them know much about; and in this respect there is perhaps more for the public to learn, and more of general interest, than there was in the "Healtheries." It must be added that there appeared to be a spirit of inquiry abroad among the visitors, and that there was a great deal more of evident interest displayed in many of the exhibits, and desire to become acquainted with their points and their working, at least in this first week, than we observed in the great collection of last year.

A considerable proportion of the exhibits, of course, do not come within our special line of subjects; of those which do we will speak in detail from week to week; in regard to some classes of subjects which are of special interest to our readers, it may indeed be better to wait a little until they are in a more complete state than at present. Meanwhile, we may give a brief sketch of the general contents of the exhibition and the plan on which it is arranged. There is something rather painfully incongruous in the fact that in this exhibition, supposed to be one of inventions for promoting the progress of mankind, the visitor, on first coming in from the principal entrance, finds himself in the midst of a set of objects of the highest and most splendid finish of workmanship, and many of them of the greatest ingenuity of construction, "all designed," as we heard a spectator remark, "for killing people." However, we presume it will be a good while yet before this feature of an inventions exhibition will have suppressed itself; and as long as there are guns, we quite agree with Mr. Ruskin that we had better have guns that will accomplish their intention in a satisfactory manner. The central object facing the entrance here is the 8-inch 12-ton gun from the Royal Gun Factory, Woolwich, a long tube in three thicknesses, suggesting the idea of a gigantic telescope, constructed entirely of steel, polished like a mirror, and not to be touched, if you please, since every touch of the hand leaves its mark on the polished surface. This is a gun with an inner core, on which are shrunk the

breech-piece and front hoop, and upon these the trunnion ring and a tier of breech hoops. An example of the core, slotted for the reception of the outer rings, is to be seen here. This large gun, with its complicated arrangements for loading and sighting, is a centre of great attraction; and next to this the attraction of this department seems to be the Maxim machine gun, probably the most compact and deadly little instrument ever invented for wholesale musketry-shooting, which feeds itself automatically as long as the string of cartridges supplied to it lasts, firing at any required rate per second; the operator, having once started the machine, having only to turn it about in the direction he requires by the brass handle on the breech. The steel barrel of the gun is encased in a water-jacket to prevent overheating from the friction of the bullets. In the same department of the Exhibition visitors may study the various forms of the Nordenfeldt, Hotchkiss, Gatling, and other guns, and the Whitehead torpedo, which, like the twelve-ton gun, impresses one painfully with the discrepancy between its beautiful finish and ingenuity, and the poor use for which all this ability of mind and hand has been bestowed.

One can look with the opposite feeling, fortunately, at the central object of the next group down the principal avenue, the splendid compound locomotive, the "Marchioness of Stafford," turned out by Mr. F. W. Wehh, from the Crewe workshops of the London and North-Western Railway. This compound engine is really, too, an "invention" of recent date, not a mere specimen of work. Its special feature is a third cylinder in the centre of the engine, between the leading wheels, of larger diameter than the other two outside cylinders, and which works at low pressure with the exhaust steam from the two ordinary high-pressure cylinders. A cynical and heretical engineering critic remarked, "it is not only so ingenious, but it does quite as well as an ordinary engine"; but this was more witty than true. It means saving steam and, therefore, fuel; but it also gets the advantage of the grip of a double set of driving-wheels on the rails without the disadvantage of connecting-rods, which have a great tendency to work loose, and the action of which is only absolutely perfect when the circumference of the two sets of wheels is absolutely identical; an ideal perfection seldom attained. Here the ordinary cylinders, which are set a good way back on the engine, drive the back pair of wheels, and the low-pressure cylinder drives the front pair; and four of these engines are now working the London and North-Western Railway Scotch expresses, and taking them up the heavy incline at Shap without the assistance of an extra engine,

which has never been done before. In some positions of the pistons the engine is apt to "jib" a little on first starting, but the drawback is but slight. The finish of this engine, put together as it is "like a watch," is something to be enthusiastic about, and as an example of perfection of workmanship for an important end, we should be disposed to call it the central point of the Exhibition. Among important things in the railway plant department are several contrivances for automatic coupling, a matter which, in the case of goods trains, means, be it remembered, not merely convenience and saving of time, but of human life; for the category of fatal accidents from being crushed between or run over by wagons, in getting between them to couple or uncouple them, is far larger and more lamentable than the general public are in the least aware of. Of three of these inventions which we noticed in passing, that of Mr. Roe seems the most complete and simple; it may be described as a couple of iron loops on the two opposed ends of the wagons, one of which, on the wagons being pushed together, slides on the top of the other and drops into a hook at the back. Difference of height in the drawbars (within ordinary limits) is of no consequence, as whichever shackle is uppermost slides over the other one, and the hook is the same on both wagons. The Brocklebank coupling is nearly on the same principle, but does not seem to us quite so strong or so sure in its hold as the other. There is no question that railways ought to adopt something of the kind without delay, for the list of killed and wounded in shunting operations is at present painful to hear of, not to speak of the waste of time and stoppage of traffic by the present clumsy system of coupling wagons.

Those who are curious about railway matters will find in another part of the exhibition a very pretty working model of Professor Fleming Jenkin's telpherage railway, which is, perhaps, destined to be an important agency in the cheap conveyance of goods; the model shows a train of engine and carriages running balanced on central wheels on a wire, the load hanging below and keeping the running carriages balanced. But to return to the central avenue: the western portion is occupied, as we before said, by the class of machines generally designated as prime movers, or, in mill phraseology, "the power," for setting in movement machines for other purposes. In this department may be studied the making of engines and portions of engines, water motors, the Westinghouse brake (the practical operation of which is in constant display, both on the cylinders of the actual size, and on model wagons which are pushed along the rails and brought to a dead stop on releasing the pressure). Professor Fleming Jenkin figures with another exhibit here, called "nest gearing," a system of gearing "by which power is transmitted by rolling friction between drums so arranged as to bring no pressure on any bearing." To the right of this end of the central avenue is a large space, behind the narrow alley of "Old London," devoted to machinery for electric lighting, on which we can only here "look and pass." The Queen's Gate, further west, is occupied by "naval architecture" and carriages and bicycles. The carriage department conveys the impression, on a cursory glance, of being a good deal occupied by a mere show of typical models of carriages (there may be more than this when we have time to look for it); but the naval architecture department looks like business, and is occupied not only with mere models of craft, which are charming things to look at, but do not teach anybody very much, but with a great number of exhibits showing improvements in rigging details, gearing, and so on. Going north, parallel to the Aquarium, we find the West Gallery half-occupied by "Machine Tools and Machinery," and this section also, including such things as milling-machines, cutting-machine-tools, wood and stone working machinery, is a thoroughly business part of the exhibition, and likely to prove most attractive to those (who, we hope, will be many) who will go to the exhibition to learn something. In the

West Annexe is to be found hydraulic machinery, prefaced in the catalogue by a short dissertation from Sir William Armstrong. We may here observe that the special prefaces in the catalogue, all by good men, are of no little interest and value, as giving the general outline and bearings of each subject for those to whom it may be a new study. Among the exhibits may be named portions of hydraulic lifts for the Mersey Tunnel Railway, each lift capable of raising eighty to one hundred passengers. The remainder of the West Arcade and the West Gallery adjoining, are occupied by textile fabrics, of which more anon.

In the West Quadrant, connecting the galleries with the Albert Hall, will be found examples of indiarubber, cutlery, and pottery and glass, and in the Eastern Quadrant exhibitions of leather-work, and the lighter subjects of clothing and toys. Coming down the eastern side of the buildings, we find in the outer line of galleries the subjects of fuel and furnaces (which have been illustrated in this part of the building in so many exhibitions that one has got quite used to the appearance of the place), and, occupying a larger space, that at present highly important subjects of "Gas and other illuminants." On the inner line of these East Galleries comes China, which certainly appears to us to be rather at present a remnant from the Health Exhibition; at least, the general aspect of the rooms is wonderfully similar. South of China the same line is occupied by paper-printing and bookbinding. The *Graphic*, *Illustrated News*, and some other journals have established printing presses here, besides the printing machinery which is exhibited on its own footing, and which is various and will be of much interest while the majority of the machines can be got at work, as we suppose they will be. In this part of the building the uninitiated visitor may trace the process of a zinc block from the artist's original drawing, through the stages of photograph, photograph on zinc, states of plate after five or six acid baths, and the complete plate mounted on wood for printing. Here also the architectural draughtsman may interest himself in what we understand is the new invention of the "Lithoplate Company," by which a calcareous deposit of the same nature as lithographic stone is produced on a metal plate. The great advantage is the saving of cost of storage space occupied by, and labour expended in moving about, the heavy stones used by lithographers; and, of course, there is the consideration that the supply of the stone may not be unlimited. The matter seems well worth the attention of lithographers and draughtsmen.

The East Annexe, within the line of the last named gallery, is supposed to include "Food, cookery, and stimulants," we presume for theoretical study only. In the South Central Gallery, running east and west parallel with the London Street, are grouped furniture, jewellery, clocks, philosophical instruments, and chemistry. Of the foreign galleries, which occupy most of the space between this and the Central Gallery, one can only say that they appear to be, at present, nearly waste spaces. The Central Gallery takes the musical department of the Exhibition, and is well filled and in good order, but on the whole it seems to have less claim to the general title of the Exhibition than any other portion. Numbers of musical instrument makers, especially pianoforte makers, have collected show specimens of their make here, but we imagine that only in a very few will be found anything beyond good examples of the ordinary products of the trade; not inventions as generally understood. Organs of considerable size by various makers, known and unknown, are to be found, and each claims to have some patent speciality, but it is only a halfpenny worth of bread to all the sack. Among the pianofortes there are some few new ideas. One which we noticed is "Blüthner's" "aliquot scaling." We do not see the sense of the title, but the contrivance itself is ingenious and worth attention. It consists in the addition, above each group of three strings which are struck by the hammer, of a fourth string tuned an octave higher and not struck, but merely

left free to vibrate, and reinforcing the harmonics of the main strings. This deserves mention as a practical application of the doctrines of Helmholtz, and of the modern investigations which he and Professor Tyndall and others have made in regard to the physics of musical sound.

Finally, Agriculture and Horticulture are represented in the South Court, south of the Central Avenue. The main entrance hall from the Exhibition-road has been redecored by Messrs. Gillow & Son, with good effect. One other feature connected with this Exhibition must not be forgotten in this general walk round. The covered way which the District Railway have had made from their station to the Exhibition is admirably carried out, lined with white glazed bricks, and lighted by electric light. It is one of the most valuable adjuncts for public convenience and comfort which we ever knew a railway company to undertake. It is quite worth the penny charged for its use, and we congratulate the Company on the manner in which they have carried out the work, in the face of the foolish opposition and outcry which was made about it.

ARCHITECTURAL STYLE.

BY EDWARD J. TAUNER, LECTURER ON THE HISTORY OF ARCHITECTURE AT THE ARCHITECTURAL ASSOCIATION.



GOOD deal is being spoken and written just now about the style to be adopted for the proposed Liverpool Cathedral, some advocating one style and some another. Surely this is quite unnecessary,—not to use a stronger phrase,—while the four selected architects are already preparing their designs and have, no doubt, quite made up their own minds on the subject; moreover, such a discussion lays them open to the chance of being twitted with the adoption of some of these gratuitous suggestions, should their designs contain any feature or arrangement bearing a more or less close resemblance to them.

While we hope that the successful architect may have the advantage of the best site that can be found,—a point which is quite open to discussion,—the eminent quartette of competitors may be safely left to work out their respective designs without interruption.

The public, however, who are airing their views on the subject of architectural style may, perhaps, be not unprofitably reminded of the essential meaning of the word "style."

It may present the matter in a new light to state a truism, namely, that there could be no such thing as style unless all ancient architecture had been modern when it was built.

The proof of this statement is the entire history of architecture from its beginning up to the opening of the present century, since which time certain past styles have been revived and initiated. For it will be found that the style of any previous period was the result of the knowledge then possessed applied to the fulfilment of the wants then felt, and that it is this very fitness of the buildings to their purposes, and the execution of them with the best materials and knowledge then at command, that constitute that which we admire under the title of "style."

To say, therefore, that any past style is entirely appropriate to a building to be erected in the present day is to admit one of two things:—1st, That our wants, materials, and knowledge coincide exactly with those that produced the particular style that we prefer, and no other (for no two past styles are alike); or, 2nd, that we do not admire that past style on account of its fitness to the wants, materials, and knowledge that produced it. The only thing left to admire is its abstract beauty; and this is the sort of admiration that we evince by imitating sometimes one style and sometimes another.

Moreover, we have been in the habit of imitating one style for Civil and Domestic, and another style for Ecclesiastical architecture,—a distinction that never existed, indeed, was scarcely possible,—in any past age, although

the ecclesiastical buildings were easily distinguishable from the civil ones.

The Renaissance, even, was a new birth of all art, and adapted itself to churches as well as to houses.

In selecting, therefore, as is so usual, the Gothic style for churches, and the Classic, or other styles, for civil and domestic buildings, we are doing something quite different from that which was done by those very people whose works we admire.

The reason generally given for adopting the Gothic style for churches is that they still have to fulfil the same requirements as did those which were built during the Middle Ages; but it is probable that at least 95 per cent. of our clergy would be shocked if a Medieval congregation were to rise from their graves, and, under the direction of their priest-hood, were to go through their services as of old. Indeed, these ghostly visitors would look about in vain for the numerous side altars which even the remaining percentage of our present clergy might like to use, but may not.

So far, therefore, as there are differences between modern and Medieval ritual, there should be corresponding differences between modern and Medieval churches, and, so far as such differences are frankly expressed in the buildings, the result is honest and modern.

Looking, next, at the mere appearance of the revived styles, we may ask,—Is modern Gothic as beautiful as Medieval architecture?

In the hands of such men as the late George Edmund Street it very often is; but that must be because his sympathies were so eminently Medieval, as shown by him in his civil and domestic buildings,—a fact which should be carefully borne in mind when taking a broad view of his architecture as a whole.

Is Modern Classic as beautiful as Grecian, Roman, or Palladian architecture?

In the hands of such men as the late Sir Charles Barry it very often is; but our modern Palladian architects have generally turned to Gothic for church work, and have shown therein a want of complete sympathy with their Medieval models.

Thus, many of our elder architects have gained special reputation as Gothic or Classic designers, and are too loyal to desert the correct purity of whichever style they have taken up; indeed, some will decline to touch any other.

Surely these purists must feel the pinch somewhere, however much they may ignore it. A Classic exterior presents many features that are uncalled for by our climate; while a Gothic interior disregards all those improvements in joinery which have been created and developed during the seventeenth and eighteenth centuries, and amongst which we as certainly feel "at home."

A great architect, who has unfortunately passed away, carried his treatment of Medieval style to an extent quite beyond ordinary sympathies; he whose vigorous genius and thorough devotion to the thirteenth-century we must admire or confess ourselves unworthy of his teaching. Yet few of us could feel quite at ease in a room whose walls, ceiling, and furniture are crowded with the details of construction and the flood of Medieval lore that William Burges poured over them. So complete were his sympathies that, in his perspective views, he would represent the inmates in thirteenth-century costume, in order to avoid a striking note of discord.

Those of us who had the advantage of working with him may indeed be thankful for the insight that he gave us into the very bones and marrow of Medieval art, a revival being far more instructive when thoroughly grasped than when superficially adopted; but it remains a rival and nothing more.

Probably the architect who first decided upon adopting and combining the vigour of the thirteenth century with the internal comfort and dignity of the eighteenth, is one whose striking disposition has kept his name out of the public papers, and whom, therefore, it could be indelicate to mention here; but we do started practice early in the 'sixties, when, perhaps, by his example, the tide of revivals

had begun to ebb, are thus set free from parties of Classic or Gothic purism.

Is any sudden leap into a Victorian style recommended or even suggested? Certainly not. Such a thing as the sudden formation of a true style has never been known, and is no more possible now than at any former time. Every style represents the survival of the fittest elements of its predecessors, with the addition of such improvements as were wanted. Our chief difficulty is the *embarras de richesses* that we have to select from, and all that is urged here is that we should select and harmoniously combine the individual features that are really useful to us, and reject the rest, instead of adopting the collective features that constitute any past style.

In an important recent discussion, the chairman of the meeting said that "Gothic would die hard,"—a needless observation, for there is no reason why the useful elements of Gothic should die at all. Probably mischief has been done by dubbing this modern development as the style of a certain reign, and thereby classing it amongst the revivals. In such cases there is danger of wild extravagance amongst thoughtless followers of fashion; but it is fair to say that the worst results emanate, not from architects' offices, but from the designing "departments" of builders who persuade people to do without architects, and of upholsterers who are not content to upholster, but who, having caught the infection of inglorious nooks, plan houses with an infinity of nooks and corners that are the despair of the dusting housemaid, and are only fit for a game of hide-and-seek; while they obfuscate windows with unnecessary stained glass and make "features" of every fitting.

The public will soon learn to discern these from the unobtrusive and refined buildings that many of our architects are producing. These contain evidences of having been built in this century, and in no previous one. They combine the refinements of Renaissance with the climatic advantages of Gothic, and thus constitute a modern style of civil and domestic architecture, now of about twenty years' growth, and fairly suited to our wants.

Having brought the subject to this point, the next question is whether any advantage is to be obtained by applying this modern style to our churches; thus repeating that which was done in all past ages, except that in them both branches were developed simultaneously.

There is no difficulty in proving that this was so as regards the Gothic styles, by a very short review of them. Beginning with the round-arched Gothic or Norman style, would any one have the slightest hesitation in calling the "Jews' House" at Lincoln an obvious example of this style? The form of the arches, the section of the mouldings, and all the details, are the very same that we find in hundreds of churches of the same period; yet no one would mistake this house for a church; the general arrangement of its façade being quite different from that required in a church. In the next style, the Transition from Norman to Early English, we may see, in the hall of Oakham Castle, couplet windows that we should assign to the period if found in a church, and yet there is a distinction between this hall and the somewhat later but similarly planned church at Skelton. In the fourteenth century Penhurst Hall presents window tracery clearly belonging to that period, yet a glance at the position and surroundings of these windows dispels the notion of their belonging to a church. Somewhat later examples present the externally square-headed windows that some people consider peculiar to domestic architecture, yet there is no want of examples of them in churches, Tideswell having even chancel windows of this form. In the fifteenth century, which, being the most recent of the Middle Ages, presents the largest number of surviving examples, the universal character of the details in all kinds of buildings extends not only to the stone and brickwork, but to the fittings and furniture, and yet bears evidence of fitness to the several purposes required.

No doubt, these numerous examples of fifteenth-century woodwork inspired the first

Gothic revivalists with the fashion and passion for Tudor dwellings that had all the weight of precedent wherewith to awe the public, who were therefore willing to pay the price of carved joinery, in order to be completely correct in their interior fittings, and it is probably to the cost of carrying Gothic work thus completely through a dwelling-house that we owe the escape to the more easily-worked mouldings of the eighteenth century for panelling, &c.

Thus a more modern and homely feeling has come to pervade the interiors of our houses; our windows have become square-headed or slightly-curved, instead of pointed; and, on going out of doors to see the effect, we have added a few more details of the modern manner, and so, by degrees, the dissolving view is changing to a domestic style of our own from the less suitable Gothic, and civil architecture is following suit.

Now, is there anything in the Gothic style equally or in any degree unsuited to our churches? Our leading church architects would appear to think not; for, although they have, like the rest of us, adopted the modern style for their civil and domestic work, they use Gothic in their ecclesiastical architecture.

Why is this? Probably the answer to the question is to be obtained from our clients. It is they who shudder when any wandering from precedent is suggested, and it is with them, and especially the clergy, that it rests to tell us fearlessly what they want, just as they would in asking us to carry out their ideas in the arrangement of a house plan.

It is said that the plan of the Greek Temple, that marvellous thing of beauty that appears in a complete form in the first known example at Corinth, was dictated by the priests, who then handed their instructions over to their architects to supply the requisite skill in construction and the eye for beauty of form.

Our clergy are specially deficient in the matter of painting and sculpture, screening themselves behind the advice of Mr. So-and-So, the eminent church architect (especially when they want to go a little "higher" than those who differ from them), and here Medieval archaeology is allowed to exercise full sway. The Medieval artists did not trouble their heads about archaeology,—we should know nothing about the costume of their day if they had done so. The subjects and the truths embodied in them of course remain, and the clergy should be responsible for the selection of them, as part of their teaching, leaving us to express them in our modern language by brush or chisel.

In matters of plan the clergy can surely know better than any one else what is suitable to their requirements.

There are some to whom the sermon is the chief event in the service. It is not for architects to say whether this is desirable or not; but, if it be, why do the clergy of this school so often make themselves and their congregation martyrs to a three-aisled Gothic church with neck-twisting side galleries? If they will instruct the architect to give them a good auditorium, as distinct from a lecture-theatre as are the respective purposes of each building, he will not fail to produce a suitable result. He will, probably, not altogether expel pillars, in the shadow of which a sinner can feel that he is in God's house, and pour out his soul unnoticed by the congregation.

Or the clergyman may like a large free open space, in the centre of which not the pulpit but the choir may be placed in the midst of the congregation, and all lift their voices in unison.

Others regard the mere presence in church for prayer, praise, and thanksgiving as sufficient; to these a large proportion of pillars and piers will be no objection.

There may be other views of church planning not yet dreamed of by laymen, but which the clergy might recommend as the result of experience; that is, by carefully noting the advantage and defects of every church in which they happen to conduct service. They might draw up an outline list of rules and fill them in at their clerical meetings, and avoid saying

a word to any architect on the subject while doing so.*

Many of these points are already laid down in the printed suggestions of the church building societies; but it seems to be now time to revise them, and to omit the advice to copy Mediaeval styles. Although this advice was the best that could have been given as a reaction from the Greek revival, it must have fostered the hyper-archaeological zeal for restoration which most people now admit to have been overdone, and which has led to such astonishing evidence as the following, given by a witness in regard to Westminster Hall. He defended the windows in the proposed restoration (or whatever word beginning with "re" should be employed), he admitted that they would be too small to light the rooms, and he suggested that they should be supplemented by unseen skylights! When we find this sort of advice gravely offered to a Committee of the House of Commons, it is high time to claim our liberty to build what we want in our own manner.

The model of the proposed rebuilding of the western adjunct to Westminster Hall opens up a new era in the art of restoration, and appears to exactly hit off what is required in that delightful study.

That the archaeological knowledge possessed by many architects and amateurs should be wasted, and bear no fruit, would be a thousand pities, and here we have the most legitimate means of displaying that knowledge and of affording profitable instruction to the public by showing them what any imperfect ancient building looked like at any particular past period.

No vast sums of money need be soaked in the greedy sponge of "restoration"; but a far more modest expenditure in canvas and paint, in the hands of such cunning artists as those who executed Mr. G. H. Birch's "Old London Street" and the model in question, will give all the necessary effect.

Let such models be prepared, under architects' advice, and be harmlessly applied to our unrestored churches throughout the land, and be left up for a few months and duly photographed, and a new branch of trade will have been started; while the buildings themselves may await in safety such solid repairs or additions as the actual wants of each case may require.

We know the delight of contemplating genuine old work, and the beautiful and honest manner in which the problems have been solved; we watch with deep interest the gradual changes from one style to the next; we are even more excited in noticing different styles in the same building, and in assigning to each its proper date, and we only want sufficient faith in our own day to leave to posterity an equally unmistakable stamp on our architecture.

Individual personal character there is in the churches of our best architects, and this would come out all the more strongly in the solution of fresh problems, while the setting of these problems would not drive clients to these few, but to any skilled architect who can work to instructions.

The clergy would, we trust, be too conservative to give up any well-established arrangement, and the architects would be too conservative to ignore the glorious lessons of the past, and they would do as their forerunners did, and not what they did.

Serious Fires in London.—To the destruction of the "Japanese Village" at Knightsbridge on Saturday last, we refer in another column. Another very serious fire occurred on Wednesday morning, in Oxford-street, when the extensive workshops of Messrs. Jackson & Graham were destroyed by fire.

* For example, has a clergyman never been deafened just before service, by the booming of the organ placed over the vestry? Has he never been unheard by those sitting in the side aisle under high roofs and separated from him by massive arcades? Has he never been blinded by the glare of a low west window when glancing up from his sermon? Has he never been rendered nervous by conflicting crowds in narrow passages on their way to and from the altar?

THE ROYAL ACADEMY EXHIBITION.

AS usual, on private view day, people were to be heard gibbering that this was "the worst Academy they had ever seen," a pessimist view which is repeated annually during the first week of the exhibition. The exhibition is, in fact, a good, but not a brilliant or a striking one. The absence of any work of the first importance by the President makes a considerable gap; and the presence on the line of an unusual number of utterly ridiculous paintings by certain old Academicians, who ought to be plainly told, even for their own sakes, that they are unking themselves and the Academy a laughing-stock, no doubt tend to intensify the ill-humour of the disaffected visitor. But there is plenty of good work, for all that.

Mr. Tadema has distanced all former achievements in painting the texture and lights on marble in his "Reading from Homer" (276), in which the figures also are of more interest and beauty than is sometimes the case in his works. The slight glimmer of transmitted light on the under-side of the marble seat, where its edge turns over, is a marvel of minute realism, a positive pleasure to look at, though one always feels a regret that the possessor of such marvellous technical power seems unable to infuse more spiritual interest into his paintings. However, there are "diversities of gifts." By the way, is the curve of the seat quite true, on the right, where it is intercepted by the reader and his chair. It does not seem to us that the two sections of the curve, if produced, would meet quite truly, a point for criticism in a painting in which technique plays so important a part.

Mr. Millais's principal work, "The Railing Passion" (212), is an admirable painting, a little deficient in interest. The dying ornithologist (or taxidermist is he? it is not quite apparent which), still admiring his birds, is pathetic with a sort of work-a-day pathos; the face of the old man looks as if it had somehow come out of the pages of Dickens; but the idea is somewhat prosaic for an important painting. The family grouped round his sofa include various figures,—a woman, young children, and an older girl,—painted in the artist's best manner; the whole picture is a little low in colour, the plumage of the dead birds forming the only decisive colour; and we may suspect that the final turn given to the subject, making the dying man a bird-fancier, was in order to get in some bright colour in this way. It seems pretty obvious that the immediate point and title of Mr. Millais's pictures are not unfrequently determined in this way, *a parte post*, and that the actual title of the picture is an afterthought; and that is hardly the way to produce pictures that will interest a spectator deeply.

How much stronger, for example, is the intellectual interest of such a picture as Mr. Orchardson's "Salon of Madame Recamier" (172), apart from questions of technique. Here there is a real concentrated effort to do a thing which is worth employing the best power of painting on, to make a remarkable phase of human society live again. There is a *raison d'être* for such a picture. There are many pictures, by very able painters, in the Academy which seem to have no *raison d'être*. Mr. Orchardson's is a large work in his peculiar manner, very effectively composed. The young hostess, in white, is seated on a sofa, conspicuous as the centre of a group on the right, whose attention is directed to her; these include Bernadotte, Metternich, and Fouché. To the left is another group, just sufficiently connected with the rest in regard to grouping, but severed in action and attention; a group conversing in a desultory manner together before taking their turn round the queen of the mansion. Among these are Lucien Buonaparte, Talleyrand, Brillat-Savarin, &c., and the calm face of Canova is seen in the background. Madame Recamier's manner and expression seem a little deficient in *esprit*. A quotation given in the catalogue speaks of "the repose of her manner," which is, perhaps, what the painter has aimed at, but we do not think her quite

a success. The character and individuality of the men are admirably brought out.

Sir F. Leighton's principal contribution is "Music, a Frieze" (344), apparently a companion to the composition entitled "The Dance," which he has previously exhibited. In the centre is a golden-robed Apollo under a canopy; various groups of singers and listeners recede from this on either hand; the colour of the whole is very rich and fine, more so than in "The Dance," but the plain thin column shafts, painted dark blue, convey to the architectural eye a rather incongruous suggestion of cast iron. Among the President's other contributions are a very pleasing half-length of a modern young lady (194), with, however, a good deal of idealising in the texture of the face, which, like others by the same hand, seems hardly made of mere earthly flesh, and a charming portrait of "The Lady Sibyl Primrose" (281), the little daughter of Lord Rosebery, whose sister is painted by Mr. Millais as "The Lady Peggy Primrose" (275); the two almost infantine figures make a charming pair, illustrative of the styles of two great painters in the treatment of children's portraits,—a human parallel and an artistic contrast at the same time.

Among the three or four nude studies of importance the finest, to our thinking, is, perhaps, the one which will be least looked at, partly owing to its less favourable position; this is Mr. John Collier's "Circe" (810), which shows the goddess seated on the grass with her back to the spectator and her arm round a tiger lying by her. In one sense the picture would be far more effective if the painter had put some more ideal surroundings than his ordinary scene of grass lawn and plantation; he should have conveyed the idea of a kind of enchanted land; as it is, he is too prosaic; it is as if one took a turn round the environs of an English country-house and came on a member of the family sitting naked on the damp grass with a tiger by her side. The situation is improbable and chilly; and there is no look of "Circe" in the side-face turned towards us. In fact, of course the picture is painted for the sake of showing the artist's power of painting a woman and a tiger; but why could not he call it "Woman and Tiger," instead of pretending to represent Circe, that wild conception of the old Greek mind, the realisation of which would demand the highest imaginative power a painter could put into his work? Apart from this, the figure is a remarkable success, both in drawing, colour, and that suggestion of the framework underlying the outer forms of the body, without spoiling their soft lines, which is the triumph of nude painting. It was for Mr. Collier's benefit, it will be remembered, that Mr. Tadema's "sculptor's model" was painted; and the older artist may be proud of his pupil. Mr. Poynter's large version of "Diadumené" (a name suggested by the fact that she is in the same attitude as the "Diadumenos" of Polykleitos, tying a fillet round her forehead), hangs in the centre of Gallery IV. (322), and is a monumental and almost sculpturesque figure, in the midst of very elaborate architectural surroundings. The figure itself is a model of realistic (not idealised) symmetry; the texture of the flesh a trifle hard, perhaps to emphasise the monumental idea and assimilate the figure a little with its architectural surroundings. We could have wished there were a little more interest and heauty in the face: it is a fine, a learned, but hardly a very attractive work; in this sense the smaller edition last year was perhaps superior to it. Mr. Calderon's "Andromeda" (295) seems evidently intended as a kind of companion to his "Venus" of the Grosvenor Gallery last year; it is a most bold attempt in contrasts of colour; on the right a dark blue sea, the very deepest blue that you possibly venture to paint the sea; then a great splash of the whitest spray, then the figure of Andromeda draped below the waist, and behind her white body a thick mass of dark hair blown wildly about by the same wind that blows the mass of spray up; the combination is truly a bold and striking one, and the head and figure very finely painted. Yet here, again, we miss what we really want

from a painter of an ideal subject. Mr. Calderon is far more ideal than Mr. Collier; but still there is nothing in the face of his Andromeda of the agony of the struggle between the fear of immediate and terrible death and consciousness of a great self-sacrifice; she might have been cut off by the tide while bathing, and looking out for a boat, except for the chains; so that the picture fails of what should have been its highest motif. This is a trifle, however, to the absurd incongruity of Mr. A. Moore's figure, called "White Hydrangea" (356). Except when the nude figure is palpably and obviously a study, it expects to be idealised, and many of Mr. Moore's pictures are purely ideal. But this figure is so exactly the type of a modern society young lady, and so exceedingly realistic in her tripping walk, that there is a kind of ludicrous impropriety about it; it is as if we were sitting in a rather æsthetic drawing-room, and the young lady of the house suddenly tripped in, with a little conventional simper on her face, and an unfortunate but entirely innocent forgetfulness of the fact that she had nothing on but her cap. But the climax of prosaic treatment of the nude is reached by Mr. Calderon in his smaller work, "The Woodland Spring" (940), which seems to represent a plump country girl who is catching cold by sitting out naked on the bank of a brook; and to this the artist appends Milton's couplet,—

"Such sights as youthful poets dream
In summer eve by haunted stream"!!

Do they really? If some painters were a little bit more of poets, they would know better than to perpetrate such absurdities.

One of the most powerful and successful paintings in the whole collection has been relegated to the last room, "The Norman Archipelago" (1,106), by Mr. Brett. The general character of this work will be understood when we say that it is one of the painter's large blue pictures; an expanse of sunlit sea with crags and islands in strong light; but though the type has been repeated rather often, the work seems to grow in power and completeness with each repetition. This picture is superior to "Britannia's Realm," of which it rather reminds one, in that it shows more delicate atmospheric effect in the distances; as a representation of what the painter means to represent, it is a splendid success, and in this kind of power Mr. Brett and Mr. Tadema alone can be paired together. Each is somewhat restricted in his range, each is completely successful within it, and both leave us in doubt whether it is better to have wider range with less perfect execution, or whether such perfect achievement is not enough to atone for a restriction of power.

One landscape alone by Mr. Alfred Hunt appears, and that badly hung; three, we believe, were sent, and when we look at some of the monstrous things by Academicians which occupy central places on the walls, and consider what Mr. Hunt's quality is, the fact of the refusal of two works by such an artist seems really nothing short of disgraceful to those concerned with the admission of pictures. The one painting by which this finest of our contemporary landscape artists is allowed to be represented is entitled "Bright October" (756), and is a scene in a lovely secluded glen, with pools of water; a scene which he has painted before, if we remember rightly, from another point of view. The picture has Mr. Hunt's usual refined and poetic feeling, and total absence of mere paintiness; but in the corner position in which it is hung, the light falls on it in such a way as to rob it of much of its lustre, and interfere with its delicate effects. Perhaps the only other work of the landscape order which we should class with that of Mr. Brett and Mr. Hunt is the powerful seapiece by Mr. H. Moore, "The Newhaven Packet" (533), so called for distinction, as the packet is merely a distant object, the subject being the "swinging waters" (the phrase is Matthew Arnold's) of the sea, shown in a style to which Mr. Moore has accustomed us, but which he has never illustrated better than in this work. The difference between Mr. Brett and Mr. Moore on the one hand, and Mr. Hunt on the

other, is that they each have one especial effect which they have worked up to perfection; Mr. Hunt's speciality is that he has no speciality in dealing with nature; his pictures are on no fixed model, and in this point he stands alone among many English landscape-painters since Turner.

We have adverted to the leading works of the year, and will mention briefly some others in another number.

ARCHITECTURE AT THE PARIS SALON.



ARCHITECTURE is represented at the Salon of 1885 by 169 artists, whose exhibits comprise 187 numbers in the catalogue. There were 162 exhibitors in this class last year, and, in 1872, just after the war, there were only 48. However insignificant in comparison with the paintings, this progress shows that here, as in other branches of art, the flood swells and rises continually.

This ascending movement, which generalises what was formerly only the small domain of a few, is most perceptible among the painters. Architecture is a difficult art, exacting varied kinds of knowledge and a special apprenticeship, which discourages young people from taking to it. It is almost a science; never an art of mere enjoyment. One cannot make architecture a pastime, though Paris swarms with amateur artists, for whom the clay or the pencil forms an innocent distraction, and whose supreme ambition is to figure in the Salon alongside of eminent masters.

Yet architecture demands, in reality, more imagination than other arts. It has not, like painting and sculpture, the resource of models and of the expression of special sentiments. Its guides are harmony, order, and taste; and, if endeavouring to express through certain forms the idea of the beautiful, it must combine and develop these forms according to precise rules and proportions. Thus it offers to the general public apparently dry and dull details, which leave them indifferent or even drive them to the galleries of sculpture or of genre for the dramatic interpretation of sentiments or facts interesting to the sight and perception. And this is why every year the rooms devoted to architecture, and which are always placed at the furthest extremity of the Salon, are isolated and deserted, while in an adjoining gallery loungers crowd around pictures whose superficial and sensational merit fills them with idle admiration.

As usual, monumental architecture holds an important place in the Salon, while private architecture hardly shows its head. This is easily understood, for the annual Salon tempts only the young architects. Those who have already made a name have no more leisure for entering upon useless combats, since they have attained the summit of their ambition. In this respect there is a great difference among painters, sculptors, and engravers, who, whatever their position of fame or notoriety, do not hesitate to encourage their young confrères by their emulation and example. In architecture, on the contrary, the artists who are already known, absorbed by their work and by the exigencies of their profession, desert the field; and, with some few exceptions, you will find nothing here but the works of pupils in the competitions in the "École des Beaux Arts" or the "Envois de Rome," which naturally have for their object monumental architecture, especially of the Classic variety.

These various causes, and the conditions under which the projects have been executed, explain the small number of the designs having relation to civil architecture in its usual application, we mean in the way of ordinary dwelling-houses, &c. It is with difficulty that we find here and there some restorations of old manor-houses rebuilt in a naive fashion, or some modern constructions without originality or style, almost all built for the same patron and revealing on the part of their authors a forced subordination to the vulgar taste of the proprietor.

One cannot too much encourage architects

who exhibit designs which are conceived apart from the conventions of the schools and out of the usual professional groove. This praise is merited by M. Auburtin, pupil of the lamented Constant Dufeux, who sends plans and elevations of a private hotel which is being built from his design as No. 36, Rue d'Assas; the brick façades are in the style of Louis XIII., elegant without pretension, well studied, and of good decorative effect. We do not like so much the villa which the same artist has constructed by the sea-side at Benzeval, the rustic over-ornamentation of which repeats itself pretty uniformly along all the Normandy coast.

It required rather more courage for M. Fivaz to exhibit, among such Classic surroundings, a project for a restaurant. The one of which we speak is to be erected in proximity to the Bois de Boulogne, in the most elegant quarter of Paris, and the architecture is gay and the aspect bright and cheerful, as it should be for that locality; which is why we give it a place in the very restricted catalogue of *édifices privés*. Here, however, is the essence of "private architecture," given us by M. Lemenil, in the plans and elevations of houses built for the "Compagnie des Immeubles" of the Monceau estate, Rue de Logelbach. If the interior arrangements are comfortable and well ordered for domestic use, one may, at least, criticise the architectural uniformity of the façades, all the mansions resembling each other in nearly every detail, an unpleasant sequel to what used to be called the *Hausmannisation* of the new streets under the Second Empire, so many rows of enormous barracks without character of any kind. This reproach is the more emphasised in consideration of the neighbourhood, which is one largely inhabited by artists, and distinguished for its happy and picturesque mixture of styles of all countries and epochs. Is not this, at all events, better than that cold, rigid, perspective of houses, all the same height, which gives such monotony to the important new streets of Paris?

Besides these essentially Parisian constructions, we may mention a design for a school, by M. Hugues, for the town of Azeu; the "Caserne de Sapeurs-pompiers" by M. Calnaud, and the design for a *lycée* by M. Bardon, who treats the building a little too much like a hospital.

Among the civil buildings exhibited, we may mention the new Palais de Justice constructed at Meaux by M. Camus, of which the interior dispositions are well conceived, but which externally wants amplitude and elevation. The Ionic order of the peristyle supports a poor entablature, behind which rises a meagre dome. The *Mairie*, which M. Bernard proposes to raise in the Tenth Arrondissement of Paris, on the site of the St. Lazare prison, deserves mention also. We do not like so much the design for a town-hall which M. Paul Normand has prepared for Chesterfield (England); and M. Rives's Theatre for Marseilles satisfies us still less, with its overgrown ornament and its façade smothered in sculpture.

As to the hot-baths establishment with which M. Depasse wishes to gratify the Pyrenees; as to the establishment for Baths on the Seine projected by M. Le Roy; as for (lastly) the Indo-Chinese architecture inspired by the Eden Theatre, which MM. Hugo and Roux wish to inflict on the "Association Internationale du Congo," we can only confess our inability to comprehend these "Fantaisies abraçadabrantes," without style, intention, or taste.

In the department of monumental architecture the exhibition is infinitely more interesting. In the centre of the first room there rises the large model of the monument to Gambetta, of which the *Builder* has already given a description. The rest of that room is in some sort consecrated to this leading work, of which the plans, sections, elevations, and mouldings have been drawn by M. Bouleau, the architect. The general appearance of it is of a grand character; though a little heavy, perhaps, the monument is very decorative in character, but the principal figure, of which this is the apotheosis, is in no way monumental, neither in aspect nor in costume.

M. Nenot, who exhibits his design for the monument to Victor Emmanuel, is the victim, or, we might say, the hero of a misfortune which has rendered him the greatest service in bringing him while still young into full recognition. It is well known that after having been chosen as the most worthy in the competition for the Victor Emmanuel monument, he was subsequently excluded because he was a Frenchman. But his design was purchased nevertheless, and M. Nenot exhibits it with the authorisation of the Italian Government to which it belongs. The design, according to the intention of the author, should have been erected in front of the Baths of Diocletian at Rome. It comprises a semicircular portico enclosing a triumphal arch which recalls that of Constantine, and which is surmounted by two quadrigas in bronze. The porticos terminate on each side in pavilions, also surmounted with quadrigas. At the centre of the semicircle, a column carrying the statue of the king rises over a basement adorned with statues representing the principal towns of Italy. Four fountains arranged in front of the porticos complete the decorative elements of the design.

In the same room, two projects by M. Fornigé attract special attention. The crematorium, which the Municipal Council wish to confer on Paris, is a design well studied, of a severe character, perfectly appropriate to the destination of the edifice. A surbase, decorated with arcades, supports a monument, the door of which opens between two immense bronze lamps. The upper portion is decorated with garlands and funeral wreaths, and crowned by a dome, on a surbase of masonry, with a tall pyramidal chimney on either side. The same artist exhibits a sketch for a monument of the Revolution of 1789, for erection in the Champ de Mars. It shows a large surbase, to which access is given by stairs on each face. At the four angles are equestrian groups, which form the terminations of a balustrade, with antique tripods at intervals. On the platform thus formed is a rounded drum or socle, adorned with statues, and the walls of which are clothed with bas-reliefs. On this is a circular loggia, open on the four faces, within which is the altar of "La Patrie." Each opening forms an arcade framed between obelisks, decorated with allegorical sculpture in alto-relief. The whole is crowned by a dome, surmounted by a group symbolising Liberty, Equality, and Fraternity.

The competition designs of the École des Beaux Arts, and the work of the students at Rome, as already observed, occupy a considerable place in the Salon. Among the first we find the designs for a museum of ceramic art, a subject which has not been really well treated except by M. Bezemenet. It is the only one which gives the true character of such a work, in a manner simple, intelligible, and appropriate to the subject. With the exception of the work of M. Pied, which displays the conscientious work of a thorough student, the rest are pretentious and affected in style.

The competition opened by the city of Lille for a Palais des Beaux Arts is also represented here by a certain number of designs, among which we may mention especially that of MM. Chancel and Bonnier, which received the first premium. The palace which they present to us has a grand appearance, and the principal façade is of very fine character, with its two angle pavilions containing the great staircases, its bas-reliefs, its centre ornamented with caryatides and surmounted by a pediment with sculpture in high relief.

Among the works exhibited in,—or, we might rather say, banished to,—the interior gallery of the Palais de l'Industrie, we may remark a series of designs submitted in the recent competition for the Exchange at Amsterdam. That of MM. Larabrie and Stevens seem to us the only exception to a collection of mediocrities.

In regard to foreign drawings, a Belgian artist, M. Jean Baës, exhibits a view of the *Salle de pis Perdue* of the Palais de Justice at Brussels. This is a heavy architecture, crushed by a colossal dome and overlaid with ornamentation, but the perspective view is cleverly

executed. The same artist sends a set of designs which cannot be passed over in silence, though they enter rather into the category of water-colour drawings, and appear a little out of place among the architectural works. M. Baës brings before us the principal bell towers and turrets of Belgium. His style is free and pleasing, as well as interesting, from its individuality. We may notice especially one drawing in which a tower rises above a sea of red and grey roofs, treated with great delicacy of colour. While speaking of this class of work, we may mention the steple of Toskoff, by M. Mayeux, who has depicted with a loving hand the lace-like details of the tower forming a silhouette against a twilight sky.

Classic art and archaeological restoration are represented at the Salon by some very remarkable works. Thus M. Lefort, Architect-in-Chief to the Department of the Lower Seine, gives us a restoration of the Palais de Justice at Rouen, of which the details are treated with much learning and absolute respect for the primitive style of that admirable monument. We notice also the restoration of the arch of Titus by M. Gérault, pensionnaire at the Villa Médicis, the drawings by M. Blavette having for their subject the restoration of the Pantheon at Rome in the reign of Augustus, and the work sent from Rome by M. Guatezous. This young artist, who has already obtained the second "Grand Prix de Rome," sends two projects. The first, which is the property of the State, reproduces the central portal of the Church of St. Maclou at Rouen, the details of which are very ably drawn; the second, executed for the competition for the diploma of the École des Beaux Arts, represents a "Salle des Séances" of an Institute. This is also a very interesting design, with an imposing façade, a little spoiled, to our thinking, by being overweighed with a somewhat too ponderous dome.

We ought to make special mention of the *envoi** of M. Laloux, a pupil of M. André, who carried off the "Prix de Rome" in 1878. He exhibits ten drawings of the restoration of the Altis at Olympia. This is a really remarkable piece of work, showing both learning and imagination, and shaded with the hand of a master. The plan, executed from a comparison of the ruins with the description of Pausanias, is made out with convincing clearness and certainty; the elevations, especially that of the temple, show a designer of the first order. The bas-reliefs, frescos, and ornaments of the frieze are very boldly drawn. We were particularly struck by a panoramic perspective view of the sacred grove, with the temple of Jupiter standing out boldly against Mount Cronos, the barren slopes of which are very well delineated. This is more than the work of an architect; it is that of a painter and a decorative artist, with a knowledge of plan and perspective which enables him to produce almost an optical illusion in his distances. M. Laloux takes us successively into the Philippeum raised by Philip of Macedon after the battle of Charonea, into the Prytaneum, and into the Pelopieon, and lastly into the temple itself, surrounded by steles, tripods, and a whole pleiad of votive statues. Behind the altar of Jupiter extends the terrace of sacred treasures, where various glories of antique sculpture were dominated by the colossal statue by Phœdidas. Above, and by way of comparison, a large water-colour shows us the actual state of the ruins of Olympia, their bare desolation contrasting forcibly with the Pagan splendours shown in the restoration.

Considerations of space compel us to pass over many works worthy of mention. We may glance in passing at the interesting and correct but rather cold drawings of M. Boitte, the charming drawings in which M. Albert Ballu shows us graceful details of Moorish architecture, the water-colour by M. Grandin reproducing the Cour du Mûrier at the École des Beaux Arts, the sketches abroad of MM. Ruy, Le Chatelier, and Renaud, the Protestant church in Romano-Byzantine style by M.

* The works sent home to Paris by the French students at Rome are generally spoken of as "les envois de Rome," hence as "envois" simply. It is difficult to find an English equivalent in a single word.

Sortais, to which we prefer nevertheless that of M. Flandrin, the drawings of M. Devrez and M. Moynéau, &c.

From what has been said, it may be concluded that the architecture of the Salon of 1885 contains much that is very interesting, although no new class of work appears to break the circle of classic tradition. The projects exhibited, with some few exceptions, have no object but the restoration of the past. Without wishing to conclude that there is no originality in France and that the art of architecture is in a stationary condition, we may say that the present state of things is a necessary and inevitable consequence of the official and "classic" education given at the Écoles des Beaux Arts. Ought one to regret this? We think not, for the traditions of the École, against which it is the fashion in France at present to combat, have, at least for the architect, the advantage of keeping intact the respect for the great styles of antiquity and of preserving a standard of pure taste.

NOTES.

THE Committee on Westminster Hall have issued their report, of course in favour of Mr. Pearson's archaeological scheme in its entirety, a result which every one who noticed the composition and feeling of the Committee must have known was a foregone conclusion. The only point in Mr. Pearson's propositions which they decide against is the proposal to raise and give more architectural importance to the towers at the north end of Westminster Hall; in other words, the only portion of his proposition which is really architectural work, the rest being only archaeological trifling: so that so far the Committee are completely consistent in their absurdities. It may be observed that no mention is made, in the Report, of the fact that the staircases to the ill-lighted committee-rooms proposed between the buttresses will project 15 ft. into the Hall. Westminster Hall is now a grand unbroken interior: how will its suitability for a great coronation fête be affected by the obtusion into its area, on one side only, of these excrescences? The Committee have endeavoured to discredit the opposition to their scheme by representing it as coming entirely from "gentlemen objecting to any addition to or restoration of old buildings." Now, no opposition to the scheme has been stronger than our own, and we are absolutely opposed to the general views and principles of the clique referred to. The misleading and inadequate manner in which the affair has been misrepresented to the public in the *Times* can hardly be overlooked. Almost all the evidence against Mr. Shaw-Lefevre's views has been omitted in that journal, and in its account of the report of the committee, the alternative report of Mr. Peddie (the only architect on the Committee) is merely contemptuously referred to as of no consequence. We shall return to the subject when the evidence in full is printed; meantime we reiterate our opinion that the whole affair is a piece of silly archaeological twaddle, and, if sanctioned by Parliament, the Committee will find out eventually that they have made themselves a laughing-stock; but unfortunately that will not undo the mischief that will have been done.

THE recent report of Her Majesty's Factory Inspectors is in many ways satisfactory and reassuring, as showing that, in the main, owners and masters are ready and willing to co-operate in the prevention of accidents, and to do all that can reasonably be expected to insure protection from machinery in motion. Unfortunately, no efforts on the part of employers can guarantee the absence of carelessness on the part of the *employés*; and to this must be attributed a death and accident roll for the year, which is far too long. The total list of casualties numbers nearly 9,000, of which over 400 were fatal, the remainder resulting in various forms and degrees of mutilation. The most numerous, though not the most serious, accidents take place in textile mills, and are in a very large degree owing to

the reprehensible practice of allowing women and young persons to clean the machinery while in motion, a practice which is prohibited to children, and should certainly be forbidden altogether. Grindstones, whether in cutlery shops or flour-mills, are mentioned as having a good many victims in the course of the year, and circular-saws figure also as accident-causers far too conspicuously. One reason of this is, that the fret-saw cutters have enormously increased of late, and that they are usually occupiers of saw-mills, renting a room, and running shafting, pulleys, belts, and countershafts within a foot of the ground, quite unfenced. Such places are veritable death-traps for the young boys working there, and for the children who are sent by their fathers for wood. A great deal of attention is devoted by the Inspectors to the different subjects of ventilation and overcrowding, and much improvement has certainly been made in this direction. London is, perhaps, the chief offender under this head, containing, as it does, a vast number of underground and ill-ventilated workshops, into which no daylight or free air enters, and where a great quantity of gas is necessarily burned. The difficulty in this case is, not to introduce a rush of cold air, against which all working hands protest, but to give a gradual supply of pure air, which will do its work without being felt; and there are several kinds of ventilators which, more or less, fulfil this end at a small expense. It is marvellous to what foul atmospheres the lungs will accommodate themselves for a time, and what a thankless task it is to make operatives healthy in spite of themselves.

WITH reference to the late disastrous fire at the Japanese village, we would call attention to the great anomaly which exists at present in the regulation of buildings like the late one. The building occupied by the Japanese Village Company was known as Humphreys' Hall, and in the interior consisted of a number of streets and shops, laid out upon the Japanese plan, the streets being exceedingly narrow. The shops were composed of light wood and matting, and a variety of trades were carried on therein. The shops and streets were lighted by gas at night, and, considering the time the place has been open, there is very little doubt that the whole of the interior was of a most inflammable character. On the recent hearing of proceedings by the Metropolitan Board of Works against the promoter and manager, for not obtaining a certificate that the building was in accordance with the Board's regulations, made in pursuance of 41 and 42 Vic., c. 32, s. 12, it was said to comply with the regulations as to fire, exits, &c., made by the licensing authorities, and that therefore there was no necessity for obtaining the Board's certificate. The building, which was surrounded by dwellings, was completely gutted in an hour, and within a very short space of time from the fire breaking out escape would have been impossible had the performance been going on. The approach to it was by one principal main entrance and one other entrance in the annexe, which very few people would have found in a panic; and besides this, the principal entrance was completely blocked up by turnstiles. Section 12 of the above Act expressly enacts that it shall not be lawful for any person to have or keep open any house, room, or other place of public resort, unless the Board certified that such place of resort conforms to their regulations; but, notwithstanding this enactment, licences continue to be granted in the cases of music-halls, &c., without calling for the certificate of the Board. Efforts, we believe, are now being made by the Metropolitan Board to get this anomalous state of things altered by fresh legislation, centering in them the whole of the licensing for the Metropolis, and we have no doubt that the late disaster will have at least one good effect, by getting rid of three bodies dealing with the subject and substituting one for the whole Metropolis, and by this means prevent build-ings of a like kind being opened without first taking proper care as to the safety of the

public who might have been present when the disaster occurred.

THAT the Arabs would burn the sleepers, and steal the keys and pins, of any railways left unguarded in their country, might have been anticipated, even without the justification of a state of war. Daily accounts arrive of the perpetration of this very easy mischief. The experience already attained in laying railways through the desert has been quite overlooked in the present case. The true plan to adopt is to use the saddleback rail, invented, now many years ago, by Mr. Barlow. The economy of this rail depends on the price of iron. At present rates, the cost for the entire material of such a line would not exceed from 900l. to 950l. per mile, and an almost indestructible way would be provided. Riveted together with red-hot rivets, the Barlow way would offer much resistance to any force that the Arabs could apply, unless they were disposed to burn their ammunition for the purpose. The rails, weighing 90 lb. per yard, are not easy to trifle with, and the hollow underneath affords a safe and hidden course for the cable of the electric telegraph. When the price of iron (as at present) is such as to render this rail available, it possesses many advantages. Many miles of the South Wales Railway are laid on the Barlow system, and it was also introduced with great advantage on the Bordeaux and Bayonne Railway in 1857. There is a little hardness in the running of the trains, but, on the other hand, the shocks experienced at the points are less perceptible than on ordinary lines.

SIR JOSEPH PEASE was again spokesman for the railway companies in the House of Commons on the 1st inst., in opposition to the Regent's Canal, City, and Docks Railway Bill. He opposed it ostensibly on the ground that the payment of interest out of capital,—which is proposed in the Bill,—is vicious in principle, and had been previously condemned by the House. This undertaking, like many others, offers 4 per cent. interest on the capital subscribed, during construction, and one of the speakers who supported Sir Joseph's amendment gave it as his opinion that they could not safely guarantee this. But though the Company may consider this step advisable in order to attract capital without delay, there is no reason to doubt their ability to meet their engagements. Mr. Chamberlain hinted plainly enough that the opposition was due to the great lines being opposed to competition, and although Sir Joseph found 117 supporters there was a majority of 70 against his amendment. Of course, there are many concerns floated which ought not to attempt to pay interest until they begin to realise profits from their undertakings, but the opportunity for attacking the principle alluded to was ill chosen. The House was evidently of opinion that the attack was really directed against the Bill as a whole, the point in question being selected by the railway companies as being a vulnerable one. The Standing Order permitting this practice of payment of interest out of capital was only passed by a small majority some two years ago, and the matter is one still open to discussion. It was, however, certainly not advisable to introduce it on an occasion like the present, when the construction of important works would be delayed, and the employment of capital and labour hindered, and the majority against the amendment shows that this was recognised by the House.

WE recently noticed a decision of Mr. Justice Cave as to the 193rd section of the Public Health Act. A decision of the Court of Appeal which is published in the current number of the *Law Reports*—throws further light on this section, which makes any official of a local authority liable to a penalty who is "interested in any bargain or contract" with a local board or similar body. It was decided in the case to which we are now alluding that a clerk to a local board who was a

shareholder in a gas company which made an agreement to supply a locality with gas was liable to a penalty. There can be no doubt that the law in this instance dealt severely with the official, but, on the other hand, it is obvious that if an exception is made in the case of shareholders, it might in local matters and local companies open the door to arrangements undesirable in the public interests.

AN important step has now been made at Berlin in the direction of permanently affording those interested in hygienic science, the advantages which were so generally appreciated at the Hygienic Exhibition of 1883. A portion of the former Industrial Academy in the Klosterstrasse is to be fitted up as a permanent Hygienic Museum, at a cost of 3,000l., and a like sum is to be spent on the arrangement of a laboratory. In addition to the above expenditure, the *Centralblatt der Baweruealting* announces that a professorship of hygiene will be established in connexion with the new museum. It will be remembered that many objects left over from the Exhibition of 1883 are still available for the purpose of establishing a museum of hygienic science.

WE have received a short pamphlet on the mechanical characteristics of lightning strokes by Col. the Hon. Arthur Parnell, in which are detailed the observations that have been made on these phenomena for the last hundred and fifty years. According to Colonel Parnell, popular belief invariably represents lightning as an electric current descending to the earth from the clouds, whereas a close research into electro-static laws tends to the presumption that the direction of the lightning stroke is more often toward the opposed plate of the electrical condenser, &c., upwards. This theory is illustrated by a large number of actual observations made during the progress of a storm, and the conclusion is that we must regard the lightning stroke more as an electric mine or explosion than as a current, and that the explosion is attended with a variable development of mechanical force. Heat force is also a result of the explosion, although far less frequently than the former. A list is given by the author, in order to show not only the greater prevalence of mechanical force, but the materials which are most easily affected by either of them:—

Substances acted on.	Instances of mechanical work.	Instances of heat work.
1. Persons and animals	52	79
2. Textile materials	88	79
3. Masonry and rocks	416	5
4. Glass and china	82	2
5. Metal	296	173
6. Wood	254	98
7. Trees	63	4
8. The ground	60	—
9. Thatch, straw	—	11
10. Gunpowder	—	15
11. Gas	—	19
Total.....	1,221	485

If the data here given are to be relied on, it will be seen how greatly masonry and wood-work are affected by the mechanical force, and whether the fact may be turned into practical use of a preventive kind, it is, at all events, one of considerable value to those engaged in works of construction.

AN interesting example of labour-saving is now to be seen in the stone-yard at Burnley, the authorities of which town are laudably determined to be in the forward ranks of sanitary improvement. The arrangement in question is one by which the boulders that were formerly wheeled up by hand to be delivered to the tender mercies of the (Blake's) stone-breaking machine are, by means of an elevator, fed directly into the machine. When crushed, the broken stone is carried into a sieve driven by an eccentric rod, and so disposed that four sizes of chippings may be delivered direct into the cart below. Not only is a much larger quantity of material broken in a given time with better results, but there is an immense saving of labour, while the stone-breaking

itself works with greater regularity than it did when it was fed intermittently by hand. At the same establishment a pick-sharpener is employed by which one man can sharpen 800 picks a day instead of the old hand number of 180. The advantages of labour saving on a large scale are nowhere better seen than in municipal and parochial management, particularly when we consider the rapid and steady increase of expenses entailed by the extension of modern towns.

WE have received this year's instalment of the photographs taken for the Society for Photographing the Relics of Old London. This set are in the Temple neighbourhood, and include Churchyard-court, with the monuments to Hiccocks and Mead, and the slab to commemorate (it does not mark) Goldsmith's place of internment; the Garden House of Clement's Inn, with the sculptured sundial, sold in 1884 (where is it now?); Clifford's Inn; Staple Inn Hall; the interior of Gray's Inn Hall, with its richly-carved columns and frieze; Gray's Inn-Field Court; Inner Temple Gate-house; the doorway of No. 5, King's Bench-walk, with its half-columns of Corinthian order; Middle Temple Gate-house, the work of Wren, with its Ionic order and pediment; and Fountain-court. In addition is a sheet of small subjects of sculpture; among others a figure of a naval officer taking an observation, the figure which is said to have been utilised by Dickens, in *Dombey and Son*, and which was a few years ago removed from Leadenhall-street to the Minorities. The figure of the boy in Panyer-alley, Newgate-street, is another of this little collection, all the items of which are of archaeological interest. The whole set of plates form a very interesting record of characteristic corners of one of the most characteristic neighbourhoods of London.

AT a meeting of the "Art Workers' Guild," held in the rooms of the Century Club, on Friday last week, Mr. Geo. Simonds gave an interesting lecture on artistic bronze-founding, on much the same lines as that of his paper on the same subject recently in the *English Illustrated Magazine*, which we noticed at the time. The lecture was illustrated by diagrams, and the moral pointed was, that sculptors should be their own founders, as far, at least, as small works were concerned. The lecture, which lasted nearly two hours, was listened to with great attention.

WE have received from Messrs. W. & T. Brindle photographs of villas being erected at Orrell, near Wigan, as examples of ornamental stone-work executed by machinery patented by them about eighteen months ago, and in which the use of edged tools is discarded altogether. The workmanship, as they observe, is a series of flutings, dog-teeth, and rings, arranged to suitable designs to obtain various alternations of light and shade, and to produce harmonious enrichments "seldom seen on the flat surfaces of stone." In the latter statement we certainly concur. The promoters do not mention the name of any architect, and we presume the design is their own. They would have been wiser to have got some one who knew how to make use of such resources in a manner in harmony with architectural taste and knowledge, to design a building for them. We should recommend them to keep the designs they have sent us carefully from the sight of architects. But we do not, therefore, by any means necessarily condemn their method *in toto*. It is evident that the mechanical means which have been here used might, under better direction, be applied with effect to produce such features as rustication and general surface ornament of a simple kind, and which is composed of the repetition of small features; and as it is stated that the cost is 75 per cent. below what is required to execute similar work by hand, it may be of use under proper direction. But Messrs. Brindle had better not send any more of those photographs about. They will frighten architects away if they do.

ARCHITECTURE AT THE ROYAL ACADEMY.

CERTAINLY the most artistic of the ecclesiastical designs exhibited this year is that for the proposed memorial church at Streatham contributed by Messrs. George & Peto. There is no accompanying plan, but the church appears, so far as can be ascertained from the perspective sketch, to consist of a nave, chancel, shallow transepts, wide aisles, and a western narthex or porch. The aisles project in an unusual manner beyond the faces of the transepts, and with good effect. They are divided longitudinally into three wide bays, and are roofed transversely, covered with lead, and finished with plain gables of so low a pitch that a horizontal line at their springing is alone wanted to convert them into Classic pediments. It will have been inferred that the style chosen is a late phase of Perpendicular, very difficult to treat well, and treated in this instance with great mastery; vast areas of plain wall acting as a foil to the richly-traceried windows, and recalling involuntarily, though without the least suspicion of plagiarism, Mr. Norman Shaw's church at Ilkley, a drawing of which was exhibited eight years ago. The interior is of remarkably lofty proportions, and the line of ridge is level throughout, as in so many of the magnificent parish churches in the eastern counties. An octagonal turret marks the north-east angle of the north transept, and terminates in a conical spirelet, of which the angles of the upper half are broken into crockets. Below the springing is an open stage, each face of the octagon having a gabled head, and below this stage is a series of traceried panels, not pierced, but extremely effective, as affording an agreeable transition from the plain masonry of the lower portion of the turret to its more ornate heltry, for it is assumed that it is a hell-turret. A window placed high up in the transept gable is, however, louvred, and the bells may be placed there, in which case the turret is probably a staircase only. There are one or two little points in which the whole truth is not told, e.g., inconvenient down-pipes being omitted, and an ancient look has been imparted to the fabric, which this generation, at least, will never enjoy. But these are small matters. The design is singularly artistic, and, notably, in the evidences of a wise restraint which add a sense of power to its picturesque grouping and detail, and it is needless to say that this excellence of design loses nothing by Mr. Ernest George's exquisite drawing, which, without any appearance of labour, is beautifully bright and sparkling.

If Mr. Brooks may be charged with a want of versatility he may justly plead that he succeeds perfectly within the limited range he has adopted. In his Church of St. John-the-Baptist, Kensington, he is seen at his strongest, and all his merits shine out brightly. He is wise enough to give the first consideration to solidity of construction and beauty of proportion, and he never sacrifices these to mere luxury of ornamental embellishment. Thick walls are a greater help to architectural effect than most architects are aware of or will admit, and thick walls with Mr. Brooks are a *sine qua non*. Consequently his buildings show a breadth and simplicity which are not always found in the works of others, and with this quality he combines a propriety of detail seldom excelled in contemporary architecture. Carving, as a rule, he dispenses with, spending its cost on more essential matters. But when he allows himself a little treat of the kind his ornament is invariably good. In the particular design before us the growing fondness for an octagonal lantern at the transept crossing is exemplified; and is very successfully treated so far as the architectural effect is concerned. But it is a serious question how far the acoustic qualities of a large church would be jeopardised by this arrangement. The sounding board over the pulpit, which is placed against the eastern wall of the transept, shows that the architect's mind is not without some misgivings on this point. A Baldachino over the altar and an elaborate screen across the entrance to the chancel are noticeable features. The whole of the interior surface is intended, apparently, to be lined with ashlar, and the whole will prove a very fine church. Mr. Brooks does not, it appears, make his own perspectives, and may be considered fortunate in having an interpreter whose style of drawing in pen and ink is so well calculated to bring out the best qualities of his designs.

The same architect's design for a proposed church at Highgate does not please us so well. Its general composition is not happy, and its detail has but little to recommend it, while the arrangement of the transept rising up flush with the face of a long blank aisle wall is extremely unsatisfactory.

"Burnham Thorpe, Norfolk," is presumably an old church, and if so, it is only as an architectural drawing that it has claimed a place on the Academy walls. It has, however, no particular merit as a drawing, and its author may, indeed, be congratulated in getting it so well hung, when so much good drawing, and good design to boot, is known to have been turned away. And this offers a convenient opportunity for a word on the subject generally. It is beyond dispute desirable that the Architectural Gallery should be the exponent of contemporary architectural design. The mere representation of ancient architecture should take its chance with the bulk of the exhibits. If good enough as artistic work, it should go with Mr. Waterhouse's Taormina sketch of this year to the water-colour room,—or if in monochrome, to the room now provided for works of that class. If the architectural room is to be open to all pictures having architecture for their *motif* by whomsoever drawn or painted, it is not difficult to see that the unfortunate architects will illustrate the old story of the cuckoo in the sparrow's nest, and be gradually thrust out of their nominal home. There is an unusual amount of such drawing this year, and the designs of architects of acknowledged skill have been rejected, whilst leaves from students' sketch-books have usurped their place.

It is no doubt sufficient to put this view before the President and Council to ensure a more discriminating selection in future, and the reservation of the architectural gallery for architectural designs.

LETTER FROM PARIS.

THE great event of last month has been the Town-hall hall, of which we have before spoken, and which has not only been a great success, but has contributed to forward the interior decoration of the new Municipal Palace, and on that account merits a special word.

Undoubtedly the old Hôtel de Ville, with its artistic *chefs d'œuvre*, its ceilings decorated by Lehmann, Picot, Cahanel, Ingres, Delacroix, and so many other masters of the French school, its columns of marble and gold, its furniture, in a style rather heavy perhaps, but so completely in harmony with the ornamentation of the saloons, was an incomparable setting for the *fêtes* given under the Empire by Baron Hansmann. On this occasion everything had to be done afresh; the rooms are scarcely finished, the columns and ceilings still the colour of stone; no painting relieved that general crude whiteness. Furniture, tapestries, lustres, chandeliers,—all were lent for the State. Nevertheless, such was the ability of the architects directing it, that this improvised luxury had no appearance of anything unusual.

The evening before the *fête* at the Hôtel de Ville, a rich financier, M. Gaillard, inaugurated by a grand fancy dress ball, his new mansion in the Place Malesherbes. This is a beautiful building, the exterior aspect of which recalls the ancient portions of the Château de Blois. The architect, M. Favier, has endeavoured to revive the architecture of the royal residence constructed under Louis XII. In this he has succeeded remarkably, and the façade of the building, with its large windows with stone dressings, its decorative balconies, its walls ornamented with red and black tile designs, its roofs crowned with leaden ornaments, constitutes an original and elegant design, of which we hope to give an illustration before long.

In regard to the annual *Salon* now open, the contents whereof will be specially treated of in other columns of the *Builder*, we may note a recent important decision, due to a certain number of the members of the Société des Artistes Français, and which will be productive, probably, of very good results; we mean the inauguration of a lottery which will be devoted each year to the purchase of works of art exhibited. The price of tickets is fixed at 100 francs (4*l.*), and the drawing will take place the month following the closing of the *Salon*.

This is not the only innovation this year, and most of the persons accustomed to enter the *Salon* gratuitously on "Varnishing Day" were

taken by surprise on that Wednesday, when they found that, with the exception of exhibitors and art-critics, no one was permitted to enter the precincts under a fee of 10 francs, to go to the poor and the wounded at Tonkin. While speaking of the *Salon*, we may add that this year M. Ch. Garnier, Questel, Brune, Bailly, Vandremere, and Sédille were appointed the jury in the department of architecture, with M. Raoulin and Gainain as assistant members.

Since our last letter, which gave some account of the exhibition of the works of Gustave Doré, the paintings, water-colours, drawings, and sculptures of that remarkable artist have been dispersed by auction. The whole proceeds of the sale have been 96,000 francs, which is little enough. The highest price was given for the design entitled "Le Rhin Allemand," which reached 2,000 francs; the large drawing of Epsom Race-course sold for 900 francs; a magnificent water-colour of the London Docks went for 500 francs. Among the pictures, the "Mort d'Orphée" reached 2,400 francs; the "Marchant de Fleurs de Londres" sold for no more than 1,600 francs. This is evidently not the time for artistic sales. The preoccupations of politics thrust art on one side, and yet the private exhibitions have succeeded each other without interruption, and have drawn numbers of visitors. That of the pastellists, of which we have already spoken, is remarkable one, and does the greatest credit to M. Roger Ballu who organised it. Independently of the old masters, the retrospective exhibition of whose works is of the greatest interest, we see here, among the moderns, M. Lévy, whose nude figures are treated in a luminous and charming key; M. Duez; M. John Lewis Brown, whose chasseurs in red dresses and his cavaliers under the shade of trees are to be noted; M. Emile Levy, represented by a number of portraits; and, lastly, M. de Nidès, who, in spite of real talent, makes a serious mistake in offering a disagreeable change of affectation and deliberately chosen impressionism.

Affection is the fault with which one must so reproach M. Tissot, a French artist well known on the English side of the Channel. M. Tissot has always put one or another affection to his works. After having conscientiously imitated for some fifteen years the painters of the sixteenth century, in an archaeology more faithful than agreeable, he has now become an inverted modernist, and the fifteen pictures which he exhibits at Sodebmayer's, under the leading title, "La Femme à Paris," profess to detail the quintessence of the various aspects of the elegant Parisienne. Making allowance for paradox, the exhibition is not uninteresting. M. Tissot's painting is clear, bright, and amusing. He has learned a good deal among the masters of the English schools, and his paintings have a je ne sais quoi of piquancy, pleasing and ductive, like the slight foreign accent which sounds so well on the pretty lips of an English woman speaking our language.

The exhibition of the works of Delacroix has just closed its doors. The sum raised thereby for a monument to him is about 67,000 francs. A few days since the Salle Melpomène, at the Ecole des Beaux Arts, gave asylum to an exhibition of portraits "du Siècle," organised by a philanthropic society, and which counts not less than 400 pictures. We find among this collection the works of David, Gros, and Baron Gérard; Baudry, Ribard, and Fantin in Gros; Ingres is the neighbour of Manet. The pearl of the collection is unquestionably the portrait of Napoleon I., by Ingres.

Not far from the Ecole des Beaux Arts, at the foot formed by the Palais de l'Institut on the rue Malaquais, the statue of Voltaire will shortly be erected. The pedestal, of which the foundations are commenced, is the work of Formigé, whom the Municipal Administration have had the good fortune to engage in the capacity of architect for the "Service des Reménades." On the other bank of the river, in the midst of the Cour du Carrousel, the work has been commenced for the erection of a monument to Gambetta, of which M. Aubé, the sculptor and M. Boileau the architect, have completed a monument, about 23 mètres in height, imposed of a pedestal in the form of an obelisk adorned by two figures representing La Vérité and "La Force." On the principal face of the monument is the figure of Gambetta dominated by a genius unfolding a standard, and surrounded by soldiers whom he orders on to combat. Various inscriptions

taken from his discourses pronounced from the Tribune, and a winged lion placed at the summit of the obelisk, will complete the monument, which will be finished about the end of the year, and will stand just in front of the Arc du Triomphe of the Carrousel. Possibly the excavations for the foundations may lead to some interesting archaeological discovery on the site of the old Louvre, where already, some years ago, there were found, in installing an electric apparatus, fragments of balustrade ornamented with animals which came certainly from the ancient kings of Bernard Palissy.

Since we have come on the subject of statues we must not forget the new competition ordered to give Paris a statue of Jean Jacques Rousseau. We may observe also that the statue of Béranger, the work of the sculptor Doublemard, will be shortly inaugurated in the square of the Temple, not far from the street in which the famous "Chansonnier" died, and which bears his name.

It is announced that the Government intend at last to take steps to ensure, at an early date, the restoration and repair of the Porte St. Denis. Among the monuments which the age of Louis XIV. has left to Paris this is one of those which has been most sorely tried. The sculptures with which it is decorated are greatly damaged; the groups representing the Rhine and Holland captive, are literally falling in pieces; and the Municipal Council have already for a long time implored that the preservative measures which had become absolutely necessary should be taken. It is high time to do so if this curiosity of Paris is to be preserved and some fatal accident prevented. It was in 1678 that the Porte St. Denis was built, from the designs of Blondel.

It will be very necessary, on the same occasion, that the new "Ministre des Beaux Arts" should take some decision relative to the crowning of the Arc d'Étoile. The temporary group which M. Falguère built up there two years ago threatens ruin, and, in fact, the monument itself has no need of that adjunct, which disagrees with its architectural style and spoils its fine proportions. Let us hope that enormous timberwork of Damocles suspended over the heads of promenaders will soon disappear for good.

Lastly, as the Government is beginning tardily to occupy itself about works long since recognised as necessary by the general good sense of the public, it is time to take precautions against the complete deterioration of the celebrated hémicycle which Paul Delaroche painted in the "École des Beaux Arts." The climate of Paris is decidedly unhealthy to mural paintings, and the dampness which saltpetres the walls of public edifices will end by destroying that remarkable decoration, at the same time that it attacks the works of Flandr in at St. Vincent de Paul and St. Germain de Prés. Accordingly the Service des Beaux Arts of the Municipality has rigidly interdicted mural painting, and all the artistic works ordered now for the decoration of municipal edifices are painted on canvas to be applied to the walls.

To the list of works in course of construction, we must add the exhibition-room which it is proposed to create in the Musée de Cluny, between the buildings of the ancient Abbaye and the ruins of the Palais des Thermes. The construction of this work necessitates the removal into the garden of the hôtel of the portal of the ancient church of St. Benoît, which will be an operation requiring minute and delicate care.

With the exception of this portal, well known to archaeologists, and some other interesting bits of architecture, Cluny is really no more than a museum of decorative art and furniture of the Middle Ages and the Renaissance; while, for the comparative study of architecture, the new museum of casts at the Trocadéro constitutes a precious source of artistic and historic instruction. It is in this respect that we notice the new room which is nearly finished at the Trocadéro, and which contains casts of the finest work of the sixteenth, seventeenth, and eighteenth centuries. The art of sculpture is nobly represented, and the new room completes very happily a collection in which the national genius is represented in all its originality, thanks to the exact reproduction of the *chefs d'œuvre* of sculpture and architecture in their true dimensions. It is incontestable that the Museum of the Trocadéro is a creation of the highest value from the point of view of popular art education.

The Museum of the Louvre is also the object just now of important improvements. Besides the repairs and improvements in the picture-galleries, which will soon be completed by the junction with them of the ancient *Salle des États*, warming apparatus is being installed in the ground-floor, which will enable artists to work there at all seasons of the year.

We will conclude by giving a few lines to an artist of talent who has died at Paris in the prime of life; we refer to Auguste Laneyre, who was a draughtsman and etcher of real power. We may name among his works an interesting collection of drawings made in the Franco-German War; an album of drawings of animals, and some very curious studies which he collected under the title of "La Rue à Londres," and which constitute a work extremely interesting, original, and full of spirit.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE NEW COUNCIL.

At the fifty-first annual general meeting, held on Monday evening last, the Council were elected for the ensuing year of office, namely:—

President.—Mr. Ewan Christian.
Vice-Presidents.—Messrs. Edward Panson, F.G.S.; Alfred Waterhouse, A.R.A.; and Thomas Worthington (Manchester).
Members of Council.—Messrs. Cole Alfred Adams, George Aitchison, A.R.A.; James Brooks, Arthur Cates, Charles Roberts Chorley, J.P. (Leeds); Joseph Clarke, F.S.A.; Henry Curry, William Milner Fawcett, M.A., F.S.A. (Cambridge); Charles Fowler, James Fowler, J.P. (Louth); John Gibson, Edward Augustus Grining, Octavius Hansard, Professor Thomas Roger Smith, and Aston Webb.
Hon. Secretary.—Mr. John Macvicar Anderson.
Secretary.—Mr. William Henry White.

COMPETITIONS.

"Wesley" Chapel, Preston.—A limited number of architects having been invited to send in competitive plans for the enlargement and restoration of the above chapel, the building committee have decided to adopt the plans and designs furnished by Mr. David Grant, of Preston. It is proposed to begin operations at once, under the supervision of that architect.

Beverly Cottage Hospital.—The Building Committee, at a meeting on the 30th ult., opened the tenders for this building, and Mr. Blackburn's tender, reduced to 1,725*l.* 1*l.* 5*d.*, through the substitution of slates for tiles, was accepted, subject to the approval of the plan by the Charity Commissioners. At the same meeting the following letter was read, but no action was taken upon it:—

"Gentlemen,—We, the undersigned, beg to protest against the decision arrived at on the 8th inst., and the acceptance of the designs of Messrs. Smith & Broderick, on the following grounds, namely:—(1) That the accommodation required as set forth in the printed circular is not provided; (2) That the general plan and arrangement is limited, and far from satisfactory; and (3) That in our opinion at least six other designs were superior to the one accepted, five of which could have been carried out without any deviation for the sum allowed, viz., 1,700*l.* Under these circumstances we consider the appointment of these architects to be most unfair to those competitors who were induced by the advertisement to compete (on two separate occasions), on the assumption that their designs would be impartially considered, and that the best would be successful.—We have the honour to be, gentlemen, your most obedient servants,

WILLIAM HAWK,

R. COULSON,

LEGGERS & CARTWRIGHT,

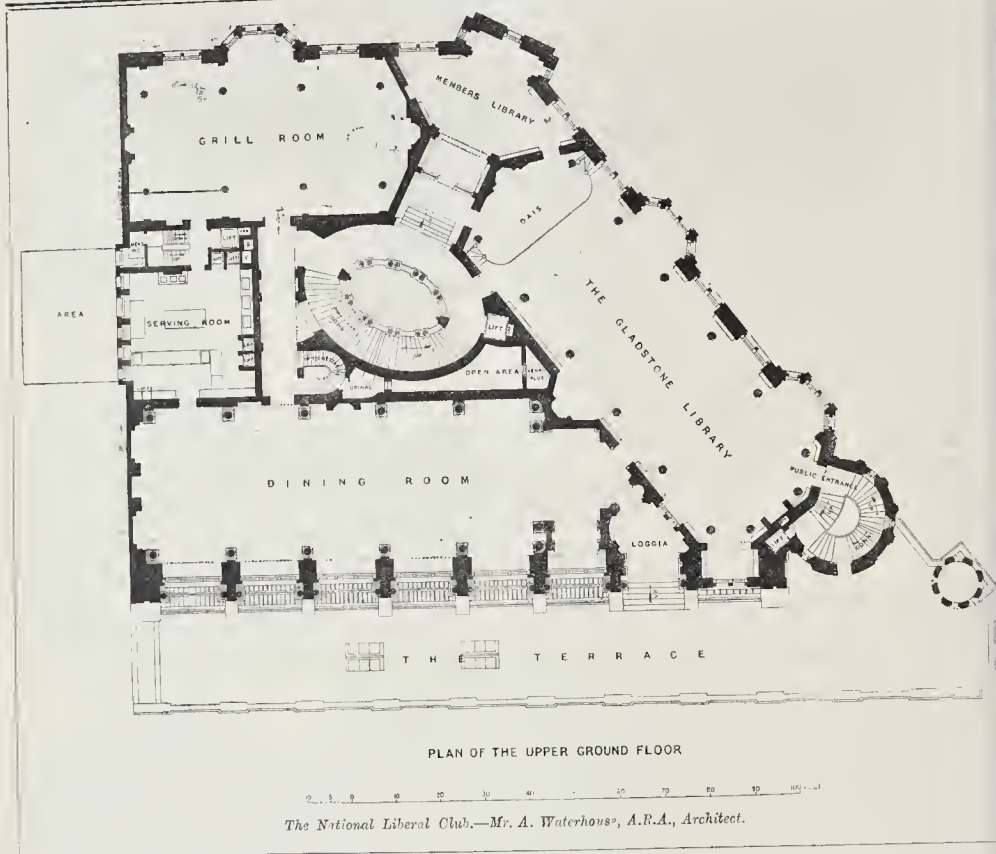
W. T. BEILER (Health),

April 28."

Lowestoft Cemetery.—We are informed that the first premium in this competition has been awarded to Mr. William Donbieday, of Colmore-row, Birmingham, and the second to Messrs. Bellamy & Hardy, of Lincoln. About forty designs were submitted to the Burial Board.

International Inventions Exhibition.

It is stated that careful attention has been given to the drainage at the International Inventions Exhibition, and that Mr. Bennisson, the surveyor, has completed what was partially done at the Health Exhibition in applying the Banner system to the whole of the drainage of the exhibition by carrying up ventilating-shafts from all the principal drains and fitting the same with Banner extracting ventilators and Banner down-draught ventilators. These ventilators have also been used for the ventilation of the staff rooms.



Illustrations.

THE NATIONAL LIBERAL CLUB.

THE new buildings of the National Liberal Club will occupy an area of 23,750 ft. The site is bounded on the north and west by Whitehall-place and Whitehall-avenue; on the east it faces the gardens of the Thames Embankment, while on the south the club-house will join the new buildings of Whitehall-court. From the main entrance, at the corner of Whitehall-avenue and Whitehall-place, a vestibule leads into the hall or principal corridor, on the left of which is a reception lobby, and on the right beyond a porter's room, and a post and telephone office; a second hall leads into the conference-room. To this there is a separate entrance from Whitehall-avenue, so that it is accessible from the street without the necessity of passing through the Club. At the end of the hall, opposite the main entrance, is the principal staircase, which rises from the basement to the first floor. It is of elliptic form, and the steps, which are 8 ft. wide, are supported at either end by an outer and an inner wall. The outer wall is solid, but the inner is formed into a continuous ascending colonnade of various and richly coloured marbles; at the foot of the first flight of steps is placed the entrance to a passenger lift, which will connect the various stages of the Club. From the end of the hall a descending flight of steps leads under the main staircase to the level of the smoking-room, 8 ft. 6 in. below that of the street. This room, which is 102 ft. by 35 ft., and 23 ft. in height, is provided at its eastern end with a bar and an entrance for servants; while in the south wall a doorway leads to a short flight of steps which ascend to the range of billiard-rooms placed under the terrace. Of these rooms, which are 13 ft. 6 in. in height and average 25 ft. by 18 ft. in area, it is proposed to construct some with top lights for use by day. Under

the entrance to the conference-room there will be a tradesmen's way to the basement, where the steward's and receiver's offices are situated. The basement also contains, besides men-servants' bedrooms, a large room for members' portmanteaus and other effects, a boiler-room, an engine-room containing the dynamos for electric lighting, and a fresh air chamber, from which air will be conducted to the various up-shafts throughout the building. From the boiler-room, steam is provided for the cooking and laundry operations.

Besides the main entrance and that to the conference room, there is yet another entrance from Whitehall-place, at the foot of the tower in the north-east angle of the building. This is for the benefit of such non-members as may be admitted to the privilege of the Gladstone Library. This library is placed over the smoking-room, and will be 102 ft. in length, 35 ft. in width, and 24 ft. in height. It can be approached from the above-mentioned public staircase, from the dining-room, which overlooks the river, from the principal staircase, or from the members' library, into which a doorway leads off the raised dais at the west end of the room. To increase the space available for books, the library is provided with a gallery which runs entirely round the room between the detached columns and the wall, and is accessible from the staircase at either end. The two principal rooms on the upper ground floor, besides the Gladstone Library and the smaller library for members, are the grill-room and the dining-room. The first of these looks into Whitehall-avenue, and the second is on the east of the building. The service-room, which is supplied by seven lifts, lies between these two, which are also connected by a corridor, out of which a small staircase ascends to a mezzanine for lavatories. From the dining-room there is an access to an open loggia, and thence down a flight of five steps to the broad terrace overlooking the Embankment. The dining-room, it may be mentioned, is 108 ft. by

38 ft.; the grill-room 63½ ft. by 35 ft.; but these rooms being 24 ft. in height and 15 ft. 6 in. above the level of the street.

The first floor is occupied by a reading and writing-room, over the Gladstone Library; a smoker's reading and writing-room, over part of the dining-room; and a drawing-room over the members' library. There is also on the floor a private dining-room, and a committee room, which can be used as a dining-room. A long the eastern front there runs a balcony, accessible from a loggia between the two reading and writing rooms, and commanding a splendid view down the river. At this floor the principal staircase ceases, and with it the club proper; the upper storeys being reached by the staircase in the tower, or by the adjoining lift. The office of the secretary has been placed on a mezzanine between the first and second floors. His clerks will have a room on the first floor, reached from his office by a private staircase.

The second floor is devoted to chamber bedrooms, or bedrooms and sitting-rooms combined, some of which have spacious balconies placed over the bay windows of the floor below. The third floor is a repetition of the second, consisting of bedrooms, sitting-room, bath-rooms, &c. The fourth floor is partly occupied by chambers, and partly by rooms for officials and servants; but the two departments are kept entirely distinct. The steward's room, butler's room, pantry, &c., look into the central space over the skylight of the principal staircase, while the members' rooms occupy the external frontages. The kitchen and scullery are placed on this floor in the south-west angle of the building, in direct communication with the service-room, into which the lifts ascend. A joining is a large still-room, with lifts descending to the various serving-rooms. The laundry storerooms, housekeeper's rooms, and music bedrooms are provided on the fifth floor. The tower staircase ceases when it reaches the fourth floor, but from that point a smaller spiral staircase





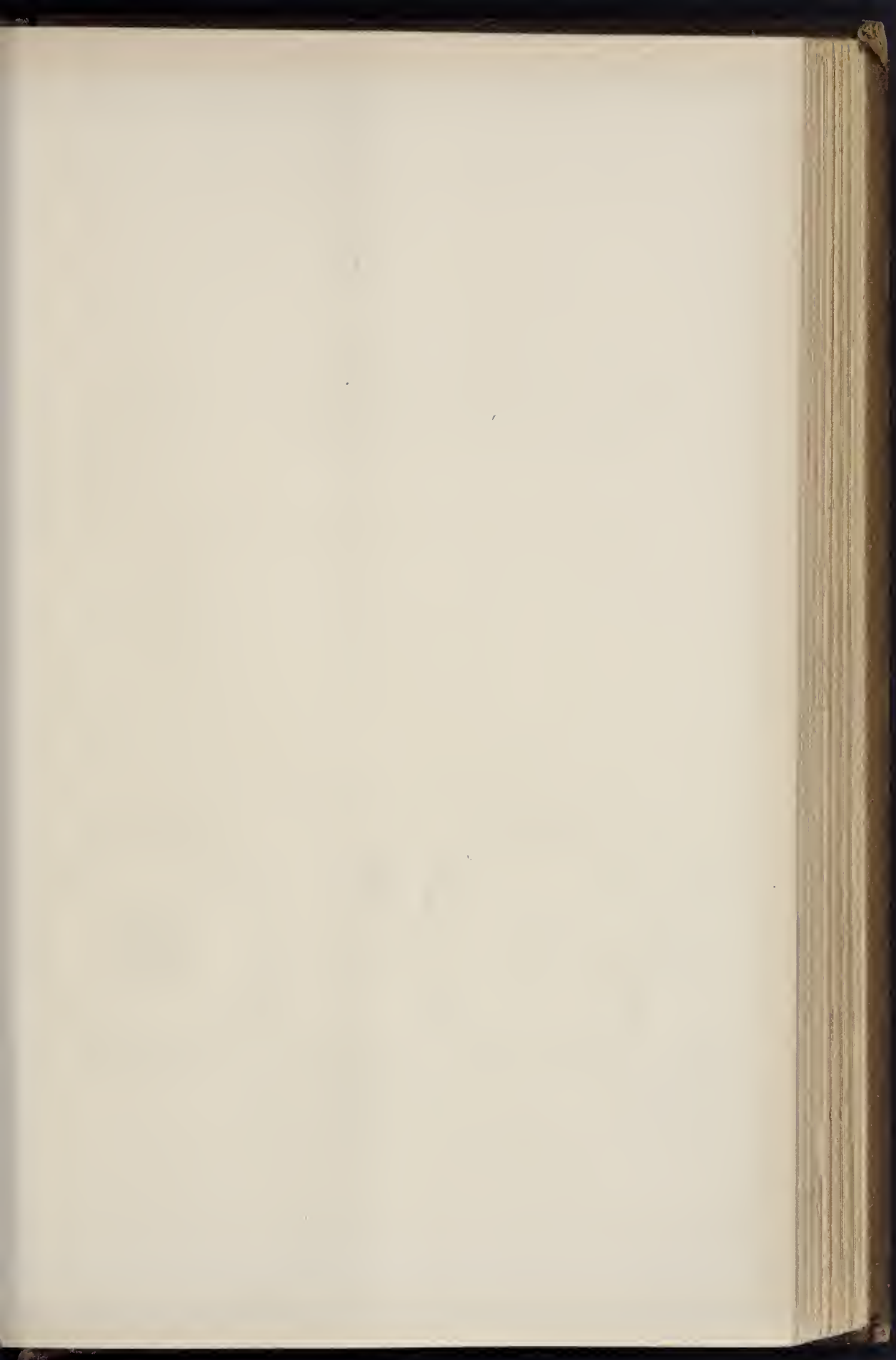
DESIGN FOR A MILITARY

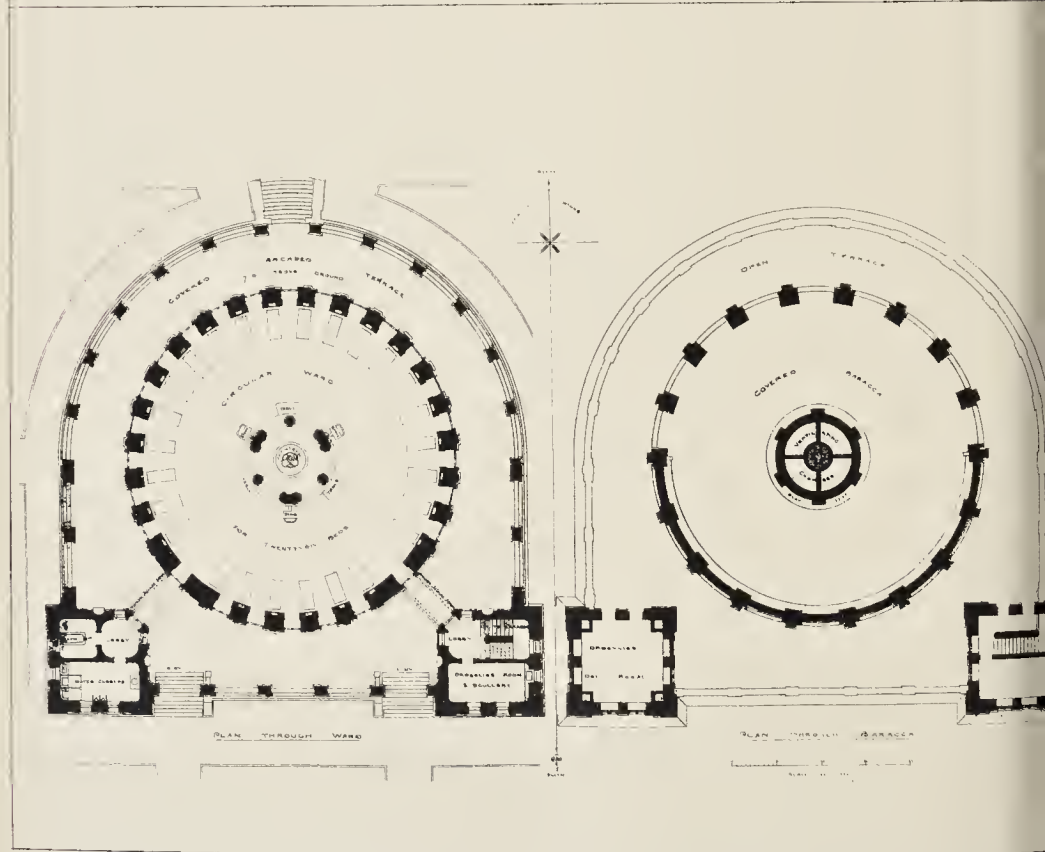
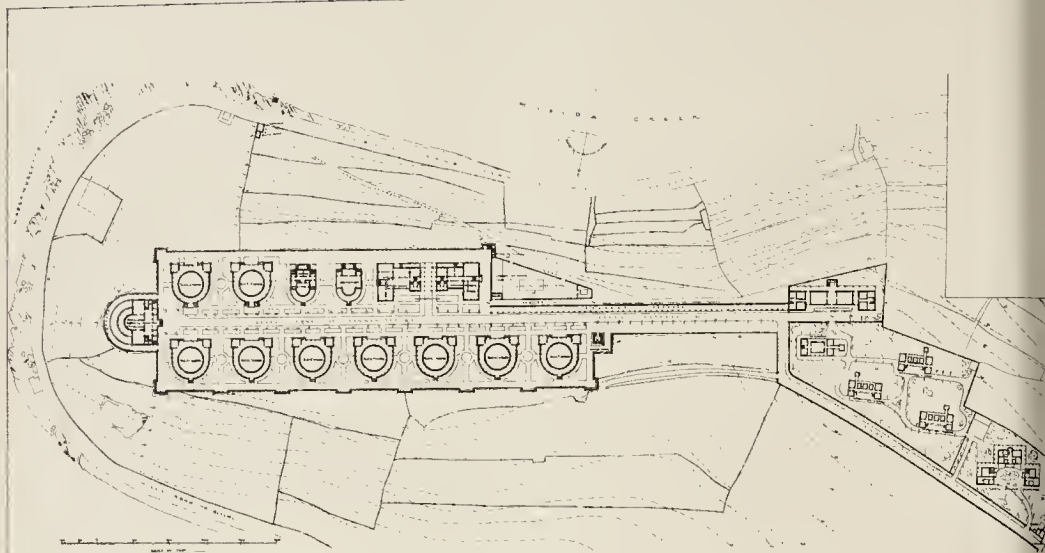
By SIR ANDREW C



FOR A HOT CLIMATE.

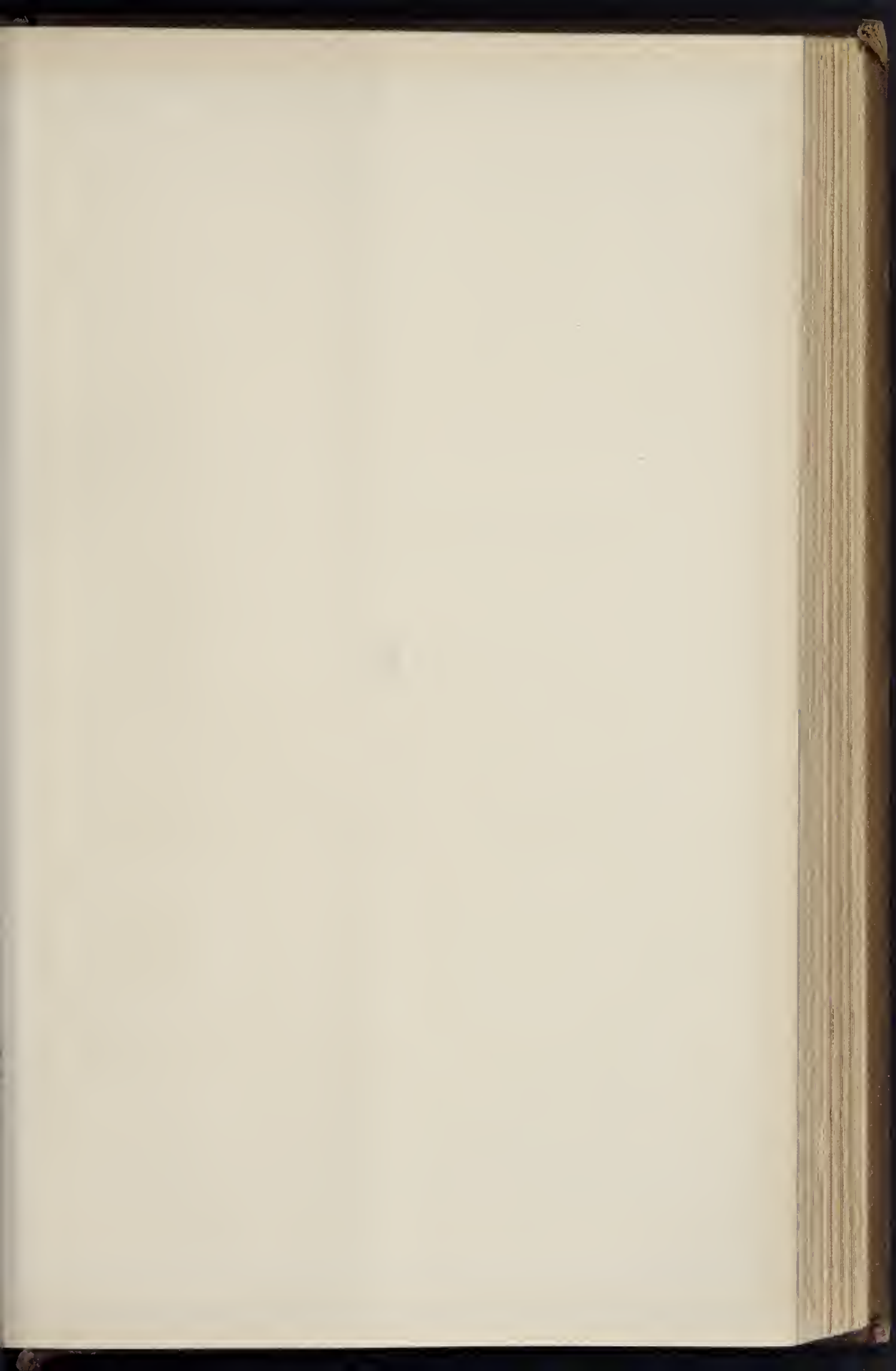
E. INGRES BELL.





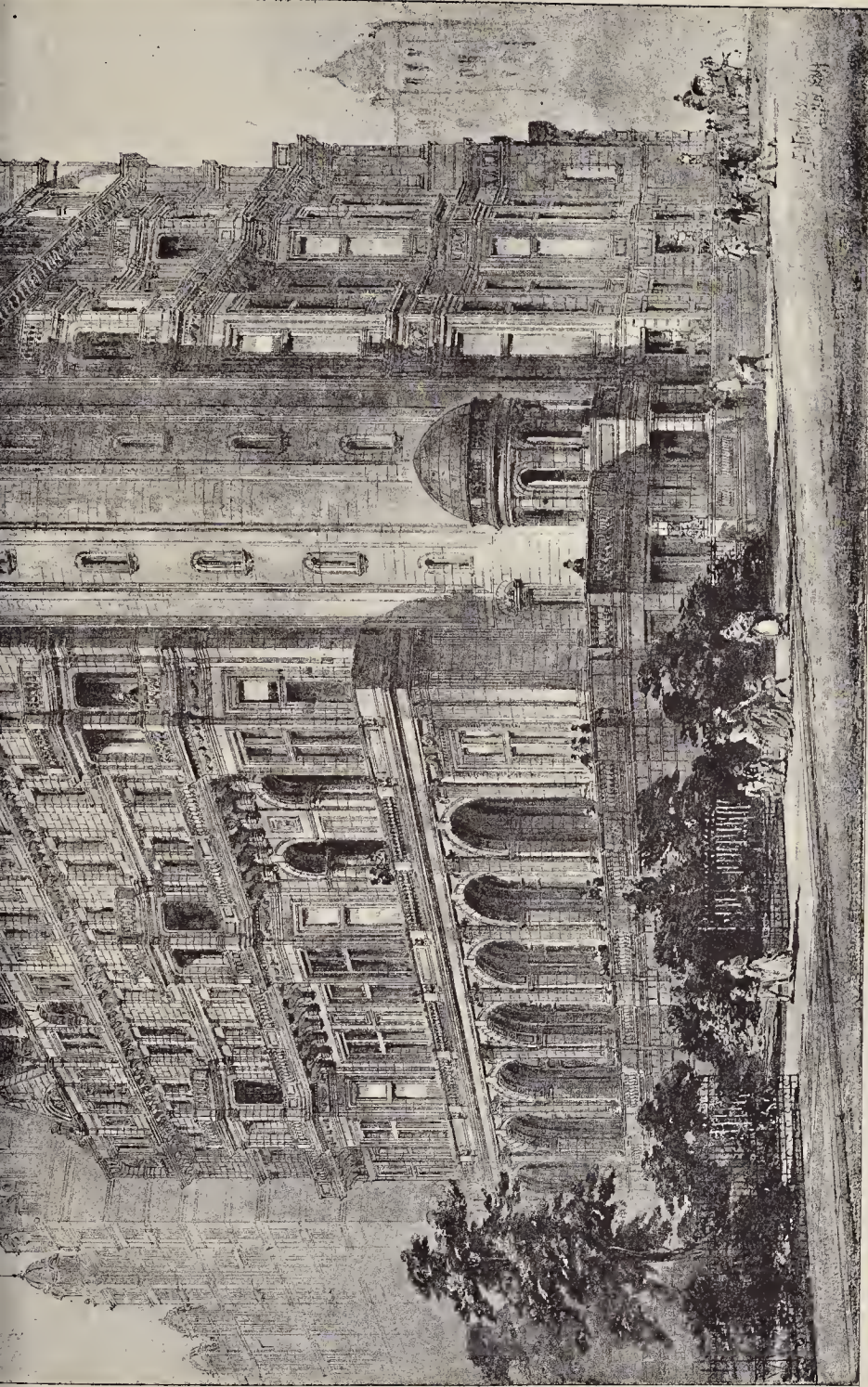
DESIGN FOR A MILITARY HOSPITAL FOR A HOT CLIMATE.

By SIR ANDREW CLARKE AND MR. E. INGRESS BELL.



THE BUILDER, MAY 9, 1886.

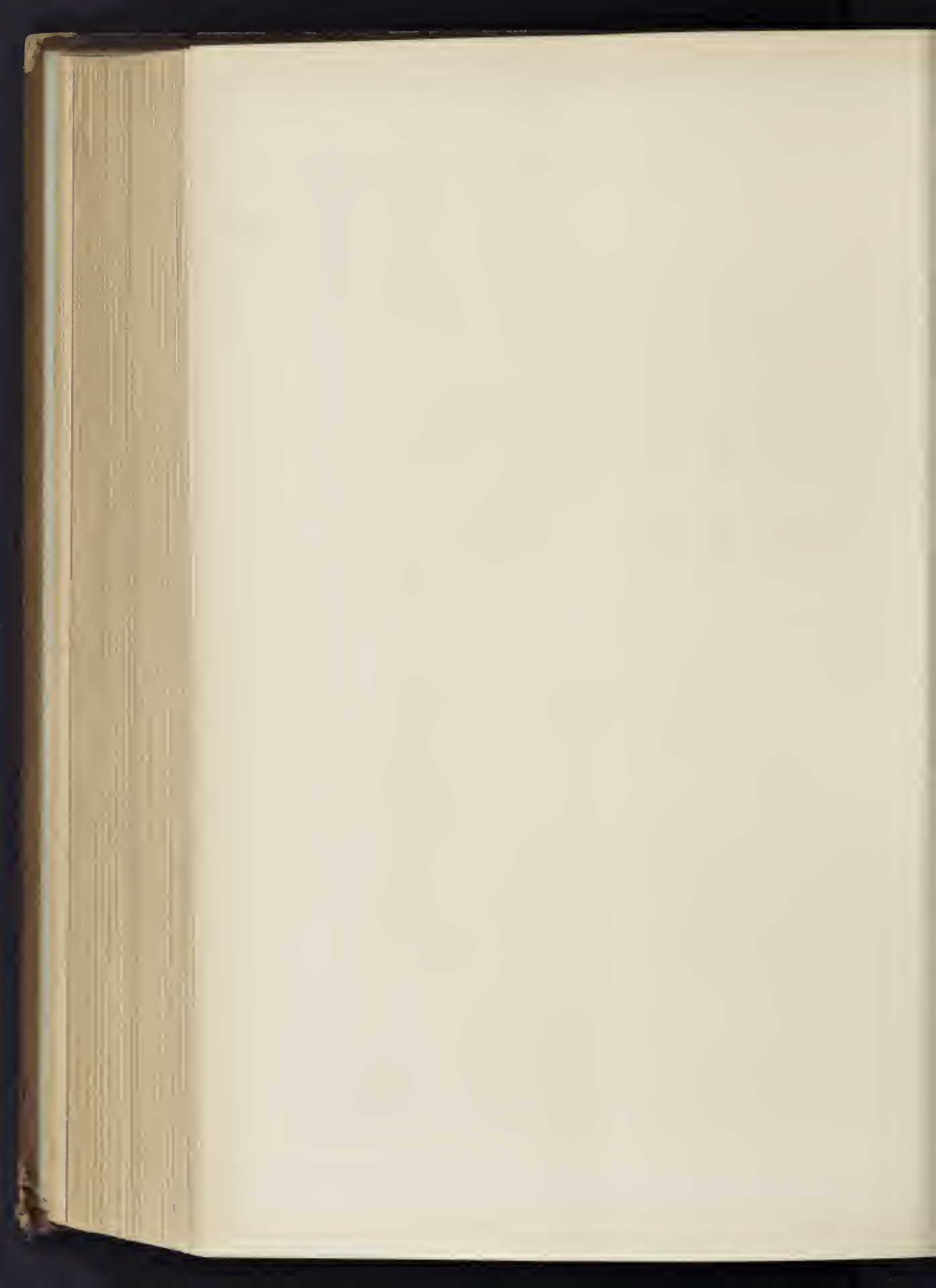




THE PHOTO, SYDNEY & CO. LONDON.

THE NATIONAL LIBERAL CLUB.

MR. A. WATERHOUSE, A.R.A., ARCHITECT.





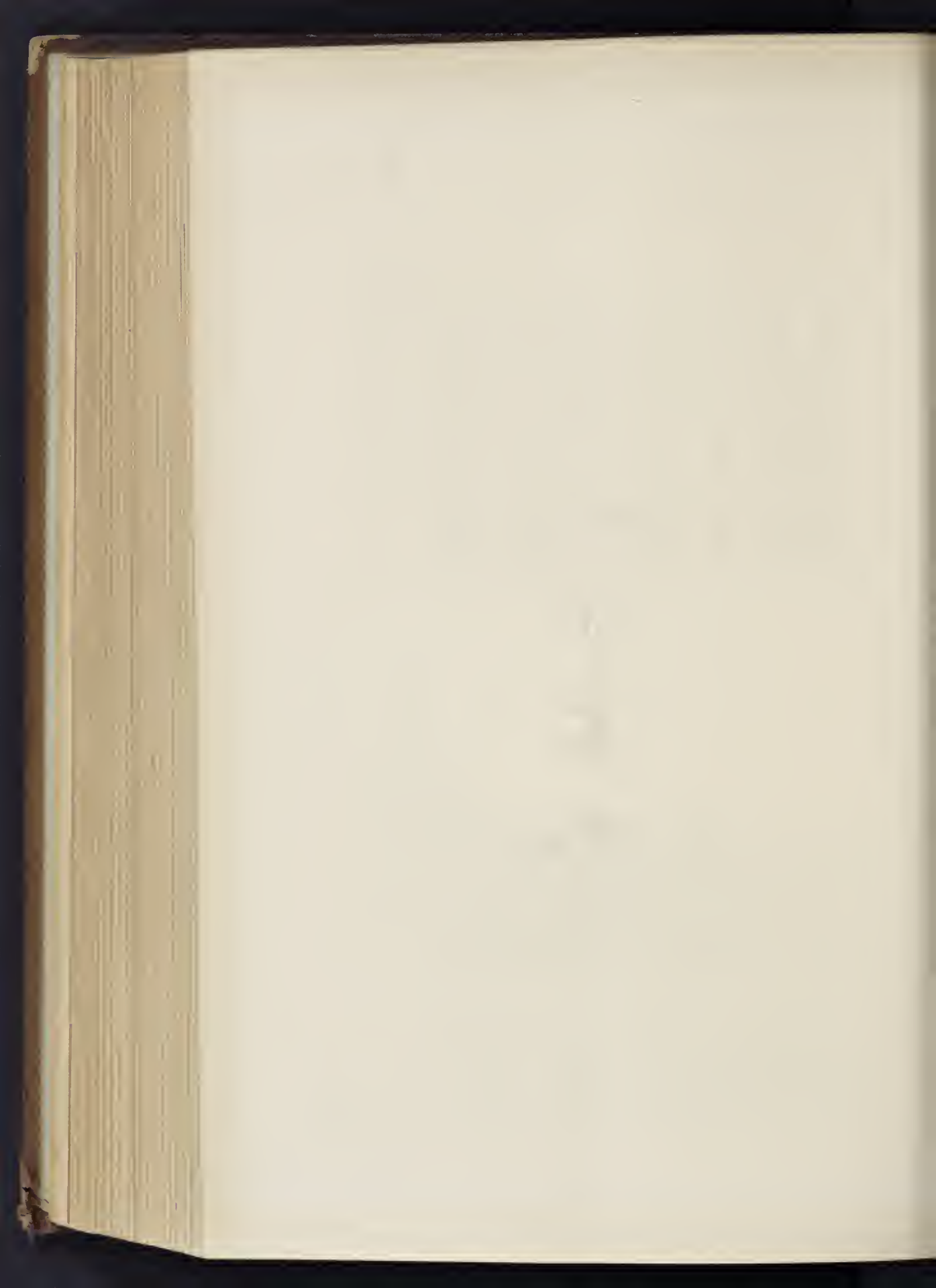
DESIGN FOR THE NATIONAL LIBERAL CLUB, JULY 1884.

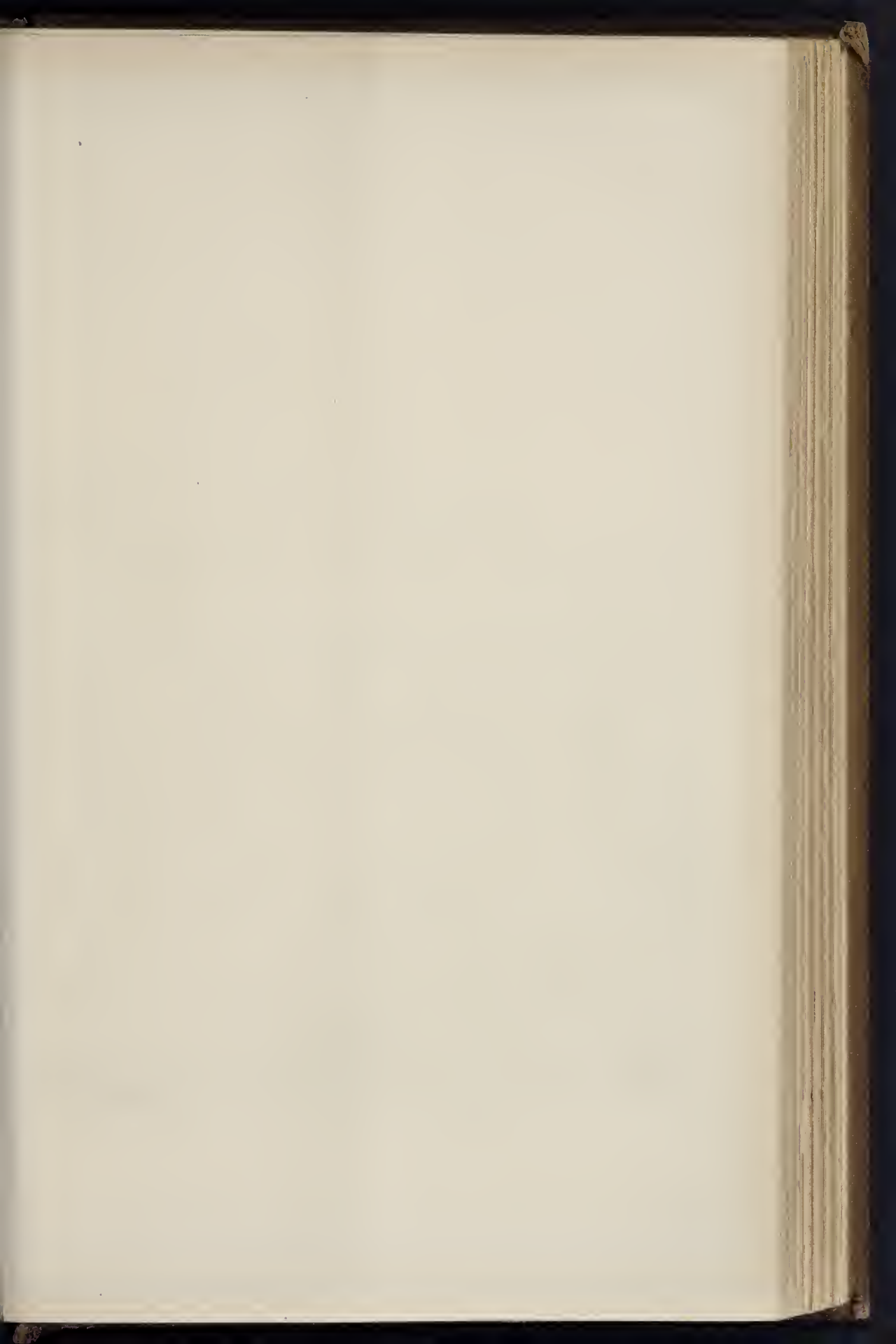
MR A WATERHOUSE, A.R.A. ARCHITECT

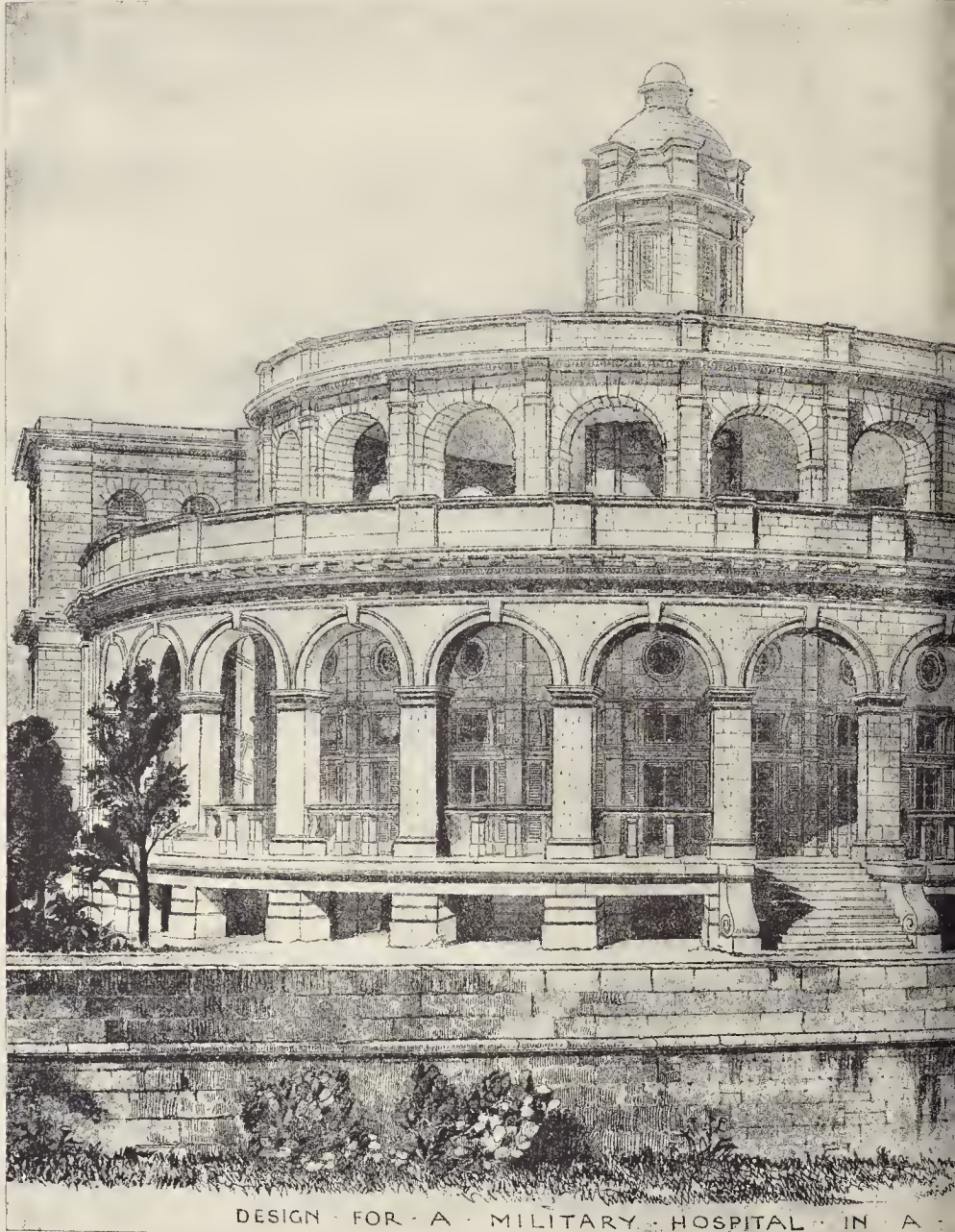


DESIGN FOR THE NATIONAL LIBERAL CLUB. NOV. 1884

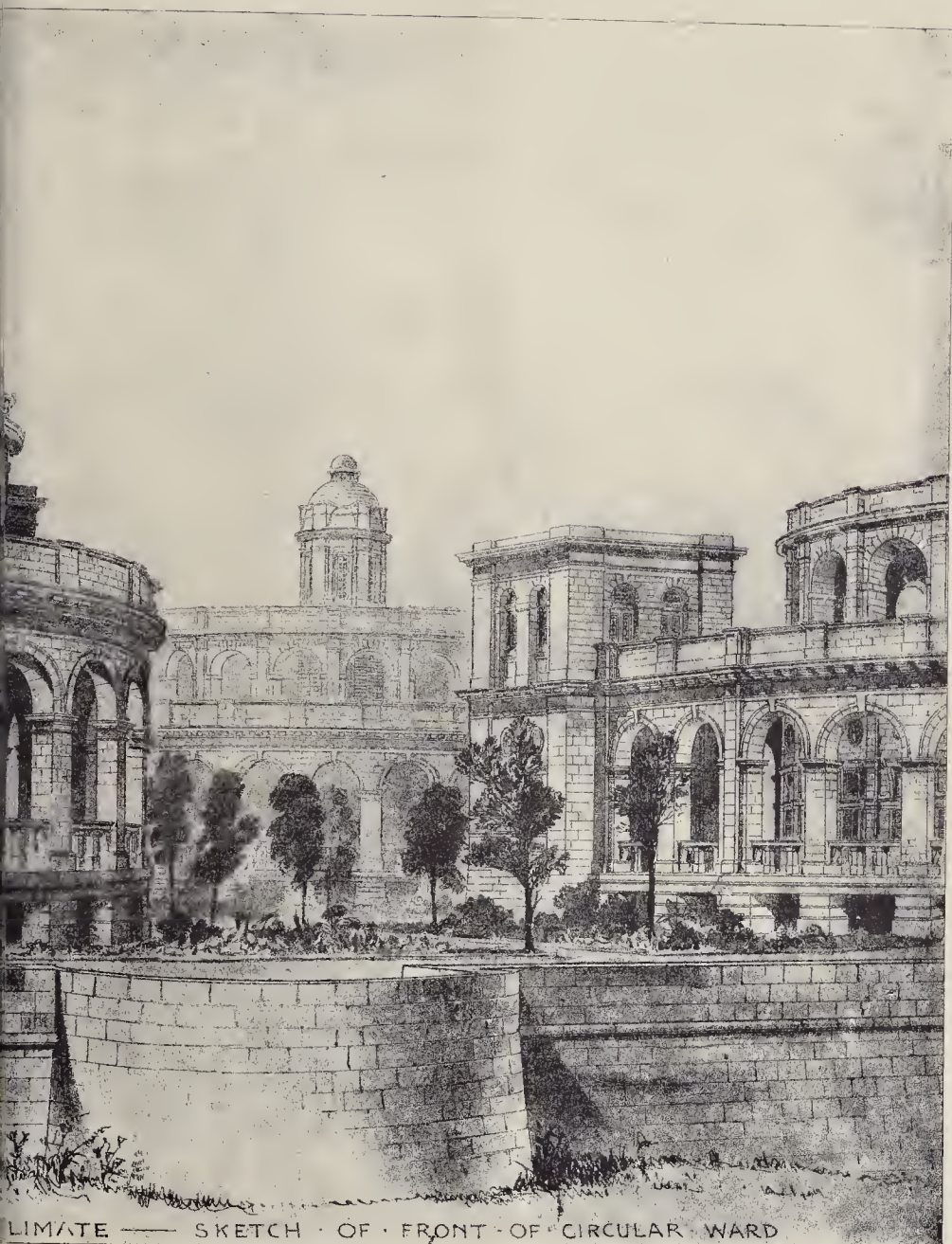
0 10 20 30 40 50 60 70 80 90 100 FEET







DESIGN FOR A MILITARY HOSPITAL IN A



LIMATE — SKETCH OF FRONT OF CIRCULAR WARD

INK PHOTO SPRAGUE & CO LONDON

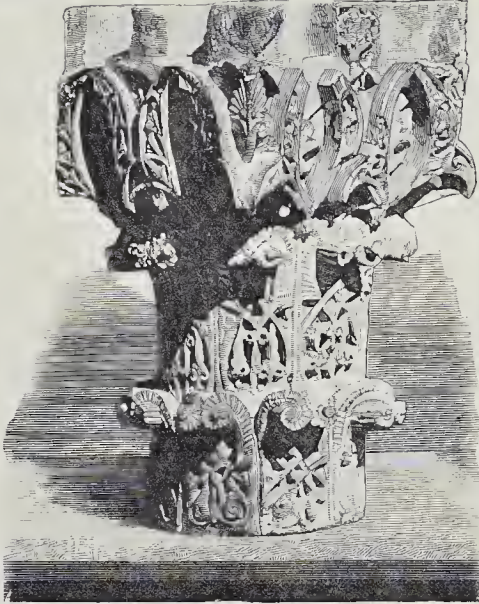




leads to the helvidere at the summit of the tower — from which, it is expected, an almost unique view will be obtained of the river and its bridges towards St. Paul's.

As regards the building generally, it may be observed that the whole of the structure will be fireproof; constructional wood-work is entirely avoided, and the beams and columns will be cased and filled with incombustible material. The apartments, generally, will be characterised rather by their size and cheerfulness than by elaborate decoration; though the main staircase, from its rich material and play of light and shade, will make the centre of the building more than ordinarily attractive, and enable the National Liberal to vie, at least in this respect, with the other club-houses of London. The style selected by Mr. Waterhouse has been that of the Early Renaissance; the exterior will be entirely of Portland stone, the roof being covered with green Westmoreland slates. The most noticeable external feature is the tower in the north-east angle, which, though severely plain in the lower stories, increases in richness and intricacy as it detaches itself from the gables which lead up to it on either side.

The foundations, in course of construction, are in the hands of Mr. Lovatt, of Wolverhampton.



SARACENIC CAPITALS.

of excessive interference made against the officials of her Majesty's Office of Woods and Forests ought to fall to the ground.

A. WATERHOUSE."

SARACENIC CAPITALS IN THE CASTLE OF ST. ALJAFERIA, SARAGOZA.

THESE three boldly-carved capitals are said to be all the remains that are left of the artistic work of this old Moorish castle, of which most of the original work has been obliterated either by time and ruin, or by alterations by Medieval builders.

A PROJECTED MILITARY HOSPITAL.

THE site for which this hospital has been designed consists of a rocky promontory, jutting into the Mediterranean, and rising from the sea at an angle of about 20 degrees. Its central ridge runs almost due east and west, thus giving an extended exposure towards the cool quarter, and to the healthy northern winds which fortunately prevail for nearly nine months in the year. The whole of the buildings have been disposed in such a way as to turn this characteristic of the site to the best advantage.

It is approached from the western side by a public road, and on the south-east is accessible by water from the barracks and garrison.

A considerable depression in the site renders it necessary to break the hospital buildings into two main sections, which are connected by a broad terrace, carried upon arches over the intervening valley, and inclosing the engine and boiler rooms, the coal-stores, water-tanks, &c.

Abutting on the public road are the official residences, and in an adjoining enclosure special wards for ophthalmic and other cases requiring isolation. Barracks for the medical staff corps or nursing orderlies, and wards for prisoners and lunatics, complete this portion of the establishment. A covered cloister-like passage

PRELIMINARY DESIGNS FOR THE NATIONAL LIBERAL CLUB.

THE two elevations for this building, of different dates, are published at the request of Mr. Waterhouse, who sends us the following letter in reference to them:—

"Sir,—In November last, writers, both in your journal and in the *Pall Mall Gazette*, appeared to have come to the conclusion that, owing to the undue interference of the Office of Woods and Forests, I was unable to carry out my original intentions with reference to the National Liberal Club in Whitehall-place. I sent a letter to the *Pall Mall Gazette* to

correct misapprehensions on the subject, but as I failed to convince its correspondent, "F.R.I.B.A.," and as I did not at the time reply to yours, "F.S.A.," I avail myself of your courtesy (as you are illustrating the National Liberal Club by a fac-simile of my perspective drawing) to publish a fac-simile of my first attempt, early in July last year, at the elevation towards the Embankment, with another of the same elevations as it had developed in November last.

A comparison of the two will prove at a glance that there has been very little change in the style of the elevation, nor more in the details than might reasonably have been expected, and that, consequently, the charge

gives sheltered access from this outlying series of scattered buildings to the hospital proper. The latter comprises nine pavilions for the sick, an operating-theatre, with preparation and recovery wards attached; a dining-room for convalescents; an administrative block, with medical officers' offices, dispensary, drug-stores, &c., and under the same roof the kitchen and accessories. Above this range of buildings the general stores for the hospital are accommodated.

At the eastern end of the site an important block of building includes the chapel, with vestry and chaplain's room, quarters for a small staff of nursing sisters, reading-room and library, and in the basement a complete series of salt water and medicated baths. A lofty water tower, of Florentine character, marks the opposite extremity of the hospital range. A special road on the south side of the rock leading to the engine-rooms, &c., enables the workmen to attend to their duties without entering the precincts of the hospital. Opening from this road on the lower level is an enclosed yard where the laundries, post-mortem room, mortuary, ice-making establishment, &c., are placed, out of sight of the hospital inmates.

The distinctive feature of the design is the use of the circular form for all the larger wards. These circular pavilions are 66 ft. in internal diameter and 22 ft. in height to the centre of the ceiling, which is an extremely flat semi-ellipse. They are each intended for twenty-six patients. Each patient will have a wall space of 8 ft., a floor area of 130 ft., and an air volume of 2,600 ft. An arcade 14 ft. wide surrounds each ward; concentrically on the north, but on the east, west, and south sides drawn in right lines tangential to the enclosing circle. At the south-east and south-west angles square towers enclose the sanitary services, the orderlies' rooms, and staircases. Above the ward an open arcaded story,—locally known as a "Baracca," and figured in Sir Gardner Wilkinson's book on Ancient Egypt as having been used thousands of years ago by that remarkable people,—will not only afford an airing-ground for those patients who are able to avail themselves of it, but also give the means of doubling the normal occupation of the hospital in times of emergency. From the centre of the ward ceiling, and carried by a ring of stone columns, a cylindrical ventilating chamber rises, built up through the "baracca" and terminating 20 ft. above its roof in a domed cupola. The wards are raised on a hollow basement 7 ft. high, and the whole site is made up to the highest point of the rock and enclosed by escarp walls broken picturesquely into shallow bastions. The ward windows are wide enough to allow of the exit of a bed on castors into the inclosing arcade. Fresh air is admitted behind each bed, and through lunettes at the springing of the domed ceiling, and is drawn out through the central shaft by a fan. The wards will be warmed when required by steam, and also by three majolica stoves near the central ring of columns. The actual centre of the ward will be occupied by a majolica fountain, which will add to what cannot fail to be an attractive and cheerful interior.

The locality furnishes excellent building stone at an almost nominal cost, which is worked at an extremely cheap rate, and this circumstance has enabled Sir Andrew Clarke to give to a design intended to embody the latest accepted principles of hospital construction a more than usually marked architectural character.

REMOVAL OF HOUSE REFUSE AND SEWAGE.

SINCE the notice in the *Builder* of the report of the Royal Commission on the Disposal of the Sewage within the Metropolitan Area, two papers have been read at the Society of Arts on the same subject, but suggesting a diametrically opposite mode of treatment; one by Dr. Hawkesley, the well-known advocate of the dry-earth closet system, proposing the abolition of water as the means of carrying off effete organic matter from towns; the other by Dr. Richardson for the removal of house refuse independent of sewage.

Of course, abstractedly considered, the correctness of Dr. Hawkesley's contention will be generally admitted, that the consignment of sewage matter to the soil is the best of all ways for its disposal, and that, as observed by him, the soil alone possesses the appropriate conditions for its reception and utilisation; but it is when the practical application of the method sug-

gested comes to be considered that there becomes apparent the existence of a great, if not greater, difficulties than are found in the system which Dr. Hawkesley so energetically condemns. To prescribe a single method as universally applicable for all places and in all situations is just as absurd as the claim of Holloway's pills or of the other hundred-and-one quack remedies to be specific for all the ills to which flesh is heir. There is no doubt that in dry climates, like that of Egypt and in parts of India, the earth system may be carried out with advantage, as has notably been the case in some of the Indian jails, where all the requisite surroundings are specially favourable for the purpose. It may be said, too, that the system has the sanction of antiquity in the sanitary rules which were of old enjoined on the Hebrew nation, being suited to the climate and circumstances amidst which they lived; but it is certainly somewhat straining "the good old helief in a providential adaptation of means to ends," to say that the earth system "presents a grand illustration of it, grand not only for its perfection but for its vastness," because Professor Way happens to have shown the power which various, and especially clayey, soils have of absorbing all such matters as it is desirable and even necessary in the interest of the health of crowded communities to be got rid of as effectively as possible. No one doubts the efficacy of "Earth, the bountiful mother of all vegetable life," as a purifying medium, but it is the practicability of its application, at least as far as experience has hitherto gone, that yet remains to be proved. Great credit is undoubtedly due to the late Rev. Henry Moule for the endeavours, in many cases successful, which he made for the introduction of his system but even he failed to see how the problem of its application to large towns, much less to great cities like London, could be solved. Efficacious though the ingenious apparatus devised by Dr. Hawkesley may be when employed under intelligent supervision, yet it was shown by several gentlemen who took part in the discussion on the two papers, that the system itself had proved very much the reverse where such intelligent supervision was wanting. In addition to the difficulty of practical application, the claim for it of economy was also called in question, while the possibility of its yielding a commercial profit seems equally unlikely.

The removal of house refuse independent of sewage in the manner suggested in Dr. Richardson's paper is a subject doubtless deserving consideration, but it is one which has already received a certain degree of attention in various parts of the metropolis. Similar practical difficulties as to its ultimate disposal, however, present themselves as in the case of sewage when it is proposed to do away with the aid of water carriage. It may seem extraordinary that so valuable a manure as stable refuse should not be able to command a sufficiently remunerative price as to cover the cost of carriage. One of the speakers asserted that the parish of Kensington finds a difficulty for the sale of its stable refuse to market gardeners "owing to the low price of vegetables"; but whatever may be the case with market gardeners, it is quite certain that private individuals in the suburbs cannot procure stable manure except at a price which ought to be sufficiently remunerative for any parish. Its employment in the manner proposed by Dr. Richardson for "growing mushrooms for the million" sounds somewhat ludicrous, and is suggestive rather of the possibility of having too much of a good thing. As the expense of transport seems to be the chief obstacle in obtaining a sale for stable refuse, the railways having refused to have anything to do with it, surely it is worth consideration whether it might not be practicable to construct small canals in various directions so as to reach suburbs to which water transport is not yet available; for by their means a sufficiently low rate of freight would be secured as to admit of manure and refuse realising a price which would, at all events, cover the cost of removal. At the present time, when capitalists find a difficulty in obtaining safe investments, they could scarcely do better than turn their attention to the promotion of a network of suburban water lines which could scarcely fail to afford a fair remunerative return if utilised for carrying off the vast quantity of refuse and manure which requires to be daily removed from the metropolis.

THE HUNGARIAN NATIONAL EXHIBITION.

THE National Exhibition, opened at Pesth on Saturday by the Emperor of Austria, is the most comprehensive enterprise of the kind ever attempted in Hungary. The Exhibition is situated in the City Park, which is approached by the splendid new thoroughfare called the Radial-street, bordered by palatial residences and charming villas. The space covered by the Exhibition grounds is 300,000 square metres. The Hungarian Parliament granted the sum of 1,000,000 florins in order to carry out the Exhibition in a style worthy of the country. The principal building consists of a vast structure in the form of a parallelogram, erected in the style of the new Italian Renaissance. This great hall of industry is flanked at each of the four corners by elegant pavilions, while the pavilions and entrances in the centre of each of the four front lines are connected with the various annexes. In the centre of the main building rises a large cupola or dome. The work of preparation made enormous strides during the last fortnight, prior to the inauguration, operations being continued through the night by help of the electric light. The Exhibition is divided into thirty-three independent sections or departments. One of the most important divisions is the hall of agriculture, where, in glass bottles and jars, an exhaustive series of specimens of all the agricultural products of Hungary is displayed. A very interesting portion of the Exhibition is that containing a series of rooms exemplifying the interiors of the ordinary houses and domestic arrangements of the country population of the various nationalities under the Hungarian crown, including Magyars, Serbs, Croats, Szeklers, Roumanians, and Germans. In each room are dummy figures, attired in the picturesque costumes of the different races. Another important portion of the Exhibition is that devoted to the different kinds of poultry and domestic animals. The exhibition of sheep, which takes place between the 20th and 30th of this month, and for which no fewer than 2,012 animals have been announced, will be the largest ever held on the Continent.

CLERKS OF WORKS' ASSOCIATION.

At a largely attended monthly meeting of the members of the above Association, held on the 4th inst., the President (Mr. E. Moore) delivered his address, in which he said,—

We have now entered upon the fourth year of our existence and have shaken off (so to speak) the swaddling clothes of infancy. We have arrived at that period in which it behoves us to take steps forward with courage not mixed with caution and prudence, or, as our American cousins put it, "First be sure you're right, then go ahead,"—our constant aim and watchword being proficiency and progress. It may, perhaps, not be desirable to dwell too much on the past. It is well, however, that we should bear it in mind so far as it may influence us for good in the future, meanwhile keeping our gaze steadily forward, fixed on the goal of our ambition. Speaking for myself, I confess I look back on the past year with almost nostalgic pleasure. There has been a steady increase of members, which we have reason to hope will continue. That in itself is most gratifying. Our *Journal* also has done, and I trust will do, great things towards bringing the Association prominently to the notice of all leading architects and surveyors. Is not this another cause for, I will not say complete satisfaction, but certainly for congratulation, that results have, so far, been favourable? Again, the isolated position formerly occupied by the clerks of works has become a thing of the past. Instead of being scattered and comparatively unknown to each other, we are, by means of this Association, drawn and linked together by ties of fellowship and good feeling, and as years roll on we shall, as we watch its progress, esteem and love this institution increasingly. A certain result of a body of men united in one common calling, whose aims and aspirations are essentially alike, must be social intercourse, mutual professional assistance and benefit individually, and the progress of the Association generally. Having briefly sketched a few of the benefits already conferred upon us by this Association, let us pause to consider one other point in connexion with which it appears to me that our

success has not been quite so gratifying as I could wish. I distinctly remember, when the rules of this Association were being drawn up, that our chief object was so to frame them as to ensure that every member enrolled should be a *bonâ-fide* and thoroughly competent clerk of works. It was ably argued, and, to my mind, conclusively shown, by gentlemen then present, that by adopting this course we should at once start the Association on a sound basis, and, as a result, not fail to secure the co-operation and assistance of architects generally. Our sanguine expectations in this direction have not, up to the present, been so fully realised as I could wish. We certainly have occasionally received good wishes and encouraging remarks and comments from some eminent architects, which have had their due effect in stimulating us to greater exertions. We have also received applications for the services of clerks of works from some few architects, which were promptly and satisfactorily responded to. But these must be not merely more frequent, but, to satisfy me, they must be continuous; the Association must eventually be the one source from which architects seek their practical superintendents of works. Architects and professional men generally must be made to understand that this institution undertakes the fulfilment of their constant and most important and pressing requirements. Their attention must be constantly drawn to the fact that the members of this Association consider the interests of architects to be identical with their own. Seeing that it exists for the purpose of increasing the practical as well as the theoretical knowledge of its members, how could it be otherwise? Why, then, have we not yet fully realised our hopes in this direction? It strikes me that the answer must be that we have perhaps been a little too apathetic upon this matter. Do architects, as a rule, yet realise the fact that this Association consists of the most experienced men of their class, who meet together for the purpose of acquiring additional professional knowledge and intellectual improvement by the reading of technical papers and general discussions thereon, and that the benefits derived therefrom must, of necessity, be shared more or less by them. Let them but become fully acquainted with this fact, and surely it must follow that our connexion with them will soon be largely increased. Any address from this chair would be incomplete if it omitted to mention the debt of gratitude we owe to Mr. John Oldrid Scott for his liberality and many kindnesses bestowed upon us from the first. Particularly must he be mentioned his gift of the free use of this office for our business purposes, which, to us, has been truly a gift of very great importance. I consider, also, that his kindness and patronage has in no small way contributed to our attaining our present position, and I am sure I only echo the sentiments of every member of this Association when I say that his name will ever be remembered by us all with lasting esteem and gratitude.

ASSOCIATION OF PUBLIC SANITARY INSPECTORS.

At the closing meeting for the session of this body, held on Saturday, May 2nd.
Mr. E. Chadwick, C.B., the President, reviewed the sanitary progress of the session, and a closing address. Impending war, he said, unfortunately still delayed the promised sanitary legislation, though the preventible mortality in the metropolis alone exceeded that due to the direst of modern wars. After referring to the greatly diminished mortality in the British and Anglo-Indian armies and the continuance of a high death-rate in the Indian army, the lecturer alluded to the work of the Commission for Housing the Poor, and to the stum visitations recently made in London and Dublin by its President, H.R.H. the Prince of Wales. It was stated that the mortality of slums such as the Prince had visited was more than four times that of certain locational institutions in Dublin which H.R.H. had also visited, where a mixed physical and moral training was given to the children on the 14-time principle. Turning to the Metropolitan Sanitary Commission and the question of Thames Pollution, which Lord Bramwell, the chairman of the commission of inquiry, declared to be a disgrace to civilisation, Mr. Chadwick strongly condemned the combined system, which

with an original estimate of three millions, had actually cost more than six millions sterling, and led to a demand for a further outlay of four millions, in order that sewage which represented the sustentation of more than 200,000 cows might be thrown into the sea. On the separate system, which he advocated, the houses would have been purified by self-cleansing house-drains, and the streets by self-cleansing sewers, with no stagnant putrefaction and emitting no smells, while the river would have been comparatively pure, and the power of production of the land would have been greatly increased. The improvement to public health by the adoption of the separate system would be represented in £. s. d. by a saving of 2s. 4½d. per head per week throughout the metropolis, on the necessary provision for sickness and loss of work. The undertakings of the Local Government Board were characterised by a loose practice, the continuance of which was intolerable, with the increasing pressure of the local rates, now amounting for works, to between 30,000,000l. and 40,000,000l. a year. These were points that demanded to be considered in discussing the functions of the requisite Minister of Health. Mr. Chadwick suggested, in conclusion, that the officers of the sanitary service might render good service during the coming general election by giving information, to the representatives of each political party, of the preventible reduction of the natural duration of life and the preventible waste of 25,000,000l. sterling due to the racking rheumatisms, raging fevers, and painful existences which so largely diminished the working ability of the nation. The sanitary service might be insisted on as a "plank" of every political platform.

A vote of thanks having been accorded to Mr. Chadwick, the chairman of the Council explained that the matters at present before Parliament being of so urgent a character, it was not intended to bring the question of the system of drainage before the House until there was a better prospect of its receiving adequate attention. The necessity for the appointment of a Minister of Education had often been insisted on, but he thought a Minister of Sanitation was no less a necessity.

Mr. Rains (St. George's-in-the-East) pointed out that outbreaks of small-pox had formerly been occasional epidemics in London, but now, although in a milder form, the scourge appeared to have taken up its abode permanently. He should like to know the cause of this change. In closing the discussion, Mr. Chadwick replied to this question. The origin of small-pox, he said, did not appear to be accurately known, but pure air and personal cleanliness, especially by frequent bathing,—a precautionary measure now prescribed to the hospital nurses by the French physicians,—were the recognised preventives.

THE CHANCERY-LANE SAFE DEPOSIT.

Two or three weeks ago we briefly mentioned the approaching opening of these premises for business, and we have now to record the formal opening, which was celebrated by a dinner on Thursday evening last, in the hall adjoining the premises, the Lord Mayor presiding. This establishment forms part of an enterprise due to the initiative of Mr. Thomas Clarke, who has entirely rebuilt almost the whole of the block of buildings bounded on the west by Chancery-lane, on the south and east by Southampton-buildings, and on the north by the buildings on the south side of Holborn. Here, on ground the property of Lord Radnor, Mr. Clarke has effected quite a transformation, not, however, without obliterating some ancient landmarks. The new buildings have been erected for use as offices and chambers, and their central situation, and the proximity of the New Law Courts, will no doubt go far to ensure the success of Mr. Clarke's enterprise. It is to be regretted, however, that these long stretches of stone façades are of the most mediocre and monotonous description, architecturally speaking.

The Safe Deposit itself is erected in the basement of the block known as "New Stone Buildings," and the entrance to it is from the pathway beneath an archway of polished red granite, on one side of which is what is described as "the largest engraved brass plate in the world," giving some views of the interior arrangements. Wrought-iron gates, and a portcullis or grille,

which is lowered from above when required, protects the entrance to the upper external vestibule, at the further end of which is a commodious waiting-room, and in the centre a flight of stairs leading to the lower external vestibule. This portion of the building is decorated in good taste, the ceiling being of enamelled iron, and the walls lined with various coloured marble, with a dado of grand antique. The broad staircase is composed of white marble and mosaic work, with a balustrade on each side of Jura marble. Passing down, the visitor will notice two appropriate mottoes worked in the mosaic, the one being "Safe bind, safe find," and the other a short extract from one of Burke's speeches,— "Early and provident fear is the mother of safety." The construction of these vestibules has been carried out by Messrs. Burke & Co. Beyond this lower external vestibule iron gates again har the way to what may be called the lobby, on the left of which are the offices of the manager, and on the right the gentlemen's and ladies' writing-rooms, the walls of which are hung with leather papers of Japanese design, while the ceilings are of enamelled iron arranged in panels. And here it may be mentioned that before any one can gain access even to this part of the Safe Deposit he has to run a gauntlet of attendants for the purpose of identification as a renter of a safe, or depositor of valuables.

Passing through the inner iron gates of the lobby the visitor finds himself in the internal "safe" vestibule, and is confronted with the various strong rooms, occupying three sides of the area, which is paved with tiles in pattern. On the right hand is a strong-room for the deposit of plate by persons going out of town. On the left-hand is the strong-room for cash-boxes, which may be deposited every evening, and taken away again in the morning; but those who take advantage of this convenience can pass their boxes and receive them again through a grille into the sub-manager's room from the lower external vestibule, without the trouble of having to go further. The strong-rooms, four in number, for documents and other valuables, are on the side of the vestibule opposite the lobby, and form the chief and most interesting portion of the Safe Deposit. These rooms, which weigh 500 tons, with doors of 2 tons weight each, are divided into about 5,000 separate iron safes or compartments, ranged tier upon tier, of different sizes, and known by the name of "integers." The locks of these "integers" are, we are informed, so arranged that the key of the renter, as well as the key of the custodian, will be required to be used at the same time before an opening can be effected. For convenience of handling the papers and other valuables deposited, each "integer" is fitted with a box which is readily taken out and replaced, the writing-rooms before mentioned being provided so that renters may consult the contents of their boxes at leisure and in comfort. All the strong-rooms are built on iron columns in the vaults beneath, and are completely isolated from any external walls, so that armed patrols can by night walk round, over, and under them. On each of the doors there is a mechanical clockwork arrangement that only admits of the door being opened at certain hours. For instance, at a particular hour in the evening the doors are locked by the manager, and no one can open them until the hour on the following morning for which the clockwork locks are set; and it is so arranged that on the seventh day one day is passed over, and the doors will not again open till the Monday morning at the given hour; so that if any customer or any one connected with the deposit wished to get into the strong rooms during non-business hours, or on Sundays, it will be impossible to do so, even when the parties have the keys in their possession. The "armor plating" of the strong rooms, consisting of boiler-plates with steel plates between them, is the strongest ever applied to such a purpose. The deposit and its approaches are lighted by electricity (with gas in reserve), arranged by Messrs. Thompson & Ritchie, and everything seems to have been done by Mr. Clarke to consult the convenience and comfort of those who use the establishment. Messrs. Milner were entrusted with the special work of the strong rooms, and, at the inaugural banquet, their representative gave an interesting account of the rise and progress of such establishments, which appear to have had their origin and widest development in the United States.

We understand that architects, engineers, and

others interested in the construction of such depositaries may obtain permission to inspect the premises in Chancery-lane by applying to the proprietor or manager.

BUILDING IN PRIVATE WAYS.

At Westminster, Messrs. Mowlem & Co., contractors, of Grosvenor-road, Westminster, were summoned by the Metropolitan Board of Works for contravening the provisions of the 45 Vic., c. 14, secs. 7 and 8, by forming or laying out a road, passage, or way, leading out of the King's-road, Chelsea, as a street for foot traffic, in such a manner as not to afford direct communication between two streets; and further, for laying out a footway without the consent of the Board. They were further charged under the Metropolitan Management Act with building in a way not open at both ends, and of less width than 20 ft.

Mr. Horace Avory, instructed by Mr. Thomas Burton, appeared for the Board; and Mr. Cripps for the Chelsea Park Dwellings Company, the actual defendants.

The facts, as deposed to by the Assistant Architect to the Board, were admitted. The Chelsea Park Dwellings Company, of which Mrs. Courtney is secretary, has erected a block of buildings for the better accommodation of the industrial classes, abutting on the north side of King's-road, Chelsea. At the back there is an open yard, about 60 ft. wide and 75 ft. long, and this is approached from the main road by an archway, 12 ft. 6 in. wide and 10 ft. high. The passage-way was stated to be 27 ft. long. On the north side of the yard is a block of six dwellings; on the east and west sides are small two-story houses and foundations of outbuildings. The dwellings are built to accommodate several families, and the upper stories are approached by a gallery, after the manner of the Peabody Buildings. The backs open into the courtyard, and there is no other exit from the square except through the passage-way in King's-road.

Mr. Avory, in support of the summons, said the proceedings had been taken by the Board to prevent the formation of a *cul de sac*, the obstruction of public traffic. It was here proposed to close the archway by a gate, and in case of fire there was likely to be great danger; and he referred to the case of the Board v. Hampton as being a case in support of his contention.

Mr. D'Eyncourt suggested that Burlington House was an analogous case to the present one.

Mr. Avory thought every case should depend on its own merits. The word "street" had a very wide interpretation. There was nothing limiting it to a public thoroughfare or highway. It included even a news.

Mr. Cripps contended that they were not laying out a new street. It was originally a block known as Park-terrace Cottages, and now the site was simply utilised for better dwellings. The managers considered that privacy was essential, or otherwise it would become the resort of tramps and vagrants. The place was no more a public street than Bernard's Inn, Furnival's Inn, or Staple Inn, and he further contended that the Metropolitan Acts did not apply.

Mrs. L. Courtney then deposed that she was the secretary of the company, and that she and Mrs. Scott were going to manage the same under Miss Octavia Hill's system. It was their intention to have a gate at the entrance, and the tenants would have keys, and the place would be kept private.

Mr. D'Eyncourt, at the conclusion of the evidence and arguments, reserved judgment.

THE REFORM OF THE INSTITUTE.

Sir,—Having received so many letters from members of the profession, substantially approving the scheme which I have proposed to them, and finding it inconvenient to answer them immediately, I ask my correspondents to be good enough to accept a published acknowledgment. There seems to be a little misunderstanding in one or two cases of my notion of federation. I wish to say that I only advocate federation after the manner of the federation of the States of America; nothing could be further from my thoughts than the destruction of individual action. On Monday night, the President promised that the proposed change in the Institute's Charter should be printed and circulated amongst us, and that we should have three weeks to consider it. That being so, I would advise special attention be given to the manner of electing the Council. Practically, it is now self-elected, and if that is maintained it is useless to look for any reform. A better plan will be the following: three months, say, before the election, candidates should send in their names, those names should be submitted to a committee composed of one half Fellows and one half Associates, and they should eliminate the undesirables.

On Monday night there was a good deal of complaint made of the library regulations, and I think with some justice. A committee had better therefore be appointed to inquire into this when we get our new Charter.

T. E. KNIGHTLEY.

No. 106, Cannon-street, E.C.
May 6th, 1885.

"DECORATION OF ST. PAUL'S CATHEDRAL."

Sir,—I have no doubt that many persons besides myself will be glad to learn from the paragraph which appeared in your last issue that it is not intended to commence with the dome.

Surely the course recommended by the late W. Burges, A.R.A., when he was acting as architect to the Dean and Chapter in 1873, was the correct one, viz., to select a bay of the nave as the commencement of the work.

1. Because the architecture is fully seen from the pavement upwards, and no part is hidden by stalls, as in the choir.

2. Because, being a public part of the church, the public would have a good opportunity of seeing the decoration, and of becoming accustomed to it; and

3. Because, in the actual execution, the work would be gained which would be useful when the more select portion, such as the choir, would be undertaken.

JOHN S. CHAPPLE.

May 4th, 1885.

COOKING APPARATUS FOR LARGE INSTITUTIONS.

Sir,—Without prejudice I would like to state that I called at the St. Pancras Workhouse to examine and to see the working of a new cooking apparatus described by you on the 18th ult. It was about 11.30 a.m., and consequently a good time as the pans were then in full operation. I noticed a quantity of moist steam escaping when the outer cover and under-lid were lifted, and the water in the jacket surrounding the cooking-vessel just on ebullition, the thermometer outside standing at 93° to 94° C. (202° Fahr.). The time taken in cooking is about fifty per cent. longer than with the usual dry steam-jacket pans. The cost of apparatus, as stated by Mr. Becker, not ascertained or even estimated while working at the same time with other machinery from the same service.

The coolness of the outer case, made so much of, is equally apparent in all other apparatus, when they are felted and lagged. The advisability of leaving the jacket charged with water until the following day, because of its losing but ten degrees of heat (2/3) is a curious recommendation. With an empty jacket and dry steam an apparatus is in operation at once.

The greatest recommendation of the apparatus appears to be that it is the production of a foreigner, and, therefore, must contain some virtues assumed to be inseparable from other than home products.

ROBT. CRANE.

Sir,—Mr. Becker will not advance his case by misrepresentation. The apparatus in the kitchen of the Lambeth Workhouse referred to in my letter to you is not a Berghaus apparatus, as stated by Mr. Becker, nor is it, as he states, "an ordinary steam cooking apparatus." It is, I repeat, identical in principle with that of Mr. Becker. It consists of two copper pans or kettles surrounded by water, which water is heated to the desired temperature by a steam pipe, so that a different degree of heat can be applied to each compartment. There is also the water seal for the edges of the cover as described by you.

I have seen Mr. Becker's apparatus at St. Pancras, and the similarity of principle between that and the one at the Lambeth Workhouse is so remarkable that I am quite content that a competent and impartial commission shall compare the two and decide whether or no the principle of cooking is the same in each case. I also invite members of the architectural profession to see for themselves. The economical results from this principle of cooking, especially in the saving of loss of weight in the meat, are remarkable, and as the Lambeth Guardians have had the benefit of the saving from this apparatus for eleven or twelve years, it is rather late in the day to be told that English architects must needs go abroad in order to learn how to design cooking apparatus.

THOS. W. ALDWICKLE.

2, East India Avenue, E.C., May 6.

THE ALBERT PALACE.

Sir,—We should be obliged if you would repair an omission in your notice of last week [p. 634] respecting the Albert Exhibition Palace. May we ask you to state that the recent works at the Palace, comprising the completion of the present buildings and certain extensive additions, have been carried out from designs prepared by us and under our superintendence, as Architects to the Palace Association?

F. & H. FRANCIS & SONS.

34, Old Broad-street.

PROVINCIAL NEWS.

King's Lynn.—A new pulpit has been presented to St. John's Church, in memory of the late Francis Joseph Cresswell, banker, of that town. The pulpit is of Carr stone, octagonal in shape, with clustered shaftings at the angles of grey and red Devonshire marbles, from which spring the cusped arches, with sculptured head at the intersections. In the panels are shaftings of Stenna marble with interlacing arches. The work has been well executed by Mr. Ducker, of the Railway Road, from the designs of Mr. W. Adams, architect, King's Lynn.

Ascot.—A jewelled Irish cross in marble has just been erected by Lady Olivo Bayley in the churchyard of Ascot, in memory of the late S. Edward Olivo Bayley, K.C.S.I., C.I.E., who had interred there. The work has been executed by Messrs. J. Underwood & Sons, of Duke-street, Grosvenor-square.

Alfreton.—A meeting of the Alfreton Sanitary Parochial Committee was held on the 30th ult. at Swanwick Delves, to consider a report made by Mr. W. H. Radford, A.M. Inst. C.E., Nottingham, as to the disposal of the Swanwick and Lea Brooks sewage. Mr. Radford proposed to locate a suitable quantity of land near the Butterley Reservoir from Mr. Wood, and concentrate the sewage from the two districts at this point, where it would be dealt with by irrigation, the land being specially prepared, lightened, and drained for the reception of the sewage. The committee resolved to recommend the Belper Sanitary Authority to adopt the scheme in its entirety, and proceed to carry it out as soon as possible. The committee also recommended that Mr. Radford be ordered to prepare a scheme for dealing with the sewage, the whole of the remaining portion of the district, including Riddings, Somercotes, Slight Moor, Birchwood, Smotherly, and Pye Bridge.

CHURCH-BUILDING NEWS.

Southampton.—The new Church of St. Mary Southampton, erected as a memorial of the late Bishop Wilberforce, and which was opened on May last year, has just received the addition of a very handsome reredos, which was unveiled at Easter. The reredos, which is 21 ft. 6 in. long and 16 ft. 6 in. high, has been executed by Messrs. Earp, Son, & Hobbs, of London & Manchester, and has cost over 600l. It comprises five groups of sculpture, executed in relief, in pure white alabaster, the same material used, green and dove-colour being used in the architectural surroundings. There are the central arches, having crocketed gables, with ornamental cross in the centre, and finials on the two sides, resting on carved capitals, supported by green and red marble columns, which cluster round enriched buttresses terminating with pinnacles. The central subject is the Ascension, the heads of beholding disciples looking towards the other chief figures in the work, with which the other chief figures in the work correspond, the supporting groups right & left representing respectively the Agony in the Garden and Bearing the Cross. The two divisions have a horizontal treatment of tracer panelling resting upon double arches, enclosing sculptures of the Annunciation and the Nativity.

Bristol.—The design of the proposed new Church of St. Francis, Ashton Gate, have been sent in by the architect, Mr. John Bevan. It is proposed to build the church in four sections, viz.:—(1) Chancel and side chapel; (2) tower and spire. Of these sections, No. 4 will be aside at once; No. 1 will have the first plan and will accommodate forty choristers, and adjoining chapel, which will hereafter be daily service chapel, will for the present be to act as an organ-chamber, and it will accommodate forty people, and will be useful for small congregations on week days, Bible classes, &c. The cost of this portion will be 1,200l. No. 2, the nave, will accommodate 450 people, at a cost of 2,500l. No. 3, vestries, organ-chamber, and the aisle, which room will be left, in anticipation of parish growing larger, and which will accommodate another 190 people, will cost 1,800l. so that when the three sections are complete the church will seat 720 people, and the total estimated by Mr. Bevan at (minus the tower and spire) 5,000l. Half this amount is raised by the Church Extension Society, 2,500l. is, therefore, to be raised by parishioners.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

2,903, Portable Buildings. A. J. Boul (T. Arrow).

The framework of these buildings is composed of wooden bars jointed together by iron shoes of various forms to suit circumstances, covered with tarpaulin or any suitable waterproof material. The pipes may be jointed also in such manner as to form shelves or berths such as are required in barracks.

13,053, Girders for Fireproof Structures. V. H. Lindsay.

An inverted trough is bolted or riveted to the underside of the lower flange of the girder. The ending sides of the trough form the abutments from which the brick arches of the floor spring. The trough is filled with fireproof composition and covered with a thin plate. The object is to prevent the lower flange of the girder in case of fire from being subjected to sufficient heat to soften it.

384, Producing Ceramic Plates with Inscriptions in Relief or Intaglio. J. B. and E. Shaw. Moulds for the production of ceramic plates with inscriptions, &c., in relief or intaglio, made up of type similar to those used for letterpress printing. The clay, in the form of a back or in the dry state, is pressed into the mould and fixed in the usual manner. The face of the type may be bolted over with mineral colour if it is desired to produce coloured lettering on the plate. By this process letters for advertising or other purposes, and enamel tablets, may be produced.

625, Lock Furniture. E. S. Norcombe. The knob is made separately from the neck, and they are braced together. The spindle is square, and has on one face a series of square grooves; the neck with shallow square recesses in its face, is inserted in the neck, a square slide with spring bearing on one side of the spindle is then put into the recess, and over that a washer. The lower part of the slide in its normal position engages to the groove in the spindle, but by pressing down the pin or its equivalent, the slide is disengaged and the knob may be turned a required distance along the spindle. A set screw is made with brads on its back to fasten to the door.

728, Floating Flushing Valve. F. J. Alford. The discharge valve at the bottom of the flush-tank, and has a float attached to it of such dimensions that when covered by water it retains the valve in either an open or closed position. The valve is opened by a lever and hand-chain, and is closed by spindle with a nut on the bottom. Any light modification in balancing the float may be obtained by adding small lead weights. An air-lead into the discharge-pipe below the valve, and may be connected to the tank to serve as an overflow-pipe. When the valve is opened it remains until the water sinks low enough for the valve to be influenced by the current, and is then drawn to its seat, where it is retained till again lifted by the hand-chain. The float may be in the form of an india-rubber ball, guided by a perforated zinc wire guard; the ground valve is then dispensed with the ball itself closing on its seat.

1,819, Street and other Lamps. J. Nohle. A method of fixing the panes of glass in street or other lamps. The top panes rest with their outer edges in grooves in the lamp framing, and are held by thumb-pieces at the top, and the sides rest in side grooves in the framing, while the bottom panes rest with their outer edges in grooves in the frame, and are secured by a central thumb-piece.

247, Asphaltic. C. J. Lortzgang. Vaste waters from wool-washing, &c., are run into a tank and treated with water containing green vitriol (or other sulphate or sulphuric acid) in proportions determined by the nature of the liquid. The sediment is dried by firing or otherwise. For asphaltic mastic the sediment is ground upon a warm metal surface under pressure, or by a mortar-mill with heated rollers. The mass is melted, limestone or slag, &c., added, and is run into moulds. For compressed mastic the sediment is powdered and thoroughly mixed with powdered limestone, and then emulsified as usual. The addition of lime to the mastic may be avoided by increasing the amount of oil added to the waste water.

817, Artificial Marbles. A. Gnattari. Various objects, blocks, or powder soaked in hot water; for black marble.

1,175, Engineer's Reversible Level. C. F. T. Cooke.

The telescope is complete in itself and detachable, is fitted with two flanges of equal size to allow the telescope to be inserted from either end. The flanges fit into two sockets connected by a tube, carrying a spirit-level above. The telescope is justed at one end by the lock-nuts, the other being slightly rounded off and joined to the tube by a screw. The vertical axis is adjusted in ordinary manner by screws.

APPLICATIONS FOR LETTERS PATENT.

Jan 22-4,968, C. Crestman and A. Lloyd, Improved Writing and Work Table.-4,975, C. Smith, Clutch Spindle for Door Furniture.-

4,990, A. Barrett, Indicator Door Bolt.-4,993, T. Smith, Lighting Houses by Electricity.-5,004, W. Lake, Preservation of Wood for Paving, &c.

April 23.-5,018, J. Walker, Cupboard Turns.-5,027, J. Smith, Improvements in Stench Traps.-5,041, T. Howie, Appliances for Ventilating Rooms or Buildings.-5,042, J. Howitt and T. Penarzo, Water Waste Preventing Cisterns.-5,059, H. Hadden, Window Fastener or Stay.-5,060, H. Pearce, Opening and Closing Sashes, Fanlights, Skylights, &c.

April 24.-5,075, O. Evans, Metallic Tang for Wood Wheels.-5,083, J. Barlow, Automatic Grip Vice.-5,089, W. Taylor, Circular Staircases.-5,094, S. Suthcliffe, Tile Hearths and Tile Checks for Grates, &c.-5,102, H. Smith, Improved Paint or Pigment.-5,112, J. Bonny, Connecting Fire-grates to the Flues of Chimneys.-5,114, J. Parkinson, Improvements in Parallel Vices.-5,129, R. Strachan and G. Henshaw, Parallel Vices, Clamps, and Chucks.

April 25.-5,137, R. Roberts, Window Fasteners for Large Windows.

April 27.-5,167, E. Kent, Improved Handle combined with Name-plate, for Doors, Drawers, Lockers, &c.-5,175, W. Brown and H. Clayton, Fire-clay Earthenware or Stoneware Baths.-5,188, A. Lake, Illuminating Combination Tiles.-5,189, A. Lake, Improvements in Concrete Lights.-5,193, H. Lake, Improvements in Sashes.-5,194, C. E. Southway, Improved Latch.-5,203, C. Few, Portable Houses.

April 28.-5,207, J. Blakeley, Improvements in Mortise Locks.-5,213, T. Fawcett and J. Fawcett, Machinery for Pressing Bricks, Briquettes, Tiles, &c.-5,264, E. Clowes, Improvements in Hinges.-5,278, B. Verity, Improved Warm-air Stove.

April 29.-5,281, R. Warry, Fastenings for Window-sashes.-5,284, R. Warrington, Improvements in Knobs for Doors, Cupboards, &c.-5,293, J. Adams, Semaphore Indicator for Electric Bells.-5,303, J. Elheridge and J. Lloyd, Nail-making Machinery.-5,309, C. Mansted, Apparatus for Preventing the Slamming of Doors.-5,315, R. Perrott, Improvements in Kitchen Ranges, &c.

April 30.-5,346, P. Lovett, Hydraulic Cements.-5,364, E. Robbins, New Decorative Concrete.

PROVISIONAL SPECIFICATIONS ACCEPTED.

3,032, J. Gibbon, Disinfecting Sanitary Lamp for Ventilating Purposes.-3,443, J. Lowe, Improvements in Glazes.-3,482, T. Hawking, Improved Method of Glazing with or without Putty.-3,536, P. Nevill, Instrument for Measuring Angles.-3,910, T. Wood, Boilers for Kitchen Ranges.-4,213, H. Mills, Improved Shield Clamp.-4,275, T. Oakley, Domestic Firegrates.-4,277, J. Pearson, Improvements in Kitcheners.-4,295, H. Lake, Door Fastenings, &c.-4,309, J. Lamb, Improvements in Ventilators.-4,413, W. Pope, Securing Sliding Window Sashes and Shutters.-4,643, G. Ellis, Portable Dry-earth or Carbon Closet.-4,749, E. Palmer, Self-acting Flushing Apparatus.-7,946, H. Talbot, Ventilating Flue Bricks.-10,894, J. Gillespie, Improvements in Garden Walls, &c., and Bricks for same.-2,648, W. Hayhurst, Cramps for Carpenters, Joiners, &c.-3,749, E. Price, Safety Door Fastener for Internal Use.-3,750, C. Hardiman, Improvements in Chimney-pots or Tallboys for Preventing Smoke or Down-draughts.-4,105, W. Neilson, Combined Latch and Bolt Locks.-4,170, F. Robinson, a Collapsing Wardrobe.-4,289, D. Waldie, Improvements in Mortise and Tenon Work.-4,331, W. Thompson, Window Closing Chairs, applicable also to Platforms, for the use of Painters, &c.-4,419, W. Stein, Improvements in Bakers' Ovens.-4,646, E. Showell, Sash Fastenings.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months. 7,499, W. Codner, Covers or Hack-caps for Covering Bricks in the Field.-9,357, S. Williams, Improvements in Kilns.-9,887, H. Smith, Coating or Surfacing Bricks and Tiles.-10,943, L. Asagne, Improvements in the Manufacture of Mosaic Work.-393, W. Heelis, Combined Wardrobe, Cupboard, or Bookcase.-2,933, W. Hayward and W. Eckstein, Cellar Covers and Coal Pates.-3,262, T. Messinger, Interlocking Coupling Joint for Gas, Water, or Steam Pipes.-3,852, P. Justice, Manufacture of Staples.-3,968, H. Steven and W. More, Improvements in Sewer-traps.-9,736, R. Rapier, Improvements in Locks and Latches.-9,886, T. Hellwell, Improved Method of Glazing.-4,950, W. Willett and H. Ball, Improvements in Rock Drills.

Salvation Army "Barracks."-Barrack buildings are in progress at Manchester, Mr. Holt, builder; Leamington, Mr. M. Gascoyne, builder; and Plymouth, Mr. T. Foote, builder. The total cost of the three buildings will be about 7,000l. "Barracks" are also about to be erected at Darlington, Runcorn, Wisbech, and Tunbridge, under the supervision of the architect's chief assistant, Mr. J. Williams Dunford. The whole of the works are being carried out from plans and quantities supplied by and under the direction of Mr. E. J. Sherwood, architect, 101, Queen Victoria-street.

The Student's Column.

DESCRIPTIVE GEOMETRY.-XIV.

SOLID ANGLES.

THE simplest of solid angles, such as the angle of a stone or a box, has at least three faces divided by three arrises, and containing three inner angles between the contiguous faces. To avoid Greek names we shall call such angles triangular solid angles. As in masonry, we shall constantly have to do with such angles, it is important that when we know some of their component parts we should be able to deduce the others.

Given the three faces of a triangular solid angle find the inner angles. (We mean by the term "inner angle," the anglely which we judge of the sharpness or the bluntness of an arris.)

Let aob, boc, cod be the faces of the solid angle; we cut them by a circle with centre o, so that ao, bo, co, do be equal. If we rotate the face aob round bo and cod round co the points a and d will meet in a point m, of which m^h is the horizontal projection; taking a m^h for L T we draw on this elevation the circle described by the point a on which will be m^v, and thereby know exactly the position of the third arris of the solid angle; m^h g m^v is one of the inner angles; m^h e m^v is another inner angle; for the third angle we carry out the same operation again after placing on the plan the face cod in juxtaposition with the face aob. We can see also by this figure that a triangular solid angle must have its largest face smaller than the sum of the two others, and that the sum of the three faces must be less than four right angles. The first is obvious; for if the face that is the angle boc were larger than aob + cod, the sides ao and do could never meet while rotating round the hinges bo and co; on the other hand, if the sum of the three faces were larger than four right angles, then the faces aob and cod would partly cover one another when laid down on the plan, and the sides ao and do, instead of meeting when rotating round the hinges bo and co will, on the contrary, move away from one another. The student will perceive this fact more clearly by making a small model of our diagram in drawing paper; to produce three sides larger than four right angles he will have to glue a piece on to one of the sides. (See fig. 71.)

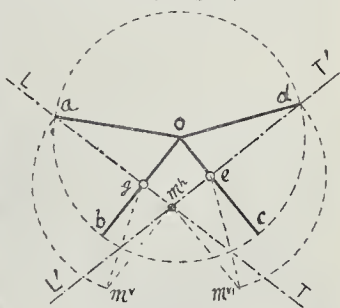


Fig. 71.

Given one of the inner angles with the adjoining faces, find the other parts of the solid angle.

Let aob and boc be the adjoining faces of an inner angle agb, we see by fig. 72 how we

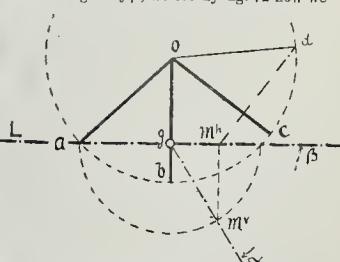


Fig. 72.

deduct m^h, from which a perpendicular to co will give us the point d of the face cod. (See fig. 72.)

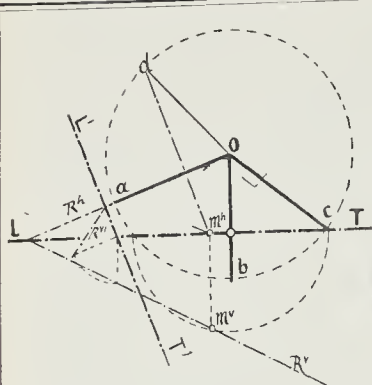


Fig. 73.

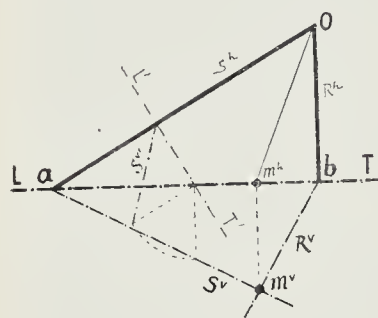
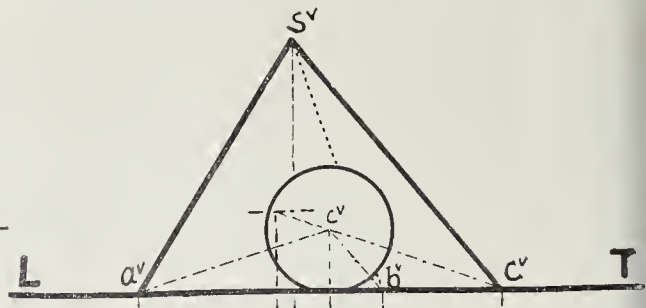


Fig. 74.

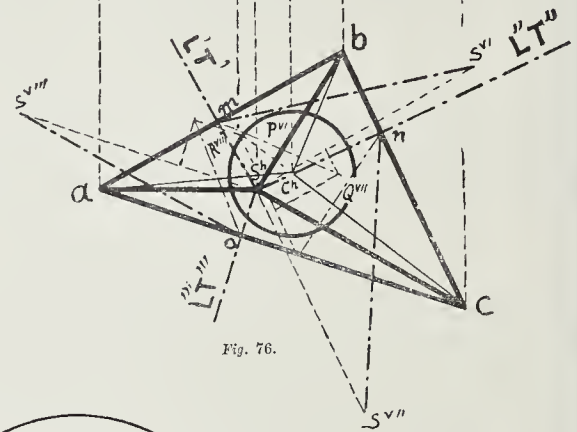


Fig. 75.

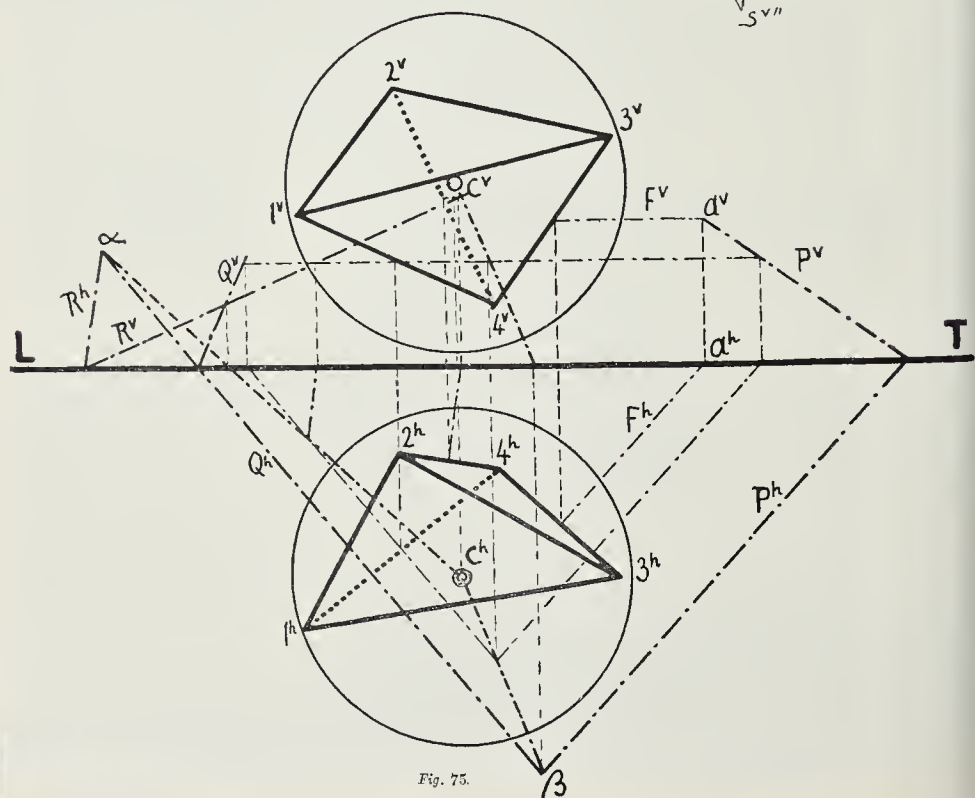


Fig. 76.

Fig. 77.

two faces and the inner angle opposite, find the other parts of the solid angle.

Let aob and boc be the given faces, and the angle given be that of the arria a o c. ... We will make a vertical plane which we as our elevation plane, and we shall have this elevation the circle described by the arc a c. If we call R the plane of the third arc a d, the intersection of its vertical trace with the circle described by the point c will be point m belonging to the arria d o red; from m a perpendicular to a o will be the point d of the face a o d, and these parts of the solid angle can be found required. To find the vertical trace R' we make an auxiliary elevation on L' T, perpendicular to a o, and the angle of the arria will give us the vertical trace R', and we cut therefrom R' in the ordinary way. (See 3.)

Given a face and two angles, find the other parts of the solid angle.

Let the students acquainted with solid geometry, we shall say that in the complementary angles of the faces are complements of the angles of the given solid angle. We solve complementary solid angle by one of the methods above and deduct therefrom the real solid angle. But we can solve direct allowing problem.

Given the face a o b and the adjacent inner angles, find the other parts of the solid angle.

Through the point a we take our elevation perpendicular to b o we have only to thereon the traces of the planes of the rising faces. We shall call these planes R' S'. The angle of arria b o allows us to cut at once the trace R'. As to the trace S', we get it first in S' on an auxiliary plane on L' T perpendicular to a o, and cut therefrom as before trace S' on the elevation plane. The intersection of R' S' gives us m, a point of the arria, and we then find as before the other parts of the solid as before. (See fig. 74.)

Describe a sphere to a triangular pyramid.

Let a sphere will touch the four angles of a pyramid. The centre of the sphere being an equal distance from each angle, it will be on the intersection of three planes, P, R, respectively, perpendicular to the faces of three arries of the pyramid. We then find that to find the traces of the plane P we first draw a horizontal line, F, of the plane through the centre of arria 4, 3. Elevation of F is horizontal, its plan is elevation of F, the plan of the arria is elevation of 4 3, the plan of the arria passes through a', vertical trace of the line is perpendicular to 4 3, elevation of the line; as for P, it is parallel to F. By the method we find the traces of the plane Q perpendicular to arria 1, 4, and of the plane R perpendicular to arria 2, 4. The intersection of the planes R and Q is the line a c, the intersection of the planes P and Q is the line b c, therefore c is the point where the three planes meet, which is the centre of the sphere required. We may only to find the real length of one of radii, such as c 1, and we can draw the rest. (See fig. 75.)

Describe a sphere in a triangular pyramid.

This would be the problem we should have to solve if we were asked to carve out of a piece of stone of that shape the largest sphere possible.

The centre of the sphere must be at an equal distance from the four faces of the pyramid, will therefore be found by the intersection of the planes which bisect the inner angles of the pyramid on the arries ab, bc, ca. To get the inner angles we cut them by vertical planes perpendicular to the arries as L' T, L' T', and L' T''; as these three planes all contain the apex S, we can draw on each the respective vertical traces of the faces of the pyramid such as a, a', and OS', which give us the inner angles of the arries ab, bc, ca. We then can on each elevation the traces of the planes which bisect the inner angles such as P', Q', and R', the horizontal traces of these planes are, therefore, the arries themselves of the pyramid. We must now find the intersections of the planes P and Q, also of planes P and R, the vertical traces of which belong to different vertical planes, a problem we have already solved in the Builder, fig. 21. Where the two

intersections meet we have C', the plan of C, the centre of the sphere, and can deduct from one of the auxiliary elevations its height, by which we get C'. (See fig. 76.)

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

APRIL 23. By C. C. & T. MOORE. Commercial-road, E.—43, 51, 56, 58, and 63, Lincoln-street, 12 years, ground-rent, 35l. 42/0

APRIL 26. By C. & H. WHITE. Bermondsey, Fenner-road—"The Prince Alfred" public-house, freehold. 1,750

APRIL 27. By WAGSTAFF & WARMAN. Stoke Newington—23, Springdale-road, 82 years, ground-rent 7l. 7s. 510

By CHENNOCK, GALSWORDY, & CO. Stoke Poges, near Slough—"The Appon Park Lands, 71 Acre 5p. freehold, ground-rent 32l. 49 years, ground-rent 4l. 10s. 3,950

By HARRIS, VAUGHAN, & JENKINSON. Highbury—22, Blackstock-road, freehold. 1,210

By C. P. WHITELY. Bethnal-green—80 and 88, Cyprus-road, 17 years, ground-rent 4l. 325

By TRUGOOD & MARTIN. Finbury Park—24, Plimsoll-road, 84 years, no ground-rent. 300

By TEMPLE & MOORE. Newington-green—25 and 27, Howard-street, freehold. 720

By DALE & SON. Kingsland—68, Buckingham-road, 40 years, ground-rent 4l. 10s. 360

By GOWAN & BASLEY. Eaton-square—33, Elizabeth-street, 38 years, no ground-rent. 1,320

By DALE & SON. Mile-end—76, Clark-street, and 55, Dempsey-street, 16 years, ground-rent 4l. 265

By NEWNES & HARRING. Fulham—111, Ratcliff-road, 49 years, ground-rent 81 and 83, Rylston-road, 66 years, ground-rent 2l. 150

By E. STREX. Islington—465, Liverpool-road, freehold. 550

Dalston—15, 17, and 19, Shrubland-road, 57 years, ground-rent 16l. 7s. 21/75

By CHARLES WARR. Highbury—1, Benwell-road, freehold. 700

By A. A. HOLLINGSWORTH. Clerkenwell—5, and 9 to 12, John-street; and a ground-rent of 10l.; 30 years, ground-rent 36l.; also, Kingsland—46 to 50 even, Appleby-street, 18 years, ground-rent 12l. 1,685

By HONNE, SON, & EVERETT. St. John's Wood—ground-rents of 173l. 8s., reversion in 68 years. 5,550

By BLISS & SONS. Hackney—2 and 4, Clarence-road, 65 years, ground-rent 50l. 600

MEETINGS.

MONDAY, MAY 11.

University College.—Mr. Barclay V. Head on "Greek Numismatics," 4 p.m.

TUESDAY, MAY 12.

Anthropological Institute.—Exhibition of a Collection of Worked Jade from New Zealand. 8 p.m.

WEDNESDAY, MAY 13.

Artists' General Benevolent Institution.—Anniversary Dinner, Prince's Hall, Piccadilly. 6 p.m.

THURSDAY, MAY 14.

Society of Arts (Applied Chemistry and Physics Section).—Dr. C. J. Thresh on "The Utilization of a Natural Chalybeate Water for the Purification of Sewage." 8 p.m.

FRIDAY, MAY 15.

Association of Municipal and Sanitary Engineers and Surveyors.—Midland Counties District Meeting at Nottingham. 11 a.m.

Miscellaneous.

Amalgamated Society of Engineers.

The effects of the existing depression of trade are clearly shown in the thirty-fourth annual report of the Amalgamated Society of Engineers, just issued. The monthly returns of members out of work increased from 1,833 in January, 1884, to 4,090 in December last. This was chiefly attributable to the collapse in the ship-building trade, which made a difference to the labour market of 7,500,000. Other countries, however, are in a worse condition than our own, the depression having been universal. The report states that the total number of branches is now 430, as compared with 424 in 1883. The total membership at the close of 1884 was 50,681, being an increase of only 263 on the previous year. The income for last year was the largest in the history of the society, and reached the large total of 157,484l., showing an increase over the previous year of 22,835l. This was due to a special levy during the year, and it is pointed out that, even with its increased income, the society has been unable to keep up with its expenditure, which amounted to 172,811l., or 48,117l. more than was spent in the previous year. A considerable proportion of this outlay had been expended in out-of-work support, which had absorbed 59,056l. Sick benefit absorbed 27,977l., and superannuation 30,510l., while special strike expenditure had been very heavy. The total expenditure during the year amounted to 15,537l. more than was obtained, but deducting this from the previous balance of 178,125l., the society had still left an accumulated fund of 162,708l.—Times.

Bust of Coleridge in Westminster Abbey.

A portrait bust of Samuel Taylor Coleridge was unveiled in Westminster Abbey on Thursday afternoon by Mr. J. Russell Lowell, the American Minister. The bust is from the studio of Mr. Hamo Thornycroft.

Fire-Resisting Properties of Cyanite.—Some interesting tests of the fire-resisting properties of cyanite were afforded by the manufacturers of the material (the Patent Liquid Fireproof Cyanite Company, Limited) on Wednesday last, on the site of the abandoned Opera-house, Victoria Embankment. The material (of which mention has been made in our columns on previous occasions) is a liquid solution, of which silica is the basis, and it is applied with a brush direct to the surface of the woodwork, serving either as a priming to be afterwards covered with paint, or as a stain in lieu of the ordinary pale oak stain, which it much resembles in colour when applied to deal or other white woods, though it is also made colourless. It is claimed by the manufacturers that this solution sinks into the pores of the wood, and renders the timber for a considerable period proof against the attacks of fire. That the application of the solution has the effect of retarding the attacks of the flames for a long time was conclusively shown by the tests of Wednesday last. The tests were four in number. For the first one, a small flight of stairs, constructed of 1½ in. common white pine, was primed with two coats of cyanite, and underneath it a large heap of chips and shavings, plentifully besprinkled with benzoline, was ignited and burned for half an hour before the soffits of the treads and the backs of the risers were perceptibly charred. After the lapse of another half-hour, during which the under part of the woodwork of the stairs continued to smoulder, the stairs were proved to be strong enough to bear the weight of a man. Other tests, with packing-cases, were equally successful. The cases (three in number) were each about 2 ft. 6 in. deep, 3 ft. 6 in. long, and 2 ft. 6 in. broad. They were each stood up on end, and a large fire of shavings and chips sprinkled with benzoline was lighted in each. One of the cases was not coated with cyanite, and it speedily collapsed and became a mass of charred embers. The two other cases retained their form and position after the lapse of an hour, and it was only after the first half-hour's exposure to the flames that the wood became perceptibly charred and began to burn to any appreciable extent. It is asserted that this solution is permanent in effect and does not injuriously affect the woodwork to which it may be applied. If this be so, the solution has a wide field of usefulness open to it.

The Fatal Gas Explosion at Rotherhithe.—Mr. Langham resumed on Wednesday the inquiry at Cuy's Hospital concerning the death of Rebecca Ewington, late of 9, Eugenie-road, Rotherhithe, who died from the result of injuries sustained by the recent gas explosion in Rotherhithe. Workmen employed by the gas company stated that the gas-pipe was laid upon perfectly solid ground. The builders afterwards excavated under the main for gravel, about 12 ft. of earth being taken from underneath. During the work the main was supported by wooden props, and there were a large number of bricks stacked in the road. This would affect the gas-pipe very seriously. The jury returned the following verdict:—"In the opinion of the jury the deceased's death was due to the explosion of gas. The cause of such explosion is traceable to the excavations made under the main, but by whom the jury have no evidence to show. They are further of opinion that in September last, when the gasman was drawn out of the hole insensible, there should have been more care taken to have seen that the main was perfectly secure."

Association of Municipal and Sanitary Engineers and Surveyors.—A Midland Counties District Meeting is to be held at Nottingham, on Saturday next, May 16, 1885. The members will assemble in the Council Chamber at 11 a.m., to elect district secretary. The following papers to be read:—"Result and Advantages of the Meter System in Domestic Consumption," by Mr. George Winship, borough surveyor, Athingdon; "Five Years' Municipal Work in Nottingham," by Mr. A. Brown, borough engineer, Nottingham. In the afternoon visits will be made to Sir John Oldknow's lace manufactory; the Work and Ways Depôt; stables, &c.; the Health Depôt, —destructor and pail closet system; the London-road Paving Works; Trent Bridge; and Nottingham Castle Museum; and if time allow, other objects of interest. The members will then return to the Council Chamber and discuss the papers, &c. A pretty full programme.

A Monster Weighing-Machine.—Messrs. Henry Pooley & Son, Albion Works, McAlpine-street, Glasgow, and Liverpool, have just turned out a weighing-machine of exceptionally great capacity. It is on the suspension principle, and has been specially designed for weighing marine boilers and heavy castings for Messrs. J. & G. Thomson, shipbuilders and engineers, Clydebank, Glasgow. The knife edges and bearings are all of extra fine cast steel, specially made for this purpose, and the other parts are of best steel and Lowmoor iron. The breaking strain is calculated at 1,400 tons, and the machine has been tested at Lloyd's up to 120 tons. After testing, the machine was taken to pieces, and all the knife edges and bearings were found quite sharp and uninjured. The machine is suspended from the shears by a massive band of solid steel, weighing 15½ cwt., and the lower link and cross-head, from which the articles to be weighed are suspended, weigh 13 cwt. The levers and other working parts are all of the finest steel, and are enclosed in a waterproof box of great strength. The steelyard or index lever is also enclosed in a waterproof box, fitted with folding doors, and is graduated from pounds up to 100 tons, the indications being obtained by means of sliding poises, without loose weights. This part of the machine is nickel-plated, to prevent rust. Messrs. Pooley & Son, who were the pioneers in the introduction of the platform weighing-machines in this country, have recently made several special weighing-machines for home and abroad, including a weighbridge with a table 23 ft. square, another with a platform 40 ft. long, and an order they have in hand at present for a leading Scotch Company, is for a weighbridge of 80 tons capacity, fitted with eight separate weighing-tables.—*Glasgow News*, Sept. 26, 1884.

Cable Tramways.—At a meeting of the Society of Engineers, held on Monday evening, May 4, at the Town-hall, Caxton-street, Westminster, Mr. Charles Gandon, president, in the chair, a paper was read by Mr. W. Newby Colam on "Cable Tramways." The author, on introducing the subject of his paper, alluded to the number of years that vehicles had been propelled by wire cable, and explained that the novelty in the cable system of tramways was the invention which had enabled a cable to be used as a transmitter of power to tram-cars in such a manner that they can be drawn through crowded streets without interfering with the ordinary traffic. The author then gave an account of the history of the invention and its application to the first cable tramway, which was constructed up Clay-street-hill, San Francisco, in 1873. The great mechanical and financial success of this first line induced other tramway companies, at that time using various motors, to convert their lines to the cable, with the result that there are now over forty miles working most successfully in that city. The lines in San Francisco are more or less very steep, in places being as severe as 1 in 5; but the introduction of the system in 1882 into Chicago, which city is practically on a dead level, has demonstrated its great advantages under such circumstances, and in climates subject to extreme variations of temperature and heavy falls of snow. Over twenty miles of cable track is now in operation in that city, and, during the very severe weather of last winter, the cables were the only uninterrupted means of locomotion. The remainder of the paper was devoted to describing the construction of the Highgate Cable Tramway, to which the author is engineer.

Messrs. Steven Bros. & Co., architectural, sanitary, and general ironfounders, of 35 and 36, Upper Thames-street, E.C., have, we are informed, secured the lease of new and extensive premises at Nos. 3, Upper Thames-street, opposite the *Times* Office, Queen Victoria-street, and, after they complete their extensive alterations, they will be able to have on show what they believe will be the largest stock in London of kitchen ranges, marble chimney-pieces, marble kerbs, tiles, and tile hearths, slow-combustion stoves, stable fittings, hot-water apparatus, bakers' oven work, ornamental gates, railings, verandahs, spiral and straight staircases, baths, and fittings, &c., &c. Owing to the large and increasing demand for their manufactures, Messrs. Steven Bros. & Co. have found it absolutely necessary to remove their stock to warehouses where it may be seen to better advantage than has been the case, owing to want of space, at their present address.

The "Great Western Hall," Farringdon.—The "Great Western Hall," which has just been erected for the Salvation Army (on the site lately occupied by the Union Saw Mill situate in Burne-street and Lisson-street, Edgware-road, W., and containing a superficial area of 14,500 ft.), was opened on the 2nd inst. The buildings consist of a large main hall, with gallery running round the entire length, basements, retirement-rooms for male and female speakers, band-room, treasurer and secretary's room, officers' and caretaker's quarters, book and uniform stores, ticket-office, boiler-house, lavatories, &c. The public approach to the main hall is from Lisson-street, leading into vestibule, which is well lighted from the ceiling by means of marginal lights. From here access can be gained to the ground-floor, which is constructed in the amphitheatre style to the galleries, the corridors of which are constructed independently and of fireproof materials in accordance with the Metropolitan Act relating thereto; and to the basement, which has been specially designed for catering purposes on special fête days, but which will be used on other occasions as a week-night hall. The private entrances are in Burne-street, immediately adjoining the Edgware-road Metropolitan Railway Station. In the main hall and galleries seating accommodation has been provided for 3,200 persons, in the basement for 1,000, and the cost has been about 5,000l. The whole of the work has been carried out by Mr. G. Brick, builder and contractor, of Hendon, from designs and under the superintendence of Mr. E. J. Sherwood, architect and surveyor, 101, Queen Victoria-street.

Coal Mining in China.—It is stated that the Chinese Government, casting aside national prejudice, are on the point of working the coal-mines of China in a more systematic manner than has hitherto been done, calling in the aid of European miners. They recently applied to the Société Cockerill, Belgium, for a contingent of experienced miners to superintend the extensive collieries which they propose to open up in certain of the rich deposits already prospected. Very liberal salaries were offered, and it is said that the appointments were eagerly accepted. Thirty miners were engaged, and they are likely to be followed by another thirty, who will proceed to China on the chance of obtaining an engagement on their arrival. As the government will probably be glad to avail themselves of European aid, there is hardly a doubt that they will speedily obtain the appointment they desire. It is also probable that the Chinese will obtain the necessary plant to work their mines properly. But they will soon learn the proper methods of working, and in opening other mines they will adopt the system they have learned, dispensing in the future with the aid of Europeans. The Chinese, like the Japanese, learn things readily, and then conduct matters themselves. There are large deposits of coal in China, and, with the assistance now obtained, they will very quickly be developed, so as to be of more importance than heretofore.—*Iron*.

Cholera in Europe.—Rumours of cholera from time to time remind us of the prospect of a recurrence of the disease in an epidemic form during the coming summer. The most important announcements have come from Spain, where early in April a considerable number of cases were alleged to have occurred in the province of Valencia. The statement was, however, soon followed by contradictions, and precise information on the subject has since then not been forthcoming. France, however, imposed a three days' quarantine on arrivals from Spain. Since then we have heard that a case has occurred at Osio, not far from Bergamo, and a French newspaper has reported cases at Cairo. In the meantime, the postponed European Conference has again been postponed to May 15th, and it is stated that the India Office will send separate representatives. Switzerland will be represented by M. Davier, the Swiss Minister to Italy, assisted by Dr. Sonderberger and Dr. Reali.—*Lancet*.

Birmingham.—On 30th ult. the Bishop of Worcester consecrated the Lea Memorial Church at Birmingham, erected from the designs of Mr. J. A. Christy, of that town. Messrs. Jones & Willis have supplied the choir stalls in oak and the bishop's chair.

Fulham Road.—We are informed that the carriage-way of Fulham-road from Stamford Bridge will be closed for a period of six weeks for the purpose of being repaved with wood-paving by Messrs. Muldoon Brothers.

New Baths at Forest Hill.—The new baths constructed by the Commissioners for Public Baths for the Parish of Lewisham at Forest Hill were opened by Earl Dartmouth on the 2nd inst. The buildings are in the French Renaissance style of architecture. There are two swimming-baths (first and second class) each 30 ft. by 30 ft., lined throughout with white glazed bricks, the depth of water being 3 ft. 6 in. at the shallow end, and 5 ft. 6 in. at the deep end. Special arrangements are made for removing the scum which accumulates on the surface of the water in all swimming-baths, by means of overflow-hoses placed at frequent intervals round the walls of the baths, these serving also as spitoons. A special inlet at the surface level of the water admits of a jet of water being introduced at this level, thus inducing a current and driving the scum down the overflow hoses. The first-class bath is specially designed so as, in the winter months, to be used for the purposes of a public hall for entertainments, concerts, &c. It has an open pitch-pine roof, and a hold gallery round two

sides and one end. In connexion with this hall careful attention has been paid to the means of exit, there being no fewer than five large double doorways, the doors all opening outwards. There are also provided twenty-eight "slipper" or private baths, and the establishment is completed with the usual towel laundry, smithy, &c. A special feature of these baths are the engineering arrangements, which are of an exceedingly simple character, but are found in actual practice to adequately perform all the necessary work, such as heating the water, &c. The cost of the whole of the buildings and fittings will not exceed 10,000*l.* The architects, Messrs. Wilson, Son, & Aldwinckle, of 2, East India-avenue, Leadenhall-street, claim that these are, in regard to their size, by far the cheapest baths in London, while all necessary accommodation is provided. Similar buildings, at the same cost, and from the designs of the same architects, have just been opened at Ladywell. Plans and elevations of both these baths appeared in the *Builder* for December 1st, 1883.

For engine-house for 100-h.p. engine, for the Tottenham Local Board. Mr. A. H. de Pape, engineer. Quantities by Messrs. Campbell & Son, Tottenham —

	Engineer's Design.	Deductions from Engineer's Design.	Reduced Design.
J. Bloomfield, Tottenham	£2,550 0 0	£3,386 0 0	£1,874 0 0
A. Porter, Tottenham	2,277 8 1	127 7 6	1,714 5 7
H. Knight & Son, Tottenham	1,974 14 0	1,868 17 8	1,558 12 6
Williamson, Tottenham	1,957 11 2	1,866 4 4	1,543 7 0
Proctor, Woolwich	2,000 0 0	145 6 3	1,520 0 0
W. J. Hack, Poplar	1,948 0 0	117 0 0	1,483 0 0
J. Humphreys, Tottenham	1,869 2 7	102 4 8	1,463 13 11
G. Bell, Tottenham	1,501 12 0	126 7 1	1,413 12 3
C. Barnes, Ilford	1,727 0 0	1,643 0 0	1,359 0 0
Fercival Hart, Tottenham*	1,761 14 6	168 4 0	1,350 14 6
W. Cornwall, Bishop's Stortford	—	—	—

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.
Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Public Hall and Institute	Slough	25 <i>l.</i> and 15 <i>l.</i>	June 15th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Detached House, &c., Potter's Bar	Wandsworth Rd. of Works	Mr. Salmon	May 11th	ii.
Infant School, &c.,	Lansely School Board	Official	May 12th	xxi.
Lease of Municipal Offices, Police-courts, &c.,	Burnley Corporation	E. H. Lingen Barker	do.	xxi.
Purchase of Granite Paving Stones	St. Giles's Bnd of Wks.	Official	May 13th	xxi.
Erection of Clock-Tower, &c., of Town Hall	Rochdale Corporation	A. Waterhouse	do.	xxi.
Walters' Home, Well-street and Dock-street, E	The Directors	J. Hudson	May 14th	ii.
General of Street Refuge	St. Giles, Canberwell	Official	do.	ii.
New Station Buildings	Midland Railway Co.	A. A. Langley	do.	ii.
Cleaning and Painting	do.	do.	do.	ii.
Washing, Parting, &c.,	Gds. Frsh St. Marylene	Official	May 15th	ii.
Eye of School and Masters' House	Chigwell School Board	R. Egan	May 19th	ii.
Painting Cavalry Barracks, &c., York	War Department	do.	do.	ii.
James Ballast and Sand	Admiralty	do.	do.	ii.
School Police Station	Kent Wesleyan Methodist	G. J. C. Broom	do.	ii.
Enlargement of County-Court, Burton-on-Trent	School Assoc., Linn.	Ruck, Son, & Smith	May 22nd	xxi.
Outrages, &c.,	Com. of H.M. Works	Official	do.	ii.
Outfitting Shaft, &c.,	Admiralty	do.	do.	ii.
Removal of Street Letter-Boxes	Kingsbridge R.S.A.	H. Lidstone	do.	xxi.
School Buildings	Brighton Sewers Board	P. C. Lockwood	May 23rd	ii.
Repairs to House	General Post-Office	Official	do.	ii.
	Coins, &c., Local Board	do.	May 25th	xxi.
	Christchurch Union	E. H. Burt	May 28th	xxi.
		J. B. Smith	Not stated	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Workman of Footway Masons	Vestry of St. Marylene	117 <i>l.</i>	May 16th	xviii.
Surveyor	Blackpool Corporation	300 <i>l.</i>	May 20th	xviii.
Surveyor by Architect	Norwich Corporation	200 <i>l.</i> , &c.,	do.	xviii.
Head Foreman	Cor. Burton-on-Trent	104 <i>l.</i> , &c.,	May 21st	xviii.

TENDERS.

For new bakeries at Battersea, for Messrs. J. & B. Stephen, of Glasgow. Mr. Thomas, architect, 43, Pall-mall—

Bell, Hornsby, & Co.	£18,615 0 0
H. & E. Lee	17,613 0 0
Lucas & Son	16,650 0 0
W. & D. McGregor (accepted) ..	16,500 0 0
Peto Bros.	16,498 0 0
C. F. Kearley	16,365 0 0
Ferry & Co.	16,270 0 0
Cooke & Son	16,139 0 0
J. Richardson (informal)	15,541 0 0

* The sender of this tender writes—"This is scarcely fair to London builders, as the above firms were asked to tender by the architect."

For alterations and repairs at Prospect House, Dartmouth, for Mr. R. W. Soper. Mr. E. H. Back, architect, Dartmouth. Quantities supplied:—

E. J. Henley, Dartmouth	£290 0 0
O. Vesle, Dartmouth	267 6 0
B. Williams, Dartmouth (accepted) ..	213 0 0

For erection of new workhouse buildings at Fordingbridge, for the Guardians of the Poor of the counties of Hants and Wilts. Mr. Fred Bath, Salisbury and London, architect. Quantities supplied:—

James Edwards, Southbourne, Bournemouth	£18,572 14 3
Hopkins & Son, Wilton, Salisbury ..	14,859 0 0
Samuel Mundy, Bournemouth	13,741 10 0
W. J. & C. S. Young, Salisbury	13,259 0 0
Wm. Church, Weymouth, Briston ..	12,953 0 0
McWilliam & Sons, Bournemouth ..	12,530 10 4
Gilbert Harris, Salisbury	12,522 8 5
H. W. Jenkins & Sons, Bourne-mouth	12,520 0 0
John Shering, Fordingbridge	12,409 13 6
H. Vickers, Nottingham	12,250 3 1
Samuel Clarke & Daniel Hetching, Farnstone, Poole	11,983 0 0
James Ball, Cowes, I.W.	11,974 0 0
H. J. Sanders, Northam, Southamp-ton	11,802 0 0
James Longley, Crawley, Sussex ..	11,680 0 0
Joseph Bull & Sons, Southampton ..	10,779 0 0
John Greenwood, St. John's street, Mansfield, Notts	10,300 0 0

* Accepted subject to omission of infirmary block, boundary-walls, general fittings, &c.

For alterations to a residence known as Ferrymead, Stratham, for Mr. W. McDonough. Mr. Richard Peters, architect, 72, Wool Exchange, Coleman-street:—

T. Ennor Julian	£245 0 0
Kemp	262 0 0
Richardson Ross, (accepted)	191 0 0

For restoring building and shop after fire, 60, Clapham-road, for Messrs. Roy & Cartwright:—

John Beale	£396 0 0
------------------	----------

[No competition]

* Accepted. † Informal.

For the erection of a new Wesleyan Chapel, Bedminster, Bristol. Mr. Herbert J. Jones, architect, Bristol:—

Eastbrook & Sons, Bristol	£1,829 0 0
Stephens & Easton, Bristol	4,500 0 0
E. T. Hatherly, Bristol	4,562 0 0
Geo. Humphreys, Bristol	4,500 0 0
H. J. Rossiter, Bristol	4,240 0 0
Jewell & Son, Bristol	4,245 0 0
J. E. Davis, Bristol	4,234 0 0
W. A. Green, Clevedon, Somerset ..	4,163 0 0
Walters & Son, Bristol	4,121 0 0
Wilkins & Son, Bristol	4,094 0 0
Jas. Wilkins, Bristol	3,984 0 0
Geo. Wilcox, Clevedon, Somerset ..	3,835 0 0
A. J. Bevan, Bristol	3,790 0 0
Thos. R. Lewis, Bristol (accepted) ..	3,791 0 0

For alterations to Nos. 39 and 40, Wine-street, Bristol, for Mr. Walter Verrier. Mr. Herbert J. Jones, architect:—

W. Church, Bristol	£315 0 0
T. R. Lewis, Bristol	498 0 0
Eastbrook & Sons, Bristol	493 0 0
G. Humphreys, Bristol (accepted) ..	482 0 0

For the erection of schools, Lower Mortlake-road, Richmond, for the Holy Trinity Schools Committee. Mr. S. H. Seager, architect:—

Seal	£1,446 0 0
Sims	1,350 0 0
Sweet & Loder	1,289 0 0
Rodwell	1,224 0 0
Miton	1,195 0 0
Carless & Co.	1,167 0 0

For works to be executed at 64, Milton-street. Mr. Coult's Stone, architect:—

Smith	£189 0 0
Blow	152 0 0
Shore	150 0 0
J. O. Richardson (accepted)	136 0 0

For alterations and additions to Albert Villa, Finchley-road, for Miss Matthews. Mr. Wm. Musket Yettis, architect, 44, Finchbury-pavement. Quantities supplied by Messrs. Franklin & Andrews:—

Prestige & Co.	£3,776 0 0
Rider	3,779 0 0
Canning & Mullins	3,769 0 0
Macey & Sons	3,738 0 0
J. W. Falkner	3,675 0 0
Woodward	3,635 0 0
Morter, Stratford	3,541 0 0
Horns	3,439 0 0
G. & J. Green, Hackney (accepted) ..	3,385 0 0

For alterations at the Metropolitan Music Hall, Edgware-road, for Mr. Lake. Mr. E. Clark, architect:—

Langridge & Sons	£2,660 0 0
F. Mark	3,179 0 0
C. Wall	2,600 0 0
J. Anley	2,507 0 0
Johnson & Manser	2,490 0 0
T. L. Green	2,429 0 0

For proposed Dispensary and Cottage Hospital at Bevelay, Messrs. Smith & Broderick, architects:—

Grasby, Hull	£2,308 0 0
Bergeant, Hull	2,114 0 0
Simpson & Malone	2,033 0 0
H. Richardson	2,008 0 0
Stophenson & Son	1,938 0 0
Pape & Son	1,916 0 0
J. Barnes	1,908 0 0
Clapham	1,888 0 0
West	1,855 0 0
Ashton	1,757 0 0
Garbutt	1,756 0 0
Blackburn, Hull	1,755 0 0
Capes	1,750 0 0

* Accepted provisionally at 1,755*l.* 11*s.* 5*d.*, slate being substituted for tiles.

For alterations at Wellclose Villa, Wellclose-road, St. Albans, for the Rev. Mr. Gates. Messrs. Glover & Galt, architects:—

Savage	£113 0 0
Holland	108 0 0
Anston	100 0 0

[All of St. Albans.]

For the erection of new District Hospital, at Newbury, for nine beds. Mr. H. G. Turner, architect, 1, Great James-street, W.C. Quantities by Mr. E. A. Jackson, architect—

	£	s	d	A*	B†	C‡
E. Proctor, Woolwich	2,996	0	0	2181	0	27 15
S. Clarke, Poole	2,329	10	0	154	3	8
C. Clarke, Banbury	2,141	0	0	141	0	25
G. Elms, Newbury	2,163	0	0	128	0	19
T. H. Knagles, Oxford	2,069	0	0	130	0	22
H. Botsford, Newbury	2,019	0	0	135	0	19
S. Elliott, Newbury	1,996	0	0	127	0	22
E. Williams, Abingdon	1,963	0	0	133	0	18
W. Woodridge, Maidenhead	1,890	0	0	140	10	23
G. H. Gibson, High Wycombe	1,873	0	0	140	10	23
Carlson & Co., Richmond	1,867	0	0	113	0	11
W. Holt, Craydon	1,969	18	0	125	0	18
Leslie & Knight, Kensington	1,960	0	0	149	0	9
Kirk Bros., Adlestone	1,900	0	0	131	0	14
Martin, Wells, & Co., London and Aldershot	1,896	12	6	124	8	10
W. H. Simonds, Reading	1,855	0	0	117	10	29
J. Bull, Sons, & Co., Southampton	1,758	0	0	118	0	7

* A. Extra for enlarging male ward for three additional beds.
† B. Extra for pitch pine instead of yellow deal floors in wards and operating-room.
‡ C. Extra for oak do. do. do. do. do. do.
§ Accepted.

For shops and offices adjoining the Monument Station, King William-street and Eastcheap. Messrs. Innes & Florence, architects. Quantities by Mr. J. G. Hiddell—

Perry & Co.	£5,767	0	0
Williams & Son	5,547	0	0
Holden & Greenwood	6,484	0	0
George Shaw	6,473	0	0
Simpson & Son	6,445	0	0
J. Grover & Son	6,288	0	0
J. & F. Greenwood	6,125	0	0
E. Conder	6,196	0	0
Patman & Fotheringham	5,973	0	0

For erection of house in William-street, Stratford, for Mr. Athill. Mr. J. Boyce, surveyor—
 Bulford (accepted) £285 0 0

For re-instating premises destroyed by fire, No. 125, Horton-street, for Mrs. Lock. Mr. J. Boyce, surveyor—
 Bulford (accepted) £185 0 0

For the erection of a large story over the bakehouse and workshop at the Exeter Workhouse—

Sutton, Longbrook-street	£827	0	0
J. Kenshole, Heavitree	595	0	0
D. Reynolds, Exeter	519	0	0
J. Smith, Parr-street, Exeter	519	0	0
Scadding & Sons	490	0	0
W. Gibson, Exeter	480	0	0
Moass & Sons, Exeter	475	0	0
Pittsoll, St. Leonard's	428	0	0
Henry Phillips, Clifton Hill	435	0	0
Garnsey, St. Sidwell's	435	0	0

For the completion of sanitary turret, &c., at the Workhouse, Arthur-street, Chelsea, for the Guardians of St. Luke, Chelsea. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities not supplied—

Balsam Bros.	£1,890	0	0
W. Johnson	1,680	0	0
J. H. Johnson	1,483	0	0
H. Haynes	1,335	0	0
Jas. Angood	1,240	0	0
J. P. Potter, Banstead	1,160	0	0

For the erection of a house at Maidenhead, for Mr. J. Wood. Mr. Edward Hyde, architect, 121, Bishopsgate-street. Quantities by Mr. Cecil G. Saunders, 6, Agar-street—

Hayard & Son	£5,900	0	0
Howard & Son	5,993	0	0
Rider & Son	5,253	0	0
L. H. & R. Roberts	5,246	0	0
Brass & Son	5,140	0	0
Silver & Son	5,133	0	0
Stimpson & Co.	5,050	0	0
J. K. Cooper & Son	5,048	0	0
W. Woodbridge, Maidenhead	4,768	0	0

For pulling down the Bricklayers Arms public-house at the corner of Sefton-street and Fenchurch-street, in the parish of St. Mary, Whitechapel, and rebuilding same, for Mr. W. T. Wackrill. Mr. J. T. Newman, architect, 2, Fenchurch-street. Quantities by Messrs. Curtis & Sons—

S. Hayward	£1,765	0	0
J. Morter	1,696	0	0
W. Shurmur	1,692	0	0
Robt. Mar	1,635	0	0
Hearle & Son	1,512	0	0
Reed	1,497	0	0

At a special meeting of the Lowestoft Improvement Commissioners, held at the Town Hall, Lowestoft, it was reported that the Paving and Draining Committee had received tenders for 15,000 square yards of concrete pavement from twenty-five different firms. Of these seven were selected; and of these again the following were finally decided on—Mr. J. H. Bryant (of the Patent Grano Metallic Stone Company), 5,000 yards at 4s. per yard; Messrs. Curzon Impervious Company, 5,000 yards at 3s. 6d. per yard; and Mr. A. Bidwell, Lowestoft, 5,000 yards at 2s. 9d. per yard.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., not later than **Four p.m. on THURSDAYS.**

TO CORRESPONDENTS.

M. P. B. & C. (shall be attended to)—J. & Co.—S. & S. (thank)—G. P. E. & W. W.—L. and D. F. E. (it is not our custom; we receive more than we can find room for as it is)—W. D.—J. & Son.—J. D.
 All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.
 We are compelled to decline posting out books and giving addresses.
 Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the author.
 We cannot undertake to return rejected communications.
 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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 "THE BUILDER" is supplied direct from the Office to readers in any part of the United Kingdom at the rate of 12s. per annum. For countries within the Postal Union, 20s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 46, Catherine-street, W.C.

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The Builder.

Vol. XLVIII. No. 2205.

SATURDAY, MAY 16, 1885.

ILLUSTRATIONS.

Chester Cathedral: Proposed Restoration of South Transept Front.—Mr. A. W. Blomfield, Architect	690-691
New Building for Messrs. Seely & Co., Essex-street, Strand.—Mr. H. C. Boyse, Architect	694-695
Penarth Conservative Club.—Messrs. J. P. Saddon and J. Coates Carter, Architects	702
Chelsea Vestry-Hall Competition (Third Premiated Design): Section, Plan, and Details.—Messrs. Newman & Newman, Architects	698, 699, 703

CONTENTS.

The Report of the Royal Commission on the Housing of the Poor	879	Chelsea Vestry-hall Competition	702	Architectural Style	703
Suggestion in Sewage Purification	881	Conservative Club, Cardiff	705	The Tubular System of Drains and Sewers	708
Notes	882	Two of the Institute Medals	705	The Ashford Prize	708
Architecture at the Royal Academy	884	The Congress of French Architects	703	Cooking Apparatus for large Institutions	708
The Inventions Exhibition: Machine Tools	884	Competitions	706	The Student's Column: Descriptive Geometry,—XV.	708
Further Notes on Academy Pictures	885	Public Libraries	706	Stained Glass	710
Leasehold Tenure in London: Architectural Association	687	The Surveyors' Institution	706	Recent Patents	710
The South Transept, Chester Cathedral	688	Durwich College and its Founder	708	Meetings	711
Publishing Offices for Messrs. Seely & Co., Essex-street, Strand	688	The Furniture Trades' Exhibition	707	Recent Sales of Property	711
		The Eastern Pediment of the Parthenon	707	Miscellaneous	71

The Report of the Royal Commission on the Housing of the Poor.



THE first portion of the Commissioners' Report, now published, deals with the questions submitted to their investigation so far as concerns England. The further consideration of the subject

as regards Scotland and Ireland is to be carried on, and the result published in a future report. As the qualifying phrase "first portion" only refers to the fact that the present report does not include Ireland and Scotland, we may regard the report as complete so far as it goes, and consider what is the result it offers in the way of an escape from the lamentable state of things to which it refers.

The Report signed by all the Commissioners occupies nearly fifty-eight pages, and to this are appended other sub-reports conveying the special views of sections or individuals of the Commission in regard to points on which the whole of them are not in accordance. Thus, a brief Report, charging the system of leasehold building with many of the evils connected with overcrowding, unsanitary buildings, and excessive rents, is signed by Cardinal Manning, Lord Carrington, Lord Provost Harrison, Messrs. Lyulph Stanley, Gray, Torrens, Broadhurst, Jesse Collings, Godwin, and S. Morley. The Marquis of Salisbury follows with a memorandum rather in elucidation and amplification of various points of the main Report than in dissension therefrom, and the Bishop of Bedford concurs in this memorandum, except in regard to a proposal to dispose of present sites of prisons at cost price, as sites for workmen's dwellings, instead of at market price; but the Bishop does not give the reason for his dissension. A joint memorandum by Mr. Goschen and Mr. Lyulph Stanley is occupied in insisting on the establishment of a strong central Municipal authority in London, before any real progress can be made, in proposals for increasing the liability of owners (in which Lord Brownlow concurs), and in making further recommendations (to be noted hereafter), for facilitating commercially the provision of increased house accommodation. Mr. Morley adds his signature to this memorandum. Mr. Goschen, in a further memorandum (Sir R. Cross concurring), objects to a recommendation of the Report in reference to rating vacant land on its selling value, and not on its income. Sir R. Cross adds another memorandum on certain points in regard to the action of local authorities, who

should not, he thinks, compete with private enterprise, except in regard to the provision for the very lowest class,—the waifs and strays,—for whom it is desirable to have lodging-houses, which can be under the strictest official supervision. Mr. E. Dwyer Gray adds a very long memorandum containing propositions of a more stringent character than a majority of any Royal Commission could probably be got to agree in, and prefacing his remarks by a statement that while he had "no difficulty" in signing the general Report, he felt that even if all the recommendations therein suggested were adopted, "they would scarcely have an appreciable effect upon the terrible evils which the Commissioners have so laboriously elucidated." Mr. Broadhurst follows with a long memorandum suggesting plans for facilitating the transfer of land; Mr. Jesse Collings with another long one containing subsidiary comments on various important points, in which Mr. Broadhurst and Mr. Morley concur; Cardinal Manning and Lord Carrington concurring, except in regard to a paragraph laying strong stress on the necessity of municipal reform, and the Bishop of Bedford dissenting only from recommending the compulsory provision of cottage accommodation by landowners. Mr. Godwin concludes with a short practical memorandum in regard to cheap building materials, and the Family-Inst. of M. Godin-Lemaire and other large employers of labour in France,—a memorandum which is rather by way of supplement to, than dissent from, the main Report.

The number of these sub-reports or memoranda, however, their varied and generally incisive character as contrasted with the more cautious and measured recommendations of the main Report, renders it evident how much difficulty a Commission of seventeen persons must have had in finding common ground of experiences and recommendations in which they could all concur, and for us a significant illustration of the general difficulty and intricacy of the task before them. Having indicated the main divisions into which the various Reports fall, let us now turn back to the main Report and see if we can summarise within reasonable space the information which it contains and the recommendations on which that information is based; no easy task, we must confess.

The main report is classified under four heads:—(1) Law and Facts; (2) Causes; (3) Housing of the Working Classes in the Rural Districts; and (4) Remedies and Recommendations. The third head we regard as, comparatively speaking, of minor significance in this report; for it is over-pressure and its consequences in London that really gave rise to the appointment of the Commission. And the

first and main thing we look for in turning over the report, is for some definite principle, founded on ascertained facts, in virtue of which the attempt to give a dead lift to the condition of the working-classes in London in regard to their dwellings can be taken out of the region of eleemosynary work, and the objects of philanthropic legislation can be shown to be under such special conditions that special remedies, apparently at first sight at variance with sound social and economic principles, are reasonably justified and called for. For that is in reality at the bottom of the whole difficulty. It is comparatively easy for wealthy individuals or for the State itself to spend money in building better buildings, and to let them, as the Peabody buildings are let, at rents below the market rate. It is natural for people to say, seeing the horrible material and moral evils that are springing up out of the want of habitations enough for the populace, "At all events, this must be amended; whatever may become of theories of political or social economy, we must put an end to this miserable and scandalous state of things." But, philanthropic as such a feeling may appear at first sight, it is, at all events in this crude form, a false philanthropy which will end in making matters worse, in stereotyping the very evils which it seeks to relieve. When there are more people crowding into a neighbourhood than there is room for; when there are more seeking for employment in this or that branch of industry than it can possibly supply, the natural result is that the most able, thrifty, and steady get the work, and the more idle, weak, and unsteady go to the wall. Let your philanthropist now step in and say, "I will provide cheap house accommodation for these wretched ones, since they cannot afford to pay for decent lodgings, at a lower rate, and make up the difference myself"; and what is he doing but offering a premium on the further crowding in and multiplying of these idle and useless ones, and commencing a system to the development of which there is no logical termination, and which must end by coming down with a ran, and making the last state worse than the first? This, as we pointed out before, is the fallacy at the bottom of Lord Salisbury's well-meant propositions, which we reviewed eighteen months ago,* and the talk raised by which was the main cause of the present Commission being organised. If the supply of workers, or of those who ought to be workers, far exceeds the demand, no conjuring will alter such stubborn facts; and the system of subsidising the masses who cannot find enough to live upon is not only in the end injurious to them, but is really an attempt to find an easy way of evading a difficulty (for

* Builder, November 3, 1883.

giving out of the superabundance of the wealthy is really the idlest and easiest of all forms of philanthropy, instead of boldly facing the problem and its consequences, and endeavouring to meet it in a way that will promise permanent success.

The first thing that a rational inquirer asks, therefore, is this,—Are there any special circumstances such as ought not to exist, such as are abnormal, to account for the disproportionate costliness and had quality of the lodgings of such a large number of the poorer and poorest classes; any circumstances which put the case at all out of the usual category of supply and demand? Has any one done wrong, that these suffer, or are there merely, in plain English, more of them than can possibly earn decent food and lodging within the space they inhabit? We must look to the answer to this question before considering the reasonableness of any of the remedies proposed.

Now, in regard to the high proportion of rent to income, there are two or three suggestions to be gathered from the Report of the Commissioners, to show cause why special remedies should be adopted. One of these is mentioned under the heading, "Causes of High Rents." "High rents," we read, "are due to the competition for houses and to the scarcity of accommodation in proportion to the population."

"It might be asked, why cannot the pressure be relieved by the distribution of the now-crowded masses over the area of the metropolis, inasmuch as it is a well-known fact that for various causes certain districts contain a large number of uninhabited houses, many of which are suitable for the working classes. The answer to this query, which will have to be referred to again when the question of suburban residence is dealt with, is that an enormous proportion of the dwellers in the overcrowded quarters are necessarily compelled to live close to their work, no matter what the price charged or what the condition of the property they inhabit. It has been seen how crowded the poor central districts of London are, and one reason is that for a large class of labourers it is necessary to live as nearly as possible in the middle of the town, because they then command the labour market of the whole metropolis from a convenient centre."

Reference is then made to the cases of dock labourers, who must be near the docks, and of costermongers who must live near the neighbourhoods where alone they find a market for their wares, where they are, in fact, to a poor population what shops are to a rich one. But this is only applying to a district of London and to a certain part of the population what really applies in a wider sense to all London. House rents of all classes are abnormally high in London, office rents abnormally high in the City, because such a number of people must live or have their places of business in London. And then, in the case for instance of dock labourers, as in other cases, the overcrowding is not because the dock labourers who are employed must live near their work, but because so many more who cannot get employment except by mere good luck, also think that they must, for the sake of this chance, live in the same neighbourhood. If any one fact has been brought out more clearly than another lately about the working-classes, it is that the competition for dock labour is enormously in excess of the demand; and overcrowding, with all its attendant evils and high rents for wretched accommodation, is simply the result of the fact in this case that there are far more of the class than can possibly find remunerative employment. It is not the dock labourers who get employment who cause the overcrowding; it is those who do not get employment, who are too many for the labour market; and if these poor men were somewhere else in the world where their labour is wanted, there would probably be room for the decent housing of those who are wanted. The same may probably be said of men in or seeking other employments; we take the case of the dock labourers because it has been brought so prominently forward of late, and so many facts published about it. This is, then, not a question of the housing of these classes, or of overcrowding, except indirectly; it is simply the case of overcrowding of that particular market. It is of no use to talk of providing better house accommodation

for these men, because the plain fact is that, poor fellows, they have no business to be there at all; they are where they are not wanted, and to help to find them house-room there is really no better than a mockery. It is they who are making the overcrowding by staying where it is clear they cannot all get a living. No doubt, as Kingsley bitterly said in "Yeast," they have committed an unpardonable sin in being in the world when they were not wanted; but the business is to find out where they may be wanted, if possible,—not to help them into a false paradise by making houses for them and leaving matters still worse for their children. The fact that London is overcrowded, that it is no use people crowding into it to look for work, will have to be forced on the conviction of the working classes sooner or later; and the longer it is staved off by a temporary philanthropic measure, the worse it will be in the end.

We do not mean to imply that the Report of the Commission proposes any eleemosynary system of providing houses for these sadly superfluous workers. What they do propose is mainly (apart from the better sanitary regulation of houses, which is a separate question) in the way of increased railway facilities for workmen living out of London; but what we do feel is that the manner in which this part of the subject is touched upon appears to pass over the consideration that the fact of too many workers in the field is the first root of the overcrowding, and that the latter is only a secondary and inevitable result. The real remedy here we take to be, for the present, organised emigration with Government assistance and direction, and a trust in the gradual results of the better education of the next generation, which would lead to greater foresight, consideration, and self-restraint. But we presume this portion of the subject was not properly within the range of the inquiries of the Commission.

Leaving on one side the question of absolute overcrowding of workers, and coming to that of the dwellings of those who do find work, but who are ill-housed at rents much higher in proportion to their income than other classes of the community, do we find any special circumstances which justify the application of special remedies? In this respect the Report brings before us, we think, one special evil of the greatest magnitude, which ought not to exist, and which arises not out of the usual influences of supply and demand, but out of the fact that some people are not doing what they ought to consider their duty. The rents paid by a large proportion of the poorer of the working classes amount it seems, in many districts, always to a fifth, often to a fourth or more, of their small income. Even for this abnormally large proportion paid in rent they get only bad, unsanitary, and sometimes dilapidated dwellings. This latter portion of the evil is one with which, as we think the Report shows, there is at present ample legislative power to deal; what is wanted is not so much new or special legislation, as the stringent and energetic enforcement of the provisions of existing legislation. But if we ask why this high proportion in rent, then we come on what we take to be one of the greatest and most crying evils of the day in regard to the poorer class of house property, the existence and the practically irresponsible power of the middleman, the direct lessee of the property from the freeholder. He is the dragon who swallows up houses and families, and whom the modern St. George must set about slaying, and that with a will. The evidence on this point is glaring and unmistakable. The most important information in regard to it is to be found on page 22 of the Report, in a passage founded, as the Commissioners are careful to observe, not on the evidence of clergy, philanthropists, and local and other reformers who have agreed in condemning the system; "they have preferred to confine themselves to the testimony of two witnesses who are intimately connected with the leasehold system." And here is part of this testimony:—

"The first [of these witnesses], Lord William Compton, is the son of the owner of one of the

largest properties in London on which middlemen are found; the second is Mr. Boodle, the agent to the Northampton as well as to the Westminster estate. From the evidence of these two witnesses it appears that the existence of the system of house farmers is in some measure owing to the preference for middlemen on the part of both the landlord and his man of business. Moreover, this evidence shows that there is an indisposition on the part of landlords to avail themselves stringently of the provisos in their leases for re-entry and for the troublesome and costly process of ejectment of tenants in case of breach of covenant, the covenants usually including external and internal repairing, cleaning and painting, and the keeping in order of drains. Again, it was pointed out that landlords like to give short leases of decaying property, so that they may fall in when long leases expire, and the property can be dealt with as a whole more satisfactorily than it could be piecemeal. All these considerations appear to favour the middleman system, to which is attributed by Mr. Boodle the breaking up of houses built for single families into tenements, with all the evil and inconvenience attending that arrangement. This is also said to be the cause in great measure of the enormous houses in which it has been seen the poor chiefly live in the worst parts of London. On the Clerkenwell Estate, Lord William Compton went very carefully into some of the figures relating to houses leased from the Marquess of Northampton by certain house farmers. In Queen-street he ascertained that in what manner the repairs are carried out by persons of this class, who are also members of the Vestry of Clerkenwell.* At No. 10, for instance, he found that the weekly rent of the front room was 12s.; of the back room, 4s. 6d.; of the kitchen, 3s.; of the first floor, 13s.; and of the second floor, 7s. This amounted to about 100l. a year, and the rent which the householder paid to the Northampton was 20l. a year. The agent to the Northampton Estate allows that a middleman might in a particular instance be making 150 per cent. per annum, not counting his outlay for repairs, but that the repairs are only wanted once in three or four years, and, therefore, in the other years he makes his 150 per cent. In what manner the repairs are carried out has already been shown in the evidence which described the condition of the houses in this and other poor quarters of the town. The house farmer is not at all anxious to encroach upon his profits, whether they are at the rate of 50 per cent. or 150 per cent., by periodical repairs. Lord William Compton stated that he shrank from calling to account the middleman for neglecting to repair, fearing that a rise in the rents would be the consequence of such a proceeding. The average income of the tenants has already been mentioned, so it is not surprising that sometimes the middlemen find a difficulty in collecting the rents on a Monday morning, and their remedy in that case seems to be a threat to raise them still higher. It was stated by witnesses that if there were more official supervision, by means of improved local government to prevent overcrowding and to enforce sanitary requirements it would be impossible for middlemen to make the large percentages they at present secure."

This last sentence, after we have just heard that the two middlemen referred to are themselves "local authorities," is a fine piece of unconscious satire. But what we wish to point out is that here is a case of misery resulting not from a natural, but from an unnatural and immoral state of things. It is, in the first place, wrong that those whose duty it is to see that property is kept in a proper state of repair and sanitation should also be those whose interest it is to neglect this duty; it is still more wrong that they should place their interest above their duty. It is this kind of thing that leads to what we hear from sanitary inspectors and medical officers sometimes, that they dare not or cannot use all their powers in regard to sanitary improvement, because in so doing they are attacking the interests of the very persons at whose will they hold their appointment, and may be cut off not only from their own means of living, but (if they have the good fortune to be independent on that score, which probably is seldom the case) from the opportunity of doing any of the partial good which they may still effect. But is not the very root of the evil behind all this? Does it not lie in the whole facts of the leasehold system (as is, indeed, partly suggested in the above quotation), and in the fact that the great freehold owners, in this generation or a preceding one, have entirely forgotten that property on a large scale entails duties on a large scale as

* The italics are our own. These are the people who are officially concerned in seeing sanitary legislation put into operation!

well as rights? We do not accuse the two freehold owners mentioned above of wilful indifference; we should probably do them great injustice in doing so, and the same may, we hope, be said of others, though we fear not by any means of all. The more thoughtful and conscientious ones may be said to be at the moment in the grip of a system which they did not create, and which they are powerless at the moment to put down. But the fact remains that a man who is in the receipt of a large income from the leaseholders on a great property, and who confines himself to the easy duty of receiving the ground-rent through his agent, and permits the middleman, merely as the least troublesome medium to himself and his agent, to exact plunder from the poor sub-tenants on the estate without inquiry and without check, is guilty of culpable neglect of what—though the law has not yet recognised it as his duty—is no less his duty as a moral and responsible being; and the system which allows of such a state of things is in itself rotten and intolerable, and ought to be put an end to. There are those among the ground-landlords who would probably gladly assist in doing so; there are others probably who, without any actual intention of wrong, close their eyes to it out of mere indolence and indifference; like the brothers in Keats's poem—

“Half-ignorant, they turn an easy wheel,
That sets sharp racks at work to pinch and peel.”

But for all these things they must give account, and at no distant date.

As already observed, it is suggested in the first short supplementary report, signed by ten out of the seventeen Commissioners, that the system of building on leasehold land is a great cause in itself of the many evils connected with overcrowding, insanitary buildings, and excessive rents. Those whose signatures are appended to this supplementary report “are of opinion that the prevailing system of building-leases is conducive to bad building, to deterioration of property towards the close of the lease, and to a want of interest on the part of the occupier in the house he inhabits; and that legislation favourable to the acquisition on equitable terms of the freehold interest on the part of the leaseholder would conduce greatly to the improvement of the dwellings of the people of this country.” It has certainly been shown that there is great tendency on the part of ground landlords to renew short leases on dilapidated portions of a property, with the view of letting the lease fall in at the same time with other longer leases that have still a few years to run, and thus dealing with the property as a whole more advantageously and economically to themselves, and, perhaps, in some cases, in the end, more advantageously to the whole property. It has also been constantly said, ever since Carlyle's brilliant prophecy, entitled “Shooting Niagara,” in which he first suggested that the modern bricks were made to last out the short leases, that houses are built in a much more jerry manner than they would otherwise be, on account of the incidence of the leases giving them possibly but a short term of existence as the property of the builder. We incline to think that this influence of the leasehold system on practical building is somewhat exaggerated; at all events, that the man who would build rickety houses on that consideration would equally do so, in most cases at least, without the excuse of the leasehold system. But we would point out that a more stringent supervision of building by local authorities, aided, perhaps, by some additional legislation in the way of conferring upon them more arbitrary powers, would go far to check a great many of the evils for which not so much the leasehold system as the acquired and inherited tendencies of the jerry-builder are to blame. But we confess that, apart from this, we concur with Lord Salisbury's expression of opinion in his memorandum, that this question of acquiring the freehold has little to do with “the interest of the occupier in the house he inhabits,” in reference to the class of inhabitants with whom the Commission is concerned. They are not leaseholders, they are the tenants of the leaseholder; and, as Lord Salisbury ob-

erves, the power to force the sale of the freehold on arbitration, besides being “wholly novel in principle,” would, in reality, “have no other effect than to put the house farmer in the position now occupied by the ground landlord.” If the Commission mean to imply that the leasehold landlord, become a freeholder, would find it more to his interest to keep the property in good condition and to build more substantial houses on it, that may be true; but, considering the way the tenants are already ridden over by the middlemen or house farmers, it would seem a rather doubtful experiment to facilitate the accession of these gentlemen to a position in which they would be without even the nominal responsibility to a higher power which they are at present under. But what surprises us is the phrase about “the house he inhabits,” as if the tenants whose interests we are considering were themselves leaseholders, which certainly very few of them can be. The memorandum really seems to indicate a momentary confusion of ideas upon the subject.

The question of the influence of the house-farmer, however, in sending rents up to abnormal proportions, and of the want of proper thought of their responsibilities on the part of the great freehold owners, appears to us to be by far the most important one which is raised by the Report of the Commissioners, because there is here evidence of a forced state of the house-market arising from neglect of duty on the part of those who are finally responsible. Apart from the question of the sanitary condition of houses being properly looked after, and of the legislative power existing or required, which we will consider separately, this of the middleman appears to be the one great evil influence which is not due to the ordinary results of such evils as improvidence, drunkenness, reckless marriage, and over-population. A great deal of valuable though painful evidence is given on these subjects, as well as on the extent to which insufficient house accommodation in turn affects morality; but these matters are really part of a much larger question than the housing of the poor. To repeat what we have already urged, it is really of no practical use to take into account the problem of the better housing of those who, to begin with, are out of their place, are doing no good where they are, and who are hanging on the skirts of an over-stocked labour-market in the hope of picking up some precarious means of existence. They can only be housed by efforts which are really eleemosynary, and which as such can only avail to stop a gap in a way that cannot possibly be permanent. The real question is as to the better housing of the industrious poor, those who are a really valuable part of the working community. The two sides of the question in regard to them are, Can they be supplied with houses at lower rents than at present? and Can we ensure their houses being better built and kept in better condition? We have commented upon the principal light which the Report throws upon the first part of the question. In another article we will consider what it has to tell us as to the second portion of this very serious problem.

A SUGGESTION IN SEWAGE PURIFICATION.



N experiment has recently been made by a scientific man at Buxton, which may possibly exert an important influence with regard to the disposal of sewage. Nor is it a theoretic discovery alone. Works have been erected, at the cost of 4,000*l.*, for the treatment of the sewage of Buxton (which varies in quantity from 200,000 to 1,000,000 million gallons per diem), by the process to be described; and on the 9th of April the Buxton Sewage Works at Ashwood Dale were formally opened, and the occasion was duly celebrated by a public dinner.

The Rivers Pollution Commissioners have for some time past insisted that measures should be taken by the Local Board of Buxton to rid the Wye of the poisonous contents of the drains. In the case of a town chiefly

known as a health resort, the subject assumed even more than usual importance, and a deputation of the Local Board took the wise step of visiting various sewage works, of which the principles had been recommended for their adoption. They went to Birmingham, where they found a sewage farm, and also a long series of tanks, and pronounced the system a failure. No fish would live in the water. They went to Bilston, where the filtration system has been adopted. It was not, however, satisfactory. They also visited Coventry, where they saw the operation of the grinding-machines, on what is called the black-ash system, in which sulphuric acid is used. That they considered the best system they had seen. At Leamington they saw an immense sewage-farm, for the effluent of which, produced at a cost of 1,100*l.*, 400*l.* was received. This they regarded as a heavy loss, and a plan that would not answer at all. They visited Hertford, where phosphate of alumina is produced by the Phosphate Manure Company. That plan they found would cost 8*d.* or 9*d.* in the pound on the rates, if applied at Buxton. It does not appear from the report under what conditions Dr. Thresh was called in to advise; but this gentleman, in the course of experiments made from time to time as to the defecation of sewage, was led to examine the water flowing from an old coal-pit, which ran to waste in the Wye, disfiguring the Public Gardens of Buxton by its course through them. This water is, in fact, a strong chalybeate spring. It contains salts of iron, aluminium, sodium, calcium, and magnesium, chiefly as sulphates, but a considerable portion of the iron is in the form of a carbonate held in solution by carbonic acid. From 1.2 to 2.4 grains of metallic iron occur in the gallon of this water.

The effect of this iron water on the sewage is remarkably prompt. The method adopted has been to mix with this natural water a certain proportion of milk of lime, and then to allow it to mix with two or three times its volume of sewage. By agitating gently a flocculent precipitate forms, and rapidly settles, leaving the supernatant fluid beautifully clear. Analyses made by Sir Henry Roscoe at Owens College are appended to the report of Dr. Thresh, from which we abstract these particulars.

Additional interest attaches to this method from the fact that its principle is much the same as that first applied at Antwerp by Professor Bischof to the purification of the waters of the River Nethe by passing them through a mixture of spongy iron and gravel. The effect of iron in the destruction of organic matter suspended in water has thus not only been previously known, but the plan has been acted on, on a considerable scale, at the Antwerp Waterworks. In 1878 Mr. Bischof, as appears from the Proceedings of the Royal Society, advocated the use of finely-divided or spongy iron as a medium for the filtration of water. It was demonstrated, according to Dr. Frankland, that filtration through spongy iron destroyed much of the organic impurity, removed colour, precipitated finely-suspended solid matter; and, above all, destroyed the germs of putrefaction, and, probably, those of all kinds of epidemic disease. In 1879 a filtering apparatus was erected at Waelhem for the filtration of the water of the Nethe. A cast-iron tank, 18 ft. 6 in. square and 11 ft. deep, was coated at the bottom with cement concrete, covered with bricks on edge. On the bricks was laid a mixture of three parts of gravel with one part of spongy iron, 3 ft. thick, which was covered with 18 inches of fine sand from the Meuse. A second filter of a similar kind was placed at a lower level, so as to receive the water that had passed through the first. The results were so satisfactory that large works were undertaken, a description of which will be found in Vol. 72 of the Proceedings of the Institution of Civil Engineers. After eighteen months' experience, it was stated at the Conference on Water Supply held at the International Health Exhibition of 1884, by Mr. Anderson, M. Inst. C.E., that, as far as the purification of the water went, Prof. Bischof's process left little to be desired; but that the working of the system had been costly.

The increasing demand for water rendering extension of these works necessary, Mr. Anderson, M. Inst. C.E., whose duty it became to advise the directors of the waterworks, made an experiment, suggested by Sir F. Abel, on the principle of passing iron through the water, instead of passing water over the spongy iron. Mr. Anderson constructed a revolving cylinder, 4 ft. 6 in. in diameter, and 5 ft. 6 in. long, which was furnished with inlet and outlet pipes, and also contained shelves or ledges for scooping up the iron used, raising it to the top of the cylinder by the rotary motion, and thus letting it fall through the water. Running water through this cylinder at 12 gallons per minute, which gives a contact of about forty-five minutes, Mr. Anderson found the water to be very heavily charged with iron. At a flow of 30 gallons per minute, 1.20 grains of iron were dissolved per gallon, which was twelve times as much as the experience at Antwerp had shown to be necessary. At 60 gallons per minute 0.9 grain per gallon was dissolved. The result of the trial proving thus successful, the revolver was sent to Antwerp, fitted with large pipes, which sent 166 gallons per minute through it, and has been at work there ever since.

Thus the history of the application of iron to the purification of water comprises a number of independent experiments and discoveries, made by different men. More than twenty-five years ago Dr. Medlock and Mr. Quick, C.E., made a number of experiments on the purification of Thames water by metallic iron. The water of the river at Battersca was left in contact with iron wire and plates in a large tank, for twenty-four hours, and the improvement in quality was very marked. It is well known to naval officers (and has been mentioned in the columns of the *Builder*) that water stored in iron tanks that have been white-washed inside becomes remarkably pure and sparkling, and that the rapidity of distilled water is removed by such storage. The Antwerp filters represent a further step in the same direction; although the propriety of the mixture of gravel with the spongy iron has been called in question. Sir F. Abel's suggestion is marked by extreme elegance; as the weak point of all filters, that of becoming choked by their own action, is avoided by the very ingenious reversal of the usual method of producing contact with the metal. A no less original step has been taken by Dr. Thresh; and the review of the advance made in twenty-five years leads to the conclusion that much yet may be done towards the perfecting of the use of iron as a purifier of water.

Dr. Frankland, an unquestionable authority on the point, states that bacteria, which are indestructible by an atmosphere of pure oxygen, of carbonic acid, of nitrogen, of sulphurous acid, and of cyanogen, are killed by a short contact with iron. As all the known forms of bacteria are affected in the same way, it is thus probable that all forms of bacterial life will be thus destroyed; and iron is the only known substance which produces this effect. Thus far, therefore, the progress of the application of iron may be taken as highly promising.

Several questions, however, remain for solution. Mr. Anderson, Dr. Frankland, and other authorities describe the action of iron as rapidly destructive of organic as well as of organised matter. In the case of the water of the Nethe, which is very impure, a contact of nine minutes is enough to dissolve 0.9 grain of metallic iron per gallon, and a contact of three minutes and a half, which presumably will not dissolve much more than 0.3 grain per gallon, is found to be more than adequate to effect purification from organic suspended matter. Indeed, the waste of iron during thirty-three days is stated at 0.176 grains per gallon of water run through the cylinder. Dr. Thresh, however, speaks not so much of destruction as of precipitation, and even says that 100 parts of dry residue from the Buxton tanks contains fifty per cent. of organic matter. The difference is cardinal. But the Burbage chalybeate water contains, together with from 1.2 to 2.4 grains of iron per gallon, fifty grains of mixed crystalline sulphates. It is thus evident that when to this heavy proportion of mineral matter is added the milk of lime

thrown in to hasten precipitation, the total amount of sludge formed must be far in excess of the inorganic elements of the sewage. It is in the mass of sludge that has in some way to be got rid of that the essential weakness of all precipitation processes lies. In the present case it is intended simply to cart away the sludge in a moist state, and put it on land belonging to the Board. This mode of disposal, as Dr. Thresh justly remarks, cannot go on for ever, and sale of the sludge for manure is evidently looked forward to as a resource. Indeed, the presence of so large a portion of organic matter in the dry residue is evidently regarded as increasing the stimulating value of the manure. Now it is on the rock, or rather the quicksand, of the profitable disposal of the *residua* of city life that most of the schemes for sewage disposal have hitherto foundered. The true chemical value of the contents of sewage is so low as hardly ever, if at all, to be worth the cost of extraction. And the other materials, put in as precipitants, or added to "fortify" the manure, can usually be applied much better in their natural state to agriculture than as constituents of the heavy and unmanageable sludge. As far then as precipitation of organic matter takes the place of destruction, and as the addition of lime to the heavy chemical charge of the chalybeate water is required, the results which may be expected from the Buxton process by no means come up to what we think may yet be secured from the brilliant discovery of Dr. Thresh.

The works recently opened have been constructed by Mr. Joseph Hague, A.M. Inst. C.E., the Town Surveyor of Buxton. The chalybeate water is conveyed by gravitation through earthenware tubes, with joints of jute, spun yarn, and cement, from a disused colliery at the foot of the Axe Edge Hills for a distance of over two miles. It then enters a tank at the rear of the liming-rooms, adjoining the works, which are situated between the river Wye and the Midland Railway, in Ashwood Dale. A series of flushing-chambers, supplied with penstocks, is introduced at suitable places along the route, with a view to supplying the carts for street watering.

The liming and mixing rooms are erected over the River Wye, on a semi-circular stone arch, the liming-room floor being on a level with the adjoining highway, and connected with a siding on the Midland Railway by a tramway. One of Messrs. Bowes Scott & Read's liming machines supplies a cistern of 800 gallons capacity, which is provided with an agitating apparatus. The machinery is driven by an over-shot water-wheel, 16 ft. in diameter and 3 ft. wide, driven by water derived from the River Wye.

Outside the liming and machinery rooms are duplicate brick tanks, into which the main outfall sewer discharges. The tanks are furnished with wrought-iron screening-wagons, for the purpose of abstracting the solid and floating matter, which is estimated at 75 per cent. of the whole sediment. After passing through the screening-wagons the sewage runs through a brick conduit into a circular water chamber, furnished with horizontal paddles, where the iron, lime, and sewage, are thoroughly mixed; thence the mixture flows to the settling-tanks, the series of which is 266 ft. long by 73 ft. wide, built of brick in cement, with concrete bottoms. The bottom of each tank is an inclined plane, 3 ft. 6 in. lower at the entrance than at the exit end, an arrangement that has been found fully adequate to retain the deposited sludge. After passing through the tanks the effluent water finally escapes over a weir, and so into the river. It is stated that the cost of the erection and maintenance of the works will be covered by a rate of 1½d. in the pound.

The interest locally taken in this undertaking is very great, and the good example set by the Local Board of Buxton in visiting the sites of the various works suggested to them for imitation cannot be too well known. The plan may prove, however, to have much more than a local interest. Chalybeate water is of rare occurrence, and it is possible that the exact conditions utilised by the skill of Dr. Thresh and Mr. Hague may be unique,

But the attention that these works will cause to be given to the use of iron as a purifier has a wider scope.

NOTES.

THE appointment of a Parliamentary Committee to consider the subject of Irish industries is, so far, an encouraging sign, inasmuch as it shows that other ideas beyond those of rebellion and disloyalty are being allowed to creep in, and that the industrial resources of Ireland, hitherto most unaccountably neglected in official quarters, may have a chance of being properly inquired into. Some two years ago a good deal of attention was devoted to them by the Statistical Society and the press generally, but the hopelessness of restoring lost confidence and attracting capital rendered all proposals abortive until the dangers of the situation should be abated and the country be again in a condition to be regarded as having a *mens sana in corpore sano*. Few would pretend that, under the existing political difficulties, this millennium has yet arrived; but nowadays we are thankful for small mercies, and are, therefore, disposed to view the present move with some degree of sanguineness. Ireland possesses extensive coal and iron fields, with other mineral wealth of more or less value, but mining industries have never flourished, although history attests that it once had a fairly prosperous iron trade. The woollen trade was unmistakably brisk, but was killed by English jealousy and injustice; and the linen trade, originally introduced by the Huguenot refugees, is the only manufacturing industry on a large scale that remains. Even under this head the cultivation of flax is diminishing annually, although there is no reason why its growth should not be an agricultural feature of Wicklow, Cork, Kerry, and Connaught, just as it now is of the counties of Ulster. The directions in which Irish industry should be encouraged are those of a *la petite industrie*, which does not involve a large capital, but rather a patient and judicious endeavour to adapt the occupation to the character of the soil and the population. Adverse circumstances have contributed to make the Irish peasantry unreliable, unadaptable, and difficult to move out of the beaten track, but that this is not their real nature, is evident from the readiness with which they become skilful artisans when away from home. The question of Irish fisheries is one of immense importance, and, if they were properly developed, employment could be found for the whole of the South and West, to the enormous benefit of English fish-consumers; and, besides this, the materials for a vast canned food trade, second only to that of the United States, are all there, only awaiting a reasonable amount of energy and organisation. Were this industry set on foot, the other great desideratum of Ireland, viz., cheap railway communications, would soon follow, bringing many other industries in their wake.

MR. EDWIN CHADWICK has just published a somewhat incisive pamphlet styled "Commentaries on the Report of the Royal Commission on Metropolitan Sewage Discharge, and on the Combined and Separate Systems of Town Drainage." Mr. Chadwick contends that, instead of employing remedies to diminish the noxious results of discharging putrid sewage into the Thames at the outfall, measures should be taken at the point of discharge from the houses themselves to secure the removal of sewage while it is fresh, and before it has commenced to decompose, as therein lies its commercial value to the soil, a value which, he maintains, notwithstanding all assertion to the contrary by specialists, is but manifold more than the cost of its removal and application. He likewise denounces the plan of conveying the whole volume to a single outlet, and asserts that the scheme for radiating sewers in several chief directions, as has been adopted for the city of Berlin, could even now be carried out for London at far less expense than the estimated cost for remedying the

existing faulty arrangements. Mr. Chadwick runs a tilt also against the water supply, which he asserts is in amount more than double what it need be, and consequently greatly aggravates the evils inherent in the combined system. Its effect on the sewerage of the metropolis may be admitted, but though there is doubtless considerable waste in the method of distributing the water supply, yet that there is or can be a superabundance of water, or that the sources of supply should be drawn solely from subterranean reservoirs, are points certainly not yet established.

THE assent of the Committee of the House of Lords to the Manchester Ship Canal Bill has of course been received with the utmost satisfaction in Manchester, and admiration is at least due to the steadfast resolution with which the Chairman of the Provisional Committee and his supporters have devoted time, money, and high ability to support a fight in which they have been twice defeated. But the one fact given in evidence by the late Mr. Spence, that cotton could be sent to and fro between Liverpool and Manchester cheaper by road than by railway, is enough to explain the anxiety with which Manchester has watched the progress of the Bill. The possible effect of the work, even in the form now proposed, upon the scour of the Mersey *embouchure*, is, however, a matter to be very carefully considered.

WE are obliged to the *Saturday Review* for the light which it has thrown upon the spirit in which the Committee for the "Restoration" of Westminster Hall has been carrying on its proceedings. As the solution proposed by Mr. Pearson was also the one favoured by the Chairman of the Committee, we are informed that "the Committee resolved itself into a pleasant family party for editing his Report." This state of things is exactly what we hinted at some time since. The Committee was formed not to examine the question on architectural grounds, but to assist Mr. Shaw Lefevre in carrying out his own ideas. The *Saturday Review* repeats the unwarrantable assumption of the Report of the Committee, that the opposition to its scheme was entirely on the part of a set of people representing a "distinct school of archaeological opinion," viz., the "Society for the Protection of Ancient Buildings." The Committee chose to summon some members of this Society, but the statement that the opposition proceeds from them only is a quiet assumption on the part of the members of the Committee, entirely contrary to fact. It is a curious coincidence that the main supporters of the scheme in the press are the *Times* and the *Saturday Review*, the proprietors of both which journals are members of the majority on the Committee.

THE two cases of *Dunston and of Seely v. Neal*, which were actions heard together last week, and which were brought by a tenant and a landlord of property at Streatham, against the owner of a brickfield, will cause satisfaction to many householders, for Mr. Justice Cave granted an injunction to restrain the burning of bricks in such a way as to interfere with the comfort of the plaintiffs. The Streatham brickfield is not the only one which causes much discomfort to many people, and it is not improbable that householders will take heart from this case, and endeavour to restrain the operation of other brickfields. We much regret to perceive that the judge reflected strongly on the conduct of the sanitary inspectors of the Wandsworth Local Board, because it shows that Acts of Parliament are useless unless those who administer them can be depended upon to perform their work in a thorough manner. "The officers of the Local Board of Health impressed him," said the judge, "very unfavourably by the way they gave their evidence. The nuisance arising from the burning of soft coal had been going on for four years, and so had the nuisance from the heap of house refuse; yet the local inspectors had found out nothing about it. This consideration materially affected the

credibility of their evidence, especially when he remembered that Bartholomew and Finister, two of those witnesses, the latter the inspector of nuisances, gave their evidence with a strong bias in favour of the defendants." In brief, the judge found that these officials had, in the first place, neglected their duty, and in the second, instead of maintaining a proper impartiality, had actually sided with the person who had committed the nuisance. In view of certain portions of the recently published report of the Royal Commission on the Housing of the Poor, this portion of this recent case is noteworthy. Everything points to the immediate necessity of looking after our sanitary guardians very sharply indeed.

IT has been decided to hold a Great National German Exhibition of Industry and Art at Berlin in the year 1888. Among the guarantors are the Council of Merchants, who have voted 100,000 marks, and the Berlin Town Council, who have granted an equal sum towards the preliminary expenses, and to make up any eventual deficit. It is intended to ask both the Reichstag and the Prussian Parliament to contribute separate grants to the guarantee fund. It was at first resolved that there should be no foreign exhibitors, but the propriety of inviting Austria-Hungary, as the close ally of Germany, to participate in the exhibition has been mooted, and finds many supporters. The site selected for the exhibition is the charming park of Treptow, one of the suburbs of Berlin.

PROFESSOR KERR seems to have amused the last Annual Meeting of the Institute, as reported in the Transactions, with some useful if not agreeable truths. He makes out that each meeting costs 212*l.*, and wanted to know (troublesome people these who "want to know") what we got for it. He can remember the time when the Institute defeated a Government in the House of Commons (in regard to the Exhibition Building of 1862); he says we cannot do that now. He remembers when Lord Palmerston called the Institute in to strengthen his hands to carry a point in the House of Commons, and carried it. "No Prime Minister sends for us now!" he remarks. We may suggest that the fault, perhaps, lies partly with the House of Commons. There is an old Greek story of a philosopher who was asked by a king why philosophers were always found coming to see the kings, and the kings never came to see the philosophers. He replied that philosophers knew what was good for them, and kings did not. The House of Commons, perhaps, does not know what is good for it, and follows the lead of self-appointed amateur architectural critics. But part of the result is also due not to the Institute, but to those who stand apart from it and do not strengthen its hands as they might and should. Then they complain that the Institute does nothing for the profession. Why do not they come forward and set a practical example?

SINCE the year 1867 there has existed in Heidelberg a society for the protection, and, when necessary, restoration, of the castle. This year the society takes a new departure, it issues the first number of a series of "Mittheilungen," which are to appear at irregular intervals, and which will deal with the history of the building. The object of the publication is a laudable one, *i.e.*, to ensure that any work undertaken in restoring the castle should be based on a thorough acquaintance with every detail of its past. Such names as those of Professor F. Von Duhn, professor of archaeology in Heidelberg, and Dr. Woermann, director of the Dresden Gallery, are sufficient guarantee of the character of the work done. The society has its members in Italy and even America. At present England is represented honourably, but singly, by Prince Albert Victor; his example should be followed by all lovers of Renaissance architecture. The subscription is only three marks yearly. Probably life membership at fifty marks will commend itself in England.

A PARIS correspondent writes:—"The situation of the architects of departments, towns, and communes is threatened throughout France; not only do the frequent political changes in the offices of prefects and mayors render the position of the architect very precarious, but now an administrative measure is threatened which will strike a fatal blow at the profession. The 'Conseils Céntraux,' as regards the departments, and the 'Conseils Municipaux,' as regards the towns and communes, are more and more disposed to mix up works of architecture, properly so called, with those of roads, sewers, &c., and are anxious that the Civil and Government engineers and road agents should be entrusted with the direction of architectural works. The question will no doubt be brought before the thirteenth session of the Annual Congress of Architects in June next."

THE Scottish National Portrait Gallery is now an established institution of the country, although, in the meantime, the nucleus of the collection is only accommodated in a temporary brick building. This erection (which was opened to the public on Saturday, the 9th inst.), occupies the extreme eastern portion of the ground required for the permanent gallery, and consists of a single room 60 ft. by 20 ft., lined with timber, which is stained a dark brown, lighted from the roof, and warmed by hot-water pipes supplied from a furnace outside. The collection comprises 113 works, most of which are of great historical interest and artistic value, and which were included in the large collection exhibited last year in the rooms of the Royal Scottish Academy. The Scottish National Portrait Gallery originated in the offer of 10,000*l.* from an anonymous gentleman upon condition that a like sum should be provided by the Treasury. That sum was voted by Parliament. The same gentleman thereafter offered a further sum of 20,000*l.* for the purpose of erecting a building to accommodate the Portrait Gallery and the Museum of Antiquities upon condition that a suitable and isolated site should be provided. The present site, at the south-east end of Queen-street, was accordingly purchased at a cost of 7,500*l.*, of which 5,000*l.* was voted by Parliament, the remaining 2,500*l.* being provided by the Scottish Board of Manufactures from their own funds. The site secured has a frontage of 260 ft. to Queen-street and a depth of 70 ft. The permanent building, the designs for which are in the hands of Dr. Rowand Anderson, will consist of a centre and wings, and be of three stories with a basement at the back; the ground and first floor will be lighted from the sides and the upper floor entirely from the roof. The style adopted is Gothic of the best period (thirteenth century), and the elevations bear the impress of that mastery of detail which characterises the works of the architect.

ON Friday, the 8th, took place in Paris the election of a President of the Association of Painters, Sculptors, and Architects, as successors to the late M. Sommerard. M. W. Bouguereau, the eminent painter and member of the Institut de France, has been elected by forty-nine votes, as against forty-two for his competitor, M. Roger-Balla. The slight difference between the number of votes, M. Bouguereau having only just obtained the number necessary for election, in spite of the support given him by his colleagues of the Institute of France, and the number of votes obtained by his young competitor, indicate the tendency among the French artists at present to restrict the very dominant influence of the Institute.

A COMPETITION has been announced in which prizes will be given for the best designs for Irish lace, to be sent in to the honorary treasurer, Mr. Alan S. Cols, at the South Kensington Museum, on or before the 15th of July next. The several varieties of Irish lace-work are defined as follows:—(1) Flat needle-point lace; (2) raised ditto; (3) tape lace, with needlepoint fillings; (4) cut cambric, to imitate lace-work; (5) embroidery on net; (6) drawn-linen embroidery; and (7) crochet. The prizes vary from 5*l.* to 15*l.*,

and the work premisses will become the property of the promoters of the fund. The useful caution is given that "a more careful copy of a natural flower, leaf, or spray, or group, does not constitute a suitable ornament. The designer must give that ornamental character to subjects derived from the study of natural objects which is essential in the composition of patterns suitable for execution." At the time of the Irish Lace Exhibition at the Mansion House, we commented on the fine character of some of the work, and are glad to find that an effort is being made to further stimulate its development. The names of Lord Cardingford and Earl Spencer stand at the head of the list of promoters. Further particulars can be obtained from Mr. Alan S. Cole.

MR. CHAS. WALLIS has produced, for Messrs. Winsor & Newton, a small "Dictionary of Water-colour Technique," mainly intended for amateurs, and prefaced by a very useful series of preliminary "practical hints" on materials and manipulation. The dictionary portion we presume may be useful in furnishing starting-points and finger-posts for the guidance of those who are taking up the art, though probably Mr. Wallis will agree with us that recipes of this kind are not of much use except where there is very decided initial ability to turn them to account. The arrangement of every kind of subject in alphabetical order produces rather a singular combination. "Aerial tint" is followed by "Anchors and Chains," "Brook (see River)" by "Brown Madder"; "Mars Orange," "Meadows," and "Mist" follow in succession. Special colours and combinations are given for such things as "hedges" and "palings." May not hedges and palings be almost any colour, materially, in reference to conditions of light, general scale of the drawing, &c.? And can we really specify pigments for "cottage chimneys," "cottage roofs," "shadows on house" (on what kind of house?), and "stones"? The combinations may be labelled "David Cox," but the student will probably be rather disappointed if he hopes to catch Cox's mantle in that way. The intention is good, but there is something dangerously mechanical in the view of the subject that may be thus induced in the mind of the too confiding aspirant.

ARCHITECTURE AT THE ROYAL ACADEMY.*

MR. J. D. SEDDING'S work is often admirable and always interesting from its originality and freedom from the trammels of prejudice and mere tradition. His proposed new church in the diocese of Ely (1,753-66-97) is a very characteristic example of his manner. A curiously irregular site has provided scope for his ingenuity in planning, which he has exercised without stint. A nave, some 45 ft. wide, is separated from a wide north aisle by an intermediate narrow aisle or passage, which is carried quite round the church. The principal entrance to the church is by an internal western porch, carrying a gallery, but not designed to accommodate the organ, which is placed in a bay on the south side of the chancel. Flanking turrets give access to a gallery or triforium in the thickness of the east wall, the use of which is not clearly apparent. The eastern gable is surmounted by a "rood," and the conventional crosses on the other gables are omitted, although an indication of some irresolution on this point in the architect's mind is afforded by a pencilled cross which has been added to the finished drawing. The altar itself is raised upon twelve steps above the nave-floor level, and is separated from the east wall sufficiently to admit of the continuation of the narrow aisle or passage-way above referred to. Both the nave and aisle are covered by almost flat wooden ceilings with moulded ribs, but without any descending principals to mark the bays. The arches dividing the nave from the aisle are low and almost semi-circular, the central member of the piers being carried up and finished by pointed arches of high pitch, under which lofty side windows are

placed, with niches on each side of them. A band of formal and uninteresting gables runs along the sides of the nave just above the heads of the lower arches. The transverse section shows a suggestion for a large fresco of the Crucifixion in the east wall, which is traceried on the exterior, but unpierced by any windows. It is undoubtedly a clever, and, in many respects, a thoughtful design; but the detail is not exceptionally good, and we are somewhat doubtful as to the general effect.

St. Saviour's Church (where?), by the same author (1,811), is a long church, without aisles, and the design includes an attached presbytery. It is marked by the originality evident in all this architect's work, who has, however, in this instance carried a daring eclecticism to the extent of adding a Queen Anne turned wooden balustrade to an otherwise vigorously Gothic building. Those who admire Mr. Sedding's work extremely,—and he has many admirers,—will scarcely follow him to this length, nor will they yield unreserved assent to the sprawling quasi-Flemish tracery which covers his blank eastern gable. An unusual, if not an unprecedented, feature in the design is a doorway for the clergy pierced in the eastern wall, immediately behind the principal altar. The whole can scarcely be considered as an artistic success, although the severest critic could not accuse it of being commonplace.

We cannot but regard as of doubtful propriety the proposed reredos for Canterbury Cathedral (1,761), exhibited by Mr. John O. Scott, the central portion of which is a solid mass of carved and gilded woodwork, carried to the height of the caps of the main arcade. The open portions of the screen on either side are the centre with the piers on either side are as light as the central is heavy. It would, we submit, be a mistake to block out the charming vista afforded by Becket's crown by any such erection as is here proposed, be it ever so beautiful in itself,—a character which, so far as this drawing enables us to judge, by no means belongs to it.

Mr. Blomfield sends a careful geometrical elevation of his proposed south transept front of Chester Cathedral (1,788), and Mr. Reginald T. Blomfield, in addition to his excellent sketch of a "Madonna" finial at Clermont Ferrand (1,788), to which we have before called attention, sends a drawing of the Interior of Beckley Church (1,744) as restored by him. It is evidently a conscientious restoration, conservative in spirit and honestly delineated.

In the same category, we place the little Church at Alfrick, Worcestershire (1,828-9), as restored by Mr. Aston Webb. The interior shows a wagon-roofed chancel displaying its section towards the nave, the western truss forming a kind of wooden chancel arch with agreeable effect, the space above the tie-beam being filled in with half-timbered work. The whole is plain to severity; an elegant Late Decorated chancel screen, with traceried panels, being nearly the only ornamental feature in this otherwise unadorned little church.

In the design (now abandoned) for the spire for Peterborough Cathedral (1,798, 1,800), Mr. Pearson is seen at his very best,—grave, academic, correct, singularly graceful in outline and in detail. It is an eminently satisfactory effort. The Norman stage is surmounted by Late Decorated work of severe and simple beauty. The spire is "broached" and set behind a battlemented parapet, the pinnacles at the angles of the tower being supplemented by a second series of higher elevation astride of the broach, repeating an arrangement seen in one of Mr. Pearson's earliest and best works, the beautiful church in Bessborough-gardens. If this tower had been executed as designed, Peterborough might have challenged comparison with the best of our English cathedral spires,—Norwich, Chichester, or perhaps even Salisbury.

The tower and spire designed by Mr. Belcher for the church in Gordon-square is Early English in character, with a dash of French feeling in the detail; the outline and proportions are graceful and well studied, and the whole is well shown in a vigorous brush drawing by a well-known artist, who appears to better advantage here than in a characteristic drawing in pen and ink, illustrative of a block of business premises by the same architect. The courageous boldness of the sky is simply amazing. "My young remembrance cannot parallel a fellow to it," and the courage of the designer who could endorse this very free translation of his design is not less remarkable.

A very business-like drawing, comprising a plan and three elevations of the church of St. Mary Madley (1,822), by Mr. F. R. Kempson, shows a restoration of an interesting church which has been accomplished apparently with both skill and judgment. We "desire better acquaintance" with drawings of this nature, which show clearly and without trick or finess what has been done and how the architect has acquitted himself of his task. A drawing of the fabric in the condition in which it was placed in the architect's bands would usefully complete the record.

In connexion with this part of the subject we may note some excellent Renaissance glass by Messrs. Heaton & Butler (1,834), some very beautiful domestic glass by Mr. P. H. Newman (1,778), a window by Messrs. Ward & Hughes (1,782), and another by Mr. Dixon, which, beautifully designed and drawn, has, however, not a single speck of pure colour, which is, after all, the glory of stained glass. We must not omit to mention a charming and highly-finished study for wall decoration by Miss (?) Ella M. Bedford; and we may perhaps be allowed to wonder how 1754 contrived to find itself in such company.

The inscrutable decrees of Fate and hanging committees had almost cheated us of a sight of a beautiful drawing by Mr. Raffles Davison, showing the restored interior of St. Mark's, Worsley, by Mr. Kail Freeman (1,823), a most artistic rendering of excellent work, though, like Thackeray's Prince,—

"Condemned to foot it in the dust
While others to the saddle vaulted."

The present exhibition affords ample evidence that in the domain of ecclesiastical art there is not only abundance of skill, but steady progress, and that the nineteenth century will be able to show a more than creditable array of really beautiful churches.

THE INVENTIONS EXHIBITION. MACHINE TOOLS.

ONE of the most interesting sections in the Exhibition is that devoted to machine-tools, and amongst the examples shown there are a good many novel features which really deserve to be classed as inventions in the present day. We will briefly notice some of the most important exhibits in this class, returning to a few of these more especially interesting to us for a more detailed notice at a future date.

Before proceeding to do this it may be out of place to give a glance at the preface to this section, which appears in the official catalogue. The whole of the prefaces in the catalogue this year have been contributed by eminent authorities in their respective departments, and Mr. Trendell, the literary superintendent, has been especially fortunate in securing Professor W. C. Unwin for the group now under consideration. We have, in the present day, become so much in the habit of looking on the simpler machine-tools as the necessary adjuncts of civilisation that it will doubtless surprise many engineers to learn that the first planing-machine was introduced only sixty-six years ago, and the first slotting-machine nine years later still. The origin of the lathe is, we believe, lost in the mists of antiquity, but a modern machine lathe is so different a tool to the old treadle lathe with its wooden bed that the one can hardly be identified with the other.

Professor Unwin divides metal-working tools into the following classes:—

1. Compressing machines, such as steam-hammers, power hammers, riveters, and forging presses.
2. Abrading machines, including grindstones, emery wheels, polishing-machines, and the less properly-formed rose-cutters and mill-cutters.
3. Shearing-machines, such as ordinary plate-shears and punching-machines, in which the material gives way over a large area simultaneously in the plane in which the cutting edge produces a tangential stress.
4. Cutting-machines, in which a properly-formed cutting-tool removes the material stroke by stroke, or by a continual spiral cut over a surface of a required form.

The Exhibition is to illustrate the progress of invention since the date of the last great International Exhibition in London twenty-three years ago. Nearly all the machine-tools at

* See pp. 607, 650, ante.

present in use were, as Professor Unwin points out, introduced before the commencement of this period; and, therefore, in order to be strictly within the scope of the Exhibition, whole machines can only be introduced incidentally, as it were, in order to illustrate improvement in detail. By these details, however, the vast strides made in the progress of engineering practice have been rendered possible, and the cheapness with which machinery of all kinds can be turned out in the present day may be almost wholly attributed to the advance in machine-tools, more especially labour-saving tools. As a general rule, the more simple a tool the greater is the skill required in its use. For instance, only long practice will enable a workman to handle a chisel or a file with facility, while mere boys are often seen in charge of the most complex machine-tools. This is well illustrated by the productions of some of the large engineering establishments now found in most manufacturing districts in Great Britain, in which we often find young lads, by the aid of some special tool, which is capable of producing only one particular article, doing work that would have required, a few years ago, the best attention of a highly-skilled workman. There is probably no better illustration of the value of special tools than is to be found at the Otto Gas Engine Works of Messrs. Crossley Bros., of Manchester, in which, by the adaptation of each machine-tool to only its own work, there is no possibility of anything but accuracy being reached, and much troublesome lining off, in which, with the greatest care, some error is likely to creep in, is avoided. Another instance we might quote is that of Messrs. Tangye Bros., of Soho, who by the use of copying-machines and special tools are able to turn out well-finished and accurate work, such as could only be obtained otherwise by the most highly-skilled and painstaking labour.

To return, however, to Professor Unwin's classification: amongst his first group reference is made to the early form of steam-hammer, in which the blow was entirely due to the weight of the descending tup; but steam is often admitted above the piston now instead of only on the return stroke. Ryder's forging-machine, in which a series of rapidly reciprocating hammers are driven by eccentrics, is referred to, and also the pneumatic hammer introduced by Messrs. Player Bros., of Birmingham, in which the tup cushions into an air-tight cylinder. Reference is also made to the drop-hammer, in which a weight or ram is lifted by being grasped by friction rollers. These release their hold at the necessary moment when the hammer falls by its own weight. Very heavy forgings, such as ships' anchors, are made with such a hammer as this. Another and simpler type of drop-hammer consists of a weight attached to the end of a belt placed over an overhead pulley. So long as the belt is loose, the pulley slips beneath it, but on the operator putting his weight on the other end, the weight is drawn up, and falls by its own gravity when the tension is released. Large numbers of the parts of small engines are forged in dies by means of this apparatus.

Among machines of abrasion the emery-wheels naturally occupy Professor Unwin's first attention. These, as is well known, are artificially made, and can be turned up true by a diamond tool. Dry grinding with the emery-wheel is much used now in place of the file for getting up bright work, but skill is required in the operation. The same may, of course, be said of filing, but there are lots of men who can use a file fairly well, while the same cannot be said of the emery-wheel, outside special work. The applications of the sand blast are also mentioned, the use of which appears to be mainly confined to sharpening files, but that there is a promising field for this invention there can be little doubt.

Amongst cutting-machine tools the improvements made within the last twenty-three years have been extremely numerous, the competition from the United States (in which American ingenuity enabled our Transatlantic cousins to attain success in spite of many disadvantages) having resulted in a great many new appliances, either borrowed or of native growth. Amongst these, cast-iron lathes, separate tool-holders, hollow mandril lathes, self-centering chucks, improved return motion for planing-machines, slot-drilling, and twist-drills, the latter with their special grinders, may be mentioned.

One of the most important changes within

the last few years has been the more general introduction of milling cutters for general engineering work up to certain moderate sizes. We believe that the small-arms makers first used these tools on a large scale, and for such work as the actions of guns, in which a few parts have to be reproduced a vast number of times, milling machinery is especially well adapted. Milling is used for much larger work at the present time, Messrs. Smith & Coventry making a cutter to mill over a surface 3 in. wide. Much of the special work in Messrs. Tangye's well-known engines is done by milling cutters which will produce almost any contour, so long as there is no undercutting, the cutters being often built up of two or more parts.

The first exhibit in Group X, under which the machine-tools are classed, is that of Messrs. A. Ransome & Co., of Chelsea. Up to the present time full arrangements have not been made here, and all the tools are not in place, but judging from appearances there will be another machine coopeage such as attracted so much attention at the Fisheries Exhibition. In another part of the building this firm shows two examples of tree-felling machinery. These consist of a saw-blade attached to a piston-rod working direct from a steam cylinder. Probably connexion would be made to a portable boiler by means of a flexible pipe. The saw can be set to any angle. Close to Messrs. Ransome's stand some very interesting stone-working machinery is exhibited by Messrs. Brunton & Trier, of Westminster. The principal tool is a geared lathe, 12 in. centres, for turning granite columns. Two circular steel cutters work one on each side of the lathe bed, being carried by appropriately formed slide rests with automatic feed. The head stock in outward appearance is much like that of a metal turning-lathe of massive construction. For traversing a cutter-holder is used, taking a circular cutter, a special place being arranged in the tool-holder for the purpose. For granite and hard limestone steel cutters are used, but for gritstones, sandstones, and freestones chilled iron answers perfectly, the edge being as hard, or even harder, than steel. The steel cutters shown at the Exhibition, which were employed in turning up a granite post at the time of our visit, are conical in shape, but they are sometimes made in the form of flat discs. The cast-iron cutters are always conical, the advantage being that the edge is always on the chilled surface. Cutters are fixed on the chuck spindles by means of a split nut, and when properly set up never get loose while working. These lathes are made from 8 in. centres and 6 ft. long in the bed up to 20 in. centres, and 21 ft. long. They have usually double expanding beds for turning taper columns. It is said that an ordinary attendant will do as much work in one day with this tool as a skilled man will get through in a fortnight. There will be some other interesting stone-working machinery in this stand shortly, and we shall make further reference to it. Mr. H. R. Marsden, of Leeds, also shows stone-working machines, the principal amongst which is an improved form of his well-known stone-breaker and ore-crusher. In the older machine the power was conveyed through an eccentric motion, but this has been improved on by substituting a crank and adding a lever for working the jaws. This lengthens the bed somewhat, but the gain is no doubt very apparent in practical work. A modification has been also made in the movement of the jaws. The motion is first a striking one, followed by a rubbing or grinding action. This is obtained by an ingenious cam motion. A pulveriser, having a similar jaw-motion, is also shown. Another stone-breaking machine is shown by Mr. Robert Broadbent, in the same court. This is an improved form of Blake's stone-crusher, to which has been fitted a positive draw-back motion.

Messrs. Tangye Brothers, of Birmingham, show a novelty in machine tools in Robson's gas hammer, which has very much the appearance of small steam-hammer, but is somewhat different in the principle of its action. An inverted cylinder is carried by a cast-iron standard, and in this are two pistons, the lower of which is attached to a piston-rod, to which the top is hung. At the side of this cylinder are two powerful coiled springs, contained in a suitable casing. These are attached by means of a cross-head to the piston-rod, and, when neither in extension nor compression, hold the hammer at the upward limit of its stroke. The lower piston is then in the middle

of the cylinder. The top piston reciprocates in the upper half of the cylinder, and then moves upwards, draws in a charge of gas, which occupies the space between the two pistons, the necessary air for the explosion being also admitted at the same time. At the proper interval, the gas is exploded, and drives the hammer downwards on to the work on the anvil. In order to set the machine in motion, a turn has to be given to the fly-wheel, and after this the work is performed automatically, the force of blow being regulated by means of a lever working in a cam, by which the supply of gas is regulated. The admission port is also actuated by a cam motion, whilst the exhaust port is opened and closed by a slide operated from a crank on the fly-wheel shaft. On the same stand are shown Robson's gas-engine and other examples of Messrs. Tangye's productions. Messrs. Sannel Worsam & Co., of King's-road, Chelsea, show an example of their four-cutter general joiner. This has been rendered more useful by an arrangement which allows of the bottom adze being detached and taken out, so that the joiner's bench can work separately from the moulting apparatus. In this way two men can, if necessary, work independently of each other, or the whole apparatus can be operated as one machine in the usual way. On this stand is shown a hand-saw, in which the whole standard carrying both riggers can be shifted for angling. This excellent arrangement is planned so that at whatever angle the saw-hand makes with the table it passes through the latter at the same spot, and the work, therefore, need not be shifted. This does away with a fruitful source of danger in bandsaws where angling is required. The motion of the frame is obtained by a worm gearing into a toothed quadrant on the back of the casting. A self-acting saw-bench in which the feed may be obtained at will, either by vertical rollers or rope, is also shown by Messrs. Worsam & Co., on this stand.

There are two exhibits of pottery-ware machines shown in this section. The first of these is shown by Minton's, Limited, of Stoke-on-Trent; but as the arrangements are not yet complete, we will defer further mention of them for the present. Messrs. Thomas Willett & Co., of Burslem, are, however, in full operation on the next stand. They show a combination of what are known as a "jigger" and a "jolly." These are used for making ordinary crockery-ware coffee and tea cups, and work automatically, the operators merely having to supply the clay and remove the form. By this apparatus, which is also applied to the manufacture of saucers, basins, &c., vessels can be moulded accurately to size, and the thickness of material is absolutely uniform. The onp-making machine exhibited will turn out fourteen articles a minute, and does not require skilled attention. An automatic bat-making machine, shown by the same firm, is also an ingenious labour-saving tool.

A machine in this group already at work is a slotting and shaping machine, shown by Messrs. John Spencer & Co., of Keighley, Yorkshire. This is a convenient hand-power machine for cutting keyways in pulleys or wheels of any kind. The cutter is pushed through by a straight movement, communicated through a lever. The withdrawal of the cutting-tool from the work is effected by its own weight. When the motion is reversed in order to make the return stroke, the first action is to pull back a small wedge, and the cutter then falls. On again reversing, the wedge is automatically pushed forward, and so raises the cutter to the part to be operated on. The necessary taper is given to the keyway by means of a guide-plate fixed to the front of the machine, by which any angle may be arranged.

An apparatus that appears to attract a good deal of attention is the paper bag-making machine shown by Mr. F. D. Bumsted, of Hednesford. By this apparatus the whole of the operations necessary for making paper bags are carried out. It would be manifestly impossible to describe these without elaborate drawings, but the way in which the paper is converted into bags affords considerable amusement to the sightseers at the Exhibition. The special point about this machine is that it will make "square bottom bags," a refinement in bag-making which other less-gifted appliances are not capable of accomplishing.

Messrs. Sharp, Stewart, & Co., of Manchester, show a Sellars' patent planing-machine. In

this machine, the table is driven by a spiral pinion, keyed on a shaft running diagonally beneath the table, the pinion gearing into a rack placed also diagonally on the underside of the table. The motion is conveyed by a pair of bevel wheels. Since this arrangement was first introduced by this firm from the United States, they have made several improvements, especially in the reversing and quick return gear. A boiler drilling machine of a new type is also shown on the same stand. This will drill or ryer internally after the plates are in place, and either two drills, working opposite to each other, can be used at once, or one can be thrown out of gear and the other used. The feed is automatic. A neat model of a locomotive is shown on this stand, to which is fitted an arrangement for preventing oscillation upon going on to reverse curves. This, however, is outside the scope of our present notice. This stand is shared by Messrs. Sharp, Stewart, & Co., and Messrs. Anderson & Gallwey, of Chelsea, who show examples of machine riveters and other heavy hydraulic plant.

The two largest exhibits in metal-working machine-tools are contributed by Messrs. Greenwood & Batley, of Leeds, and Messrs. Hulce & Co., of Manchester. The former firm shows some very fine examples of milling-machines of highly ingenious construction, while Messrs. Hulce have novelties in planing and drilling machines, lathes, &c. We shall return to these again, together with other exhibits in this section, at a future date.

FURTHER NOTES ON ACADEMY PICTURES.

The central work in Gallery I. is Mr. Britton Rivière's "Sheepstealers" (24), a man and dog preparing to capture one of a flock of sheep by moonlight. We say of this as of many other moonlight pictures, that so much detail and so much light are never really seen in moonlight,—in this part of the world, at least. The dog and sheep, of course, are all that can be wished; but the picture has been over-rated. Opposite to it Mr. Yeames makes rather a success with a large painting called "Prisoners of War: 1805" (67), two midshipmen under the charge of a stolid French sentinel, one of them a mere child, regarded with great sympathy by the French women among the spectators. The character of the two lads is very well contrasted. Mr. Frank Dickson's "Chivalry" (53) is very fine in colour, utterly unreal in its personages; an eminently theatrical work. It is balanced by Mr. Hodgson's "Don Quixote and the Galley Slaves" (39): the Don hardly rises to the ideal of the character; the humour in the other characters is good and not exaggerated. Mr. Marcus Stone touches the well-worn chord of "The Gambler's Wife" (18) in a way not calculated to awake our sympathies; Mr. Marks gives us a pleasant bit of humour in "A Good Story" (30). A landscape by Mr. Oakes, "Cwm Eirian Moor" (61), and one by Mr. Peter Graham, "Evening" (73), are large and well-executed works, both partaking too strongly of mannerism to interest us. Mr. Orchardson's "Mrs. Balli" (72) is a fine harmony of tones; Mr. Calderon's "Mrs. Harry Rouse" (19), a finely posed and spirited portrait, uninteresting in colour.

In the "Language of Flowers" in Gallery II. (141) Mr. Leslie gives us one of the most pleasing works in his own vein that we have seen; two girls form a group that we have seen in style of beauty and tone of costume, harmonised beautifully in composition. There is a more thoughtful expression, more of feeling, in the work, than this painter has given us lately. The same room contains an example of Mr. Hook's river subject and sea subject, "The Stream" (140), and "After Dinner Rest awhile" (146), the quotation applying to certain be-glutted cormorants who serve to give a tide to a sea-piece. But we make a run for a moment into Gallery III. to note that Mr. Hook's great success (which we certainly ought not to have omitted in our first notice) is "Ye, leave oh!" (270), a sea-piece on a breezy day, where a group of men and women are hauling the net into the ocean, and "the lightning of the noon-tide" flashing beyond them to some purpose. The look, the very smell of salt water is in the picture; the artist has never done anything finer. Backing again into Gallery II., we note Mr. Dendy Sadler's clever work "The Salad" (136), the scope and

humour of which are best indicated by the quotation appended: "Pour faire bien une salade il faut être trois personnes; une sage pour y mettre du sel, un avare pour y mettre du vinaigre, un prodigue pour y mettre de l'huile." Mr. Brown's "Our Playground" (92) is a study of London children on the Albert Embankment, very clever in character, a little weak in executive detail: its grey and brown tones form a good foil to Mr. Prinsep's "Afternoon Gossip on the Banks of the Ganges" (91), a hard piece of powerful colour. Mr. Herkomer's "Earl of Ducie" (119) is a fine portrait.

We shall be glad to offer a reasonable reward to any one who will tell us the meaning of Mr. Goodall's picture (165) of an infant sprawling on his back, with a quotation from Farrar's "Life of Christ." The limelight is badly handled, for it falls on the floor round the child, and not his figure. But, on the whole, we give it up. Mr. Vicat Cole's "Sinclair Hill, Dorchester" (186), and Mr. Graham's stormy coast scene (190), are good examples of the work of the two painters, who produce effects, and fine ones, but do not take us to nature in her reality. Mr. Hook appears here with a fourth work of great power, "The Close of Day" (202), a golden sunset effect over sea, an impressive work, possibly a little exaggerated, the sunset laid on rather thick. Mr. Britton Rivière's "Vae Victis" (231), a combat à l'entrance between a wolf and an eagle, has a kind of screeching power about it; Mr. Marks's quiet and luminous painting (248), "A Treatise on Parrots," is in his best manner; Mr. Faed's "When the Children are asleep" (225) is a pleasing interior, with a freight effect; Mr. Pettie's "Challenged" (230), where a young gallant has been roused from his bed to receive an apparently very unwelcome challenge from a booted and cloaked person, who is making his retreat, is a pointed and humorous variation of an old theme. Portraits are numerous in Gallery III., among which Mr. Watts's "Miss Laura Gurney" (201), with its rich mellow tone, is a pleasure to see; and Mr. Hell's "Earl of Dufferin" and "S. Weir Mitchell, esq., M.D." (211, 219) are masterly in character, expression, and broad, solid execution. A rather harshly-coloured and "loud" portrait, by Mr. Wells, of Mr. D. F. Carmichael (255), a late member of Council at Madras, has, nevertheless, a good deal of force and character. Among other portraits of note, besides those previously noticed, are Mr. Outess's "Bishop of Worcester" (240), an embodiment of the "Church dignitary" type; Mr. Pettie's Mr. J. G. Orchar (185), a very forcible work; and Mr. Horsley's, the Academician, of his two daughters; and Mr. Sant's of a pretty little maiden, "Nesta" (179).

We have already mentioned the most noticeable works in Gallery IV.; but Mr. Herkomer's rather remarkable portrait of "Miss Katharine Grant" (360) claims a word. This is a portrait of a brunette dressed almost entirely in white, and against a nearly white background; it is a bold but an undeniably effective experiment. The attempt to portray the power of nature through the medium of allegorical figures is made by Mr. G. McCulloch in "The Cloud" (372), and by Mr. H. J. Stock in "Night covering the Sleeping Earth" (373); the latter has something fine about it, but Night is coming down headlong in a way that disturbs the repose of the scene, and suggests the idea that he is shocked at the state of poor Earth and anxious to throw some respectable covering over her at once. Such works are praiseworthy as an attempt to escape from the ordinary boundaries of prosaic subjects; but there is always danger of their trenching on the ground of the ludicrous, which we fear this one does.

There is little, indeed, to give us pause in the waste places of Gallery V. Mr. Goodall's great canvas, "Gardner's Last Messenger" (432), is what we suppose is called "a picture for the times." For ourselves, it is little pleasure to see the tragic loss of that great man to the nation turned to the providing of subjects for theatrical and unreal painting. The most impressive work in this room is Mr. Miller's "Mahalah" (490), a fine painting of a very fine young woman in seafaring costume. Some of the things, e.g., such as "Sweet and Twenty" (505), which might better have been called "The Ogress," make one wonder equally how any one could paint them and how any hanging committee could pass them; that is to say, we

should wonder, if it were not for the pictures by an Academician in the same room, and they are, as Rosalind says, "out of all whooping."

The central place in Gallery VI. is occupied by Mr. Fildes's "Venetians" (559), a picture which would be striking if seen for the first time, but which is really only a rather inferior repetition of his painting of last year. Mr. Leader's "Hedgerow Elms and Hillocks green" (555) is a very pleasing landscape, though not marked by any power; Mr. J. Knight's "Solitude" (605) is one of the best of his dark-green or brown-green studies, which reproduce only one aspect of nature, but reproduce it with great power and fidelity. Mr. Benham's "Winds that are Wild, and Waters that are Free" (618) is a fine work, and there is a certain individuality about a small dark painting of "Tintagel" (617), by Mr. H. Welsh.

In Gallery VII. Mr. A. Gow has chosen a very fine and pathetic subject, "Absolution for the Lost at Sea" (656), where a Catholic bishop and acolytes, with mourners, are assembled on a bleak windy height outside a church, to go through the solemn form of benediction over those who are lost in the sea below. Superstitious as the subject is, there is a keen pathos about it which the painter has evidently felt and makes others feel. It is not too often that we can say this about Academy pictures, many of which seem to have no cause of existence, except that the painter wanted to show that he could paint this or that other form or substance. Mr. MacWhirter's "The Track of a Hurricane" (662) in another way has also a definite motive, but strikes us as more ambitious than successful: we should be curious to know whether it was painted from any actual scene in the regions of hurricanes; the picture does not lead us to think so. Mr. Colin Hunter has made a great attempt to paint "The Rapids above the Falls of Niagara" (709), a large painting, in which the turmoil of the irregular heaps of water is well conveyed, but it is the movement, not the substance, of water; it is a material thicker and less translucent than water. Among other works in this gallery may be named "Sunday Morning" (672), by Mr. Arthur Hughes, a girl in a garden on the way to church, sending the dog back, the picture is filled with a wealth of blossoms somewhat too hardly painted; "Milton visited by Andrew Marvel" (663), by Mr. Boughton, who has reduced the Puritans to a very washed-out and weak-kneed set of people; "The Temple of Luxor" (680), by Mr. Frank Dillen; "Lake Lemna" (682), by Mr. Inchbold; "A Harbour in the Channel Islands" (689), by Mr. W. M. Willie; "The Coming Race" (691), an admirable study of puppies, by Mr. W. Strutt; another clever dog picture, "How now! a Rat" (713), by Mr. Yates Carrington; and "In Disgrace" (717), by Miss Cornillon.

In Gallery VIII. is a tremendous picture of a young Christian lowered into the arena after a fight with beasts, by Mr. Armitage (792), concerning which we cannot say much. It is altogether too big for our understanding. There is a very clever representation by Mr. Pettie of "Charles Surface selling the Pictures" (812). Mr. Pettie has got Charles and Careless to a T. They are the very men, and uncle Oliver is very good also. A little delicately-painted work by Mr. Percy Thomas, "The Old Sketch-book" (790), is well worth looking at by those who can appreciate its tender and regretful expression. It is a small painting, quite out of the line of the commonplace. How few of them there are, to be sure! "Honeymoon in Normandy" (780) is a clever work by Mr. Eyre Crowe, representing a young English couple tricycling through the street of a Norman town, to the respectful astonishment of the natives. As to Mr. Calderon's big wench, called "Morning" (774), supposed to be listening to the lark, unless he did it "for a lark" we cannot tell what he is at. Mr. Eyre Crowe's other work, "The Old Chantry at Auberville" (811), is a very interesting interior, with calm and placid sisters kneeling beneath their enormous eaves. Mr. Herbert has actually done a landscape, "On the Llugwy" (797), and it is not by any means so astounding as his figure pictures.

Gallery No. IX., the old Water-colour room, is filled mostly with small cabinet works, among which is a superb little painting by Mr. Brett, "The Lighthouse on Cape Wrath: Daybreak" (841). The painter has got the look of early morning wonderfully; the cold, dark, inky-looking sea and the pale gleam of the lighthouse light in the merring seem almost real as we

look into the picture. In this gallery is also a fine and poetical work by Mr. R. Bottomley, "Death's Betrothed" (906), a dead girl in her bed, and a visionary figure of Death standing up behind. We have before noticed Mr. Bottomley as a painter who looks for subjects out of the beaten track, and treats them with pathos and originality. Mr. Pettie's "Sir Peter and Lady Teazle" is another highly successful *School for Scandal* picture; and in the same room Mr. H. W. B. Davis exhibits a fine concentrated composition of landscape and sheep, under the title "Lost Sheep" (874).

In Gallery X the battle pictures find place. These include Mr. Crofts's "William III. at the battle of Landen" (1,051), illustrating a descriptive passage from *Tristram Shandy*. This is not so complete a success as the painter's "Marlborough" some two or three years ago, but it somewhat recalls that, and is full of characteristic and spirited figures. Mr. C. E. Frapp's "Last Stand at Isandhlwana" (1,065) and Mr. Douglas Giles's "Battle of Tamai" (1,038) we can only name, but Mrs. Butler's "After the Battle" (1,081), the arrival of Lord Wolsley and Staff at the Bridge of Tel-el-Kehir, is a striking work, hard and raw in colour, as this brilliant lady's works are, but full of force and reality in the look and action of the men. Mr. J. D. Linton has a large picture of "The Marriage of the Duke of Albany" (1,028), painted for the Queen; even Mr. Linton has hardly been able to make these formally-arranged groups and strongly-coloured uniforms interesting, but it is, at least, less hard and conventional than paintings of this class usually are, and those who were responsible for the choice of an artist showed their judgment in availing Mr. Linton. As to the public at the exhibition, they crowd and gaze round this representation of royal personage from morning till night, to show their enthusiasm for art. In the same room are Mr. Herkomer's "Found" (1,027), a large "Landscape with Figures" (as the old catalogues would have put it) with nothing of special interest in it; Mr. Tom Lloyd's "Tollers of the Sea" (1,040), a good oast picture; Mr. MacWhirter's "Iona" (1,043) and "Corrie Burn" (1,088), the latter, to our thinking, his best picture of the year; Mr. Joseph Clark's "Home Again," the return of a sailor to his family (1,067), not equal to Mr. Clark at his best, but interesting in the figures and face of the children; and an effective portrait of Mr. Bret Harte (1,077), by Mr. Pettie.

In Gallery XI are a couple of good landscapes by two of the more recent landscapists, "The Slopes of Ben Nevis" (1,126), by Mr. Johnson, and "Last Leaves" (1,136), by Mr. David Murray, who, however, seems to have acquired a favour in the eyes of the Academy which we cannot quite see justified in his rather tame though refined works. Mr. Storey's picture of the "five maidens" who were supposed to have sat to Zeus for his "Helen" (1,149) is far superior to another on the same subject which was recently exhibited in London, as the subject seems a stambling-block to artists, who are always at it, and never succeed in making anything very attractive out of it. Here is beautiful painting in the work, but the five maidens are coquetish and rather vulgar, and not worthy to supply models for a golden age. Mr. W. H. Bartlett sends an interesting picture, the studio of a deceased sculptor, where a wife and daughter, in deep mourning, are exhibiting "His Last Work" (1,160) to visitors; a figure is sufficiently expressive, and the accessories, casts and marbles, &c., painted in much care. Mr. Herkomer's excellent portrait of "Sir Watkin Wynne" (1,155), with a kindly and thoughtfully Welsh face, has a melancholy interest at this moment. Mr. Long exhibits a hard but in certain respects a fine and good portrait of Mrs. Chamberlain Starke (1,147), what we should characterise as a very ladylike portrait, and the artist fairly share the credit of that with his sister. Mr. Seymour Lucas's "From a Field of Sedgemoor" (1,128) illustrates wonderfully one of Macaulay's brilliant assumptions,—"The neighbouring villages long membered with what a clatter of horse-hoofs and what a storm of curses the whirlwind of valry swept by." A fugitive with a scythe-like weapon sits at the table with his head hid in his hands; the girl of the house listens with frightened face at the door: the picture very real and effective.

We will say something of the sculpture separately.

LEASEHOLD TENURE IN LONDON. ARCHITECTURAL ASSOCIATION.

The last ordinary meeting of the Session was held on Friday, the 8th inst., Mr. Cole A. Adams, President, in the chair.

Mr. Wm. Fawcett, of Cambridge, Diocesan Surveyor, was elected a member by acclamation; and Messrs. E. Carter, Owen Fleming, and T. Henry were elected members by vote.

It was announced that the next visit would take place on the 16th inst., to Tilbury Docks and Hotel.

Votes of thanks in connexion with the late visit to the Church of St. Bartholomew the Great, Smithfield, were accorded to the Rector and to Mr. Aston Webb.

The Association Travelling Studentship, it was announced, had been awarded to Mr. Henry Denison Walton, and the second prize to Mr. Roland Wilmot Paul. The prize drawings were exhibited.

Mr. W. H. Atkin Berry (Hon. Sec.) then read the report of the Special Committee appointed last session to consider the whole system of education as carried on in the Architectural Association. This report will be discussed at a special meeting to be held on the 29th inst.

The Chairman stated that the lecturer for the evening, Mr. Ince, had been prevented preparing his paper, and that Mr. Percy Hunter had kindly taken his place at short notice.

Mr. Percy Hunter then read a paper entitled "Leasehold Tenure of Property: its Prejudicial Results to London, both Socially and Architecturally," of which the following is a summary:—

The author, in the course of his introductory remarks, observed that while his paper dealt only with London, many of the facts stated and the deductions drawn applied, though in a lesser degree, to the other large towns throughout the country. The leasehold system might be said to paralyse in Londoners all personal interest either in the localities in which they lived or in the houses which they occupied, and consequently it depressed, if it did not actually destroy, any active expression of that interest which should be shown in the promotion and execution of public works of local improvement, in the proper maintenance, structurally and decoratively, of private dwellings, or in the general architectural adornment of this vast and wealthy metropolis. The growth of London in population and area during the present century had been extraordinary, and probably unparalleled in any other city that ever existed. In 1801 the census returned 950,000 inhabitants, so that in the last eighty years the population has more than quadrupled itself. It now continued to increase at the rate of 70,000 per annum. These figures, extraordinary as they were in themselves, became even more interesting if at the same time the plans of the London of the past were compared with those of the London of to-day. Between 1560 and 1818, i.e., in the long period of two centuries and a half, London only increased from two square miles in extent to six square miles. Between 1818 and 1834 it more than doubled itself in those sixteen years, and covered sixteen square miles. It was worthy of notice that up to 1834 the most outlying districts of the London of that day were within walking or easy driving distance of the business centres. The change, however, brought about by the development of the railway system between 1834 and 1881 was wonderful. In those forty-seven years the metropolis increased from an area of sixteen square miles to one of one hundred and seventeen square miles. If London continued to expand at the same rate, Stratford, Clapton, Highgate, Hampstead, Hammersmith, Putney, Balham, Blackheath, &c., will all be enclosed before the end of the century within bands of brick-work. When we find that nearly the whole of the property within the vast area of modern London is held upon short terms of leasehold tenure, we begin to realise the magnitude of the question of leasehold tenure. Lord Beaconsfield, speaking at an agricultural meeting a few years ago, stated that there were three values belonging to agricultural land,—firstly, the value of the ground-rent according to the freeholder; secondly, the value of the produce obtained from it by the farmer who put his capital into the cultivation of the land; and, thirdly, the value of the work of the labourer who had expended his labour upon the land, getting as an equivalent his daily wages. On the same principle Mr. Hunter defined three

values in urban property. There was the ground-rent belonging to the freeholder; there was the rental-value obtained by the leaseholder in return for the capital laid out in erecting suitable buildings on the land; and there was the value of this improved property to the occupier or sub-lessee, depending in amount upon certain relative conditions of suitability of site, &c., for the purposes for which he occupied it, whether for residence or business. But in London, grouped as it is all round a narrow central area of daily business, a fixed and inelastic quantity like that of land becomes of enormous value, and, broadly speaking, this value is proportionately greater or smaller according to its proximity to or remoteness from this central area. This initial value of land, therefore, directly affects the other two values mentioned above, and the consequence is that they together become too great for one individual to possess. Mr. Hunter next proceeded to detail the relations subsisting between the freeholder, the leaseholder, and the occupier, pointing out that generally,—and almost invariably in Outer London, with whose progressive condition we could practically alone hope to deal,—the leaseholder is a builder,—a speculative builder. This is not necessarily a term of reproach, though many people seem to think it so. But it is in its bad influence on the speculative builder that the evil of the leasehold system first manifests itself. The lease granted being for any period less than one hundred years, there is no personal inducement held out to the leaseholder to lay out capital in the erection of buildings that will outlast that period, for any such outlay on his part will obviously be for the permanent improvement of the freehold, in which, however, he has not the slightest interest. Besides, his occupation is building, not house-owning; therefore he builds to sell, and his object is gained if he can build in such a way as to get the greatest possible return on the least possible outlay. This result is now attained more surely by "showy" appearance than by sound construction. The direct consequences are at once painfully obvious in the meagre appearance of modern houses built under this system, with their cheap and generally hideous embellishments of Bath stone or stucco window-bays, porticoes, string-courses, and cornices, repeated *ad nauseum*, and they become still more obvious in the course of time, as the original unstable construction gradually makes itself apparent. These results, however, do not declare themselves until after the original lessee, the builder, has sold the property, and transferred his energies to fresh woods and pastures new. To prevent a too serious and rapid depreciation of the reversionary value of the property, a compromise is, to certain extent, arranged between the freeholder and the leaseholder at the commencement of operations, by means of the supervision of the freeholder's surveyor. But, in spite of this, the results cannot be said to be satisfactory to either of the parties, or to society as a whole. The freeholder does not get such sound buildings erected on his land as he would like to get; the lessee has to put more value into the property than he wishes to put there; and the public, who, as usual, have to pay for all this, do not get healthy houses to live in. The leaseholder, however, may, and often does, change his personality several times during an eighty or ninety years' lease. The original lessee, the builder, as we have seen, sells his interest as soon as he has established it on the basis he arranged in his calculations,—unless he has made a mistake in those calculations, in which case the property probably passes to his sub-partner, the mortgagee. In either case the leasehold interest is sold. But the direct interest of the lessee for the time being in the property is decreasing year by year as the term runs on; for about two-thirds of the lease the structural stability of the property is maintained by him, because that affects its marketable value; but after that period this value becomes so diminished that it ceases to operate as an inducement to maintain or repair, and he generally prefers to let the property at a reduced rental to a lower class of tenant to laying out a capital sum in the requisite repairs. Hence the growth of "rookeries." Such were some of the results of the leasehold system on individual properties. Its influence on localities was next discussed by Mr. Hunter, who pointed out that the freeholder, who surrenders, for a consideration, nearly all active interest in his

own property, does not as a rule concern himself in matters of general local importance. For the primary development of his land he may have formed the roads and laid the necessary sewers. But the annual rates for the maintenance of these, together with all rates and charges for paving, lighting, and maintaining the roads, all of which are of permanent value to his property, he devolves upon the leaseholder. Such matters of important local interest as the establishment of a free library, the erection of a town-hall or concert-room, or the formation of a public park, would all tend to the permanent improvement of property, but the freeholder's reversionary interest in it is, by the leasehold system, too remote to induce him to take any active share in promoting such works. If, however, in spite of this, they are carried out, he contributes nothing towards them. Now, the cost of all these works of local importance, whether of practical necessity or of general advantage, is defrayed upon all local rates. These rates are levied upon all property, and that, by the leasehold system, means upon the leaseholder, who is regarded as *de facto* the "owner." But the lessee is the builder, who builds to sell. If, therefore, the rates were increased to meet the cost of these educational or aesthetic works (which he would certainly regard as speculations), his financial calculations on his speculation would be upset, and he would therefore, in the Vestry, decidedly oppose their execution at the time when they could most economically and advantageously be carried out. When, at a later period, the neighbourhood has developed and settled down, the responsibility for the rates has devolved upon the occupiers. It might have been assumed that here, again, they would be personally and directly interested in its neighbourhood in which they reside, in its sanitary improvement and general healthiness, and in its architectural and horticultural adornment, all of which add to the enjoyment of the daily life. But the occupier's term being, as a rule, only a seven years' tenancy, his interest is too limited to induce him to promote works which will be a permanent improvement to property which is not his own, yet for which he will, as a ratepayer, be immediately pecuniarily liable. It is still less likely that he will concern himself much about his neighbourhood. Therefore, if he is on the Vestry, he opposes any increase in the rates, and if he is not on the Vestry he opposes everything by simple apathetic indifference. Moreover,—and here is one of the most serious and mischievous effects of the leasehold system,—the occupier is of a migratory disposition. Partly from these causes, and partly because of local government, the occupier has no inducement to share actively in local government work. Mr. Hunter next proceeded to discuss the effect of the leasehold system on London, architecturally. He observed that the law and order which we boast of in our civil life is absolutely wanting in the architecture of the metropolis. But the worst influence of leasehold tenure is more evident in Outer London, and is of course contemporaneous with its recent great development, for it is worth bearing in mind that with the exception of the great Bedford, Westminster, and Portland estates, the present extensive system of leaseholds was not fully developed until the period between 1818 and 1834, and then with the growth of the metropolis the system gradually affected with ever-widening circles the architectural face of the whole of greater London, where local government, with its slow action and divided counsels, has been unable to provide that guiding hand which is manifest on the great dual estates. Another reason is that the freeholder himself, in addition to being a less wealthy man, and holding, perhaps, only one or two acres instead of many, has, in the race for ground-rents, become, to a certain extent, speculative too. There is no use in vilifying the speculative builder. He is not really responsible for the sins he commits, nor has he been imposed by a wicked and tyrannical Government upon a helpless and down-trodden humanity; both he and his works are the natural offspring of the system of leasehold tenure of property. It was very difficult to suggest a remedy for the evils of the system, for just as surely as the existing condition of things has been the result of the development of one part of this economical question, so any alteration or reform that may be brought about must rather be through a correct appreciation of its evils by the general

public than by any fanciful or arbitrary schemes of legislation on questions of property. It has been said that "we can command Nature only by obeying her laws," and we can only hope to permanently improve the conditions of urban life by a correct appreciation of all its circumstances, and eradicating those evils which have been developed. It has been proposed of the freeholder to any leaseholder possessing an unexpired term of more than twenty years. There seems to be no logical reason for fixing on this arbitrary term of twenty years. If the principle is sound that any leaseholder should have the right to enfranchise the property which he holds if he is able and willing to do so, it must apply with even more force to a short term than a long one, as an insurance by the lessee against disturbance. Suppose, however, that by such fanciful legislation or a stroke of the pen we were able to enfranchise all leaseholds throughout London to-morrow, what would be the natural and inevitable consequence? We should simply find, the day after, that half the freeholders had realised the present value of their newly-acquired properties and had sold or mortgaged them for different terms of years at their market values. And chaos would have come again.

In the course of the discussion which followed,—

The Chairman remarked that this question would be considered to be one belonging more to the seniors in the upper room; but at the same time it was one which deserved the consideration of the juniors. The report of the Royal Commission, just issued, stated that the overcrowding in London was mainly due to the leasehold system. Perhaps some might take exception to Mr. Hunter's sweeping condemnation of London architecture. Many of the London streets,—the Strand in particular,—a variety of buildings,—had a remarkable picturesqueness of its own; and Ladgate-hill, and its approach to St. Paul's, had always struck him as being very fine, especially on a misty day.

Mr. H. G. Turner proposed a vote of thanks to Mr. Hunter, with whom he agreed that it was impossible to effect everything by legislation. The only possible way out of the difficulty was to improve public feeling, because really the public were much to blame in the matter. It was all very well to blame the system of leaseholds, and speculative building, but it was the public who made that, by being anxious to get a showy house at a much less price than such a house should be built for. Most of the houses built eighty years ago on the dual estates were substantial, but nothing was spent on outside appearance.

Mr. Brodie remarked that if the paper proved anything, it proved that what was wanted was that buildings should be carried out by the large landowners. He seconded the vote of thanks.

Mr. Ellison thought that Mr. Hunter had been somewhat hard on the majority of the freeholders. A remedy might be found were the artistic as well as the constructive merits of the plan to be submitted.

Mr. Blagrove believed that Mr. Hunter had proved his case. At the same time it was difficult to suggest a remedy, though it would be a good thing if the public could be educated to understand the value of good building. It ought to be the duty of every one before taking a house to employ a qualified architect or surveyor to examine it.

Mr. F. W. Miller thought that many of the evils Mr. Hunter had put down to leasehold tenure were due as much to a vitiated public taste, and to the operation of the law of supply and demand. Nearly all existing public buildings in the metropolis were built on leasehold tenure, so that whether they were good or evil, the good was due to the leasehold system as well as the evil. Mr. Hunter seemed to bear in mind rather a cheap class of property; but some of the houses put up at Hampstead and South Kensington, under the leasehold system, would be an ornament to any country. It was idle to expect that every man who wanted a house would buy the ground, as Mr. Ruskin would have him do.

Mr. Hunter, in returning thanks, agreed that there were many picturesque parts in the architectural appearance of London, of which they had every reason to be proud. But considering

the immense amount of capital spent, and the trouble taken, the results were far from being commensurate. His paper did refer to a good deal to a small class of property, but this supported the truth of his argument; because houses in the larger residential parts, where the houses approached to something like an absolute ownership, that it was worth while to give some attention to architectural appearance.

Mr. J. A. Gotch proposed a vote of thanks to the retiring President, Mr. Cole A. Adams.

Mr. Stannus seconded the vote, which was very cordially received.

A vote of thanks was also passed to the retiring Secretary, Mr. Atkin Berry, and to the retiring committee.

The Scrutineers, Messrs. Fawcett and Frase then presented their report on the voting of the new Committee, with the following results:—President, C. R. Pink; Vice-Presidents, J. A. Gotch and W. H. Atkin Berry; Committee, C. A. Adams, W. J. N. Millard, J. Slater, B. A. L. A. Stokes, F. E. Eales, W. A. Pite, E. May, W. H. Bidlake, M. A. F. R. Farrow, Young; Treasurer, J. D. Mathews; Assistant Treasurer, H. W. Pratt; Librarian, R. L. Colton; Hon. Secs., H. D. Appleton and T. E. Pryce; Solicitor, Francis Truefitt; Assistant Librarian, W. Burrell and J. Shelley Birch.

Illustrations.

THE SOUTH TRANSEPT, CHESTER CATHEDRAL.

THE south transept of Chester Cathedral was built partly in the fourteenth and partly in the fifteenth century, and never to have been entirely completed. Springs were prepared for the stone-groined ceiling of the central and side aisles, but the flying buttresses were left incomplete, and only a bay of groining at the south corner of the eastern aisle was finished.

For three centuries this transept was entirely cut off from the cathedral, and was known and used as the parish church of Oswald, the original church being pulled down to make room for it. The congregation is now provided for in the new Church of St. Thomas the transept has been thrown open to the cathedral, and the much-needed work of preparation is by degrees being carried out.

The restoration of the exterior of the west and east sides with the flying buttresses was completed by Sir Gilbert Scott; since then the new roof has been put over the central aisle and the groined ceiling of the eastern aisle has been finished.

It is now proposed to restore the south front to something like its original form. Old fragments of the cathedral before the erection of the existing front, which (as mean a work as Gilbert Scott) is "in some ways a work as present value has produced," are vague, vary very much, but all agree in representing it as elaborately and richly decorated with niches and sculpture.

The design for its reconstruction must therefore be, to a great extent conjectural. Old fragments were fortunately left intact in two places sufficient to indicate what the details must have been. The great central window which was destroyed when the present front was built, appears to have belonged to the perpendicular architecture seen in the transept (perpendicular), but no reliable record of design is known to exist; it has been thought permissible to design the new window in harmony with those of the aisles which remain.

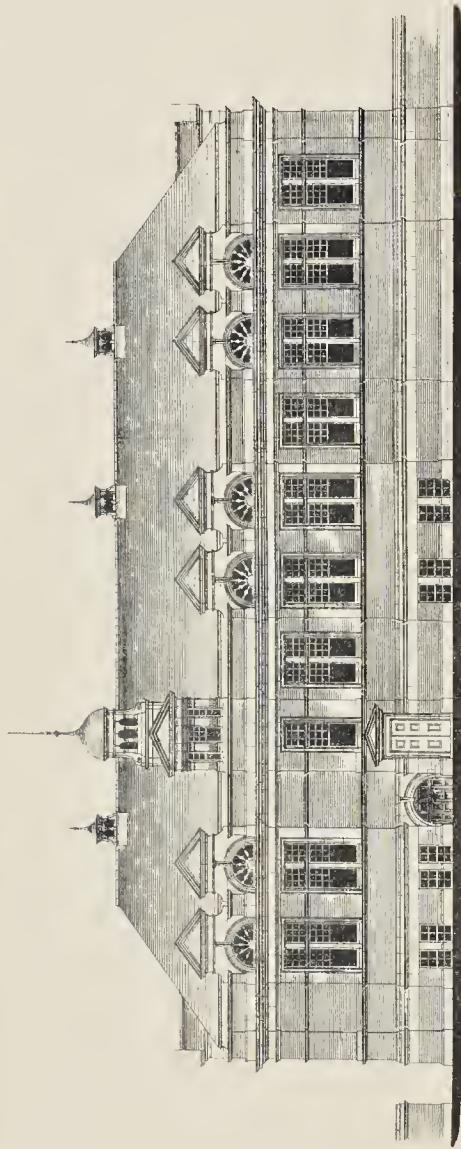
After the completion of this front, it is hoped that the remainder of the groined ceilings the repair of the interior may be taken hand.

PUBLISHING OFFICES FOR MESSRS. SEELEY & CO., ESSEX-STREET, STRAND.

This building, designed partly as a warehouse and partly as offices, has been lately built by Messrs. J. & J. Greenwood. Mr. Henry Coates is the architect. The two top floors are ware-rooms, and are of plainer design than the lower stories. It was originally intended to have three dormer gables at the top, one over each of the projecting bays, but difficulty of "light and air" intervened, and the two

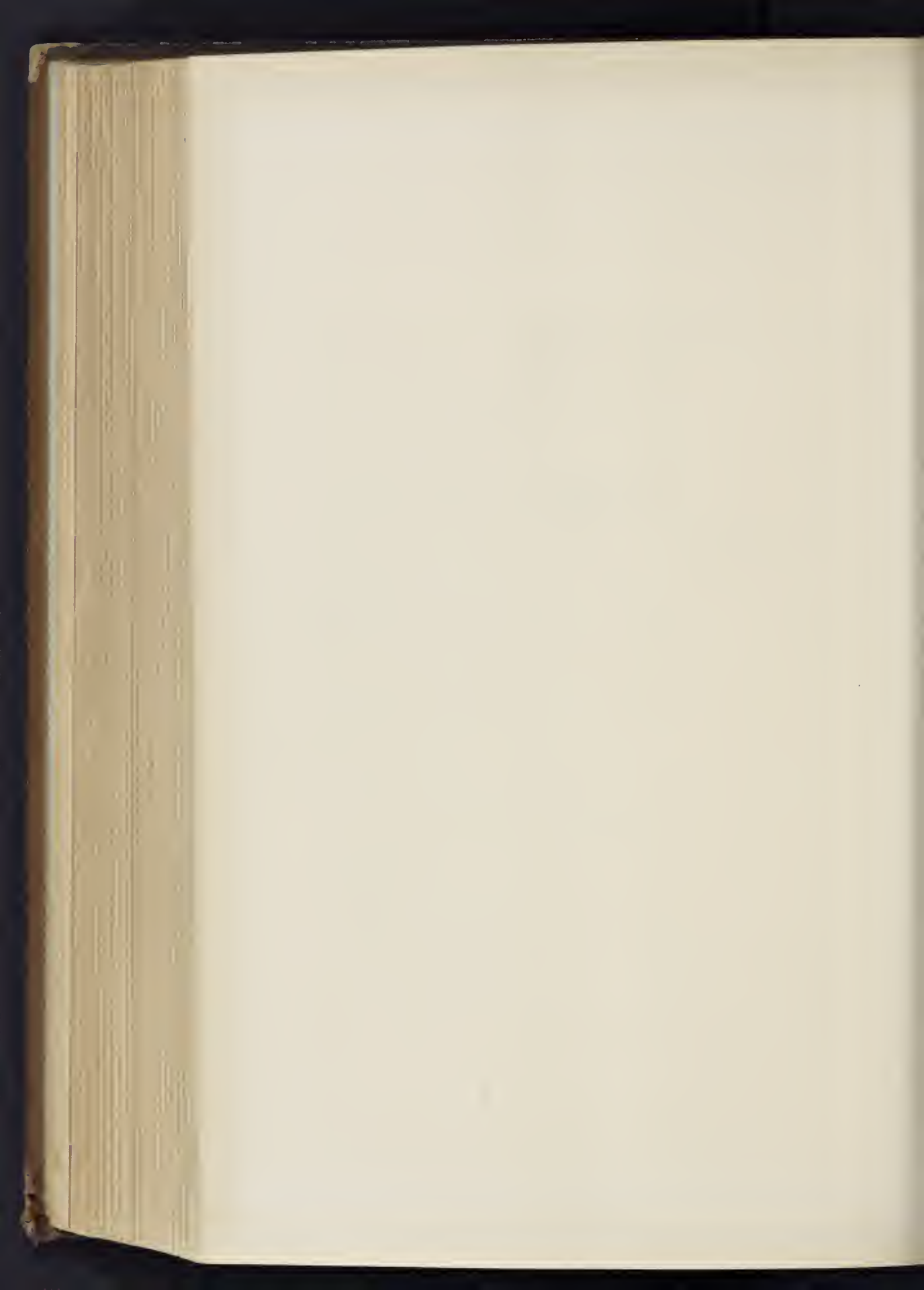
The first part of the life of the subject of this memoir is passed in the most ordinary manner, and is not worth recording. He was born in the year 1750, at the village of *St. John's*, in the county of *Down*. His father was a gentleman of moderate fortune, and his mother was a lady of good family. He was educated at the *University of Oxford*, and afterwards at the *Bar*. He spent some years in the study of the law, and afterwards in the exercise of his profession. He was distinguished by his talents, and his industry, and his integrity. He was a man of a liberal and generous mind, and of a warm and affectionate heart. He was a friend to the oppressed, and a champion of the rights of the poor. He was a man of a high sense of honor, and of a strong attachment to his country. He was a man of a high moral character, and of a high reputation. He was a man of a high rank, and of a high position. He was a man of a high name, and of a high fame. He was a man of a high spirit, and of a high courage. He was a man of a high soul, and of a high glory. He was a man of a high mind, and of a high wisdom. He was a man of a high heart, and of a high love. He was a man of a high will, and of a high power. He was a man of a high strength, and of a high endurance. He was a man of a high courage, and of a high valor. He was a man of a high honor, and of a high respect. He was a man of a high reputation, and of a high fame. He was a man of a high name, and of a high glory. He was a man of a high spirit, and of a high courage. He was a man of a high soul, and of a high glory. He was a man of a high mind, and of a high wisdom. He was a man of a high heart, and of a high love. He was a man of a high will, and of a high power. He was a man of a high strength, and of a high endurance. He was a man of a high courage, and of a high valor. He was a man of a high honor, and of a high respect. He was a man of a high reputation, and of a high fame. He was a man of a high name, and of a high glory.

THE BUILDER, MAY 16, 1885.



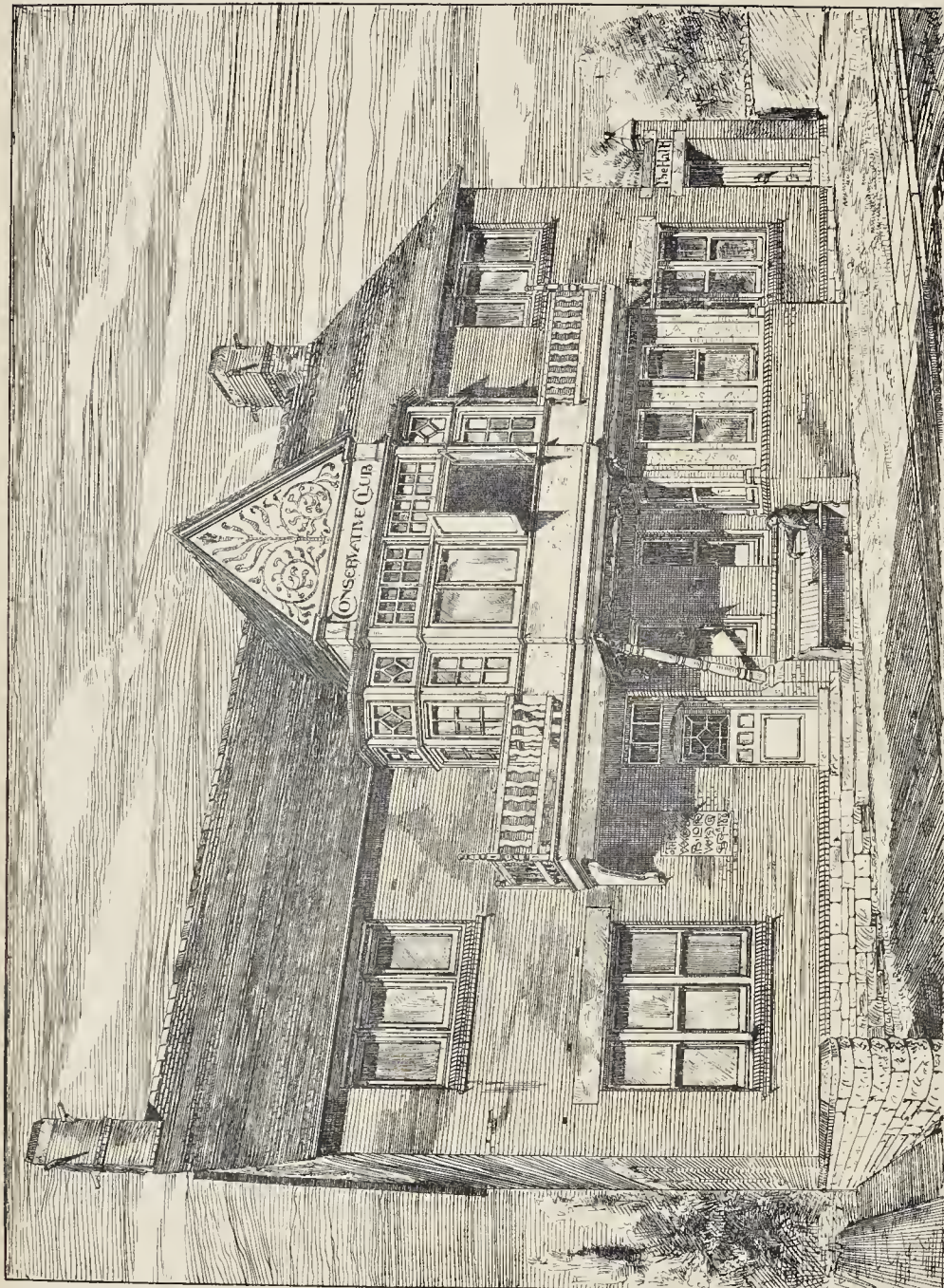
CHELSEA VESTRY HALL COMPETITION.—THIRD PREMIAED DESIGN.
MESSRS. NEWMAN AND NEWMAN, ARCHITECTS.







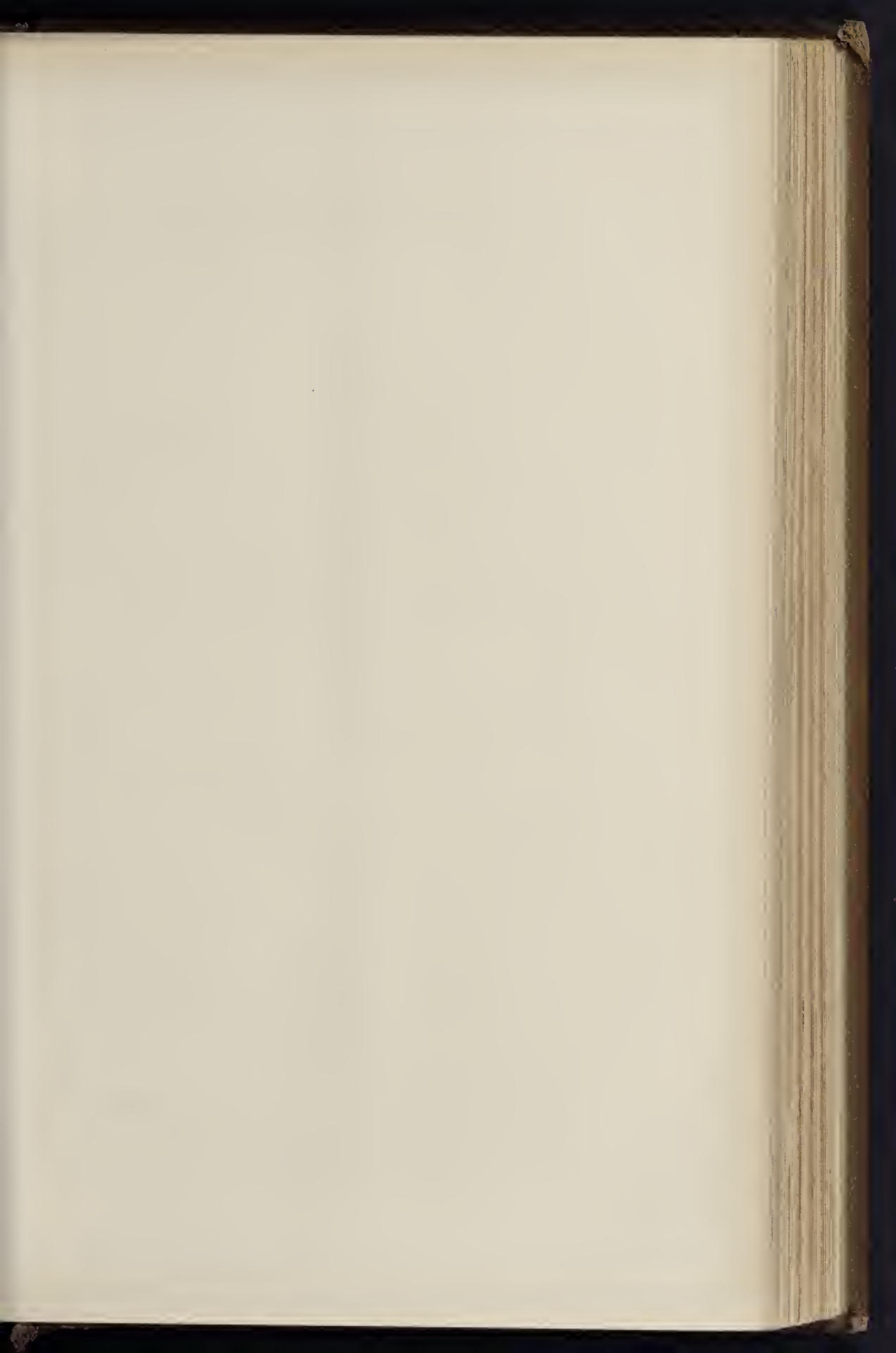
THE BUILDER, MAY 16, 1885



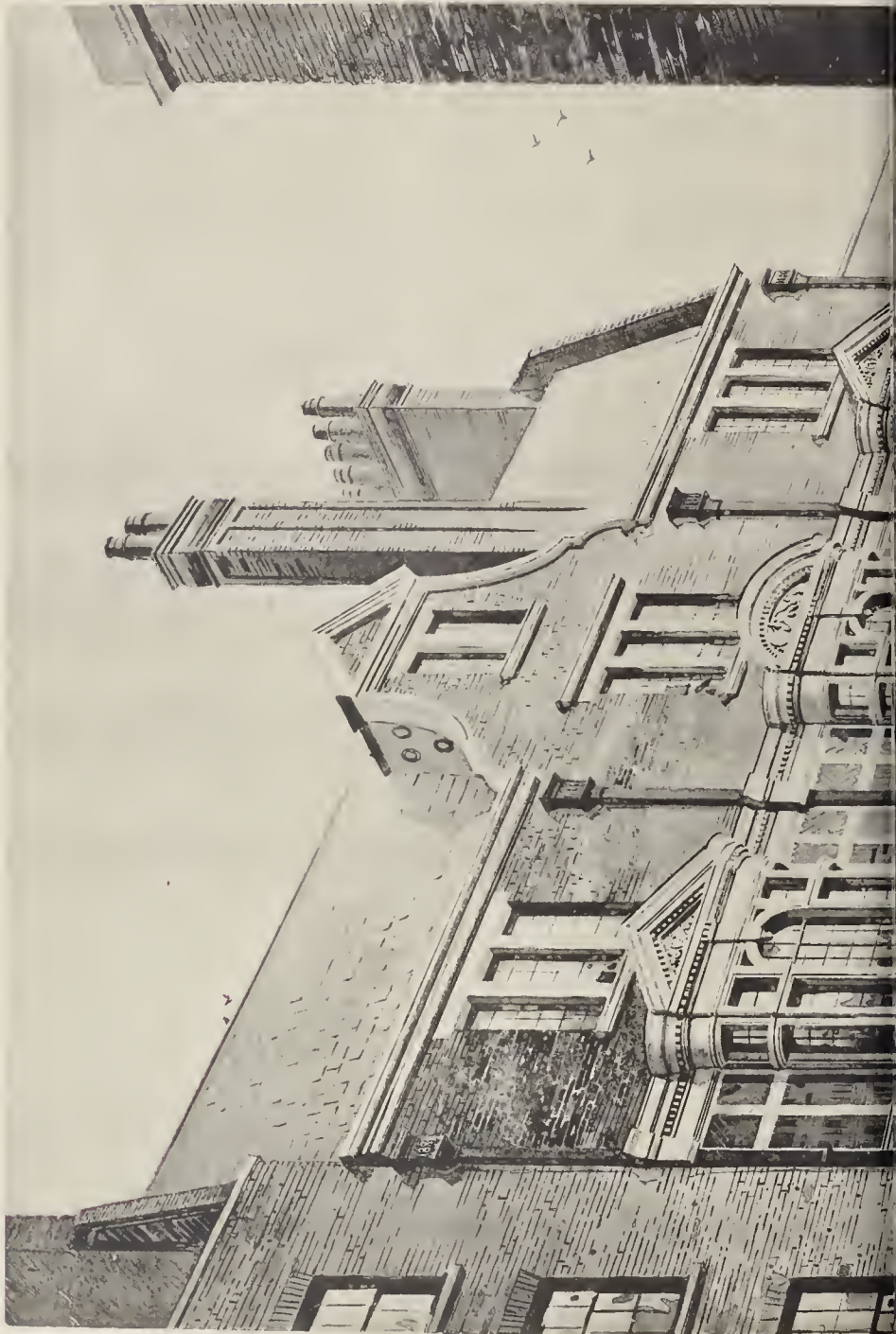
PENARTH CONSERVATIVE CLUB.

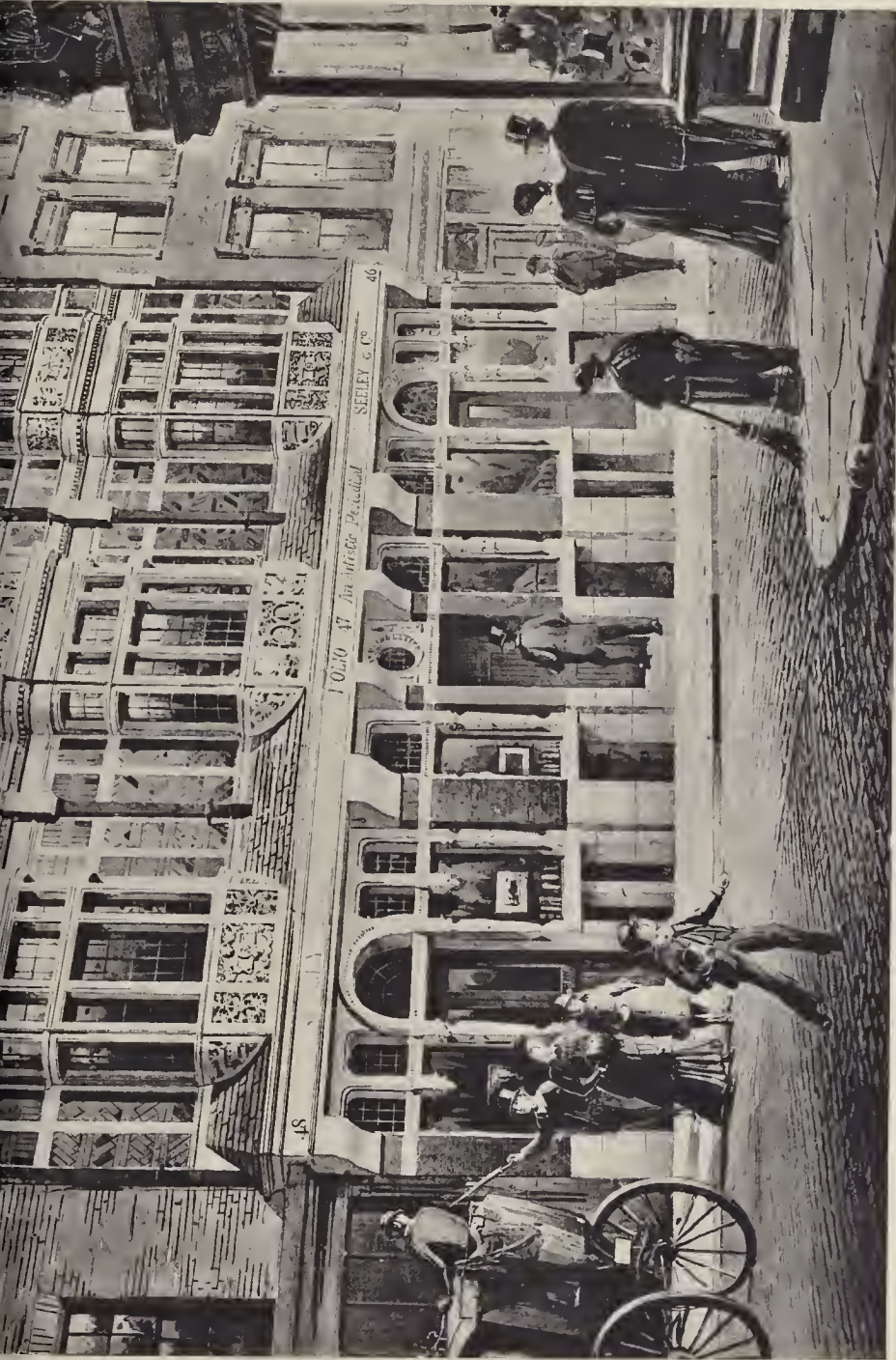
MESSRS. J. P. SEDDON AND J. COADES, CARTER, ARCHITECTS.

7 Pall Mall, London, E.C.



THE BUILDER, MAY 16, 1885.



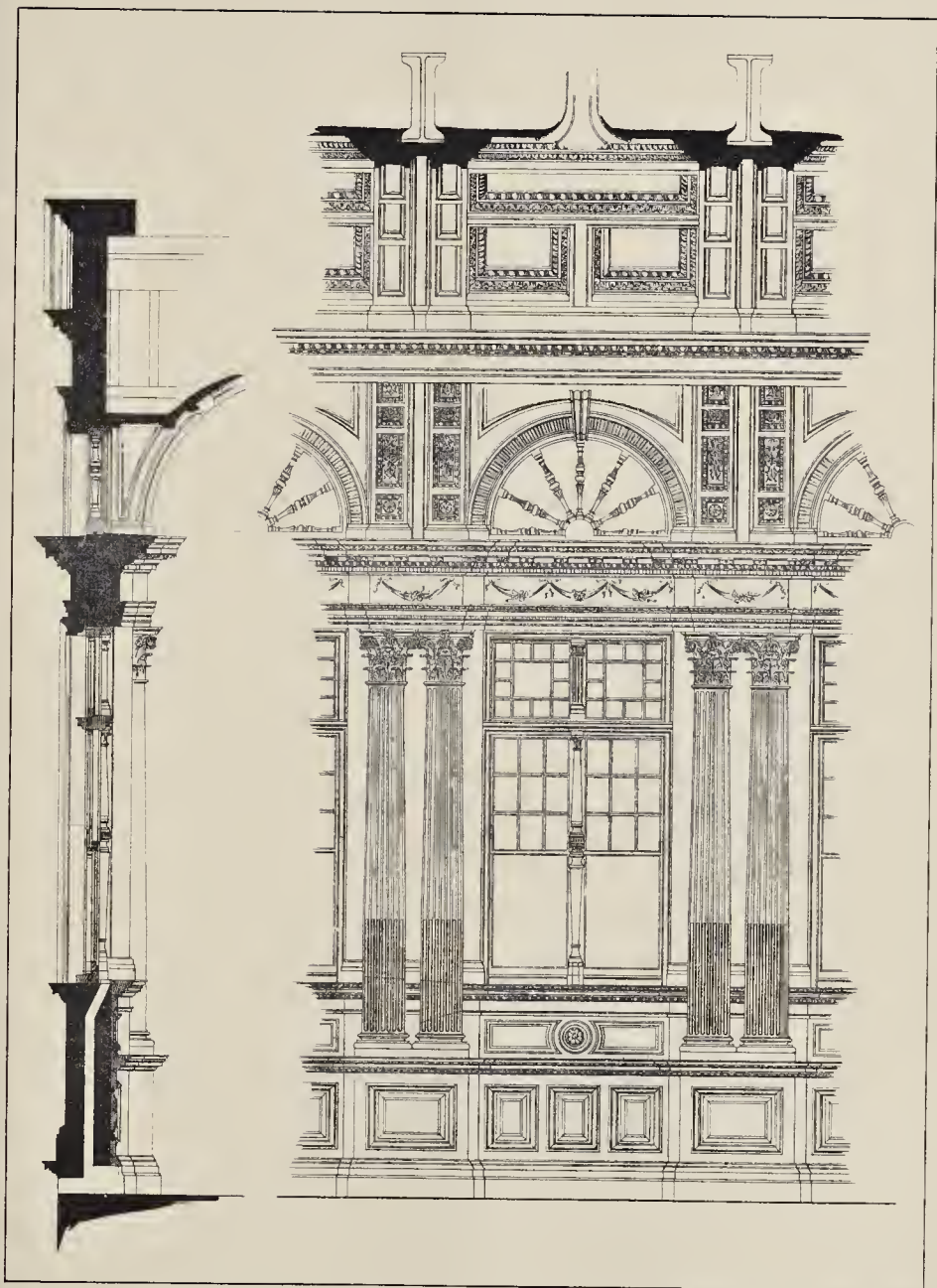


Photograph, Peterloo & Sons Limited, London.

NEW BUILDING FOR MESSRS. SEELEY & Co, ESSEX STREET, STRAND.

Mr. H. C. BOYES, F.R.I.B.A., Architect.

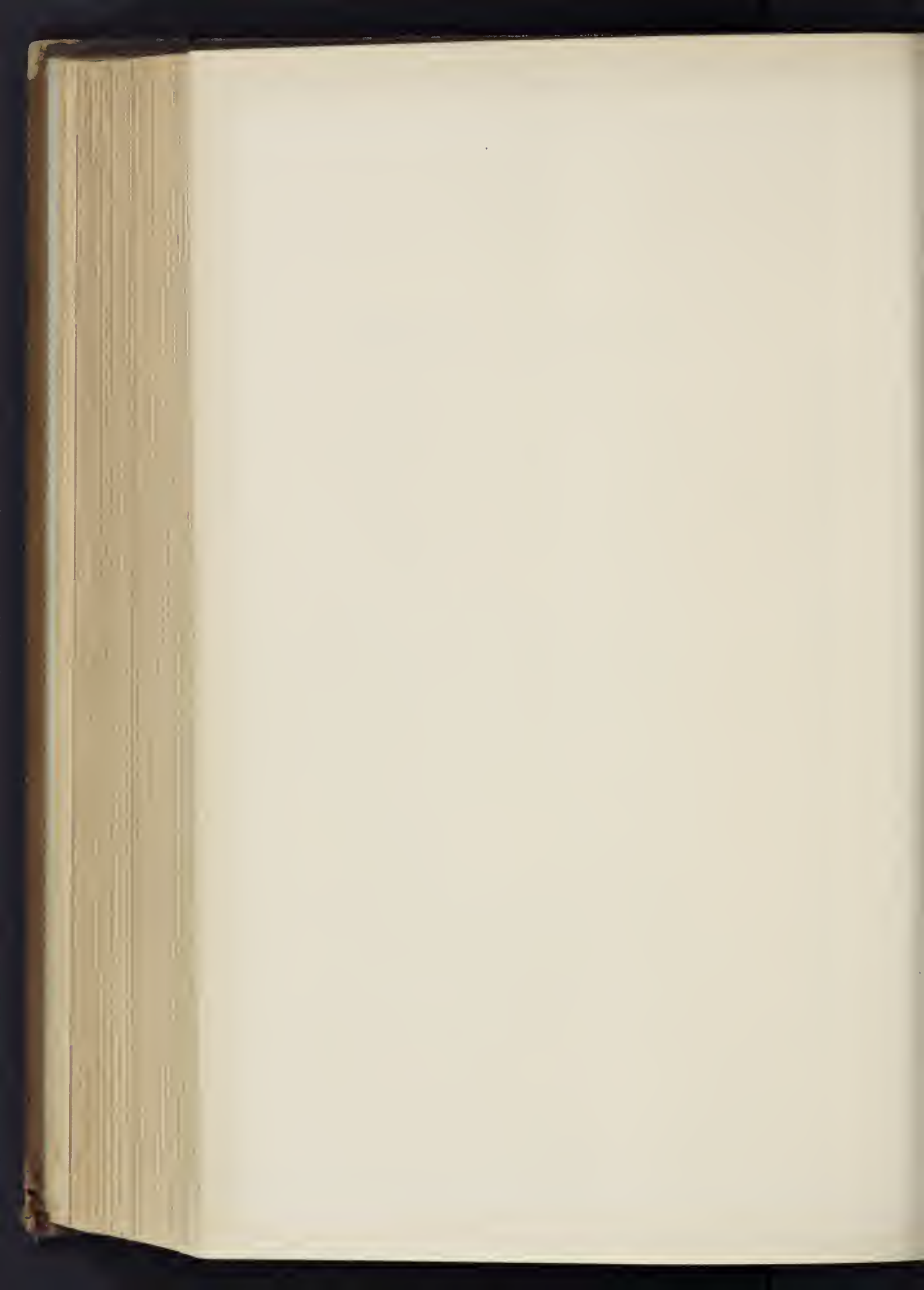


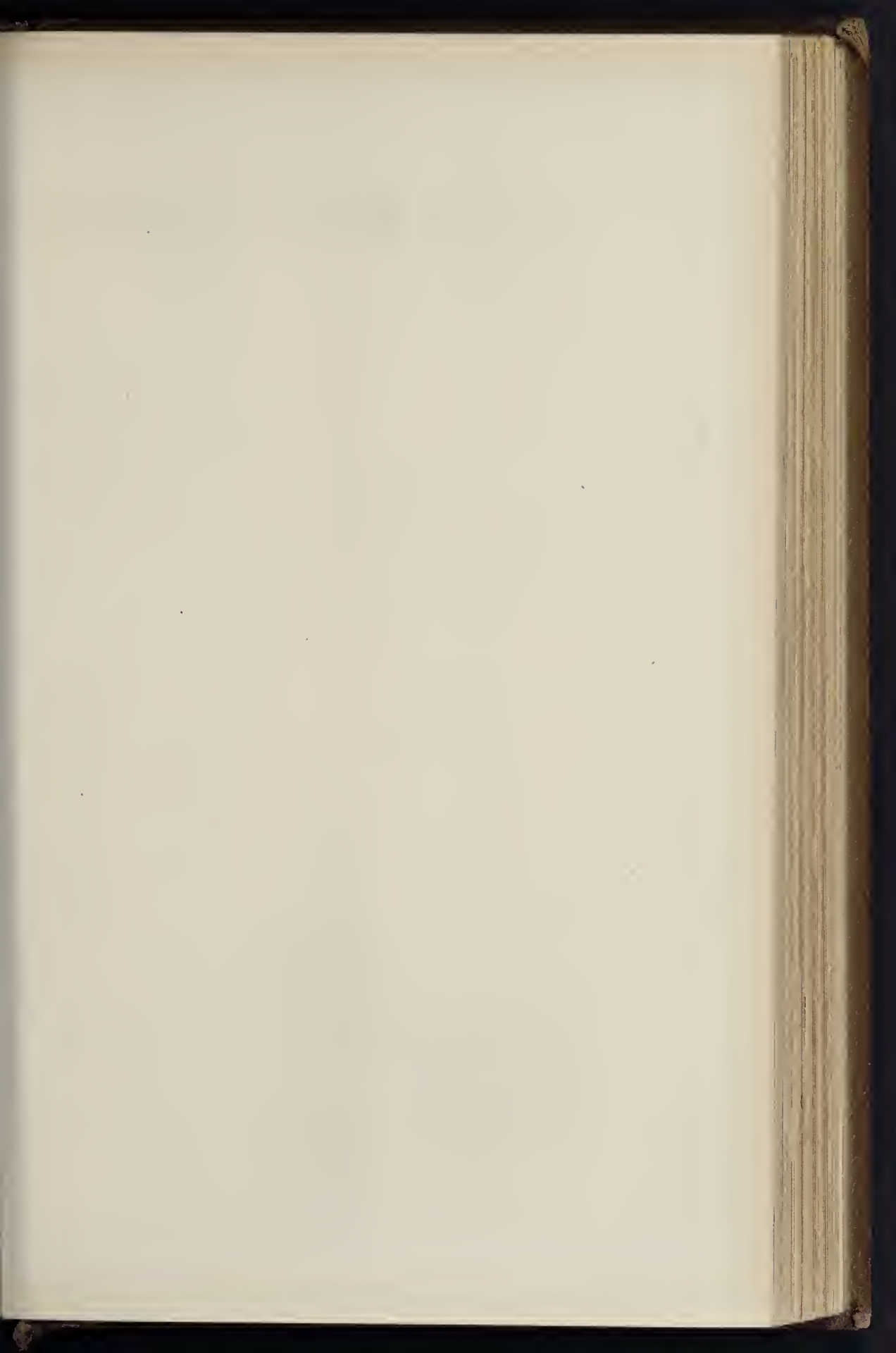


CHELSEA VESTRY HALL COMPETITION.—THIRD PREMIATED DESIGN.

DETAIL OF HALL INTERIOR.

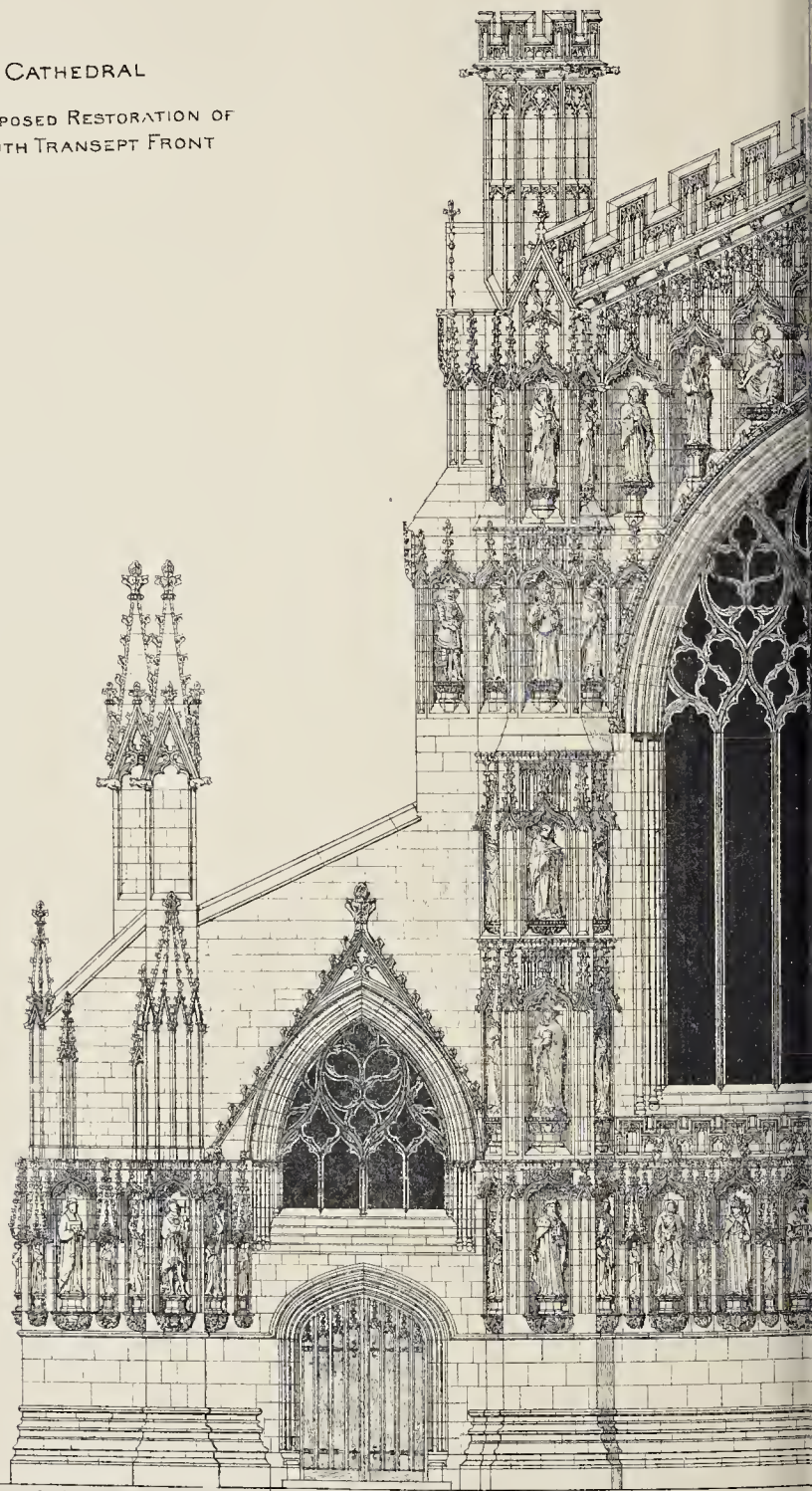
MESSRS. NEWMAN AND NEWMAN, ARCHITECTS.





CHESTER CATHEDRAL

PROPOSED RESTORATION OF
SOUTH TRANSEPT FRONT



Architectural drawing showing the proposed restoration of the South Transept Front of Chester Cathedral.

SCALE OF 1/4" = 1'-0"



MR. A. W. BLOMFIELD
ARCHITECT





The Pugin Travelling Studentship Medal.



The Godwin Bursary Medal.

es had to be abandoned. The materials used were Portland stone, red brick, and, in the panels of the first and second floors, plain red unglazed tiles in herring-bone patterns, affording a workable surface. In the ground-floor story a sufficient amount of light and air has been obtained without making the building appear to rest entirely on sheets of plate-glass. A special feature in connexion with the work is the framing of the panels, &c., in the projecting gables. This has been designed and carried out throughout by Mr. E. Roscoe Mullins, the well-known sculptor, who had free scope subject to the general control of style, scale, and subject, which the architect considered necessary. Mr. Mullins desires us to state that the drawing, of which our illustration is a reproduction, was selected at the Royal Academy Exhibition this year.

WELLS VESTRY HALL COMPETITION.

We give this week the third premiated design in this competition by Messrs. Newman & Newman. The following is the architects' statement of their views in regard to arrangement and design of the building:—
"In the existing buildings the corridors being very long, it was thought undesirable to confine them to any greater length in one direction, and it was partly upon this consideration that partly to secure good light other than top light to the committee and cloak rooms, and to place the reception-room in proximity to the two lobbies that the plan assumed the leading lines. The conveniences are so arranged as not to interfere with the ingress of the people, and yet be close at hand, but retired from the halls and reception-room.
The position of the committee-room was fixed by the desire to have it near the present fittings, as it was thought that it would be used in conjunction with them, to keep it as near the hall as possible on account of the use, and to obtain direct light.
These considerations helped the working out of the main idea, viz., to have the two lobbies arranged en suite to present as large a front as possible to Manor-gardens for the improvement of that property.

The dimensions of the main hall are 77 ft. by 41 ft. and 32 ft. high. A gallery is formed over the servery with two staircases, one communicating with the interior of the building and the other with the street. Accommodation is provided for 530 people in the large hall and 70 people in the gallery, or a total of 600 in all.
The halls are lighted from the side and ends, and separate exits provided into Manor-gardens, which also lead to the retiring-rooms.

On the west side of the Vestry-hall is the secondary hall. Its dimensions are 41 ft. by 37 ft. and 27 ft. high to the ceiling. The service-rooms adjoin and are arranged between the two halls.

Externally red bricks, with Portland stone dressings, cornices, &c., were proposed.

Internally, in the halls, committee and reception rooms, it was proposed to have wainscot dados and doors, and the walls above plastered and finished in colour, while the vestibules, corridors, and lobbies were to be finished with marble mosaic floors, marble dados and columns, and the plastering finished with colour decoration. The dome lights to vestibules were to have had artistic glass to suit the style and finishings."

If we remember rightly, the retiring-rooms at the end of the Vestry-hall were not shown in the plan as sent in, but have been added since, to supply what was an obvious deficiency in the original plan. The arrangement of the approaches to the hall for the public is, as we have before observed, very pleasing and effective.

CONSERVATIVE CLUB, CARDIFF.

This club-house is to be built for the Penarth Conservative Association by a limited company, promoted by the association. It will be called the Penarth Conservative Club. The architects are Messrs. John P. Seddon and J. Costes Carter (of Cardiff), with whom is associated Mr. S. H. Snell, of Penarth, the resident architect on Lord Windsor's estate. The drawing is by Mr. Carter.

The club consists of dining-room, bar, and committee-room on the ground-floor, and on the

first floor of billiard-room and a room for public meetings, having a separate entrance from the road. This large room could be used for public dinners, &c., as it has a lift from the ground-floor near the kitchen. There is a large kitchen, besides the usual offices.

The walls are built of the local blue lias stone, faced externally with Penarth pressed red bricks, and the roof covered with Bridgewater tiles.

TWO OF THE INSTITUTE MEDALS.

We give here engravings, made by Mr. J. D. Cooper, of the Pugin and Godwin Medals of the Institute of Architects. The Pugin Travelling Studentship Medal has been established for a good many years, and is generally one of the best contested competitions at the Institute. The Godwin Bursary, originated and endowed by the late editor of the *Builder*, was established in 1851, and the Medal exhibits a portrait of the founder on the obverse. The Pugin Medal shows the Institute arms on one side and the Pugin arms on the other side. The special objects for which each was founded are well known to our readers. The Pugin Medal was modelled by Mr. J. Taylor Foot; the Godwin Medal by Mr. G. G. Adams, F.S.A.

THE CONGRESS OF FRENCH ARCHITECTS.

The Congress of French Architects, under the presidency of M. Questel, will be held at the École des Beaux Arts, from the 8th to the 13th of June (inclusive). We subjoin the full programme, in its original form:—

Lundi, 8 juin.

à 2 h.—Constitution du Bureau et ordre des travaux du Congrès.—Nominations des Commissions sur les questions suivantes: Concours publics, Honoraires, Hygiène, Propriété artistique, Responsabilité, Vieillesse, &c.—L'Architecture au Salon, par M. Hardy, architecte.—Visite des ateliers de M. Chais, imprimeur éditeur de la Société.

Mardi, 9 juin.

à 9 h.—Visite des fouilles archéologiques du Louvre, sous les salles des Crisatides, de la Vénus de Milo et de Melpomène, M. Guillaume, architecte.—Les monuments Sumériens du Louvre et les rois architectes de la primitive Chaldée. Conférence dans la galerie assyrienne, par

M. Ledroit, conservateur et professeur au Musée national du Louvre.

à 2 h.—Étude sur la céramique, par M. Deslignères, architecte.—A travers l'Espagne, conférence par M. Coquet, architecte à Lyon.

Mercredi, 10 juin.

à 9 h.—Visite des abattoirs de la Villette, fen Janvier, architecte.

à 2 h.—Le premier temple de Jérusalem, essai de restauration par M. G. Perrot, membre de l'Académie des Inscriptions et des Belles-Lettres, directeur de l'École normale supérieure, et M. Chérier, architecte.—Compte rendu du Congrès des Sociétés savantes, par M. Charles Lucas, architecte.—Études ou rapports des Commissions nommées le 8 juin.

Jeudi, 11 juin.

Excursion à Ronen, départ à 9 h. du matin, gare Saint-Lazare, retour à Paris, 11 h. 30 du soir.

Vendredi, 12 juin.

Matinée réservée à la Caisse de secours mutuelle.

à 2 h.—Études ou rapports des Commissions nommées le

Lundi, 9 juin.

Samedi, 13 juin.

à 9 h.—Visite aux ateliers de la Corderie d'art de M. Lebnitz.

à 1 h.—Distribution des médailles décernées par la Société Centrale des Architectes, à l'Architecture privée, à l'École des Beaux-Arts, aux Écoles d'Athènes de Rome, aux Écoles privées, au Cercle des Maçons, au personnel du Bâtiment, aux Industriels d'Art.—Notice sur la vie et les œuvres de M. Paul Abadie, membre de l'Institut, par M. Dames, architecte.

à 7 h. très précises.—Dîner confraternel, à l'Hotel Continental.

All inquiries should be addressed to the "Secrétaire du Congrès," at the offices of the "Société Centrale des Architectes," 168, Boulevard St. Germain, Paris.

COMPETITIONS.

St. George's Parish Church, Stalybridge.—The drawings submitted by Mr. John Lowe, architect, of Manchester, in competition for the proposed restorations of this church, have been awarded the first premium.

Co-operative Store, Chester-Le-Street (County Durham).—The plans of Messrs. Sept. Oswald & Son, architects, of Newcastle-on-Tyne, have been selected in competition for extensive additions to the Co-operative Store at this place (including stabling, abattoir, &c.), and also for laying-out the adjoining land in sites for dwelling-houses.

Bexhill-on-Sea Drainage.—In reply to the invitation of the Local Board, some time back, nine sets of plans were sent in for the main drainage of Bexhill, by, amongst others, Messrs. Davison & Sons, Windsor; Mr. J. B. Watt, Walbrook, London; Messrs. Orchard & Van Putten, Lewisham; Messrs. Lailey & Read, Westminster; Messrs. Francis & Robinson, Furnival's Inn; Mr. Coghland, St. Albans; and Mr. Fowler, Manchester. On Tuesday last the Board selected the plans of Messrs. Nichols, Birmingham, as being the most economical, subject to modifications, and they decided to offer Mr. H. C. Roper, C.E., Dudley, 141, for the retention of his plans, the Borough Surveyor of Hastings, in conjunction with the Board's Surveyor, having reported strongly in favour of the lines laid down on his scheme as being essential in several particulars. The unsuccessful plans are to be returned with thanks for the trouble taken. At present they are on view at the Surveyor's Office, Bexhill.

PUBLIC LATRINES.

The Vestry of Paddington has just had presented to it the report of its Public Lavatory Committee, appointed on the 4th of March, in pursuance of a resolution by the Vestry affirming "that it is highly desirable that public lavatory accommodation (with water-closets, &c.), for both men and women, should be provided for the use of every part of the parish." By the terms of the "reference" the committee was "to consider and report as to whether this accommodation cannot be provided in such a way as to be a boon to the immediate vicinity in which it is placed, instead of being a nuisance, as must be the case, more or less, where structures for this purpose are erected in the centre of the public thoroughfare." The Committee, of which, Mr. Mark H. Judge was chairman, answered this question in the affirmative, and in their report they say,—

"Your committee is of opinion that the opposition usually made to the construction of urinals in new places is mainly due to the unsatisfactory structures which have hitherto been erected, and they venture to suggest that not only should better designed places be provided, but that, as far as possible, they should be in charge of an attendant. The construction of one or two public lavatories on some plan similar to that proposed for the thoroughfare of the Harrow and Edgware roads would, it is thought, prove so satisfactory that there would be no opposition to the construction of others in similar posi-

tions, so that the present common stall urinals erected in the public thoroughfares might, in time, all be removed. The cost of an attendant would in most cases be in large part met if complete lavatory accommodation were provided, as a small charge should be made for the use of the closets and the wash-basins. In such positions as at the junction of the Harrow and Edgware roads a considerable profit would be realised."

The committee recommend:—1. That an underground public lavatory for men be constructed at the junction of the Harrow and Edgware roads, in accordance with the plans presented to the committee by the chairman, Mr. Mark H. Judge, A.R.I.B.A.; and that the Surveyor to the Vestry be instructed to obtain estimates for the same for the consideration of the Vestry. 2. That the urinal in the Uxbridge-road be removed, and that a new underground public lavatory be constructed near this spot, directly opposite the Queen's-road; the lavatory to be in two parts, one for men and one for women; the plan to be somewhat similar to that proposed by Mr. Judge for the Harrow and Edgware roads. That advertisements be inserted in the architectural journals offering a premium of 10l. for the best design for the said public lavatory; the premium to be awarded by three members of the Royal Institute of British Architects, to be selected by the Vestry.

What may be done in this direction is shown by the underground urinals and water-closets (for men only) erected by the Commissioners of Sewers of the City of London beneath the ground at the base of the Wellington statue in front of the Royal Exchange. Of these conveniences an official description is before us, and we extract the following particulars. The underground construction is formed around the base of the Duke of Wellington's statue, on the western front of the Royal Exchange. It is wholly beneath the street-pavement, and was excavated in the mass of solid concrete which surrounded the foundations of the base of the statue. The base of the statue being oblong, with a railing round it, forming an ellipse, that form suggested itself as best suited to the requirements of the structure. The area may be said to be divided into three rings, the outer ring being occupied by the water-closets, the middle ring by the passage-way or corridor, and the inner ring, or that which is closest to the base of the statue, by the urinals. The outer ring contains twelve water-closets, six on each side, divided by brick partitions radiating from the centres of the ellipse; space is provided at the ends for four additional closets, should they be required, or the space may be otherwise utilised, as may be found necessary. The outer ring contains also two rooms for attendants, one on each side of the entrance, and together they command a view of the whole of the interior of the structure. The corridor or passage-way is 3 ft. 6 in. wide, and gives access to the water-closets on one side, and to the urinals on the other side, and passes completely round the ellipse, giving a clear passage-way from the entrance to the exit. The internal dimensions of the structure are as follow:—Length 38 ft. 4 in., breadth 33 ft. 8 in. The depth from the street paving level to the floor of the corridor is 10 ft. There is no external evidence of the structure other than the entrance-steps leading to it; the cast-iron railing which heretofore surrounded the base of the statue is retained in its original position, and the levels of the pavements are unaltered. The street pavement over and forming the roof of the structure is carried by three rows of cast-iron ornamental columns, which carry rolled iron joists filled in with breeze concrete, the whole being covered with asphalt. These columns at the same time form the points of subdivision of the urinals. The structure is lighted by prism pavement-lights let into cast-iron frames lying outside the curb of the railings surrounding the base of the statue, and forming also the footway pavement, and is ventilated by perforated iron panels and gratings laid at the pavement level. An elliptical grating forming the outer border ventilates the water-closets, and the gratings immediately at the base of the statue inside the railings surrounding it ventilates the urinals. Ventilation is also obtained to the water-closets by open fluepipes over each of the doors to the same. The closet apparatus are of the best quality, the whole basin and trap being formed in one piece of white porcelain. The seats are constructed of hard light-coloured wood, polished and put together so as to be easily removed when neces-

sary, the seats are hinged with brass hinges, and the risers made movable. The urinals in the inner ring are fourteen in number, and are formed with enamelled slate backs, sides, and divisions, and fitted with white porcelain-lipped pans. The floor of the standing-place of each urinal is of slate, dished and covered with a brass grating, with a hinged gully and trap in the centre. The drains throughout the structure are to be inspected and kept clear by means of hinged inspection boxes, man-holes and covers, and have ventilating-pipes carried up the gas standards in the entrances. The floors throughout of the closets and the passage-ways are asphalted. The whole of the internal walls are faced with white glazed bricks with coloured borders and dado. The building is from the design of Lieut.-Colonel William Haywood, the Engineer and Surveyor to the Commissioners of City Sewers. The builder was Mr. Mark George, contractor, and all the sanitary fittings were supplied by Mr. George Jennings, of Stangate. Adjoining Whitefield Chapel, in the Tottenham Court-road, is a urinal lately erected under the superintendence of Mr. William Booth Scott, the Chief Surveyor to the Vestry of St. Pancras, which possesses some good features. It is of enamelled slate, and takes the place of one of the old-fashioned iron kind. The structure has been erected for the Vestry by Mr. George Jennings.

THE SURVEYORS' INSTITUTION.

The Council announce that the following candidates, whose names appear in alphabetical order, have passed the recent Professional Examinations of the Institution:—

For the Professional Associateship:—

Arthur Joseph Edwin Arch.	George Edward Hilliard.
John Arnott.	William Vincent Full.
Cecil Cantley Baker.	George Arthur Lansdowne.
Edwin Thomas Beard.	Charles Ralph Maddox.
Harry Blundell.	Arthur John Martin.
Alfred Virgove Buckland.	Frank Massie.
Herbert George Coales.	Sydney Perks.
Marcus E. Collins.	John Raad.
William Jacobus Gihhou.	John Moore Sturgess.
Robert Godfrey.	John Henry Titen.
Charles Henry Hehblithwaite.	John Watson, jun.
	George Arthur Williams.
	Sidney Williams.

For the Fellowship:—

Frank Arthur Bontor.	James Pain.
Thomas Arthur Dixon.	Philip Edward Pilditch.
Harold Edward Moore.	Henry John Treadwell.

DULWICH COLLEGE AND ITS FOUNDER.

MR. T. C. NOBLE, in a recent communication to *Notes and Queries*, says:—"In his carefully compiled 'Catalogue of the Manuscripts and Mementos of Alleyn's College of God's Gift at Dulwich,' 1881, p. xxiii, Mr. G. F. Warner, of the British Museum, gives a brief introductory account of the earliest purchases made by Edward Alleyn in the parish of Camberwell, and traces step by step the gradual acquisition of the large estate which was subsequently left for the support of that noble foundation Dulwich College. 'The precise date of Alleyn's first acquisition of property in the manor has hitherto been a matter of doubt; but, adds Mr. Warner,—It is now ascertained to have been October 1, 1605. This purchase, however, seems to have been merely a preliminary, in order to clear off a mortgage held by Sir Robert Lee since 1602, and it was followed, on the 3rd October, by articles of agreement on the part of Sir F. Caulton for the sale of the manor itself and the whole of his estate, excepting the Camberwell advowson.

The articles of agreement of October 3, 1605, stated by Mr. Blanch in his 'Dulwich College and Edward Alleyn,' 1877, p. 59, to be 'the oldest document in Dulwich College respecting the purchase of the manor by Alleyn,' was stated by Mr. Warner, in his 'Catalogue,' 1881, to be missing. His precise words are, 'The original of this document has been lost.' Such being the case, it must have been lost between the year 1875, when it was in the custody of Dr. Carver, the master of the College, and, in fact, is stated by Mr. Blanch to be at that date in the College, and 1881, when Mr. Warner compiled the 'Catalogue.' These dates are important, because it is now my pleasure to say that this precious MS.

has recently been discovered—in fact, was offered for sale at the well-known auction-room of Messrs. Puttick & Simpson, in Leicester-square, on March 5, 1885, being described as—

“Lot 106. Agreement for the leasing of lands in the paroch of Dulwich in the County of Surrey between Sir Francis Carlton, Knight, and Edward Alleyn. Dated 4 October, 1605. 3 pp. folio. Signed by both parties.”

It is only realised at the auction the insignificant sum of 2l., simply because many persons doubted its genuineness; and, if genuine, why was it there for sale? An explanation is certainly required; but it is to be hoped that by the time this note is printed the MS. has been deposited with the other papers at the College. It is not, then, immediate steps should be taken to secure it before it again becomes a loss.

When I printed my ‘Ramble round the Crystal Palace,’ in 1874, I had occasion to note down many curious hitherto unknown facts relating to the district. Among all the items there was one which I think is now worth reprinting, and is, perhaps, the funniest, and at the most deplorable evidence we have of the way the English people sometimes venerate the memory of ‘a worthy benefactor.’—

“1867, March. Mr. Webb, of the Half-Moon Inn, Dulwich, presented the College with the original grave-stone of Edward Alleyn, which for many years had been reserved by himself and father in the tea-gardens at the rear of the inn. I recollect seeing it there. It is now, I understand, ‘buried’ among other odds and ends in the luge storehouse.”

Where is it now, in 1885? The ‘Manor House,’ we know, was destroyed in 1880, and the site is now a building estate.”

THE FURNITURE TRADES' EXHIBITION.

The fifth annual Furniture Trades' Exhibition, which has been open at the Agricultural Hall, Islington, for the past fortnight, has been one of the dreariest of the many dreary exhibitions which have been held in that building during the last few years. The large amount of occupied space (notwithstanding the inclusion of several exhibits having nothing whatever to do with the avowed object of the Exhibition), the scarcity of visitors, and the generally dismal appearance of the “show,” go to convince us more strongly than ever that the mania for yearly exhibitions in particular groups of trades has almost spent itself. As I believed from the first would be the case, it has been found impossible to maintain the interest of frequently-recurring exhibitions of such a character, for the intervals between them are too brief to allow of material advance and improvement, and it necessarily follows that an exhibition after exhibition the same things are shown, generally by the same exhibitors. Even in this “age of exhibitions” this sort of thing begins to pall after a time, and the present Furniture Trades' Exhibition at Islington affords evidence that the public and exhibitors alike are of this opinion, for the visitors are few in number, and there is a marked falling off in the roll of exhibitors. Nevertheless, there are a few good things to be seen in the Exhibition. Amongst these we may mention some chair-frames exhibited by Messrs. G. S. Lucraft & Son, of Ty-road, containing some excellent inlaid work in brass and tortoiseshell. The design of these inlaid panels is of a flowing Renaissance character, and the workmanship throughout is exceedingly good. Messrs. William Woollams & Co., of High-street, Marylebone, have a very old display of their well-known paperhangings, good design, and free from arsenic; and they also exhibit specimens of a new material for wall-decoration named “Tergorine,” which texture and appearance is very similar to leather, and which is capable of treatment in any way in which real leather may be treated. The material is worth the attention of architects, and bids fair to become a serious rival to leather materials now in the market. Messrs. W & Co., of Bentham Works, near Ironbridge, show a cabinet and dado illustrating the application of faience as a material for inlaying culture, panelling, &c. Mr. A. Putney, of Edge-park, Harrow-road, shows his “Pavolo” solid wood flooring, of which we have on previous occasions spoken in terms of commendation. By its use architects may have a satisfaction of materially improving the character of the floors of the houses they set without any very serious increase of cost. The poorness of the floors in the vast

majority of modern houses in this country has on more than one occasion been referred to in the pages of the *Builder*, and we hope that the use of Mr. Putney's “Pavolos” flooring will help to effect a very desirable improvement in this respect. In addition to its better appearance when compared with the ordinary nailed and too-often gaping floor-boards, a solid floor, such as Mr. Putney has brought forward, has important and obvious advantages from a sanitary point of view. Messrs. M. C. Duffy & Sons, of Bermondsey, show some very excellent work in the shape of turned balusters, newels, and table and chair-legs; also handrails, &c. Their “Board School Wood-block Flooring” is also well worth attention. Messrs. W. R. Crow & Sons, of Clerkenwell, have also a good display of the same class of goods. Messrs. F. Walton & Co., of Berners-street, have a stand showing the now well-known capabilities of “Lincrosta-Walton” as a decorative material. Messrs. Henry Bassett & Son, of the West London Parquet Works, exhibit some good specimens of parquet floors. The miscellaneous exhibits include Mr. Renton Gibbs's admirable heating apparatus for buildings; Messrs. C. Kite & Company's excellent ventilators; the “Glacier” window-decoration, exhibited by Messrs. Perry & Co. as a cheap substitute for stained glass; cement for mending broken glass and china; Ridge's food for infants; and some other things whose claim to be admitted to a “furniture trades' exhibition” has apparently been that they were wanted to help to cover the vacant floor-space.

THE EASTERN PEDIMENT OF THE PARTHENON.

SIR,—It is evident that the writer of the article* criticising my paper on the Eastern Pediment of the Parthenon, in the April number of the *Nineteenth Century*, has to some extent misunderstood the nature of my work and the character and intention of my paper. Perhaps some remarks on pp. 664 and 669 of my article ought to have led your critic to consider it more than possible that, “for anything we know, Dr. Waldstein may have such instances *in petto*.” But I can quite see that the writer was not obliged to wait with some patience, and assume the presence of such arguments. On p. 669 of my article I refer to the necessary limits of space and to a note at the beginning of the paper (“It is chiefly with regard to this part of the work that the remarks in the introduction to this paper apply”). This introductory note, which might perhaps have caused the critic to wait, had unfortunately to be omitted.

The article was written at the desire of the editor of the *Nineteenth Century*, and is a popular abstract of an essay in the forthcoming volume of *Essays on the Art of Pheidias*. This essay has been in print for several years, and had to be reduced by more than one half to take the form of a magazine article. This reduction, again, I was obliged to reduce by more than one-third, omitting all the *pieces justificatives*.

In the eighteen pages of the article (a comparatively large space as such articles go) I was led merely to give the results of my investigations, which appeared to the editor of considerable interest to a portion of the cultured public. But I admit that it may fairly be questioned whether it is just or wise thus to give only the results of scientific investigation. On this point I have not definitely made up my mind, and I am willing to learn by the experience which the misunderstanding of the criticism on this paper offers.

For the *pieces justificatives* to my conclusions I can only refer to the forthcoming book, though I cannot be certain whether I shall there satisfy my critic. I there give a considerable number of the instances I have collected to show the prevalence of the personifications of nature referred to. But to realise how certain similarities necessarily point to some relation more or less direct in monuments of Classical or Mediæval art (nay, I might add, in objects of nature), it is essential that the student should have followed these types through the mass of scattered data, and should have developed in himself the feeling for what are criteria of similarity and difference, the power of testing importance or irrelevance in the coincidence of phenomena. And though I

give what I must consider a sufficient number of instances to prove my conclusions, they will only have adequate weight with those who have been trained in such observation. I have often found myself unable to discover important similarities of form and structure, or delicate difference within general likeness between objects shown me under a microscope, evidently because I was not trained in this class of scientific observation. In matters of art and archaeology, on the other hand, it has not yet been realised that efficient observation must also be studied or practised.

There are two points in which the statements in the criticism are misleading.

(1) The writer charges me with my neglect to acknowledge an indebtedness to a previous authority, namely, to Weher, who, in 1822, interpreted one of the two figures I call Thalassa and Gaia as Thalassa. On p. 156 of my book, which has been printed off for some time, I do refer to Weher. Weher's articles, quoted at second and third hand as Schorn's “Kunstblatt,” 1821, have, I venture to believe, rarely been seen in the original. They appeared in the art-supplement to a daily paper (*Morgenblatt für Gebildete Stände*), which was issued at Tübingen. Along with many other things I was obliged to omit in the article, there were special reasons why space could not be given to Weher's interpretation, as it would require additional explanation. I could in no way regard it as a confirmation or anticipation of my view. Weher mistakes the western for the eastern pediment, considers the subject of the eastern pediment to be the strife between Athene and Poseidon for the Attic land, and accordingly interprets all these figures as followers of Poseidon: Rhode, Amphitrite, and Thalassa. This mere guessing at Amphitrite and Thalassa on a mistaken basis surely required no mention when I was briefly giving my interpretation of Thalassa and Gaia.

I take a very conscientious view of the duty of acknowledging priority, as I also regret deeply and shrink from discussions concerning it. To avoid such discussion I always prefer to sink any possible claims I might have to absolute originality where any doubt might be maintained. But the remarks of my critic incite me to publish facts which I should otherwise have never published. In my book and in the article in the *Nineteenth Century* I have throughout acknowledged my indebtedness to Professor Brunn for the suggestion of the general cosmical (not “topographical”) conception of the scene in the eastern pediment. As a matter of fact, I formed my view of the interpretation of Thalassa and Gaia and of the general conception of the eastern pediment while a pupil of the late Professor Stark at Heidelberg in 1873, and I expressed my views to him, and, since then, to many others. In 1874 Brunn's completely original interpretation appeared, and, though my work has been independent, I thought it undesirable to make assertion of this fact, and have given full acknowledgment to his published work.

2. The second case in which the remarks of my critic are misleading is when he says:—“A little lower Dr. Waldstein does cite one actual instance,—an instance already very familiar to all archaeologists, i.e., the mountain-god in the Esquiline wall-painting, representing the landing of Odysseus on the coast of the Læstrygonæ.” This appears to imply that the analogy between this mountain-god and the figure from the Parthenon has already been made. This is untrue. If it is meant to imply that I am not the discoverer of these mural paintings it is meaningless. If it implies that these wall-paintings are exceptionally well known among ancient monuments, or, still more, that this one figure is very familiar, it is erroneous. In any case, as regards my comparison of two monuments, both of which have been published, such a remark is superfluous, and, naturally suggesting the first possible meaning, it is misleading.

I would, finally, add the closing passage of the Essay in the book to indicate the spirit in which I should like my interpretation to be taken. This passage I was also obliged to cut out of the article:—

“Much harm has been done to good and useful suggestions in that they have been overstated. Whoever brings forward a new theory or establishes a new fact becomes so enamoured of the new aspect disclosed before his eyes, that he is apt to overstate its importance, and claims to complete acceptance. The result is that others are stimulated to opposition by the element of excess in the over-

* See the *Builder*, April 11 (p. 507).

statement, and, on their side again, are carried away by opposition, to the destruction of any moderate or modified acknowledgment. Thus artificial antitheses and parties are formed with purely negative impulses and aims, to the detriment of truth. What is extreme in the statement as well as in the method becomes stereotyped, and the normal progress towards the recognition of truth is suppressed until the violence of opposing forces is spent, and time has so far elapsed the harshness of the extreme view as to allow the main questions to become again visible in their true importance and usefulness.

In offering this new interpretation of the two figures from the eastern pediment of the Parthenon, I have no desire to bring about a similar state of discussion.

Though personally I feel that this is the most probable of interpretations, I am not blind to the fact that, as matters now stand, we cannot hope to solve the question conclusively and for all time. We can merely hope to find that interpretation which, from the nature of other extant monuments, and the general spirit of Greek art in the time of Pheidias, is most in keeping with that spirit, and with the limited amount of undoubted data which we possess concerning that individual composition.

While writing this essay, I have not held before myself the probability that all authorities will or must straightway relinquish all previous notions, and accept my explanation. But I have felt strongly that, at all events, this view is one which, at least, has much in its favour; that it is one without which the list of possible interpretations is incomplete; and, above all, that it will explain many of the peculiarities in the artist's work itself, both in composition and in detail of execution, which would otherwise be unexplained. And I hold firmly that, of all things to be considered by the interpreting archaeologist, the recognisable indications of the artist's work by means of his peculiar language, is of primary importance.

I believe, therefore, that of the many interpretations offered, this is one worthy of consideration, and one which, in scientific duty, required to be published when recognised by the archaeologist.

CHARLES WALSTEIN.

ARCHITECTURAL STYLE.

SIR.—Will you kindly allow me to call attention to two errors that creep into my article on "Style" last week [p. 644, ante]. In the fifth paragraph, "initiated" should obviously have been "imitated." I hope that it is equally obvious that I did not wish to speak of the clergy as being "deficient" in matter of painting and sculpture,—the word should have been "deficient,"* the whole gist of the article being that they should, like house-building clients, dictate their requirements to us, instead of deferring to such ancient examples as we are forced to recommend, for want of fuller instructions. Obedience to the Prayer Book will, of course, check the introduction of any radical changes.

EDWARD J. TARVER.

THE TUBULAR SYSTEM OF DRAINS AND SEWERS.

SIR.—The origination of the tubular system of drains and sewers for houses and towns (see page 636, ante) is due to the strong advocacy of Mr. Edwin Chadwick, C.B., in his Report on the Sanitary Condition of the Labouring Population of Great Britain, 1842, and in subsequent Reports in 1844-45, on the Health of Towns. But the first to practically use tubos for such purposes in the metropolis was myself. This was while I was chief Surveyor of the Westminster Districts of Sewers. In 1844, or 1845, when most of the present surveyors were in their infancy, I wrote articles, which appeared in the *Builder*, on the great defects of brick drains, and recommending stoneware pipes to be used for drains instead. At that time no such pipes were made or to be had in the metropolis. Shortly after, Mr. Thomas Peake, of Tunstall, in Staffordshire, who was a manufacturer of ferro-metallic drain-pipes, and who had read my articles in the *Builder*, informed me that he had opened a depot at Macclesfield Wharf, City Basin, London, for the sale of his pipes and other goods. I thereupon ordered a large quantity of his pipes, which I used in the drains and sewers under the jurisdiction of the Westminster Commission. Previously to this I had used some hutt joint flue-pipes for the same works. Some time after I had been using Mr. Peake's pipes, Mr. Wm. Northew, of Lambeth, brought me two glazed stoneware pipes, 9 in. diameter, and 2 ft. long, for my inspection. As I understood he could make and supply these pipes, I reported on their suitability and superiority, and recommended them for adoption. This the Commissioners agreed to, and sanctioned my ordering a large quantity of them, 6 in., 9 in., and 12 in. diameter. I then went to Mr. Northew, who told me he could not execute the order, as he would be compelled to erect new shops for making and drying them, and now kilns for

burning them. Upon this I saw three other firms of potters in Lambeth, namely, Green's, Doulton's, and another of whose name I have forgotten, all of whom declined the order. At last I called on Mr. Thomas Smith, of Prince's-street, Lambeth, who by degrees manufactured and delivered the pipes. After that, all the Lambeth potters began to make them, and, at my recommendation and persuasion, architects and builders began to use them; and so bricks for house-drains and small sewers were entirely discarded, and stoneware pipes were used instead. This is the true history of the first use of stoneware pipes for drains and sewers in the metropolis.

While I am writing I may as well record the fact that a great advance towards the tubular system for house drains and sewers was started by Mr. Thomas Cubitt in Belgravia. With half-round tiles, 9 in. diameter and 1 1/2 in. thick, which were made at his brickworks in Kent, he formed the channels and crowns of his drains. These half-round tiles he solidly surrounded with concrete, and bedded and pointed the joints thereof with cement, so as to prevent the leakage of foul liquids and gases through them. In this method of constructing drains which had the nearest possible approach to the tubular system of drains. Mr. Cubitt took great interest in sanitary improvements. In these matters he was far ahead of many of the architects and builders of the time. I had frequent conversations with him on the excellency of his drains, and on the superior workmanship of the sewers he proposed for carrying off the sewage from the metropolis, and down to the sea, for intercepting the sewage from the Thames. The plan of separating the sewage from the rainfall, afterwards called the *separate-system*, was then simmering in my mind. Practical experience began to teach me that it was a great advantage to combine the two kinds of sewers in the same channels. I remember he favourably entertained my idea as to the separate-system, and encouraged me to systematise and propose it. When I subsequently did this, the then Royal and Railway Engineers of the Metropolitan Commission flatly opposed and burked it. The great engineer who afterwards made up and carried out a main drainage scheme, worked on the old lines; and hence the abominable condition the Thames has been in ever since. When the Westminster Commission in 1846 adopted my egg-shaped sections of sewers, Mr. Cubitt was the first to apply to the Commissioners for leave to build them in the squares, roads, and streets in London. He built 7,500 ft. run of these sewers during that year, and used thereby over 1,800 ft., and had infinitely better sewers than he would have had by the odd system of sewers with nearly flat bottoms and upright sides. Mr. Cubitt's drains before referred to, like all his works, and all his actions, were good and honest. If any one should ever write the "Lives of the Builders," the life of Thomas Cubitt would occupy a most interesting and worthy place among them.

JOHN PHILLIPS.

THE ASPHITEL PRIZE.

SIR.—At the Institute meeting, held on the 4th inst., Professor Kerr asked "Why the Ashpitel Prize had been withheld from the best of the seventeen candidates who had passed the examination for Associateship during 1884." Mr. Arthur Cates, in replying, "Expressed regret that the Council for two years had been unable to recommend any candidate as worthy of being honoured by this distinction,—a distinction which, if lightly given, would discredit the prize itself. It is the most distinguished honour which any candidate can receive; it is an honourable distinction which should not be lightly thought of, but should be secured by a recipient worthy of the honour of being designated in the list of members as Ashpitel prizeman."

This prize was instituted about 1873, and it has only been awarded four times in these twelve years, viz.:

- In 1873, to Hugh Stannus.
- In 1877, to F. T. Baggallay.
- In 1879, to Bruce John Capel; and
- In 1882, to Thomas Purves Marwick.

The prize has now assumed considerable importance. It is given to the candidate "who has, in the opinion of the Council, most highly distinguished himself in the examinations for the degree of Associate held during each year." It is thus the most important prize in the gift of the Council. The examination for the Associate degree embraces all the branches of an architect's training, and it follows that the man who all over is the most distinguished Associate of his year attains a highly honourable position, and one not easily gained.

For this high honour the Council award a prize of books valued at 10*l.*, while for essay writing they give a medal and 25*l.*; for design, a Soane medallion and 50*l.*; and for sketching, a medal and 40*l.* Medals are given with nearly all the prizes in the gift of the Institute,—the Soane, Grassell, Pugin, and Godwin prizes, as well as those for essays and architectural drawings. I venture to affirm that a medal is the most popular form of award; and I would suggest to the Council the propriety of adding a medal to the Ashpitel Prize.

I am perfectly sure that candidates going up for examination would prepare themselves thoroughly

to compete for this distinction. At present they give the minimum study in order to pass. Give an object to strive for in the shape of a good prize accompanied by a tangible record like a medal,—which one can show,—and you will not only give a zest to those preparing for examination, but you will increase the number of candidates for the degree.

The cost would be trifling, and I do not think that on another occasion Mr. Cates would have reason to complain of the lack of worthy candidates.

A. B. C.

COOKING APPARATUS FOR LARGE INSTITUTIONS.

SIR.—In reply to Mr. Crane's letter in your last issue [p. 672], I cannot understand how any one can assert that the escape of steam, on opening the cover of my cooking apparatus, is a defect. This, of course, quite natural, and Mr. Crane can no more avoid this than I can; besides, I only contended that no steam escaped during the process of cooking. Further, Mr. Crane says that cooking takes fifty per cent. longer in my apparatus than by the ordinary method; this is also a mistake, for I can cook just as quickly as in any other one if I employ the same temperature as used by others; but it stands to reason that if I cook at a lower temperature, I must of course take a longer time. Every cook knows that meat cooked slowly is more palatable and more nourishing than when it is cooked quickly, and this is the reason for my preferring this method. For instance, a piece of meat weighing 10 lb. if kept at boiling-point, is thoroughly cooked in two hours, i.e., 120 minutes; therefore it takes 120 minutes \times 100° Celsius = 12,000 minute-degrees; but if it is cooked at 80° Cel., it takes $\frac{12,000}{80}$ = 150 minutes, which is a very simple problem.

It is well known that when meat is cooked at 100° Cel. a great deal of the nutriment is lost.

CARL BECKER.

. We cannot publish any more letters on this subject.

The Student's Column.

DESCRIPTIVE GEOMETRY.—XV.

How to distinguish the lines seen from those that are hidden either in an elevation or a plan.

WE have said that in representing solids it was usual to dot the lines hidden by the solid itself. We are supposed to look down on the plan from above, and to look at the elevation from a position in front of it; therefore, if we pierce the solid by a vertical line, we shall see on the plan the highest point of penetration, whereas the lowest is hidden. On the other hand, if we suppose the solid to be transparent by a line perpendicular to the elevation, the point of penetration which is in front is seen on the elevation, whereas the one that is behind is hidden.

The projection of an object limited by plane surfaces is made up of the projections of its arrises; it is evident that these projections will be enclosed by a polygonal figure which will form the outline of the object, this outline separates the parts that are seen from those that are hidden. To determine which are the arrises that are seen, we select two arrises the projections of which cross one another, and we then find out which of the two is seen when this is done, we know that all the arrises connected with the one seen will be also seen up to the outline of the object, the others will be hidden. (See fig. 77.)

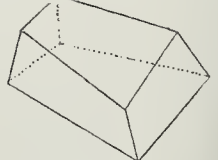


Fig. 77.

Draw the elevation and plan of a triangular pyramid.

Let a, b, c, d be the angles of the pyramid we join them, and find at once both the outline a¹, b¹, c¹, d¹ and a², b², c², d² on the plan at elevation.

On the plan the arrises a¹, b¹, and c¹, d¹ cross one another; consulting the elevation, we find that c¹ d¹ is at a higher level than a¹, b¹, therefore we conclude that c¹ d¹ is seen and a¹, b¹ hidden. On the elevation the arrises a², b²

* The word in Mr. Tarver's MS. was "deferent," and the printer unfortunately rendered it "deficient."—Ed.

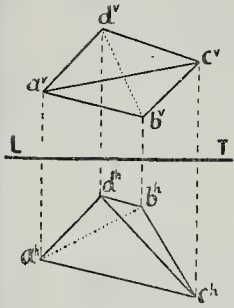


Fig. 78.

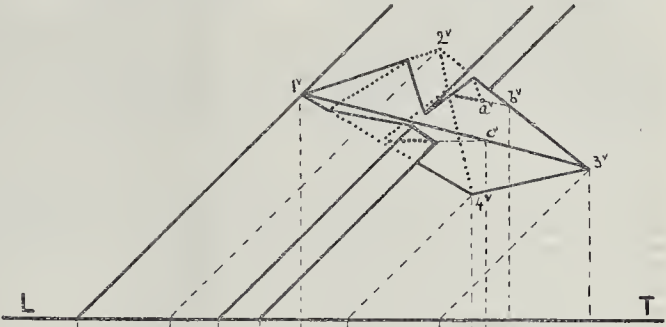


Fig. 81.

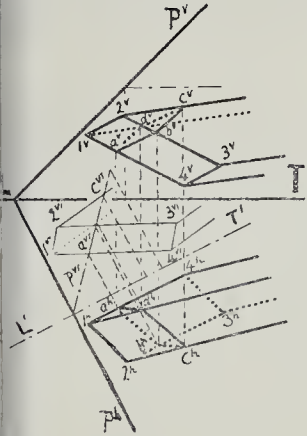


Fig. 79.

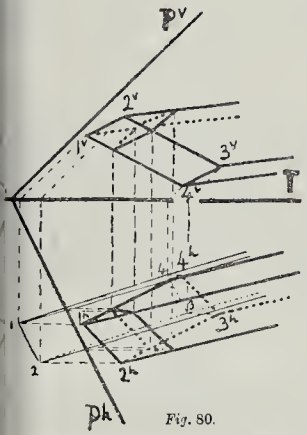


Fig. 80.

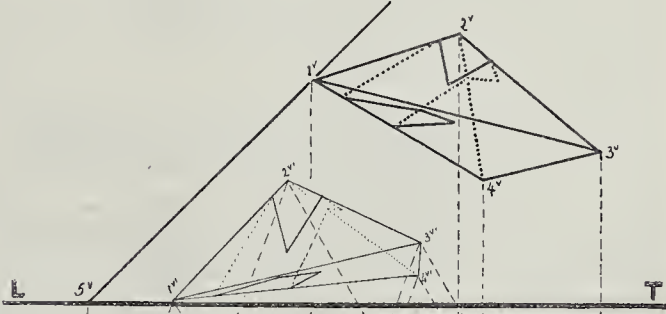


Fig. 83.

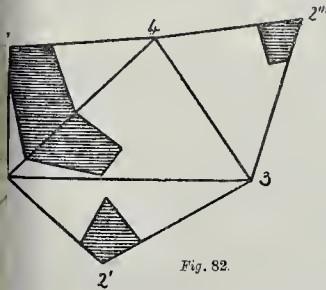


Fig. 82.

b^o d^o cross one another; consulting the plan, we find that a c stands in front of d b, therefore a^o c^o is seen, b^o d^o hidden. (See fig. 78.)

Find the intersection of a plane P with a prism, the base of which is the parallelogram 1, 2, 3, 4.

We simply make an auxiliary elevation on a plane perpendicular to P^o, and then the elevation of the intersection will fall on the trace P^o, we have only to deduct therefrom the plan of the intersection a^o, b^o, c^o, d^o, and then its elevation a^o, b^o, c^o, d^o. (See fig. 79.)

Second method of finding the intersection.—Instead of making the ordinary projections perpendicular to the planes of elevation and plan, we make an oblique projection of both the prism and the plane P, the projection lines being made parallel to trace P^o. All the surface of the plane P will be projected on P^o, and therefore its intersection with the prism will be projected on P^o; we deduce therefrom its plan and elevation as before, remembering that the elevations of the projection lines are parallel to P^o, and their plans are parallel to L P. This system of using oblique projections simplifies the drawing, as seen below (fig. 80). In both these diagrams the student will find a great advantage in using rod ink for the auxiliary projections to distinguish them from the data of the problem. We have indicated the oblique projection of the prism by thinner lines than the data, and marked the angles by small figures without signs.

Find the intersection of the triangular pyramid 1, 2, 3, 4 by the prism of base 5, 6, 7, 8.

We begin by the method which uses oblique projections parallel to the sides of the prism, as it is so very much shorter than the ordinary method of making auxiliary elevations and plans. The base of the prism is, of course, the oblique projection of the prism itself. Where it cuts the oblique projections of the arrises of the pyramid we have the projections of the intersections of the two solids, and we can deduct therefrom their plans and elevations. There are, of course, two intersections in the surface of the pyramid, the one where the prism enters, the other where it comes out of the pyramid; 1^o, 2^o, 3^o, 4^o, marked with thin lines, is the oblique projection of the pyramid. The point, of which the projections a^o, b^o, c^o, d^o are marked, is a point of the intersection; the points b and c serve only to find the intersections of the sides of the prism with the sides of the pyramid. (See fig. 81.)

By changing the plan so as to get it parallel to one of the sides of the pyramid, and turning down the three other faces, we could obtain the pattern for constructing the pyramid out of a sheet of cardboard, and also for cutting out thereon the openings for the penetration of the prism. The cardboard pattern of a triangular pyramid is like fig. 82. The students are advised to draw the fig. 81 on a larger scale, and construct it in cardboard. In fig. 82 the parts shaded are those that are cut out by the penetration of the prism; 2^o, 2^o, 2^o are the different positions of angle 2 when turned down on each face.

The ordinary method of solving this problem is by making a plan on a plane perpendicular to the direction of the prism. For this, we first have to make an auxiliary elevation on L^o T^o, parallel to the prism, then make an auxiliary plan on L^o T^o, perpendicular to the arrises of the prism. In this last plan the intersection of the projection of the prism and the projection of the pyramid gives us the plans of the intersections required, but we have to deduce therefrom their original elevations and plans by working backwards first their auxiliary elevation, L^o T^o, then their real plan, then lastly the elevation, as in fig. 83. To avoid crowding we have in fig. 83 drawn the elevation of only one of the arrises of the prism, and the plan of the arris used as L^o T^o.

A Medallion Portrait of the late Peter Squire will be unveiled by Sir Spencer Wells, Bart., F.R.C.S., at the House of the Pharmaceutical Society of Great Britain, in Bloomsbury-square, on Wednesday, May 20th, at four p.m. Mr. Squire was one of the founders of the Society in 1842, was thrice elected President of it, and was its Examiner in Botany for twenty-seven years. He was Chemist in Ordinary to her Majesty for forty years. Mr. Squire wrote the widely-known "Companion to the British Pharmacopœia."

STAINED GLASS.

Kensington.—Two Munich stained-glass windows have just been erected in the south transept of St. Mary's, Boltons, Kensington. The subjects are Ruth and Boaz, and Christ blessing Little Children respectively. These windows, as well as the other two already in the church, are the works of Messrs. Mayer & Co.

Farnworth.—The parish church of St. John, Farnworth-with-Kearsley, near Bolton, has just been provided with a memorial stained-glass window in two lights, erected by Dr. Kershaw, of Farnworth, to the memory of his deceased wife. The subjects represented are, "Christ Blessing Little Children," and "The Baptism of our Saviour." The window, which is placed over the baptistery, is the work of Messrs. Barlison & Grylls, of London.

Newchurch.—A two-light Munich stained-glass window has just been erected in the parish church of Newchurch, Rosendale. The subjects represented are "St. Elizabeth teaching St. John," and "Giving Alms." The work has been designed and executed by Messrs. Mayer & Co.

Blairgowrie.—A stained-glass window has recently been erected in St. Mary's Church, Blairgowrie, representing the Presentation of our Lord in the Temple. The work was designed and executed by Messrs. Warrington & Co., of Fitzroy-square, London.

Kensington.—A Munich window representing Charity has just been erected in the south transept of St. Peter's Church, Cranley-gardens, Kensington. It is the gift of Mr. C. Dalrymple, M.P., the inscription at the foot recording the fact that it has been placed to the memory of Alice Mary Dalrymple, Sept. 2nd, 1884. The work is by Mayer & Co.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,901, Dwarf Window-blinds. W. Kay.

A solution of fluorescine or aniline in a gelatinous medium is treated with boroglyceride or other antiseptic substance, and in a film on a sheet, or between two sheets of glass, which may then be used for dwarf blinds or analogous purposes.

2,686, Device to Prevent Rattling of Sashes. A. B. Johnson.

A small lever is pivoted at each side of the sash by a screw to the inner head. The short end is made eccentric, and is heavier than the long end, so that when the sashes are open the lever hangs vertically, but by pulling the long end forward the eccentric end is pressed against the plate, keeping the meeting-bars together, and preventing the rattling of sashes.

11,108, Artificial Asphalt. F. Bosshardt.

Natural or artificial stones, ores, earth, sand, powdered glass, wood or paper substances, are powdered, mixed mechanically with pure bitumen, sprinkling the mixture if necessary with petroleum, and warmed in a rotating vessel.

13,075, Casement Window-frames. J. Elsley.

The fixed and swing frames are made of metal, rolled to an E section. One of the frames is fixed in the stonework, and the swing frame fits close to it by two rebate joints, being flush at front and back, and leaving a space between. In some cases two ribs may project, so as to bear alone against the stonework, and the space between the frame may be narrowed. The swing frame is hung by pivots taking into sockets at top and bottom of the fixed frame.

4,577, Portable Gas Lamp. J. E. Kelby.

A bracket or brackets are fitted with the usual cocks, burners and shades, which are attached to a sliding piece on a vertical rod upon a stand. The sliding piece is pierced by a curved tube for supplying gas to the brackets, and is fixed at any required height by the thumb-screw. The lamp is connected to an ordinary gas-bracket or chandelier by a flexible tube and metal coupling. The coupling screws into the place of the burner, or over the screw made for carrying the globe holder or gallery.

APPLICATIONS FOR LETTERS PATENT.

May 1.—5,369, W. Righty, Appliances for Opening, Closing, and Fastening Mill, Factory, Warehouse, and other Windows, and retaining same in any desired position.—5,374, G. Garrett, Machinery for Sharpening Circular Saws.—5,377, A. Adams, Improvements in Venetian Blinds.—5,384, J. Evans, Union Joints for Pipes, &c.—5,403, A. Rollason, Pipe Couplings and Connections.

May 2.—5,414, A. Paico, Expanding Writing Cabinet.—5,420, C. Falkenstein, Combined Electric Bell, push-button and incandescent Lamp-holder and Switch.—5,423, E. De Pass, Improvements in Gutters and means for connecting same.—5,432, R. Elmore,

Perspective Demonstrator.—5,437, A. Link, Preventing the Formation of Fog on other Atmospheric Precipitation upon Windows.—5,442, J. Ransome, Manufacture of Cement.

May 4.—5,456, C. Chapman, Improvements in Apparatus for Boring Wells.

May 5.—5,497, J. Akeroyd, Improvements in Cooking-ranges, &c.—5,506, R. Heap, Improvements in Water-closet Seats.—5,529, W. Richel, Improvements in Combining Cabinets, &c.—5,534, J. Alton and J. Ramsay, Improvements in Cookings and Heating Stoves.—5,537, G. Halbach, Improvements in Bow Saws.—5,555, J. Jones, Folding or Adjustable Bench or Seat.

May 6.—5,568, H. Fiske, Pavements, Facing blocks, &c.—5,570, G. Budd, Apparatus for Ornamental Turning and Shaping.—5,573, A. Dias and H. Goodey, Construction of Fireproof Hearths and other Parts of Buildings.

May 7.—5,629, A. Seggie, Machines for Grinding, Polishing, Graining, and Preparing Stones.—5,630, M. Wallace, Combined Ventilating and Flap Valve or Chimney-door for Kitchens, &c.—5,636, J. Coombs, Mechanical Door-check.—5,639, R. Hodgson, E. Lilley, Adjusting Door-knobs to Spirals.—5,644, T. Anastantine, Improvements in Movable Bottom Grottes of Ranges and Stoves, and Appliances for operating same.—5,661, J. Horne, Apparatus for Warming Houses and other Buildings.—5,663, L. Wesp, Improved Heating Apparatus.

PROVISIONAL SPECIFICATIONS ACCEPTED.

2,731, E. Deacon, Locks for Doors, &c.—2,781, J. Willis, Improvements in Pickers, Hammers, and similar Tools.—2,859, L. Bickley and J. Winn, Improved Paint Brush.—3,730, R. Payne, Fasteners for Sashes, Casements, Doors, &c.—4,209, F. Henderson, Flushing Apparatus for Water-closets, &c.—4,234, P. Jensen, Improved Arch or Span Bricks or Blocks.—4,398, C. Murray, Apparatus for Making Bricks, &c.—4,429, P. Redman, Fixing Sunblinds, or Ceiling Lights.—4,469, B. Hewetson, Security Slates used to repair damaged Slates on Roofs.—4,521, H. Yull, Water-waste Preventer.—4,614, A. Clark, Bolts or Fasteners for Doors, Shutters, &c.—4,736, A. Squire, Improvements in Venetian or Lat. Blinds.—14,463, E. Stacey, After-rush Apparatus for Water-waste Preventing Cisterns.—4,164, J. Best, Improvements in Chandeliers.—4,247, J. Crows and W. James, Cisterns or Flushing Apparatus for Water-closets.—4,486, E. Ormerod, Apparatus for the production of Paving Slabs, Blocks, Sinks, Roofing Tiles, &c., in Concrete, Terra-cotta, &c.—4,668, W. Wilson, Ornamenting Wall or other Papers.—4,681, J. Barwick, Ventilating Pipes and Caps.—4,721, J. C. Pneumatic Door Check Spring.—4,726, R. Jones, Window Sash Fastener.—4,819, J. Baker, Disinfecting and Deodorising Apparatus for Water-closets.—4,926, G. Wells, Water-closets and Appliances for same.—5,004, W. Lake, Preservation of Wood for Paving Purposes.—5,023, J. Smith, Improvements in Stench Traps.—5,047, T. Howie, Ventilating Rooms or Buildings.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

7,268, J. Thomasson, Improvements in Ventilators.—10,105, A. Clark, Improved Attachment for Squares for Builders and Joiners' Use.—10,125, J. Jagger, Slow combustion Stoves.—2,453, G. J. St. Messenger, Improvements in Ventilators at Chimney Cowls.—4,078, H. Gilbert and C. Blumy, Construction of Gas Pliers and Tongues.—7,864, C. Inwood, Improved Apparatus for Ventilating and Heating by Air.—406, M. Macleod, Laying Asphalt Roads, Pavements, Roofs, &c.—1,874, A. Putney, Improvements in Wood Flooring.—3,875, H. Ibbotson, Opening and Closing Sash Windows of any description.—4,248, H. Allisell, Improvements in Burglar Alarms.—4,297, H. Lake, Locks for Fastening Doors, &c.

MEETINGS.

SATURDAY, MAY 16.

St. Paul's Ecclesiological Society.—Visit to Chesham Old Church and other churches in Chesham, under the guidance of Mr. Somers Clarke, F.S.A. 3.30 p.m.
Association of Municipal and Sanitary Engineers a Surveyors.—Midland Counties District Meeting at Nottingham. 11 a.m.
Edinburgh Architectural Association.—Visit to Abdoucr.

MONDAY, MAY 18.

Royal Institute of British Architects.—Mr. Alexander Graham will read a paper entitled "Remarks on the Occupation in North Africa, with special reference to Algeria." 8 p.m.
Surveyors' Institution.—Discussion on Mr. Mathews's paper on "The Influence of Taxation upon Rent." 8 p.m.
Victoria Institute.—Dr. M. Eells "On the Results of Archaeological Research in North America." 8 p.m.
University College.—Mr. Barclay V. Head on "Greek Numismatics." 4 p.m.
Inventors' Institute.—8 p.m.
Edinburgh Architectural Association.—Annual General Meeting: President's Valedictory Address. 8.30 p.m.

TUESDAY, MAY 19.

Institution of Civil Engineers (1).—Discussion of Mr. A. H. Thompson's paper on "The Construction of the London and North-Western Railway; (2) fine permission Papers on Steam-engine Indicators and Indicator Diagrams, by Professor Osborne Reynolds and Mr. A. Brightmore. 8 p.m.

Historical Society.—Mr. A. K. Connell on "Indian says and When Trade." 7.45 p.m.

WEDNESDAY, MAY 20.
Archaeological Association.—Mr. Thomas Blashill the Cistercian Abbey of Dore." Mr. Alfred C. Fryer "Danish Crosses." 8 p.m.

Metropolitan and Clerks of Works' Institution.—
ary Meeting, 8.30 p.m.
Royal Meteorological Society.—Papers on "Wind
ities and their Measurement," by Lieut.-Col. H. S.
it and Dr. W. Köppen. 7 p.m.

Thursday, May 21.
Storey for the Encouragement of the Fine Arts.—Mr.
Storey, A.R.A., on "Footprints of the Beautiful."

Archaeological Institute.—(1) Mr. J. P. Harrison
Chevron Beads and Blue Bangles from Peruvian
(2) Mr. G. E. Browne on "Scandinavian"
Danish Sculptured Stones found in London, and their
on supposed "Scandinavian" or "Danish" Grigin
English Sculptured Stones." 4 p.m.
(3) Mr. G. E. Browne on "Scandinavian"
Danish Sculptured Stones." 8.30 p.m.
Institute of Architecture.—Mr. J. G. H.
ler on "Art-Work in the Middle Ages."

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

Table with columns for date (MAY 4), agent (By J. & R. KEMP & Co.), and property details (e.g., London-140 and 142, Praed-street, 38 years, ground-rent 10l., £1,900).

MAY 5.

Table with columns for agent (By Messrs. LEGER) and property details (e.g., London- Ground-rents of 40l. a year, reversion in 10 years, 1,900).

MAY 6.

Table with columns for agent (By DEVERE & Co.) and property details (e.g., London- A plot of land, area 9,000 ft. freehold, 16,000).

MAY 7.

Table with columns for agent (By FLEURY & Son) and property details (e.g., London- Green-The residences "Southdene" and "Highclere," 84 years, ground-rent 12l., 700).

MAY 8.

Table with columns for agent (By DEBENHAM, TEWSON, FARMER, & BRIDGEWATER) and property details (e.g., London- Dean-1 to 8, Felbrigg-villas, freehold, 3,760).

MAY 9.

Table with columns for agent (By WHITE, BERRY, & TAYLOR) and property details (e.g., London- 18-19, South-street, 10 years, term 39 years, 2,410).

MAY 10.

Table with columns for agent (By RUSSELL & STEVENS) and property details (e.g., London- ury, near "Bodicote House," and 33a, 1r. 3p., freehold, 14,000).

MAY 11.

Table with columns for agent (By HARRISON & MARRIOTT) and property details (e.g., London- ury, near "Bodicote House," and 33a, 1r. 3p., freehold, 14,000).

MAY 12.

Table with columns for agent (By G. A. BICKERTON) and property details (e.g., London- ury, near "Bodicote House," and 33a, 1r. 3p., freehold, 14,000).

MAY 13.

Table with columns for agent (By G. A. BICKERTON) and property details (e.g., London- ury, near "Bodicote House," and 33a, 1r. 3p., freehold, 14,000).

Table with columns for agent (By NEWBON & HARDING) and property details (e.g., Hoxton-38, Allerton-street, 23 years, ground-rent 3l. 10s., £120).

Table with columns for agent (By J. & W. JOHNSON & Co.) and property details (e.g., Hackney-63, Pritchard's-road, 48 years, ground-rent 3l. 10s., 335).

Table with columns for agent (By BRAUN, BURNETT, & ELDRIDGE) and property details (e.g., Peckham-road-11, The Terrace, long leasehold, 750).

Table with columns for agent (By FARRINGTON, ELLIS, CLARK, & Co.) and property details (e.g., Urbridge-The freehold residence, "The Vineyard," 1,900).

Table with columns for agent (By BARR & Sons) and property details (e.g., Tufnell Park-road-Nos. 164 and 166, term 82 years, ground-rent 14l., 800).

Table with columns for agent (By JONES, LANG, & Co.) and property details (e.g., City-78, Mansell-street, freehold, 2,000).

Table with columns for agent (By COLETT & COLLETT) and property details (e.g., Notting-hill-37, Lancaster-road, 78 years, ground-rent 10l., 700).

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New Fever Hospital, Coventry.—The new permanent hospital, which the Corporation are providing for the isolation and treatment of infectious diseases, is rapidly approaching completion,—indeed, it is practically finished, and might be made ready for occupation in a fortnight. The site has a frontage to the Stoney Stanton-road, and adjoins the Coventry and Warwickshire Hospital estate. The buildings comprise four detached blocks; the front building, which is 260 ft. from the road, is intended for the administrative department, and is of two stories, consisting of a surgery, 14 ft. by 13 ft.; a room of the same size for the matron; stores and kitchen; four bed-rooms, scullery, larder, and other accommodation. The next block, on the south side, 330 ft. from the road, is for scarlet fever patients, and consists of two wards, one for six beds and another for four beds, nurse's room overlooking the ward, and a bath-room. On the opposite or north side, at a distance of 119 ft., is a hospital of similar size for small-pox patients. The fourth side of the square, on which it has been proposed to erect a supplementary block for paying patients, is left open. The total accommodation will be for twenty patients. The architects are Mr. E. J. Purnell, City Surveyor, and Messrs. G. & I. Steane, Little Park-street, the drainage being under the supervision of Mr. Purnell. The gas-fittings are by Mr. Hodson, of Coventry, and made to special design. The contractor is Mr. Thomas Mayo, builder, Coventry, and the clerk of the works Mr. George Dalton. The cost of the building, which is upwards of 4,000l., will be defrayed by loan, to be paid off in thirty years.

Mr. David Brandon, F.S.A., and the Institute of Architects.—At the annual meeting of the Royal Institute of British Architects, held on the 4th inst., regret was expressed at Mr. David Brandon's resignation of the office of Vice-President. Mr. Octavius Hansard, chairman of the Library Committee, remarked that Mr. Brandon had long been a member of the Finance Committee, and had taken special interest in the financial prospects of the Institute. In a letter to Mr. Hansard, dated May 2, Mr. Brandon wrote:—

"As it is apparent that the expenditure will be greater next year than usual, in consequence of the publication of the library catalogue, and as I am desirous of preventing, as far as possible, the necessity which I fear will arise for selling-out part of the funded property of the Institute, and, in order to prevent a result which would be very undesirable, I shall be happy to subscribe the sum of 250l. towards defraying the expense of publishing the catalogue of the books, &c., in the library as now proposed. I presume that the actual cost cannot at present be ascertained with certainty, nor is it at all a necessity, as it is evident from the remarks in the annual report that funds will have to be raised for this special purpose, or part of our funded property appropriated in this way, which it would probably be thought desirable to avoid."

Mr. Brandon moved a special vote of thanks to Mr. Brandon for his liberal offer, which, after a few words from the President, was carried by acclamation and amid general applause.

Birmingham Architectural Association. On Saturday last the members of the above Society paid a visit to Worcester Cathedral and City. On the way to the cathedral the party visited Trinity Church, and inspected the fine ancient roof formerly over the Guesten Hall. On reaching the cathedral they were met by the Dean (the Very Rev. Lord Alwyn Compton, D.D.) and the Rev. Canon Catley, who drew attention to the most interesting features of the building. Before leaving the church the members inspected the crypt, cloisters, chapter-house, and bells, and obtained a fine view of the surrounding district from the top of the great tower.

Mission House, Poplar.—Princess Christian opened a hazard on Monday afternoon at Poplar Town-hall, on behalf of a new mission house, to be built in Giraud-street, in connexion with St. Saviour's Church. The building is to be Gothic in style, and of red brick, with York stone dressings, and is to cost 1,000l. The site, costing 500l., was given by the Bishop of London's Fund. Mr. Brett A. Elphicke is the architect.

An Interesting Discovery.—During the excavations for the foundation walls of the new Mairie at Arcueil-Cachan, Seine, an ancient burial-place, containing a considerable quantity of human bones, has been discovered. Every skeleton was lying with the head to the west and the feet to the east, whilst beside each skull was an earthenware vase pierced with holes, and ornamented with three series of six perpendicular lines, which are thought to have been intended to simulate tears.

Miscellaneous.

Building and Sanitary Work at Walthamstow.—The annual report of the Surveyor (Mr. G. B. Jerram) to the Walthamstow Local Board, for the year ending March 25th, 1885, says that during the past twelve months there has been a perceptible diminution in the number of houses being erected, in the formation of new streets, and in the laying out of new estates, compared with that of a year or two ago. 153 plans have been received for the proposed building of 519 dwelling-houses, two churches, two corrugated iron buildings, and fifteen stables and sheds, and including also additions and alterations to twenty-two buildings, and fourteen plans for new drains. There have also been seven plans received for the construction of new streets. Over 400 houses and one Board school, two churches, and two corrugated iron rooms, have been built or in process of erection, of which about fifty-six have been erected in districts where there is no system of sewers, thereby necessitating the construction of cesspools; of these 48 houses have been erected in the low-level district, west of St. James's-street and Black Horse-lane, but these are not all inhabited. The length of new streets formed on private estates is about one mile, one furlong; and about 24 miles of soil and surface-water sewers have been constructed. The works executed by the Board comprise the following, viz.:—New sewers, in Union and Prospect roads, and the alteration to the syphon in the northern main sewer; the widening of Clay-street, west of Greenleaf-lane; over 6½ miles of footpaths in the principal streets have been paved with asphaltic tar paving, and about 2 miles 3 furlongs of kerb have been laid in the public roads; some 2 miles 5 furlongs in length in main roads, and 1½ mile in length of other roads have been reconstructed with granite, by means of a special loan sanctioned by the Local Government Board.

Obituary.—Mr. Charles Moreing, who died at his residence, 37, Spring-gardens, on the 6th inst., at the age of 75, was probably but little known to the present generation, but he enjoyed years ago an extensive practice and amassed a considerable fortune. His most important work was Ingress Abbey, near Greenhithe, for the late Alderman Harmer, the proprietor of the Weekly Dispatch, who expended upwards of 120,000l. upon the building, which forms a prominent object in the landscape seen from the river. He also designed Messrs. Swan & Edgar's shop-front at the corner of Regent-street and Piccadilly-circus. Mr. Moreing had resided for the last few years at Hastings, he having taken over from the mortgagees the site of Warrior-square, upon which large sums had been expended, at first without any profitable result, but which eventually became a very lucrative investment. Mr. Moreing was unmarried, and although he had for some time past withdrawn from the active pursuit of his profession, was unremitting in his attention to business up to the last.

The Artists' General Benevolent Institution.—On Wednesday evening the annual dinner of this institution took place at the Prince's-hall, Piccadilly. The Right Hon. W. H. Smith, M.P., presided, and was supported by, amongst others, Mr. C. T. Newton, C.B., Mr. Horsley, R.A., Mr. Alma Tadema, R.A., Mr. Fribb, R.A., Mr. Poynter, R.A., Mr. Marks, R.A., and Mr. Linton (President of the Royal Institute of Painters in Water Colours). After the usual loyal toasts had been proposed and drunk, the Chairman proposed the toast of "The Army, Navy, and Reserve Forces," which was responded to by Col. King-Harman, M.P. The toast of the evening, "Prosperity to the Artists' General Benevolent Institution," was then proposed by the Chairman, who apologised for his inefficiency to do justice to such a toast. In the course of his speech the Chairman remarked that the profession of the artist seemed by some means or other to render him more liable than the rest of the world to those peculiar and exceptional misfortunes which claimed the sympathy of all who benefited by art; and when he said of all who benefited by art, he would remind them that within the last twenty or thirty years there had sprung up a sense of necessity for art which had not existed when he was quite a young man. The Chairman concluded by expressing his sincere hope that so deserving a charity would meet with the liberal support of all present, especially since its funds were not in so flourishing a condition as they had been in the past. Several other toasts followed, including that of the health of the Chairman, which was proposed by Mr. Gregory, M.P. During the evening the treasurer, Mr. Hardwick, announced subscriptions and donations to the amount of 2,456*l.*, which included a donation of 25*l.* from the Chairman.

Pietermaritzburg (Natal).—The foundation stones of a new Baptist Church here were formally laid on the 23rd of March last. The building will be a plain brick structure, having a length of 63 ft. and a width of 34 ft. To the main structure there will also be attached a minor building, which will be divided into two rooms by folding-doors, and forming two vestries, or class-rooms, capable of seating about thirty persons in each. The church, as at present designed, will accommodate 250 people, and, with the addition of a gallery, which is ultimately to be added, it will accommodate 350. The walls are substantially built, having a thickness of 18 in., and will support a tiled roof. The total cost of the chapel, it is estimated, will be 800*l.*, the site costing 500*l.*

Machine-worked Stone Ornament.—In reference to a "Note" in our last number, Messrs. W. & T. Brindle write to say that they did employ an architect to design their villas, their instructions to him being "to design villas having as much work executed by our machinery, and as various as possible, so that when completed the drawings or photographs should stand for us as an 'illustrated catalogue of designs,' and not as a model of architecture at all." We can only say what we did before, that the result was not such as to recommend the system to architects.

"The Chancery-lane Safe Deposit."—In connexion with the description of this establishment, given in our last, we are asked to mention that for the blocks of chambers and offices which adjoin and surround the safe deposit premises, Mr. James Hill, of Queen Victoria-street, supplied upwards of 1,500 sets of special locks and door furniture, the locks being all under master-key arrangements.

Ventilators.—We understand that Kershaw's Patent Pneumatic Ventilators, or their Patent Inlet and Air Diffusers, or both, have recently been used at several public buildings, including the post-offices at Stamford, Leeds, Newcastle, and Watford; the Newport Town-hall; the General Post-office, St. Martin's-le-Grand, London; and at a number of churches, schools, hotels, and other buildings.

The Late Mr. Edmund Reddin's Business.—We are informed that the lease of the wharves and the goodwill of the business carried on at Bankside by the late Mr. Edmund Reddin for upwards of fifty years has been acquired by Mr. R. H. Blatchford, who was for many years connected with Mr. Reddin in the business.

The Surveyors' Institution.—The annual dinner of the Surveyors' Institution will take place at the Holborn Restaurant (Venetian Room), on Monday, June 1st, 1885.

Appointments.—We learn that Mr. Sam. Abbott, M.Inst. C.E., of High-street, Lincoln, has been appointed chief resident engineer to the Buenos Ayres Great Southern Railway Company, and will leave England next month. Mr. Archibald R. Whitehead, who has been engaged with Mr. Abbott for several years on the engineering staff of the Great Northern Railway, and for some time past at Lincoln, will continue the practice at the same offices. —The Tottenham Local Board of Health have appointed Mr. C. J. Eastow, of Clarence-square, Gosport, sanitary inspector for their district, at a salary of 150*l.* per annum. Mr. Warring, of Birmingham; Mr. Jessop, of Battersea; Mr. Taylor, of Egremont, Cheshire; Mr. Loach, of Handsworth, Birmingham; and Mr. Wilkinson, of Bury, were the other selected candidates.

Civil and Mechanical Engineers' Society. The annual dinner of this Society was held at the Holborn Restaurant on Thursday, the 7th inst. The chair was occupied by the President, Mr. Thomas Cole, and a large number of members and visitors were present. The usual loyal toasts having been duly honoured, Mr. R. H. Willcocks, LL.B., proposed "Success to the Society." The President responded, and in the course of his remarks spoke of the usefulness of the Society and the benefit which had been derived from it by many of the members. He expressed the hope that the large increase in numbers which had taken place during the last year or two would be steadily maintained.

Cooking Apparatus for Large Institutions.—We understand that the Guardians of the Wandsworth and Clapham Union, having inspected Mr. Becker's apparatus at St. Pancras Workhouse, and the "Warrenising" apparatus at Lambeth Workhouse, fitted up in 1872 from Mr. Aldwinckle's plans, have decided upon adopting the apparatus at Lambeth as the model for the cooking apparatus at the new workhouse at Wandsworth.

St. Hugh's (Roman Catholic) Church, Lincoln.—Mr. Albert Vicars, architect, of London, is preparing the design for the above church and presbytery. The whole cost of the building, we understand, will be the gift of the Mayor of Lincoln, Mr. F. J. Clarko.

New Saw for Stone.—The *Dresden Industrie Zeitung* remarks that in consequence of stone-boring appliances having been successfully constructed with cutting surface black diamond, this material has now been adapted to a saw for stone. An Alsace factory has commenced the manufacture of this saw, which is put in motion by a steam engine of two horse-power. The quantity and quality of the work produced are said to be very satisfactory, and the saw is considered applicable to all kinds of stone.

Advantages of Glazed Floors.—The *Bauwerks-zeitung* remarks that large rooms which there is a good deal of moving about should never have wooden flooring, but should have slabs of stone or tiles, &c., as other the dust is insufferable. This assertion is confirmed by the fact that in the old Bank Exchange the principal room was always enveloped in a cloud of dust, while now stone flags have been laid down, nothing of kind is to be remarked.

Site of the "Cock" Tavern, Fleet-street. The *City Press* states that the Bank of England has purchased for 30,050*l.* the important site of the Cock Tavern and the vacant land in Fleet-street between Chancery-lane and Law Courts for the erection of new buildings for the accommodation of the large business of the Bank in connexion with the High Court of Justice.

Examination for Local Surveyors Inspectors of Nuisances.—We are asked to mention that the Sanitary Institute of Great Britain will hold its next Examination for Local Surveyors and Inspectors of Nuisances on Thursday and Friday, June 4th and 5th, at Parkes Museum, 74, Margaret-street, W.

New Government Buildings, Bloemfontein, Orange Free State.—The Government of the Orange Free State have appointed Lennox Canning, A.R.I.B.A., superintendent architect for the new Government Building to be erected in the City of Bloemfontein.

The Institution of Civil Engineers. The President's conversations will be held by permission of the Executive Council, in the International Inventions Exhibition, South Kensington, on Friday, June 5, from 9 to 12 p.m.

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitomes of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.
Public Hall and Institute, Slough	The Committee.....	25 <i>l.</i> and 15 <i>l.</i>	June 24th

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Additional Offices, &c., Town Hall	Boothle-cum-Linsare Corporation	J. Alexander.....	May 19th
Painting Cavalry Barracks, &c., York.....	War Department.....	Official	do.
Thames Ballast and Sand	Admiralty	do.	do.
Scavenging, Watling, &c.	St. Saviour's Bd. of Wks. Kent Wesleyan Methodist School Assoc. Lim.	do.	May 20th
Enlargement of County-Court, Burton-on-Trent. Cottages, Watch-room, &c.	Com. of H.M. Works	Ruck, Son, & Smith	May 22nd
Machinery House	Admiralty	Official	do.
Pulling down and Rebuilding Stable, &c.	Met. Asylums Board	H. Jarvis & Sons	May 23rd
Removal of Street Letter-Boxes	General Post-Office	Official	do.
Board-room, Oilcees, &c.	Cole, &c., Local Board	H. Bancroft	May 25th
Firewood	Grds. Holborn Union	H. Saxon Small & Son	May 26th
Granite, Ballast, Hoegin, and Flints	Lewisham Union	Official	May 27th
Paving and Kerbing Works	Hackney Board of Wks	J. Lovygrove.....	do.
Earth and Concrete Carriers, and other works	Hendon Local Board	Official	May 28th
New Schools	Canterbury Cor.	J. G. Hall	May 29th
Foot Bridge, Teddington	Walthamstow Loc. Bd.	G. B. Jertram	do.
New Workhouse Buildings	do.	do.	do.
Construction of Reservoir	Redrath School Board	G. B. Nichols & Sons... ..	do.
Breeds	Teddington Local Bd.	G. Pooley & E. Thompson	June 1st
Ornamental Fence on New Sea Wall	Grds. Knighton Union	Official	June 3rd
Schools, &c.	Dewsbury, &c. Water-works Committee	Bateman & Hill	do.
Commercial Gas Co.	Commercial Gas Co.	Official	June 5th
Have Commissioners	Have Commissioners	do.	June 6th
Tottenham Local Board	Tottenham Local Board	E. & E. D. Ellis	Not stated

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
Clerk of Works	Leeds Corporation	110 <i>l.</i>	May 19th
Surveyor	Blackpool Corporation	300 <i>l.</i>	May 20th
Road Foreman	Cor. Burton-on-Trent... ..	104 <i>l.</i> , &c.	May 21st
Town Surveyor	Wendesbury Local Bd.	200 <i>l.</i>	do.
Assistant Surveyor of Highways	West, St. Mary, Islington	150 <i>l.</i>	June 9th

TENDERS.

For the main wing of the new President's House, in the Orange Free State, South Africa, for the design of the Orange Free State. Mr. Lennox Mackenzie, A.R.I.B.A., architect, Bloemfontein. Quantities as follows:—

Table with 2 columns: No. 1. In Brick, No. 2. In Stone. Lists various construction items and their costs.

For the erection of new Board Schools, for 300 infants, and a schoolroom, for the Canook School Board. Mr. Annie Baker, architect, Wiltonhall. Quantities by the architect:—

Table listing various construction items and their costs for the Canook School Board project.

For alterations, additions, and fittings to 15, Eastcheap. Mr. Fabian Russell, architect, 6, Moorgate-street. Quantities supplied:—

Table listing various construction items and their costs for alterations at 15, Eastcheap.

For alterations and additions, 32, Charles-street, Mayfair. Mr. R. Fabian Russell, architect, Mount-street. Quantities supplied:—

Table listing various construction items and their costs for alterations at 32, Charles-street.

For alterations and additions, 10, Hyde Park-terrace. Mr. Fabian Russell, architect:—

Table listing various construction items and their costs for alterations at 10, Hyde Park-terrace.

For alterations and additions to 49, Curzon-street, Mayfair. Mr. R. Fabian Russell, architect:—

Table listing various construction items and their costs for alterations at 49, Curzon-street.

For building a retort-house, coal-store, engine-house, and brick-iron tank, stack, and sulphate-shed, for the Crays Gas Company, Kent. Plans and specifications by Mr. F. Morris, C.E.:—

Table listing various construction items and their costs for the Crays Gas Company project.

For the erection of three shops and premises on the site of Biagrove-street, Reading, for Mr. J. H. W. Blagrove. Mr. Fred. W. Blagrove, architect:—

Table listing various construction items and their costs for building schools and offices at St. Andrew's-street.

Table listing various construction items and their costs for building new schools and offices at Biscay-road.

Table listing various construction items and their costs for alterations and additions to 49, Curzon-square.

Table listing various construction items and their costs for alterations and additions to the Seven Sisters Hotel.

Table listing various construction items and their costs for alterations and additions to the Weavers' Arms public-house.

Table listing various construction items and their costs for alterations and additions to the Pavilion.

Table listing various construction items and their costs for alterations and additions to the Pavilion.

Table listing various construction items and their costs for alterations and additions to the Pavilion.

Table listing various construction items and their costs for alterations and additions to the Pavilion.

For the erection of a revivifying shed, for the Hastings and St. Leonard's Gas and Coke Company. Messrs. B. & A. Smith, architects, Hastings. Quantities by the architects:—

Table listing various construction items and their costs for the Hastings and St. Leonard's Gas and Coke Company project.

For new house at Lockwood, Chilworth, Surrey, for Mr. St. George Mivart, F.R.S. Mr. Fred. A. Walters, architect, 4, Great Queen-street, Westminster. Quantities by Mr. A. H. Garro, 25, Surrey-street, Strand:—

Table listing various construction items and their costs for the new house at Lockwood.

For heating apparatus at the new Working Lads' Institute, Whitechapel, London. Mr. George Baines, architect, Great Winchester-street:—

Table listing various construction items and their costs for heating apparatus at the Working Lads' Institute.

For alterations to the Bedford Music-hall, Arlington-street, Camden Town, for Mr. Geo. Fredericks, Mr. E. Clark, architect:—

Table listing various construction items and their costs for alterations to the Bedford Music-hall.

For alterations and additions to 49, Curzon-square, Chelsea, for Major Charles Mercer. Mr. Clark, architect:—

Table listing various construction items and their costs for alterations at 49, Curzon-square.

For alterations at the Masons' Arms, Maddox-street, Regent-street, for Mr. Chas. Hollis. Mr. E. Clark, architect:—

Table listing various construction items and their costs for alterations at the Masons' Arms.

For alterations and additions to the Seven Sisters Hotel, Page-street, Tottenham, for Mr. James Oddy. Mr. E. Clark, architect:—

Table listing various construction items and their costs for alterations at the Seven Sisters Hotel.

For alterations to the Weavers' Arms public-house, Bethnal-green. Mr. Joseph Harris, architect:—

Table listing various construction items and their costs for alterations at the Weavers' Arms.

For alterations and additions to Brynecawn, in the county of Carmarthen. Mr. J. B. Wilson, architect, Swansea:—

For the erection of thirteen shops and for the repairs to thirteen houses, and other incidental works in the Kentish Town-road, for Messrs. H. H. Bridgman & H. Newson Smith. Quantities supplied by Mr. F. Thomson:—

Table with 3 columns: Item, Quantity, Price. Includes sections for 'Thirteen Shops' and 'Repairs' with various materials like Killingback, Manley, Brass & Son, etc.

For detached house, Euston-road, Great Yarmouth, for Mr. Frank Arnold. Messrs. Bottle & Olley, architects, Great Yarmouth:—

Table with 3 columns: Item, Quantity, Price. Includes sections for 'Contract No. 1' (Excavator's, Bricklayer's, etc.) and 'Contract No. 2' (Carpenter's, Joiner's, etc.).

For the erection of house and stabling at Thorpe Arnold, near Melton Mowbray, for Mr. A. Brocklehurst. Mr. W. Milnes, architect, Leicester:—

Table with 3 columns: Item, Quantity, Price. Lists various construction materials and labor for the house at Thorpe Arnold.

For rebuilding No. 24, Greek-street, Soho, for Mr. H. Cooper, under the superintendence of Mr. John Waltram, C.E., 16, Cranen-street, Strand. Quantities by Mr. Henry J. Treadwell, 5, Agar-street, Strand:—

Table with 3 columns: Item, Quantity, Price. Lists materials for the rebuilding of No. 24, Greek-street.

For painting and decorating the Oddfellows' Hall, Albert-square, Stalybridge, for the Stalybridge Oddfellows' Social Club and Institute Company (Limited). Mr. Gregory Gill, architect and surveyor, Stalybridge:—

Table with 3 columns: Item, Quantity, Price. Lists materials for painting and decorating the Oddfellows' Hall.

For renovating the General Baptists' Chapel, Wakefield-road, Stalybridge, for the Trustees. Mr. Gregory Gill, architect:—

Table with 3 columns: Item, Quantity, Price. Lists materials for renovating the General Baptists' Chapel.

For the erection of St. Mary's (R.C.) Church, Leek, Staffordshire:—

Table with 3 columns: Item, Quantity, Price. Lists materials for the erection of St. Mary's Church.

For 6,540 yards super. of wood paving, Silver-street and Church-street, Kensington:—

Table with 3 columns: Item, Quantity, Price. Lists materials for wood paving in Kensington.

New Bakeries at Battersea.—For "Cooke & Son" in the list of tenders for the works, published in last week's Builder (p. 677), read "B. Cooke & Co.," of Church-road, Battersea.

Metropolitan Music Hall.—In the list of tenders for this work in our impression of last week (p. 677), the amount of Messrs. Langridge & Sons' tender was stated to be 2,500l. It should have been 3,500l.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

E. O'D.—J. P.—H. P. H.—T. L.—C. G.—P. (thanks).—T.—M. & Co., Paris.—J. F. (received).—A. H. G.—J. & R. McC. All statements of facts lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses. N.B.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors. We cannot undertake to return rejected communications. 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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The Builder.

XLVIII. No. 2267.

SATURDAY, MAY 23, 1886.

ILLUSTRATIONS.

Sculpture at the Royal Academy: Memorial Figures of the Late Very Rev. Dean Close (Mr. H. H. Armstead, R.A., Sculptor); and the Late Lord Frederick Cavendish (Mr. T. Woolner, R.A., Sculptor).....	736-737
Church of St. John the Baptist, Kensington: Interior looking East.—Mr. James Brooks, Architect.....	730-731
Elevations, Sections, Plans, and Details of Wenlock Priory.—Measured and Drawn by Mr. T. L. Worthington.....	734, 735, 738
House at Gainsborough Gardens, Hampstead.—Mr. H. S. Legg, Architect.....	739

CONTENTS.

The Housing of the Poor.—II.....	715	Villa, Gainsborough Gardens, Hampstead.....	741	The Reform of the Institute.....	744
Sculpture at the Royal Academy.....	717	Roman Remains in Algeria: Royal Institute of British Architects.....	741	Chelsea Vestry-Hall Competition.....	744
The Railway Commissioners.....	718	The Old Wall at Blackfriars.....	742	Mixing Portland Cement with Lime Mortar.....	744
Notes.....	719	Architectural Association: Excursion to Tisbury.....	742	The Hospital Prize.....	744
Architecture at the Royal Academy.....	720	The East London Industrial Exhibition.....	742	Unemployed Labour.....	744
Notes at the Paris Salon: Painting.....	721	Science and Art in Buildings: Liverpool Architectural and Engineering Societies.....	743	The Student's Column: Descriptive Geometry.—XVI.....	744
The Lion and the Palma: Notes on Recurring Forms in Historic Ornament.....	723	Association of Municipal and Sanitary Engineers and Surveyors.....	743	Church-Building News.....	746
The "Inventions Exhibition": Furniture and Accessories.....	723	Building in Private Areas: The Metropolitan Board of Works & Mowlem & Co.....	743	Recent Patents.....	747
Sculpture at the Royal Academy.....	724	Cases under the Metropolitan Building Act.....	743	Recent Sales of Property.....	747
Church of St. John the Baptist, Kensington.....	724			Meetings.....	747
Drawings of Wenlock Priory.....	724			Inventor's Institute.....	748
				Miscellaneous.....	748

The Housing of the Poor.—II.



IN a previous article we considered the Report of the Royal Commission in regard to the light which it throws on the question of rents, and the extent to which the natural conditions of supply and demand are influenced by circumstances specially affecting the poorer classes of London. The other half of the question, as we then observed, is in regard to the possibility of ensuring that dwellings of the humbler class shall be better built, and maintained in better sanitary condition, than they are at present.

We have already said that the general conclusion adopted by the Commissioners, and indicated in their Report, is that there is not need so much of fresh legislation as of more energetic application of existing legislation. There are indications here and there, however, that the Commissioners do not regard the present legal powers as entirely adequate to the situation. On page 31, for instance, we are told that in regard to cellar dwellings and the operation of the Metropolis Management Act of 1885 (and of the Public Health Act of 1875 in reference to the Provinces) "evidence was forthcoming that there were cases of cellars inhabited both in London and in the provincial towns which were dark, damp, and unhealthy, and which could not be condemned because they came within the limits prescribed by the law. In Wilmington-place, Clerkenwell, to take one instance, there were said to be cellars totally unfit for human habitation, where the walls are dripping with wet ten months of the year, which the medical officer declines to condemn because they satisfy the requirements of the law, though in the opinion of two unprofessional witnesses they fall short of them. Without citing further instances, the mere recital of these legal requirements is sufficient to show plainly that an apartment may satisfy them all and yet be destructive to health, and totally unfit for habitation." Some of the evidence to this effect is summarised on page 12 of the report, and the Commissioners recommend that the provisions of the two Acts referred to should be amended with the view of securing greater height above the level of the street and larger area in front of the windows of all inhabited rooms that partake of the nature of cellar dwellings. And certainly regulations which only demand 7 ft. in height from floor to ceiling, of which one foot is to be above the street level, may be said to descend to the very lowest imaginable

limits of sanitary legislation for such cases. The question of dampness, referred to in the above quotation, is a portion of the subject which may and ought to be dealt with by the medical officer, and the allowance of such a defect appears to imply a very careless and lax exercise of his duties.

This leads to the general subject of the powers of sanitary officials and the manner in which they are exercised, in regard to which the Commissioners evidently think there is great room for reform. The qualifications of the sanitary inspector appear to be in some cases by no means what they ought to be, evidence being given of the appointment of persons as inspectors who had given no proof of any special qualification for the exercise of the duties with which they were to be entrusted; and without recommending so centralising a measure as the appointment of such inspectors by the Local Government Board, the Commissioners are of opinion that the said Board might, "pending future legislation with regard to London government," be provisionally entrusted with a veto on the appointments of inspectors. On the whole, however, we gather that the need for greater freedom and more scope for the exercise of their powers by sanitary officials is more pressing even than the need for greater circumspection in their appointment. This subject turns up in several portions of the Report. It is most strongly taken up by Mr. Dwyer Gray in his supplementary memorandum. He strongly urges that greater responsibility should be fixed on medical and other sanitary officers, and that to this end they should be placed in a position of greater independence. In regard to what may be done even in a democratic State, in the way of despotic action in regard to insanitary property, he quotes the result of the evidence given by Mr. Meyer, editor of the *Sanitary Record* of New York, and subjoins a suggestion with the view of placing our own sanitary officials in an equally independent position:—

"The New York Board of Health consists of four individuals, three appointed by the Mayor and one by the Governor of the State. The Mayor appoints one medical member of the Board, and one who is not a medical man; the third is an ex-officio member, being the president of the Police Board, who is appointed by the Mayor; and the fourth, also ex-officio, is the health officer of the port, who is appointed by the Governor. The Board thus constituted appears to have the most absolute power of closing and even of destroying unhealthy premises without compensation. They have gone so far that, failing attention to orders and notices, they one night employed three hundred men and demolished an unsanitary market and cleared it all away. On another occasion, finding fines ineffective, they destroyed a gut factory in a similar way, and compelled the owner to pay the cost of carting away the material of his buildings.

Until the local authority is made absolutely representative of the whole body of the community, such autocratic powers would possibly not be submitted to here, but something might be done in this direction.

Much good might be effected if upon the appointment of every medical or other sanitary officer his salary, the rate of increase on that salary, and the terms of his superannuation were fixed, as in the case of civil servants, and he were appointed to hold office 'during good behaviour,'—a well-understood legal term,—and were removable by the local authority only for misconduct or neglect of duty. This change would be no interference with the principle of local representative government, while it would have the effect of freeing sanitary officers from undue interference in the discharge of their duty after they had been appointed.

The sanitary officers should, if thus freed from undue interference, be held more directly and personally responsible for the abatement of nuisances in their districts. They should be empowered to institute proceedings upon their own initiative, and, in the event of their neglect, it should be open to the Local Government Board or other central authority, on the representation of any ratepayer, to investigate their conduct in this respect, and, if necessary, to dismiss them by sealed order in the same way as the Local Government Board at present may order the dismissal of a Poor Law official who fails in the discharge of his duty."

And, when we find that one Vestry Clerk frankly said in his evidence that "he and his Vestry had never turned their attention to the Act" (the Sanitary Act and the Sanitary Law Amendment Act), and find that members of Vestries own and draw profit from house property that is in an unsanitary and overcrowded condition, it certainly seems time that competent sanitary inspectors (and these are by no means wanting) should be freed from mere servitude to such authorities and placed in such a position that they can act independently.

At the same time it must not be forgotten, but on one page of the Report it certainly does seem to be forgotten, that energetic action in one district may have, often must have, only the effect of changing the locality of the evil, so far as overcrowding at least is concerned. On page 28 credit is given to two Vestries,—those of Chelsea and Hackney,—for the energetic manner in which they have enforced legalised regulations of various kinds. Chelsea especially is credited with having in one year effected the clearing of 300 houses, the improvement of 129 water supplies, and of 146 drainage arrangements, as well as a number of instances of preventing the evils of overcrowding and of sleeping in cellars, and of the occupation of sleeping-rooms by more than two adults of different sexes. "The consequence of all this energy on the part of the local authority is that in the whole of Chelsea there is, practically, no overcrowding." This is very satisfactory, of course, for Chelsea; but it stands to reason that the prevention of

overcrowding in this district in the way described, must drive out the superfluous ones to another district, and that it is only a local amelioration after all. This seems suddenly to occur to the framers of the Report on the next page, where they quote the Medical Officer of the District of Hackney to the effect that "one result of the enforcement of their regulations was that persons who did not like to submit to them, or for whom there was no room without overcrowding, had to leave the district and go to others where the local authority allowed the people to live in whatever condition they pleased." This illustrates, it is observed, the disadvantage of each local authority having its own sanitary system; but if all the local sanitary systems were made identical and carried out with the same rigour, that would only result in the fact that the less desirable among the population would be unable to find housing anywhere, and be left out in the streets. That might be an efficient, though rather a cruel remedy against overcrowding; but this inevitable result of such "energy" does not seem, so far as the words of the Report enable one to judge, to have been so distinctly present to the minds of its framers as one might have expected.

The question of the possibility of building healthy dwellings with sufficient accommodation at a lower rate of expenditure than at present is the subject, as we observed, of Mr. Godwin's memorandum or postscript to the Report, the recommendations being in the direction of concrete building as a cheaper method (in London) than brick, and of concentration of houses into larger blocks so as to have a somewhat smaller initial expenditure per domicile. Something also is to be achieved by the judicious planning of the property so as to have one portion capable of being let at tolerably high rates to a wealthier class of tenants, who will thus help in making an adequate return for the outlay. On this head we may as well quote Mr. Godwin's paragraph as it stands:—

"Arrangements for housing the working-classes by some of the large employers are made abroad which are less common in England; that is, tenements are provided by the employers in connexion with the works, and various social advantages are afforded to tenants. One remarkable example of this is the establishment of M. Godin-Lemaître at Guisa, near St. Quentin, in France, who has made a fortune as a manufacturer of stoves and ranges. The workmen,—700 or 800 in number,—and their families are here housed in flats, three and four stories high; nurseries for the infants and schools for the children as they grow up are provided without additional charge. The unmarried apartments are let at the rate of 3s. 9d. per calendar month per room. A furnished room for a single man (bed made and room set right every day) costs 6s. 8d. a month, and a bed in a dormitory can be obtained at one penny a day. This, it is stated, pays the employer six per cent. It happens that I gave some particulars of this establishment at a congress of the Social Science Association held in Sheffield in 1865. A view and plans of the building will be found in the Sheffield volume of the 'Transactions of the Social Science Association.' Illustrations are also given in 'Habitations Ouvrières en tous Pays,' par Muller, 1872.

In looking for the means by which the above result was brought about, it appeared that there were retail shops on the ground-floor where anything required by the tenants, meat, clothes, &c., could be obtained at a small per-centage above wholesale prices, and which yet gave a profit, and this was considered in settling the charge for the lodgings."

The suggestions arising out of this passage are highly important, for, as we have over and over again said, unless dwellings for the poor can be made to pay, at the rents which the poor can afford, the whole thing becomes merely eleemosynary, and to say that no lodgings can be made to pay at such rents, is only to say, in other words, that there are more people on the site than can make a living, and the sooner some of them go the better for the whole.

The evidence as to the Peabody Dwellings is naturally suggested by this portion of the subject, and the Report brings out emphatically the fact that this great and well-meant charitable bequest hardly touches the real problem we are dealing with at all. The evidence summarised on page 54 is to the effect that, in the first place, when bad

property was pulled down to build model dwellings, the persons dispossessed did not return to take advantage of the model dwellings; and, indeed, that they were often not a class who would be desired as tenants of a Peabody building: so that, as far as the lowest class are concerned, the action of the Peabody trustees is as inimical to them as that of the railway companies. Again, persons with large families, and persons following certain callings, such as costermongers, were not admitted in the Peabody buildings; the inhabitants of these form, in fact, a kind of working-class aristocracy. To keep the semblance, however, of providing for the poorer class, the maximum of wages to qualify for a Peabody tenant is 30s. a week, but the Report implies that this condition is often evaded, either because both husband and wife in the family are bread-winners, or because "it seems hard" to eject a well-behaved tenant from the buildings because by thrift and industry he has raised his earnings above the stipulated limit. Seems hard! why, it is the very climax of absurdity; it is against all the rules by which the relations of landlord and tenant are influenced in other walks of life. Just imagine any man, not a "philanthropist," letting house property on the understanding that if the tenant improves in circumstances so as to raise his income above a certain amount, and so become so much the more valuable and reliable a tenant, he is to have notice to quit! and even with this absurd theory (which we can well believe is not always acted on), the buildings do not house the class they were primarily supposed to be intended to benefit. Gratitude to Mr. Peabody for his large-heartedness and good intentions ought not to prevent our recognising, what portions of this Report bring out more clearly than ever, that his great bequest is a piece of fancy philanthropy, only producing perfectly unnatural and unbusinesslike relations between the Company and the tenants, and such as cannot possibly be permanently carried on upon the same principles, or regarded as any step towards a solution of the question before us.

The evidence as to the dispossessing of people in erecting these structures leads us to speak of another portion of the evidence, in regard to the effect of railway clearances on overcrowding. In reviewing Lord Salisbury's propositions eighteen months ago, we expressed an opinion that the effect of railways and new streets in leading to overcrowding had been much exaggerated, and we did not say this without special inquiry among those who had reason to be acquainted with the facts. The Report leads to the belief, however, that these influences have had somewhat more grave results than we had been disposed to think; though we still consider the effect of such public improvements in crowding up various quarters has been over-estimated. But what we were not prepared for is the evidence as to the cool and cynical neglect on the part of the railway companies of their legal as well as moral obligation to provide house-room equal to that which they remove. There are Standing Orders to this effect, and here is the summary of the Report thereupon:—

"The City Engineer of Newcastle-on-Tyne, who has had experience as a railway engineer, said that he had never known a single person to be re-housed by a railway company after clearances in connexion with railway extension. Sir Edward Watkin, speaking with greater authority, stated that he did not remember any case where a railway company, being under an obligation to re-house, had fulfilled it. Miss Hill corroborated this evidence without qualification, saying that the Standing Orders which were intended to provide for the re-accommodation of the poor are practically a dead letter. She pointed out that, even supposing they were satisfactory, and did compel the companies to re-accommodate, the companies would only be compelled to re-house the people they actually displaced, and they have a method of evading re-housing provisions by getting rid of the people privately before coming to Parliament. The witness said:—'Usually the railway company communicate with the landlords, and tell them, "We are going to take your property"; the landlord would only be compelled to re-house the people they actually displaced, and they have a method of evading re-housing provisions by getting rid of the people privately before coming to Parliament. The witness said:—'Usually the railway company communicate with the landlords, and tell them, "We are going to take your property"; the landlord would only be compelled to re-house the people they actually displaced, and they have a method of evading re-housing provisions by getting rid of the people privately before coming to Parliament. The witness said, and in spite of the advice of my follow-

workers, in Albert Buildings. In Albert Buildings, Lambeth, the tenants are told by the agents of the railway company that they will have to move, and that their best plan is to get out soon. This is before the Act is obtained. The companies, therefore, can go before Parliament, and say, "We do not displace people; there is nobody there." Therefore, it would seem to me as if the clauses, whatever they may be, should deal with the question according to whether houses that were formerly occupied by the labouring classes were displaced, and not whether the particular Act displaces them. The Rev. W. Denton, vicar of St. Bartholomew, Cripplegate, who for a quarter of a century has exerted himself on behalf of poor people forcibly evicted from their homes by railway companies, says that the Standing Order directing a return of the number of persons to be displaced by railway companies is systematically evaded."

Sir E. Watkin, it may be supposed, would stand up for railway companies, if any one in the world did, but on this point he seems not to have had a word to say for them; and it is stated on the next page of the Report that he has stated that in his opinion there would be no injustice in saying to people who control a private enterprise, and who remove the houses of working-class people in the construction of the works, "that they shall, before they commence their works, erect an equivalent amount of accommodation." Let us hope Sir E. Watkin will set the example.

The very important subject of special loans of public money for the purpose of facilitating the erection of working-class dwellings is dealt with in the Report at considerable length, and we can only here summarise very briefly the conclusions arrived at. In regard to Mr. Torrens's proposal that a portion of the balance in the hands of the Post-office Savings Bank should be applied for this purpose, the Report, after careful consideration of the arguments on either side, concludes that the desirability of lending money at lower interest for artisans' and labourers' dwellings should be considered on its own merits, apart from all question of the source whence it comes; and in this we entirely concur. The Commissioners then refer to Lord Shaftesbury's Labouring Classes' Lodging Houses Act of 1851, the general object of which is "to encourage the establishment of dwellings for the working classes by giving power to localities to adopt the Act, and to borrow on the security of the rates." The Commissioners appear to endorse Lord Shaftesbury's opinion that if this Act had been put into operation "it would meet almost everything that is required at the present moment," and that a trial should be given to it, if amended in certain respects so as to make it effective. To do this, it should be made for London, metropolitan instead of parochial; it should have more expeditious powers and less elaborate machinery; and, inasmuch as in its present form the Commissioners for carrying it out would have to negotiate for every separate interest in the property they proposed to acquire, and the owner of any interest, however trifling, could stop proceedings by refusing to treat, it is expedient that provision should be made conferring upon the local authority compulsory powers to purchase land under the Act, on the same footing as the powers given to railway companies and undertakings for general local improvements. This appears to us to be a perfectly sound and logical view of the matter. Subjoined to this is a paragraph recommending that vacant land should be rated at its selling value. "At present, land available for building in the neighbourhood of our populous centres, though its capital value is very great, is probably producing a small yearly return until it is let for building. The owners of this land are rated not in relation to the real value, but to the actual annual income. They can thus afford to keep their land out of the market, and to part with only small quantities, so as to raise the price beyond the natural monopoly price which the land would command by its advantages of position. Meantime, the general expenditure of the town on improvements is increasing the value of their property. If this land were rated at say 4 per cent. on its selling value, the owners would have a more direct incentive to part with it to those who are desirous of building." The Commissioners, therefore, recommend that these matters should be included in legislation when

the law of rating comes to be dealt with by Parliament. This, we suppose, would be one of the items in the Report which have been called in some quarters "very drastic measures"; but it seems only on all fours with other measures by which private interests are made to give way to public advantage.

Akin to this subject is the question of compensation for insanitary property. The Commissioners observe that there are arbitrators who, in assessing compensation, "seem not to exclude from their minds the improvement of the property which would be due to the [improvement] scheme itself, and give a prospective value to the unhealthy property in consequence of the impression that it would be increased in value when the improvement was effected." On this head they quote and ratify the opinion of Sir Henry Hunt, that if a house is in a dilapidated condition, and it would be waste of money to repair it, the value should be calculated on the principle of what the land and materials are worth, and the claimant should have that and nothing more. Our only astonishment is that it should at this time of day be necessary formally to lay down such a principle, which is, in fact, no more than simple justice. The compensation which, we believe, has often been obtained by owners or leaseholders whose property is purchased simply because they have allowed it to lapse into a condition which is a public nuisance and scandal, amounts simply to a premium on rapacity and selfishness.

There are two other points which touch the question of giving special advantages in favour of the erection of working-class dwellings. One of these is the fact that the owners of large properties are in some cases under a disability to grant long leases except on the best terms possible. "When the Duke of Westminster's re-settlement was drawn in 1874 a clause was put in to enable him to let land for the purposes of artisans' dwellings upon other than the best terms." If this means that, artisans' dwellings not being the best form of property, the owner was to be at liberty, nevertheless, to grant leases for this class of building when public wants seemed to demand it, that is a provision not probably contrary to sound economy in fact, though it seems opening the door to a rather dangerous principle. The same, perhaps, may be said of the proposition to convey to the Metropolitan Board the sites occupied by prisons in populous districts, in order to give more space for dwellings. In the abstract it seems most desirable, since there is no necessity to have some of these prisons on town sites, that the land should be freed for the erection of dwellings; but the suggestion is somewhat complicated by the remark that "in fixing the price at which such sites should be conveyed, due regard should be had to the purposes for which they are so required." Lord Salisbury, in his own memorandum, enforces this proposition strongly, urging that to part with these sites under their market value cannot properly be called "eleemosynary,"—"it is the surrender of an increase which has become unexpectedly disposable." We confess we cannot quite follow the logic of this. It may be a very indirect and in the main harmless way of being eleemosynary, but it is none the less so in principle.

In regard to this and other suggestions for granting special advantages, the question seems to be, how far public interests demand a special departure from ordinary commercial dealing. It is on the ground of public interests only, not of class interests, that any such departure from strict economical principles becomes justifiable, or, rather, ceases to be, properly speaking, a departure from such principles. Throughout the study of this remarkable Report, which we have endeavoured to summarise and consider, and from a careful perusal of which there is so much to be learned, two considerations have been always present to our mind: 1st, that no scheme of assisting the working classes to better dwellings can be of any real or lasting advantage which is not based on commercial principles, or which attempts to provide specially for them as a class under permanent special difficulties and claiming special condi-

tions to be made for them. How indeed, even if we admitted the principle, are we to define the class? Where does it begin and where does it end? The result of the Peabody bequest is surely enough to teach every one the difficulty of arranging matters so. Secondly, that the real initial difficulty and evil lie far behind the plane of enquiry of the Royal Commission. They have made valuable suggestions for securing that justice should be done to the industrious among the working classes, and that they should be protected from the consequence of private rapacity and of official neglect; but the root of the overcrowding evil lies in overpopulation, vice, ill-health, and want of foresight, and it will not be cured in a generation, commission we never so many Commissions. It is in the slow but certain influence of better education that the remedy will be found at last. All we can really do at the moment is to curb those who are wronging their neighbours, to spur those who are neglecting their duties; taking heed that in doing so we do not sap the moral and material strength of those whom we seek to benefit, by any hasty measure of false philanthropy:—

"'Twill be regarded for a precedent;
And many an error, by the same example,
Will rush into the State."

Since the above was written, the second portion of the Report, dealing with the question in Scotland, has come into our hands, but it is short and of very minor importance in comparison with the first portion. It goes to show clearly that the difficulties in London are exceptional and peculiar, and that the problem does not present itself in any such dire and perplexing dimensions elsewhere.

SCULPTURE AT THE ROYAL ACADEMY.

THE largest sculptural work in the Academy this year is Mr. Boehm's heroic group of "St. George and the Dragon," in the centre of the octagon. To his treatment of this very well-worn theme the sculptor has brought spirit, fine modelling of man and horse, effective grouping of the whole, but not much energy or greatness of conception. The St. George, who is nude, not armed (rather at variance with our associations with knight-hood) has quitted his reins to drive the spear into the dragon with both hands, while the horse rears in a rather *ménage* attitude. The dragon is carefully studied; he is a clever compound of lizard and serpent; his head is the flat one of a poisonous snake, and he twines his forked tongue round the shaft of the spear, which he catches in his jaws; behind the wrinkled eyes grow short horns, increasing the uncanny aspect of the head; but his limbs, where the lizard element comes in, are feeble and spongy-looking, and one does not wonder that a horse prances over him without much difficulty. The dragon, however, shows the most invention of the group, which, as a whole, can hardly be said to be imaginative, or to add anything intellectually to our conception of the legend, but it would make a fine monumental object for a central position, say in the courtyard of a palace.

Unquestionably the finest piece of modelling in this year's sculpture is Mr. Lawson's "Spartan Dancing Girl" (1,985). This is essentially a sculptor's subject; it is simply a modelling of the nude figure in a happy moment of repose; and in its complete representation of bodily structure, firm, well knitted, not without beauty, but striking one rather by its nervous energy, it is one of the best things of the kind that has been seen in the Royal Academy. We shall be able to give an illustration of this by which it is marked, just let the spectator compare it with the nerveless, mechanically-rounded, and polished limbs of such a thing as the "Ganymede" of Herr Kühn (1,994). The Germans, however, are behind every one in sculpture now; the French are before every one else, and we are a long way behind them; but Mr. Lawson's figure is one of a class of

works which will help us to make up our position, and we hope it will have worthy successors.

Another very clever and original work in the octagon-room is Mr. Mullins's "Autolyeus, son of Mercury" (1,990); not Shakespeare's Autolyeus, the name being merely used to typify the character of a petty deprecator. This is a nude figure of a youth, with a most amusing and cleverly-wrought expression of roguery in his countenance, and one hand drawn back preparatory to making a snatch at some piece of booty, in accordance with the sentence quoted,—"A snapper-up of unconsidered trifles." The whole figure is what one might call the idealised pickpocket, or what may be called the amusing side of him; it is half doubtful, perhaps, whether the subject was worth so much ability, but it is very clever and really original.

The pathos of the heavy German,

"With his sentimentalibus lacrymæ roat 'em,"

is delightfully exemplified in a work which on first view appears like a colossal heftle executed in plaster, but which on further examination is found to be a mass of drapery with a man donned up under it, and which is entitled "Overwhelmed" (1,981), with the addition, "O Thou, Eternal One! now let me die." This is the work of Herr Oscar Junck, who seems to have said to himself, "Go to! let us be sublime!" It is an easy way to be sublime, to hide all the figure and even the face out of sight, and let the spectator only see the cloak and the beard; you thus get rid of all the chief technical difficulties, and at the same time leave the imagination of the spectator entirely unfettered. Herr Kummer's "Lady Macbeth" (1,977) is better than this; the drapery is fine, but this and the heavy mass of hair overshadowing the brows are so much the repetition of a manner which pervades German sculpture that one is quite tired of it; and the attitude, though expressive, is somewhat too violent for sculpture. Two terra-cotta studies on either side of this, have a good deal to recommend them; one is Signor Lucchesi's "Oliver Twist" (1,975), the countenance of which is truly pathetic; the other, Miss Curtois's "Prayer" (1,797), a figure of a young girl kneeling, more expressive in attitude than in countenance, but a very pleasing ideal work. Signor Fabrucci's "First Love" (1,987) is a pretty child group; and among the portrait busts in the octagon may be noticed the "Earl of Beaconsfield" (1,973), by Mr. Adams-Acton; the "Marquis of Salisbury" (1,974), by Mr. Theed; "Mr. Henry Fawcett" (1,988), and the "Archbishop of Canterbury" (1,995), by Mr. A. Bruce-Joy. All these are busts with much character, and worthy of their subjects. There must have been a great weeding of busts this year, if we compare the generally good average of them with the crowd of tame and feeble things that we have so often found in the Academy.

In the lecture-room are two recumbent monumental effigies, which seem almost as if made to be companion works to each other, and which we publish as such, at all events, in this number.* These are Mr. Woolner's "Lord F. Cavendish" (2,130) and Mr. Armstead's "Dean Close" (2,132). Both, as will be seen, have the simplest of motifs; the portrait head and the cere-cloth covering the body, the form of which is only partially indicated beneath its folds. Mr. Onslow Ford sends the marble of his statue of "Mr. Irving as Hamlet," the model of which was before exhibited here, but we dwell with more pleasure on his other work, "In Memoriam" (2,084), a sleeping figure guarded by cherubs, the whole in very low relief, and set off with delicate ornament of a free Renaissance character also in low relief, and for which we fancy that a remarkable large circular monumental panel in the South Kensington Museum has furnished some hints. The attitude and expression of the figure are very beautiful, the whole is a most refined work and quite on one side of the ordinary paths of English sculpture. Beneath this is another really clever and superior work, three

* See this week's illustrations.

small panels in alto-relief (2,086-7-8) by Mr. Harry Bates, illustrating subjects from the "Æneid"—the first, "Dido looking after the departing ship"; the second, "Then, indeed, Æneas weeps"; and the third, "The form of the God returning with the same aspect, appeared to him in his sleep." These small sketches, for they are little more, are works of imagination; they illustrate the highest use of sculpture, and lead us to look with interest to what their author may accomplish in future.* We shall give an illustration of the work shortly. Mr. S. Fry's terra-cotta group of mother and child, called "Play" (2,113), is one of the class of subjects which Dalou may be said to have given the suggestion for, and is successful in uniting sculptural quality with natural realistic action and expression. Mr. Greenough's "Circe offering the Cup to Ulysses" (2,134) is a life-size marble of high finish of execution, but not remarkable otherwise, though the face has a fine expression of confident and deceitful triumph, which is in keeping with the idea; certainly this personage is more like Circe than Mr. Collier's painted Circe, to which we have before referred. Mr. Hamo Thornycroft's wax statue (small scale) for an equestrian statue of Edward I. is fine and monumental in character, and the horse is posed with a look of massive strength in his attitude, which comports well with the heavy armoured figure he carries. With Mr. Calder Marshall's "Eve" (2,114) we must confess we are disappointed.

Among smaller works round the wall of the lecture-room are several of considerable interest. We may instance a charming ideal bust by Mr. Armstead, entitled "Maidenhood" (2,069), a head not strictly beautiful, but full of expression, and marked by broad and free execution. One of the cleverest of the smaller things is a bas-relief of "Leda," by Mr. Montford, who sends also a terra-cotta statuette of a reclining figure of a "Tired Dancer" (2,092-4); the former is admirable from an artistic point of view, but it is about time that this very indecent Pagan legend were dropped as a subject for art. It was well enough for Michelangelo to do it in the Renaissance period, which was a Pagan and an indecent epoch in spite of all its genius, and his painting is too remarkable and characteristic a legacy of the age to wish it undone; but such subjects are, at any rate, anachronisms now. Mr. Mark Rogers sends a head of the Centurion (2,071): "I am also a man in authority, having servants under me," &c., which is a fine conception. Mr. W. Couper's two delicate medallions in very low relief, "A Vision," and "Before the Scenes" (2,047, 2,064), should be looked at; as also Mr. Mark Roche's "David entering Saul's Tent" (2,015),—is not David's right arm, by the way, rather long?—and Miss Rope's "David playing before Saul" (2,029), a very refined low-relief work. There are two busts of Gordon, neither of them satisfactory; a grotesque and wild-looking one of Mr. Ruskin, by Mr. Conrad Dresser (2,009); a powerful one of "The late W. Docker" (2,021), by Mr. Lawson; a very pleasing low-relief medallion of Lady Watkin (2,025), with a decorative effect produced by a lace head-dress carved in low relief; a very pretty and lively little alto-relief, by Mr. J. T. Williamson, called "Spring" (2,033), three little nude boys twining flowers; an expressive child statuette, "Pussy has scratched my finger" (2,035), by Signor Lucchesi; an admirable miniature study of a tiger (2,072), by Mr. Allen Hutchinson; a medallion portrait of Mr. John E. Sandys (2,080), by Mr. Henry Wills; a bust of Gray, the poet (2,090), to be placed in the hall of Pembroke College, by Mr. Hamo Thornycroft; a medallion of Mrs. Mirrilees, by Mr. Woolner; two small medallion portraits of Miss Ellen Terry and Miss Mary Anderson (2,115-7), by Mr. G. M. Curtice, admirable likenesses these; and a clever *repoussé* silver panel, by M. Morel-Ladenil, of the wedding scene from "Much Ado" (2,116).

* We understand that the Royal Academy had the intention of purchasing this work with the Chantry bequest, but it was technically unsuitable on account of its not having been executed in E. gland.

There is no great predominant work of the year, but there is in the sculpture of this year more to interest and more which promises that we are slowly progressing towards a better notion of what sculpture should be and what it is meant for, than we have observed in recent Academy exhibitions. The stupidity and indifference of the public about sculpture are the great obstacles to its advancement among us; but this, again, reacts on the sculptor, as many melancholy examples have shown. It is at least something to record that there are fewer such examples or warnings this year than is usually the case.

THE RAILWAY COMMISSIONERS.

A SHORT time ago the President of the Board of Trade was asked in the House of Commons whether, in his opinion, the Railway Commissioners had jurisdiction now to entertain questions of undue preference as between foreign goods and English goods. Mr. Chamberlain replied in the affirmative. The fact of this question being put in the House is an indication that the functions of this important body are not generally known, and a few particulars as to their constitution and duties may prove of interest.

Leaving the preference-rate question until later, it may be stated that the Commission came into existence in 1873, and consists of three members. Each of these is supposed to be experienced in railway law, or practically acquainted with the details of railway business, and thus thoroughly competent to give judgment in the cases brought before them. The appointment of such a tribunal had long been recognised as a necessity; for, without reflecting for a moment on the capability of the Court of Common Pleas, or of Her Majesty's County Court Judges, to deal with railway, as well as other disputes, it was very seldom that the companies did not appeal against an adverse judgment, and by taking the case from court to court, make it ruinous to the litigant, although he might be successful throughout. The power of appeal from the decision of the Commissioners is naturally limited, and, although the expense involved in bringing a case before them is considerable, there is much more chance than formerly of its being brought to a speedy and satisfactory issue. With a view of still further lessening the cost of litigation to individuals in cases brought before the Commission, a clause was embodied in Mr. Chamberlain's Bill of last year, dealing with railway matters, giving a *locus standi* to Chambers of Commerce, &c. This was one of the most useful provisions of the Bill, and it is unfortunate that this, at least, has not become law. It is, however, only a question of time, as it is probable that the Bill, or something similar, will be re-introduced, now that the attempt of the railway companies to settle the matter has proved abortive. However, the law as it at present stands, makes certain provisions tending to relieve individuals of the onus of laying complaints of contravention of the Acts by the companies before the Commissioners. A clause in the Act of 1854 authorised the Attorney-General to take proceedings in cases in which the provisions of the Act were violated; but that of 1873 goes further, and permits complaints to be made not only by a person aggrieved, but by any person appointed by the Board of Trade, or by a municipal or public corporation, if furnished with a certificate of the Board of Trade. This, as Mr. Chamberlain explained in the House on April 30th last, gives better facilities for the public to have their grievances brought before the Commissioners direct, than by leaving the Attorney-General to watch and enforce the due carrying out of the provisions of the law.

The duties of the Commissioners are mainly to see that the existing Acts relating to railways are duly observed, and to hear and determine any complaints of contravention of them. These Acts were in a manner consolidated by Mr. Cardwell's Act of 1854, which

may be said to be the most important enactment on the subject in the statute-books. This measure, among other useful clauses, contains the following, which is comprehensive enough to justify Mr. Chamberlain's reply as to the jurisdiction of the Commissioners in cases of preference.

"Clause 2.—Every railway company shall, according to their respective powers, afford all reasonable facilities for the receiving, forwarding, and delivering of traffic upon and from the several railways belonging to or worked by such companies respectively, and no such company shall make or give any undue or unreasonable preference or advantage to or in favour of any particular person or company, in any respect whatsoever, nor shall any such company subject any particular person or company, or any particular description of traffic, to any undue or unreasonable prejudice or disadvantage in any respect whatsoever."

This seems to include undue preference as to transit, accommodation, or charge, the words, "in any respect whatsoever," leaving no room for exceptions. Nevertheless, it would appear that even this was not clear enough; for in the Act of 1873, appointing the Commission (in which the provisions of Mr. Cardwell's Act are incorporated), there is a section commencing "Whereas it is expedient to explain and amend the said enactment," referring to and enlarging upon the clause just quoted.

Another clause in the Commissioners' Act provides that they may, on the application of any person interested, make orders requiring a railway company to distinguish in their rate-books how much of each rate is for conveyance, use of railway, locomotives, carriages, &c., and how much for other expenses, specifying the nature and detail of such other expenses. This has proved very serviceable, but the principle might with advantage be extended,—indeed, in the discussion on terminals caused by the Bills just abandoned by the railway companies, a step in this direction was proposed. This was to exhibit at each station the amount claimed for terminals at that station; but it would seem desirable for each station to be furnished with a list of the terminals charged at all the stations. With this, and a uniform classification and scale applicable to all companies, a rate could be fully tested without having recourse to the Commissioners, unless still more detail was required.

The powers of the Commissioners in "terminals" cases is defined in Clause 15, which may be quoted at length:—"The Commissioners shall have power to hear and determine any question or dispute which may arise with respect to the terminal charges of any railway company, where such charges have not been fixed by any Act of Parliament; and to decide what is a reasonable sum to be paid to any company for loading and unloading, covering, collection, delivery, and other services of a like nature. Any decision of the Commissioners under this section shall be binding on all courts and in all legal proceedings whatsoever." It will be noticed that these are what may be termed "handling" services, but the companies claim the right to make additional charges for all terminal accommodation, including all station buildings, &c., and expenses in connexion therewith, these charges being distinguished by the term "structural" terminals. In a recent case in which this question was involved, it was elicited that the following are among the items included in claims for structural terminals, in addition to goods sheds, warehouses, and offices:—Land, earthwork, ballast, turntable, weighbridge, gas, &c.; interest on capital expended upon and the cost of maintenance and renewals of the above, together with rates and taxes being reckoned as the estimated cost per annum. This is divided by the tonnage dealt with during the year, thus producing a rate per ton. In the case referred to it was 11.72d. per ton! Now, as explained in our article of March 7th last, the companies' Acts give them no power to make charges for accommodation of this description, and it is therefore held by the Commissioners that all such charges are included in the amount they are

authorised to demand for conveyance; but at the same time they are decidedly of opinion that it was really the intention of Parliament to allow something additional for terminal accommodation, though this does not find direct expression in the Acts. This has always been a sore point with the railway companies. The Commissioners have, of course, administered the law as they found it, and their judgments in these cases have invariably been against the railway companies. The main object of the latter in introducing their Rates and Charges Bills was to get the law on this point altered in their favour; but by adopting wrong tactics and asking for too much, they have got nothing, and the law remains as it was. The Commissioners have had many cases coming under this clause brought before them, and it has been shown that the most unreasonable charges have been imposed for terminal services and accommodation, the opponents of the Rates and Charges Bills being thereby furnished with powerful arguments against the legalisation of these charges, though there is no doubt that the companies are justly entitled to some payment in this respect.

The Commission only had a five years' lease of life, and although at the expiration of that term it was again renewed, it has proved itself of sufficient value to be constituted a permanent tribunal. The majority of cases, such as are brought before them, formerly went to the Court of Common Pleas, and the confidence of railway litigants in the ability of the Railway Commission is proved by the fact that many more cases are brought forward now than before their appointment. It cannot be doubted that a court dealing specially with railway matters would be more likely to bring them to a satisfactory issue than the Court of Common Pleas, with its varied practice, and the appointment of the Commissioners as a Court upon a similar footing to that just named would be a decided advantage. This will, no doubt, be accomplished when our legislators have a little more time to devote to internal affairs; for railway matters have been brought so prominently before them this session that they are not likely to be lost sight of.

NOTES.

SCIENCE, which is as restless as politics in changing old things for new, is pressing hard on our lighting and heating systems, and will soon end by transforming them altogether. Our gas, the purveyors of which have regarded with comfortable complacency the attacks of electricity, has just received a rude shock from a chemist of considerable note, Professor Armstrong. In a paper read before the Iron and Steel Institute, he remarked that the present mode of making illuminating gas was irrational; the yield was very small in proportion to the amount of coal carbonised; the gaseous product was poor in quality, owing to the high temperature that prevailed in the retorts; while the coke was also of low quality, and the operations clumsily conducted. The public was slowly awaking to the fact that gas was supplied with very indifferent illuminating material, and the Professor expressed an opinion that consumers would soon insist upon something far better, which could be used in much smaller quantity, and the evils arising from gas-burning would be thereby diminished. As to the other question, viz., fuel for heating, Admiral Selwyn has been leading a crusade at the United Service Institution against the use of coal on board of the ships of the royal and mercantile marines, as being bulky, costly, wasteful, and dirty. He advocates the employment of liquid fuel, which is already in vogue with the Russian fleet, and certainly has many advantages. There is great economy; no change is required in engines and boilers, and comparatively little adaptation of furnace; a whole army of stokers and trimmers dispensed with; the ship can receive her supplies at sea or any where, without resorting to a coaling station; there is no nuisance of dust and ashes, nor any liability to spontaneous combustion. The greatest point, however, is

that 46 lb. of water, according to experiments, can be evaporated with 1 lb. of fuel, giving power for full steaming for twenty-four days, whereas now that power is limited to four days. As each ship in the navy could remain on her station twice as long with liquid fuel as with coal, the saving on the expenses of the whole fleet would be about twelve millions sterling per annum. This is a serious and important matter, and we cannot see why the same application should not eventually be made to fuel for manufacturing purposes and domestic heating. Notwithstanding the warnings of geologists and mining surveyors, the output of coal increases every year, and little effort is made to check the waste and recklessness. As we have not, like the lucky Pittsburg folk, reservoirs of natural gas underneath our manufacturing towns, it is worth considering whether we cannot find some economical substitute, in the shape of liquid fuel.

THE evidence of Professor Sullivan, the President of the Queen's College at Cork, before the Select Committee on Irish Industries, described the neglected state of what might readily be made an unrivalled system of inland waterways. All the various rivers and canals, the President pointed out, had locks of different dimensions, so that, as to commercial utility, "the whole thing was a joke." The canal system of Ireland, according to the evidence given before the Select Committee on Canals (252, 1883, p. 232), covers a length of 775 miles. On 4,332 miles of inland water-way in England there exist, according to a table published by the Institution of Civil Engineers (Proceedings, vol. 76, p. 175), seventy-two sizes of locks, ranging from 45 ft. to 165 ft. in length, and from 6 ft. 10½ in. to 37 ft. in width. The Irish irregularity thus falls short of that which obtains in English waters. The capacity of a canal of ordinary section for traffic, taken from work actually done in England, has been calculated as two millions of tons of net load conveyed one mile in a year. The maximum work done on an English railway of mixed traffic, in the same time, was 1,410,000 tons conveyed one mile. But the railway cost more than five times as much per mile as the canal; and while the English railways on the average have not established a higher rate of net earning than 4.3 per cent. on the capital, the Trent and Mersey Canal has earned as much as 30 per cent. net profit in a year, and the Birmingham Canal a higher rate of dividend.

ALTHOUGH the traffic of the Irish Railways is very low, the result of their working is shown by analysis to bear comparison with that of richer and more populous countries. The gross receipts on the railways of the United Kingdom in the last year analysed in the "Index to our Railway System," were 3,551.7 per mile; those on the Irish lines in the same year being 1,257. For England alone the receipts were 4,220.7 per mile. But the capital spent on the English lines was 46,113.7; while that for which the Irish lines have been constructed was 14,187.4, stated at per mile in each case. And, notwithstanding their small traffic, the Irish lines were worked rather cheaper than the English; the coefficients of working cost being 53.97 per cent. of gross receipts in England, and 53.55 per cent. in Ireland. The outcome of all this is, that the Irish lines, out of a gross traffic amounting to 8.15 per cent. of their outlay, earned a net profit of 4.17 per cent. over their whole capital; while in the same year the English lines earned 4.38 per cent., and the Scottish lines only 3.99 per cent. net on their respective capitals. It is thus obvious that the judicious mode of laying out the Irish railways, for which the country is mainly indebted to the late Field-Marshal Sir John Burgoyne, affords a sound basis for a remunerative traffic, if Irish industry were to revive. The effect of a very small traffic in diminishing net returns is illustrated by the fact that while every railway servant in France earned 207.1 in a year (dividing gross revenue by total number of men employed) and in

England every one earned 193.1; in Ireland, in 1883, every person in the employment of the railway companies earned only 164.

THE reduction of 10 per cent. in the wages of the colliers appears to be becoming general throughout the country; and the Lancashire Miners' Confederation have decided to call a National Conference of Miners on the wages question. In South Yorkshire 2,000 miners are now working at the reduced wages; and the masters state that at the present price of coal it will be impossible to work many of the pits even on these wages. Under these circumstances, attention is being raised to the fact that out of a strictly limited quantity of coal we are now exporting upwards of twenty million tons per annum for prices that hardly keep body and soul together among the coal winners. Our export price per ton for coals in 1883 was less than half what it was in 1873, and is now probably lower. It was the estimate of the Coal Commission in 1871 that if the annual increase in the demand for coal, which was then tolerably steady, were to continue, our coal supply would be exhausted in 110 years. On the appearance of such calculations, the price of coal rose, and the rate of consumption was materially checked. Great prosperity accompanied the rise in the price of coal, but it is not clear what was the true source of the sharp demand then made for our produce at continually rising prices. At present our home consumption of coal is declining, although the exports, at an inadequate price, are rapidly increasing. It does not seem to be the English collier or coal owner who derives most benefit from this increment.

THE Architectural Association have issued to members a report of a Committee for "Amending and Consolidating the work of the Association." Among the suggestions are that two defined divisions be formed, the "Elementary Division" and the "Advanced Division," and that a "Committee of Advice" be elected each Session, whose duty it should be to recommend to new members the particular course of study which it would be advisable for them to pursue. This is an admirable idea, and a proposition made in a most generous and unselfish spirit. The committee particularly ask members to consider and give their views on proposition 19, how the advantages of the Association may be best extended to country members. There is one way we could suggest, but it would be a troublesome one for the sub-committees and visitors of classes, viz., criticism of designs in these various classes by letter. The question of publishing the papers read at the meetings has also been mooted, and of course this would very likely open up the question of raising the subscription. The latter is a point that the Association can best judge of for itself. We may point out that there is the alternative of publishing a selection only of the papers read, those that are the most practical and likely to be most permanently valuable. In some of the papers read we have noticed a great deal of discursive writing, not always in the best literary form, which would certainly not be worth printing in a permanent form. Of course there are other societies of which the same may be said.

BY an odd coincidence, just after writing the above remarks, we receive the circular of the Institute of Architects, announcing a proposal to be submitted by Professor Kerr at the next meeting (June 8th) for conducting "the higher operations of the Institute" by means of four standing committees, taking charge respectively of the Departments of "Art," "Science," "Literature," and "Practice." We will not dismiss the idea in a hurry, but it comes in a "questionable shape." Architecture is a combination of Art and Science, and Practice is intimately bound up with both; why split them up?

WITH reference to the case of the Metropolitan Board of Works v. Mowlem & Co., reported in another column, and in which notice

of appeal was given by the Board, it is to be hoped that the decision of the Divisional Court will be pressed for as quickly as possible, as the present state of uncertainty as to the law on the subject has not only caused great loss to some, but has also prevented spaces being used which otherwise might be utilised and made valuable.

IN Rome there is much building going forward in all directions, but principally in the district between the churches of Santa Maria Maggiore and San Giovanni in Laterano. There is a large square which promises well,—the Piazza Vittorio Emanuele,—and the new streets are being made much wider than was the custom in past times. One will be enabled to walk on the pavement without fear of being jammed by a passing carriage. If these streets turn out like the Via Nazionale, the Romans ought to be congratulated, for this is the handsomest street in Rome,—although much good work was destroyed to make it. It contains two recently finished buildings worthy of note, although of widely different character, the American Church, the tower of which is a fine design, and the new Museo di Belle Arti, a handsome Classical elevation. Mr. Street's English Church, in the Via del Labirinto, is progressing, but apparently rather slowly; the walls are nearly completed throughout, but the roof is not commenced. It is curious to see windows and arched English characterside by side with the nave piers, which are square in alternate layers of yellow Siena and red Perugia marbles; and between the larger piers a single column of green marble. The effect will be very rich when finished.

ACCORDING to the *Wochenblatt für Baukunde*, the first portion of the work of restoring the Palace of Diocletian at Spalato has just been completed under the direction of Professor Alois Hauser. The interior, with the exception of some trifling work to be done at a later stage, is now restored. The galleries and the organ-loft which defaced the building have been removed; the pulpit and the two Gothic altar canopies have been restored, and the whole interior has been cleaned,—that is to say, simply washed down. The effect of the whole space, we are told, which now appears much larger and wider than formerly, is such that the beholder cannot sufficiently admire the beauty of proportion and the grandeur of the monumental Roman architecture. Perhaps some "heholders" would have preferred it, dilapidations included, before the trail of the Teuton was over it all.

IT is matter of great regret that chance should have led Correggio to paint his magnificent domes in what is one of the dampest towns in Italy. It is only at Parma that the master is seen in all his greatness, and his work in the domes of the cathedral and in the church of San Giovanni Battista in that place is rapidly perishing. The greater part of the funds of the fathers of the latter church have been confiscated by the Government, so that little can be done to prevent injury. The brick pavement, however, which is reeking with damp, is about to be replaced with marble, in the hope of arresting the decay.

THE magnificent choir-stalls in the Duomo of Perugia, so long the admiration of architects, are being restored, so far as the intarsia work is concerned. Whole panels have been cut out and replaced with new, which, as regards the execution, is about as bad as the Italians know how to make it. There is none of the refinement and delicacy of the old work about it; in fact, the work is about up to the level of the English jobbing carpenter.

EVERYWHERE restoration,—and that generally of the very worst kind,—meets the eye of the traveller in Italy. What the lovely Upper Church of the Monastery of San Francesco of Assisi will be like when it has passed from the restorer's hands,—to judge from what has been already done,—Heaven only knows. There is much to be thankful for in

the fact that the greater part of the old work in the nave is still fairly perfect. Perhaps, however, this is only all the more reason why, from an Italian point of view, it should be restored.

IN reference to the Metropolitan Board of Works Bill, Mr. Bryce moved, on Tuesday last, that "The Board shall, under the powers conferred upon them by this Act, acquire the whole of the piece of land in the parish of All Saints, Poplar, No. 2 on the deposited plans (Greenwich Ferry, plan No. 4), and in the hook of reference, page 68, and shall lay out, or cause to be laid out, as a public-garden or recreation-ground, so much of the said piece of land as shall not be required for the purposes of the ferry between Greenwich Pier and Bark-street, Poplar, and the purposes mentioned in Clause 12 of this Act." The Bill, he said, took powers for the construction of a ferry between Poplar and Greenwich, and the piece of land, which was now a garden, would be only partially required for the uses of the ferry. Sir James Hogg resisted the motion on the very poor ground that it would add to the cost of the ferry by preventing the use of the site for building purposes. The clause was carried, however, by a majority of 136 to 50. It is gratifying to see that the Legislature seems alive now to the importance of open spaces and recreation-grounds in London.

THE managers of the American Exhibition which is to be held next year have secured what they consider "the best" site in London for their enterprise, a site of twenty acres at Earl's Court. The station for the District Railway will be in the Exhibition grounds, and "every railway in Great Britain," so we are assured, "will have facilities for immediate and direct connexion with the Exhibition building." The promoters evidently mean to make a big success. From the Report of the Director-General, Mr. Whitley, we learn that already more space has been applied for than will be available, but the management will continue to receive applications up to September 30th of this year, and then we presume the rule of *decur digniori* will be followed. From a paragraph in the report it appears to be supposed that, as we have had the "Fisheries," the "Healtheries," and the "Inventories," so the American Exhibition will be popularly known as the "Yankeries." We have already predicted that the exhibition is likely to be an exceedingly popular one, and it seems also likely to be a very large concern, and in fact, to apply the words of Artemus Ward, "The American eagle will be screaming all over the length and breadth of this bright and beautiful land."

THAT admirable French "Monthly," the *Revue Générale de l'Architecture*, is exceptionally good this month. Among its illustrations are some fine pieces of bold Renaissance ornament from Le Pautre, and a view and details of the beautiful Classic monument to Michelet, the historian, in the Cimetière de l'Est at Paris, designed by M. Pascal. There is a refinement and a variety of inventive fancy in the best of the contemporary monumental work of this type in France such as we must sadly confess we rarely see in England.

THE Duke of Bedford, we are informed, has made a donation of 50l. to the funds of the Society for the Protection of Ancient Buildings. This is an admirable stroke of policy on his Grace's part. There have been for a long time past more or less indignant outcries against the state of Covent Garden and against the market building itself, as an anachronism which calls for rebuilding. Against such demands on his purse the Duke of Bedford has now secured the valuable support of a Society which will allow nothing that exists, however bad and worn out, to be removed, and which will support the maintenance of the *status quo* in Covent Garden, not on the mean and sordid ground of economy, but on the highest moral and æsthetic principles.

UNDER the characteristic and grandiloquent signature "A British Matron," some rather ill-educated lady has been allowed to write a very silly letter in the *Times*, inveighing, on "moral" grounds and in no measured terms, against the nude paintings at the Academy and the Grosvenor. The writer would have done well to remember the rebuke once administered to a lady of similar prejudices, who observed to the company who were looking at a picture, that "it was a very indelicate picture," and was met by the comment that "the indelicacy was in the remark." We have ourselves criticised some paintings of the year, not on the ground of serious impropriety (which, in the case of any Academy paintings of this year, must reside in the spectator rather than in the painting), but on the ground of the prosaic incongruity of representing nude figures in no ideal connection, but as if they were subjects from common life. So far some attack on some of the Academy paintings of the year might have been justified. But as the "British Matron" (we like that phrase!) includes the Grosvenor Gallery in her censure, it is to be presumed that she numbers Mr. Watts's "Love and Life" and Mr. Mitchell's "Hypatia" among the things which "a modest woman cannot look on without a burning sense of shame." If so, there is only one conclusion possible;—the "British Matron" whoever she may be, is a vulgar-minded idiot. It is little to the credit of the taste or judgment of the *Times* to have published such a letter, and we are glad to observe that "An English Girl" made, in the succeeding issue of that journal, an indignant protest against it.

ARCHITECTURE AT THE ROYAL ACADEMY.*

THERE is no drawing in the architectural room which can for a moment compare for beauty of draughtsmanship with Mr. Waterhouse's design for the National Liberal Club (1,908). His power of composition, and feeling for harmonies of warm colour,—the swift dexterity and abandon of his fearless brush were never seen to greater advantage. In these respects he is admittedly without a rival. The design in question has been so recently illustrated in these pages that a minute description of its features is unnecessary. Its style could not be described in a word. The pervading feeling is that of a free Classical Renaissance, but the quasi-machioliolations of the cornice, the Romanesque arches of the tower, the Venetian character of the traceried arceding of the Belvedere and several minor points of detail, remove the work from any known style. We are far from saying that this is a fault. On the contrary, we are strongly of opinion that a puritanical adherence to one particular style, and even to a particular phase of a particular style, has done much in the past to rob our modern work of that picturesque quality which is so much admired in the ancient. We have too scrupulously avoided those incongruities which are a legitimate source of effect, and our work has been uninteresting in proportion to its self-imposed and straight-laced propriety. But while yielding the fullest admiration to the cleverness which this design everywhere displays, we cannot refrain from expressing our disappointment with it as a work of art. The object of the building is distinct and unique. It is to be the home and head-quarters of one of the great parties in the State. Not exclusively for the aristocracy thereof; but for the great multitude of educated men throughout the country who hold and profess in political matters the Liberal creed. It should therefore have a distinctive and appropriate character—and such a character it would not have been difficult to impress upon it. Fine architecture is not a mere matter of window and wall-space—of string and cornice,—of plaster and archivol. "Every building erected for public assemblage was considered incomplete by Greek and Goth unless it were adorned with sculpture or painting designed in accordance with the purpose of the building." Mr. Waterhouse has given us a building which will indeed be a jewel in comparison with the depressing mediocrity of its neighbours, but has risen to the full conception of the task committed to

* See pp. 617, 620, 684, ante.

him? Has he, in fact, given us a building eloquent of its *raison d'être*? Our Tory friends,—and we are thankful to say we have many such,—will perhaps reply in the affirmative. They will say that the Liberal party is a heterogeneous jumble of discordant elements, and that in scattering varied and inconsequent details over his work Mr. Waterhouse has exactly hit off the idiosyncrasies of his clients. In this side of the question we do not intend to enter.

"Politics we bar,
They are not our bent."

Personal feeling apart, it was the bonnden duty of the architect to put his clients' case as strongly as possible, bringing prominently and permanently before the public those momentous achievements which for good or ill have marked the progress of the Liberal party, and on the strength of which they claim the affruges of the nation. Portrait-sculptures of such statesmen as Peel and Palmerston, Cobden and Lewis, Mill and Fawcett, not to mention the names of those still happily living, might reasonably have adorned its walls; and surely there are dramatic incidents connected with the repeal of the Corn Laws, the passage of the First Reform Bill, and the more freshly-remembered Education Act, which would have provided our sculptors with themes worthy of their skill, and fit for record in the plastic and enduring *terra-cotta*. For all this we look in vain. The detail which gave voice and vitality to the natural History Museum is unhappily dormant. An exercise would have given us a companion structure having equal claims to our regard and our gratitude; instead of this we are put off with a merely facile combination of dumb lines and dead surfaces.

The architect had a great opportunity,—

"It might have happen'd but once
And he miss'd it,—lost it for ever."

We think that we have some reason to complain Mr. Waterhouse's treatment of himself, and only deplore the inexplicable and disappointing result.

No sound judgment can be formed of Mr. Waterhouse's design for the rival Constitutional Club upon his drawing of an inconsiderable fragment of the entrance-front (1,835); but, so far as can be ascertained, he also has taken an inadequate view of a great occasion. "To the mind of Pheidias to that of Pisani or Giotto it seemed desirable to have a good building first, of fine material and such masses and proportions as the spirit of wisdom within them ordered; and then to ornament it inside and outside with such historic or symbolic forms as should make the building speak for itself about its intention, and dwellers in it, and the work to be done in it, and how it came into existence."

We have unfortunately changed all that, and modern architecture is for the most part severely inartistic.

Mr. Snlman's design for the New Exchange in Amsterdam (1878) is a brilliant drawing, and too high for a critical examination of its details. The general balance of the composition is effective and pleasing. The building is of brick, with scanty dressings of freestone,—the roofs covered with brown tiles. The gables of wide span and high pitch, and are consequently conspicuously lofty, and being taken into curves and corbie steps, are picturesque in a way which is entirely accordant with the genius of the *locus in quo*. There are no more than four lofty towers visible in the drawing, effective and well designed, and agreeably varying the ensemble. We should have expected to see the *motif* of the whole,—the Exchange itself,—exteriorly expressed, and this is the only real objection to a very striking design.

We have, on previous occasions, spoken at length of the design for the proposed Admiralty War Office buildings (1,923-1,931), by Messrs. Aston Webb & Ingress Bell, and have no testimony to its many fine qualities. We will only add that it improves on further acquaintance. It is unfortunate that the revised design by Messrs. Leeming has not found a champion upon the walls of the Academy, and if it were, as reported, that its absence is due to tardy delivery of the drawings, we can only say that a rule, which is reasonable enough in general application, had been stretched a little in this particular instance.

'Detail of portion of a Public Building' (1,750) strikes one at first sight as the work of a French architect; but upon examination it

turns out to be by Mr. Phené Spiers, who has adopted the French system of drawing and shading which he has so often advocated by public speech. It has, no doubt, some technical advantages; but it is not without some artistic drawbacks. We are glad to see one drawing of the kind in the room, and should be sorry to see many; partly because we do not want to be Frenchified even to our advantage, and the advantage in this instance is at least doubtful. Those who would prefer it to Mr. Flockton's free and flowing lines (1,742), or Mr. George's piquancy (1,765), or Mr. Johnson's clearness and breadth of treatment (1,751), will, we suspect, be in a minority.

Sir Andrew Clarke's "Design for a Military Hospital" (1,957-1,958) was illustrated by us last week, and its leading characteristics have been fully dwelt upon. If built as proposed it will undoubtedly be one of the finest establishments of the sort in Europe,—local circumstances being, it is stated, favourable to the adoption of a more than customary elaborate architectural character, and a singularly fine site affording an unusual opportunity for its effective display.

Mr. E. S. Prior's "Martyn Hall, Cambridge" (1,793), is a vigorous drawing of a masculine design, in a sort of late Gothic between our insular Perpendicular and French Flamboyant. The circular staircase is a prominent feature; and it is a matter for regret that the need for lighting the great hall has apparently prevented this being carried up as a tower. We have only space to refer briefly to Mr. T. G. Jackson's several works, amongst which his Brighton College Chapel Hall and Gateway (1,831-1,838) may be particularised. There is a happy union of breadth and brilliancy about this architect's work which is always attractive, and his peculiar method of pen drawing in imitation of a now obsolete style of engraving is admirably suited to the qualities of his architecture. His later works show a chastened style, and are without defects of detail which detracted from some of his first efforts.

"An two men ride of a horse one must ride behind," and by the same rule we cannot all be hung "on the line." Mr. Conder's drawing "A Temple at Tokio" (1,849) is too high up for careful scrutiny, but its characteristic outline and brilliant colouring can be appreciated, and will no doubt be enjoyed by a public which is just now enamoured of everything Japanese.

NOTES AT THE PARIS SALON.
PAINTING.

THERE are no imposing or epoch-making works in the Salon of 1885; but it shows serious efforts and illustrates the new path on which modern French art has entered. Mythology is abandoned to a few painters of Classic prejudices, and artists attach themselves more and more to scenes of real life and its surroundings. These tendencies, to which Bastien-Lepage gave such an impulse, have for one result the substitution of realistic colouring for that of convention. In attaching himself to Nature, and interpreting her as she appears to the eye, the artist is under the necessity of modifying his palette, with marked results on the general effect of the collection. One may notice also the almost entire absence of the battle-pieces, for many years so numerous, while, on the other hand, there are some important works in the branch of the art which is more properly called

Historical Painting.—Thus, in the grand entrance, the eye is immediately caught by the immense triptych in which M. Bérond has endeavoured to recall the splendour of the great era of Venice, when Henri III. was received by the Doge with sumptuous hospitality. This composition, full of movement, but disagreeable in colour, shows, however, a strong feeling for decorative design. "La Fille de Jephthé" serves M. Cahanel as a pretext for an exhibition of Oriental costume, giving his composition more the aspect of a modern harlem than of a Biblical scene full of the sentiment of sorrow; but on the whole it is treated with great ability, which is more than can be said of the "Comédie, Mère des Gracques," of M. Boulanger.

Drawing is certainly not the special merit of M. Falguière's picture, entitled "Acis et Galatée." It is extraordinary that a sculptor, going out of his way to paint, should appear as if predetermined to paint coarsely, and scarcely to draw at all. At all events, M. Mercie,

another sculptor-painter, who represents "Michel-Ange dessinant un Cadavre," seems able to combine correct drawing with powerful colour.

Here are the eternal early Gallic scenes of M. de Luminais, whose "Prisonnières évadées" is infinitely better than his "Mort de Châléric." This year Gallicisms seem to be rather the fashion, too; but we will merely mention the enormous canvases of MM. Lehoux and Maillard, with MM. Maignan, Rochegrosse, and Clairin who are in the full Middle-age period. A chamber in disorder, a corpse whose tone is scarcely distinguishable from the draperies of the bed; that is how M. Maignan represents "Le Mort du Guillaume le Conquérant," a composition solidly painted, though hard in style. Cold as it is, however, we are tempted to prefer this picture to the melodramatic carnage of M. Rochegrosse and the false Orientalism of M. Clairin. The former has made scenes of blood his speciality for some years past. After exalting the massacres of ancient history, he serves us up to-day the atrocities of *le Jacquerie*. A chateau sacked by the mob, a group of women and children being slaughtered, is the sensational scene by which M. Rochegrosse endeavours to excite an emotion which is not forthcoming. It is a very old-fashioned art for so young a man. M. Clairin, who seems to wish to revive the glowing colouring of Henri Regnault, gives the title "Les Maures en Espagne" to the largest picture in the Salon. The stage figures in parti-coloured garments, with glistening ornaments, the women naked amid the bleeding bodies of the vanquished, all leave us unmoved, though there is a wealth of talent exhausted on them; in fact, this crowd grouped round the Moorish king, in the gay palace of Granada, suggests too much a *mise-en-scène* at the Eden Theatre.

Modern history is badly represented this year. The "Marie Antoinette," whom M. Flameng shows conducted to execution, looks with haughty contempt on the howling crowd. The figure is destitute of either likeness or sentiment, and certainly does not express the Christian resignation of the Royal martyr.

Religious Paintings.—Leaving Greek mythology alone for this year, M. Bouguereau shows us, under the same guise, two religious paintings. His "Adoration du Christ par les Bergers" and "Par les Mages" exhibit the same learning, the same absolute correctness, the same cold and expressionless colouring. He is at once powerful and commonplace, marvellous in *technique*, repellent in sentiment. "Le Martyre de St. Denis" of M. Bonnat is intended for the Pantheon. This vigorous composition is not characterised by any religious feeling, but one cannot see without astonishment the decapitated saint running after his head, to the surprise of his executioners. On the other hand, M. Olivier Merson has put genuine feeling into his small picture entitled "L'Arrivée à Bethléem"; all the poetry of the Bible narrative shines through this exquisite picture.

"Laissez venir Moi les petits Enfants," by a German painter, M. Uhde, shows original talent. In the kitchen of a farm-house children and peasants are grouped round a personage with a slightly monastic aspect. The Christ, in his long blue mantle, with thin and ascetic face, and sad and tender expression, recalls nothing of the legendary type of church art. There is a charming sentiment in the baby who stretches his little hand to the Saviour in the beautiful confidence of infancy; it is a strange and very individual work.

Allegorical Paintings.—Much attention is attracted by the "Solum Patria" of M. Fritel, and one looks with astonishment at this equestrian *danse Macabre* of gigantic cavaliers on the soil which they are prepared to defend against the invader. There is something to make a great chapter of here, and Delacroix would have produced a *chef d'œuvre* out of it. With M. Bandonin, allegory comes down from the clouds and shows itself under the form of our own day. He has no need, like his neighbour M. Chartran, of traditional shepherds and shepherdesses to illustrate "Les Financières." A workman, a pretty girl in a peasant's dress, a corner of a modern village, suffice for this decorative idyll, commissioned for the city of Paris. Here is a work which M. Humbert has executed for the Mairie of the Fifteenth Arrondissement. The day is ended, and the women sit at the waterside waiting for a boat which brings home the labourers. The scene is in open

air, the landscape calm and poetic. In the distance the outlines of a wooded coast are profiled against the sky; the oxen are returning from the plough. All these details are united in an ensemble of clear and pleasant colouring. We find the same qualities in "Le Veillé," by M. Pierre Lagarde, ordered for the same building. It is also for a Mairie in Paris that M. Emile Lévy has painted a picture of a young mother nursing her infant, other children playing on the grass at her feet. This picture, entitled "L'Enfance," is charming in style, colour, and expression, but it is a piece of purely neo-Greek archaism; and for a Mairie in which the principal facts of civil life are registered, we cannot but prefer subjects of real and actual life, without compromise with Classic recollections.

Belonging to another order of ideas, the decorative fragment which M. Besnard entitles "Paris" is very remarkable. In the midst of flag-bedecked vessels which float on the Seine is a raft, covered with flowers, on which stands upright a young woman, symbolising "the Republic," who carries in her arms two sleeping children. Behind extends the panorama of the quays, full of life, and glittering with lights, illuminating the perspective of the bridges, the Ile St. Louis, and the monuments. There, to our thinking, is a genuine piece of monumental decoration.

"L'Automne," by M. Pavis de Chavannes, is a variation on the picture at the Musée du Lyon. There is much charm in this graceful, though rather colourless, composition; but, unlike many other paintings, the works of M. de Chavannes certainly do not gain by being reduced to the dimensions of genre. They must remain of monumental scale, like those at the Pantheon and at Amiens.

Genre Paintings.—This class of painting occupies, as always, an important place at the Salon, except in regard to military subjects, which, as already observed, are at a discount this year. One cannot class among military pictures the works in which M. Flameng and M. H. Cain have dressed up models in the uniforms of ineffectual officers of the First Empire, and affected Hussars of the Revolution. M. De Neuville is very ill,* M. Detaille is not represented, and M. Protais alone holds aloft the standard of "l'armée française." His "Halte de Chasseurs à pied," cleverly composed in a rather colourless scale, has only the fault of being the repetition of a subject forcibly treated already. We prefer the "Soldats Hollandais partant pour les Indes" of M. Israël, who translates an interesting scene with charm and truth.

The "scène mondain," as it may be called, is, on the other hand, abundantly represented. It is regrettable that its painter-in-ordinary, M. Berand, should have quitted this year the "Soirées Parisiennes," in which he excels, to transport us to a "Hospice de Fons," a melancholy and disagreeable scene, in place of the spirit, the originality of type, the glittering effects of light which mark the works of his accustomed style.

The quality of elegance, which we regret the absence of in the works of M. Jean Berand, is what makes the success of the "Hunt Ball" of M. Stewart, where a brilliant effect of light, a gleaming of pearly shoulders set off against the scarlet dresses of the huntsmen, all contribute to the excess of this pretty picture. Elegance and taste equally characterise the works of M. John Lewis Brown, whose very individual talent recalls for us this year two episodes of the chase, entitled "Halls" and "Fauconniers," in warm and luminous colour, a quality absolutely wanting in the "Cavaliers à la Mer" of M. Max Claude, who seem lost in a fog.

The very Parisian taste of M. Heilbuth has taken this year for its object "Lawn Tennis," painted in charming fashion. M. Heilbuth excels in these kind of elegant scenes of "pleasure," which he treats with infinite spirit. There is much humour in M. Gervox's "Jury de Peinture" at the Salon, introducing the portraits of well-known artists, but the interest of the work could have been just as well realised on a much smaller scale. What are we to say of "L'Atelier" of M. Duez? Does he wish to prove to us that in this year of grace 1885, the studio of a painter à la mode is a sort of museum, where the amateur, astounded by the luxury around him, is to be frightened out of

* Since this was written, we regret to see that his illness has terminated in death.—Ed.

any question of reduction of prices? This fastidious care over accessories leaves us uninterested. How much do we prefer the fine profile of the young girl whom M. Lerolle has painted, in church, singing a hymn, "Dans le Tribune des Orgues." The figure is relieved strongly against the white walls of the church, in an attitude the naïveté of which is most attractive.

It is by simplicity, too, that M. Adan produces his effect in the two pretty pictures "L'Anniversaire" and "Le Retour du Travailleur." "La Mauvaise Nouvelle" of M. Beyle, and "L'Enterrement d'un Fermier" of M. Brispot, are scenes of manners closely studied and of delicate sentiment. "Les Loups de Mer" of Madame Démont-Breton is painted from nature with talent, but with rather heavy colouring. The peasant women of M. Pearce and M. Ridgway-Knight have nothing of the country about them but their costumes.

Though the remark may seem unkind, there is, nevertheless, in these scenes of rustic life a certain poetry, which seems to disappear com-

pletely in the realism of the occupations of the town workmen. In painting from nature "Les Tailleurs de Pierre du Chantier de Suresnes," M. Roll has shown a courage which is hardly crowned with success. This immense painting wants life, and offers only a grey tonality such as does not exist in nature. Everything in the scene, figures and materials, is of the colour of stone. To these sad and depressing "ouvriers" M. Lhermitte opposes the loud gaiety of the cabaret. Women and toppers crowd around a table stained with wine; the scene is brutal, but full of life, vigorous, and broadly painted.

As for M. Pelez, his delight is to show us every year misery in all its forms. His "Martyr" is a poor little mendicant dying of hunger and cold. His "Mère à l'Opéra" is sordid. Two *figurantes* are dressing, or rather undressing, to appear on the scene. They are exchanging their ragged things for spangled petticoats and red sashes. Under the paint on their faces is the sadness of submission to fate. It is a melancholy picture, but it is well painted and true in colour.* R. B. FRANKWICK.



A Music of Talim.

THE LION AND THE PALM.

NOTES ON RECURRING FORMS IN HISTORIC ORNAMENT.

ON Mr. E. Burne Jones's picture in the Grosvenor Gallery, King Cophetua's golden throne is patterned with designs in *repoussé* studied from ancient metalwork, known as Phœnician, although found widely distributed; these designs are two birds affronted and a lion tearing a bull.

In Venice on the Byzantine palaces these birds and beasts, symmetrically arranged, framed in panels, and altogether made much of, are frequently found. In the "Stones of Venice" several examples are drawn, and of them Mr. Ruskin says:—"The most remarkable point about them is that the groups of beasts or birds on each side of the small pillars bear the closest possible resemblance to the group of lions over the gate of Mycenæ. . . . the whole ornamentation of that gate is so like Byzantine sculpture that I cannot help sometimes suspecting the original conjecture of the French that it was a work of the Middle Ages to be not altogether indefensible"; and then follows a passage from Ezekiel (xvii. 3-7), suggested to his mind by these sculptures, to which I will couple another from the Prophet's vision of the Temple which he saw in the land of the "Chaldeans by the river Chebar." "And it was made with cherubims and palm trees, so that a palm tree was between a cherub and a cherub" (xli. 18).

In "Ariadne Florentina" also, Mr. Ruskin speaks of an old sampler of our great-great-grandmothers' time ornamented with these mystical birds, which again remind him of the Byzantine ones, and I have before me some printed cotton curtains, Persian work of today, on which, on either side of an immense Noah's ark tree, are peacocks, the whole making a composition exactly the same in intention as the mosaic at Palermo (thirteenth century), or an Assyrian design figured in Perrot and Chipiez: more than this, there are also two representations of a lion tearing a stag, and the "hom," or sacred tree, grows from a mound, like a heap of stones arranged in a pyramid, just like the tree and hill (Mount of Olives) in Middle Age art.

The great ideas expressed in graphic symbols, the struggle of good and evil by the lion and

peay, immortality by the "tree of life," and the peacocks, together with the zodiacal signs and chimæras of all sorts, had their origin in the East in remotest times.

I propose to put these few notes together more especially with reference to:—1. The lion's struggle. 2. The birds of immortality. 3. The tree of the desert.

The great work of Messieurs Perrot and Chipiez on Chaldean art, recently published will afford us examples of all these, but I quote here the descriptions from the catalogue of the British Museum of objects lately arranged in the Kouyunjik Gallery.

4. Cylinder.—"The sacred tree of the Assyrians seems to have been an emblem of the god Assur (chief deity), and the eagle-headed figures his attendants."

7. . . . "a staff, at the top of which is a tasselled disc supposed to be emblematic of the god Assur" (the staff and disc which thus take the place of the sacred tree is the symbol of the Mycæne gates and the Byzantine sculptures).

11. "Two winged figures making offerings to the sacred tree."

13. . . . "between the two animals a tree upon a hill of stones, perhaps another form of the sacred tree."

50. "A lion about to devour an ibex."

53. "Winged figure holding a staff, above two birds, perhaps emblems of the sun."

These small engraved cylinders are of Babylonian, Assyrian, and Phœnician workmanship.

The pattern, known as the "knop and flower," is either the lotus and bud, or the hom and its fruit alternately, and in both forms are the most frequent of Assyrian ornamental designs. From the first the Greeks derived their "egg-and-tongue,"† and from the latter the "honeysuckle and palmette" patterns.

We have just seen the Phœnician engraving seals for the Assyrians; let us now read the Bible account of their work in building and ornamenting the Temple and Solomon's Palace (Chief. 1 Kings v. to vii.).

"And the cedar of the house within was carved with knope and open flowers" (2 Kings iv. 18).

"And King Solomon sent and fetched Hiram

* To be concluded in our next
† We suspect the egg-and-tongue ornament goes a great deal further back than that.—Ed.

out of Tyre . . . and he made two chapters of molten brass . . . of lily work . . . the two pillars and the two bowls of the chapters that were on the top of the two pillars, and the two networks to cover the two bowls of the chapters" (1 Kings vii. 13-41).

"And he made a molten sea . . . it stood upon twelve oxen . . . all their hinder parts were inward . . . and he made the ten bases . . . on the borders thereof he graved cherubims, lions, and palm trees" (ver. 23-39).

Mr. Ruskin notices in the "Stones of Venice" the curious resemblance that the Byzantine reticulated and basket-work capitals have to those of the Temple, and suggests that perhaps they were an intentional carrying out of the above description. In the British Museum is an Assyrian pavement of stone carved into a geometrical network pattern in flat relief, with a border of "lily-work," and in the introduction to Owen Jones's "Grammar of Ornament" is figured a capital, said to be Sassanian Persian, and therefore many centuries earlier than the Venice examples; it is "howl"-shaped and is covered with a "network," each reticulation has a form carved in it, which suggests how the "two hundred flowers" were probably arranged in the Temple chapters, nor with all these resemblances would it be out of place in Venice.

The golden laver was, we have seen, carried on twelve bulls (compare lion fountain of the Alhambra), and the great winged Assyrian bulls in the British Museum were the impostors for the arches of the main entrances. On a slab also we have a lion bearing a column, which is seen at once to be like those of Lombardy, and this resemblance is pointed out by Perrot, who has engraved a real model for one of these lion bases to a column which was found.

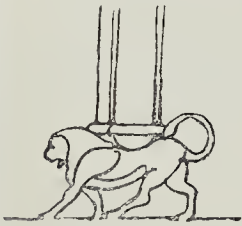


Fig. 1.

Fig. 1 shows us this lion bearing the column;



Fig. 2.

Fig. 2, a column and parapet, afterwards revived by the Persians, and introduced wherever the Saracens had influence, either in Venice, Sicily, or Spain. Fig. 3 is a group of domes. All these are from the slabs, and engraved by Perrot and Chippiez, who say that the Romans probably derived their domes from Assyria (and it is almost certain the barrel-vault is well). Speaking of the resemblance to Byzantine art, they have the following passage:—"Isidore and Anthemius, the architects of Sta. Sophia, were the disciples and perpetuators of the forgotten masters, who raised so many millions of bricks into the air at the bidding of Sargon and Nebuchadnezzar." Phœnicia is the middle point in the Assyrio-Greek way in its set westward. Of the metal work of the Phœnicians,—principally bronze bowls in our museums,—few have no examples of the ideas we are tracing. A slight advance, and we find the earliest of the Greek pottery in

Rhodes, and the work probably of Phœnician colonists; here, too, are the struggling heasts and the knop and flower of lots, plainly, as we

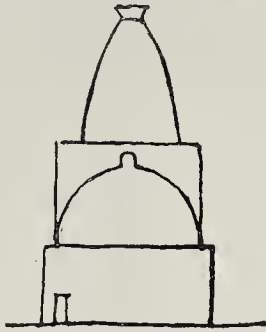


Fig. 3.

see it on some of the vases, the origin of the egg and tongue (figs. 4 and 5).



Assyrian Pavement

Fig. 4.



Early Greek Vase

Fig. 5.

In the early Greek art of Asia Minor, the good and evil struggle is, of all subjects, the most frequent; a slab from Xanthus in the British Museum gives us a magnificent example of the lion and stag, and the Temple of Assos and a tomb at Myra of the lion and bull (see Texier and Pullan), and if we follow carefully the transition, it will be apparent that the tradition is Assyrian, even when the structure becomes modified by availing itself of Greek marble in the place of the burned clay of the plain, and by borrowing some constructive ideas from Egypt. I think it could be shown that the Greeks invented nothing (eliminated, rather, and perfected). Do we look for the prototype of the processional frieze, through Lycia we shall come to Assyria; for that of the great sitting Zeus let us go to Branchidae and Kalab Shergbat.

The earliest Greek coins are closely allied to Assyrian engraved seals; the Phœnicians seem to have worked for both peoples. A coin of Acanthus, of the sixth or seventh century, has the lion tearing the bull; those of Sybaris show that bull striking the ground with its hoof, of which there are so many Assyrian carved ivories; and, indeed, most of the types are of Eastern origin.

In fully-developed Greek art any symbolical import in these ideas had been forgotten, and although the sacred tree has become the almost universal palmette or honeysuckle, it is merely ornamental (see the palmette and gnollche on the Ninevite ivories). That we should find these Eastern ideas in all progressive schools, and lose them in all falling ones, is one great proof of the proposition I am trying to establish.

For one generation this great tide of art washes the rock of the Acropolis, and then its strength spent, it falls during later Greek and Roman times, still continues to fall in Romanesque, and is finally lost, leaving us only the stones which its power has channelled. Henceforth we must be careful to discriminate between this spent impulse and the one that follows.

In the third century of our era the old Persians rose under Artaxerxes, who founded the dynasty of the Sassanides; and here, again, in the land of Iran, are the beginnings of a

new cycle,—the second or Byzanto-Gothic, which culminated in Europe in the thirteenth century: at once our mystical heasts and birds are resumed as national symbols, and an architecture is founded on the old Assyrian dome.

As Phœnicia was our middle term in the first series, Syria was in the second; here the new art, which was the old, was adopted for Christian use. "La Syrie Centrale" of the Count de Vogüé shows us work which might be Venetian Byzantine, of the ninth century, or even Southern French of the eleventh, being done here from the fourth to the seventh. It will be useless my pointing out individual resemblances, the whole being so much to the purpose. The peacocks become Christian symbols of immortality, and decorate important positions, together with the sacred monograms and foliage of the vine, it will be well to notice, however, that this foliage is identical in character with that of the North Italian schools of the thirteenth century; and is, at the same time, the Assyrian relief. Those exquisitely-sketched vines and flowers of an Eastern "Paradise" which we find on the slabs, have no following, so far as I know, in Greek art.

It should be remembered that the emperors lived much in Asia at this time, and here at Nicaea was held the first great Council. Which ever may be the first Byzantine buildings on our side of the Hellespont, those of Constantinople or of Thessalonica, there can be no doubt of their Eastern origin, although, of course, they take to themselves much from the Old Greek. Persian gold is added to the Roman mosaic, and the Sassanian dome spheres over the centre of a Latin basilica. Sta. Sophia was commenced in 531, and but little later Eastern artists were at Ravenna, where we shall find our peacocks and palms on the golden field of the mosaics.

When in the seventh century the Saracens conquered the Persians, the latter became their artists, as the Greeks had for the Romans (the Arabs not being nor becoming architects); it was through the conquests and commercial relations of the Saracens, however, that this Eastern art acted on the West, and it is interesting to compare the buildings of Cairo and Damascus with those of Italy. In these cities we shall find the alternate courses of different marbles (Aladdin's Palace was of courses of gold and silver), and the embossed paravets, of many forms, derived from those shown us on the Assyrian and Lycian slabs.

The Persians, too, had revived the tresses for which Babylonia was so famed; and on these in all ages, from the veil of the Temple to the latest hanging by Morris, will be found the horn and the birds. Haroun Alraschid made a present of some of these textiles to Charlemagne, and in a few centuries, from the marts of Venice, Palermo, and Limoges, they were distributed all over Europe, and are the origin of all those luxurious brocades of the Renaissance painted by Veronese or Bronzino.*

W. R. LETHBRIDGE.

THE "INVENTIONS" EXHIBITION. FURNITURE AND ACCESSORIES.

A GREAT invention apparently would be to define an invention; for, although we are told that there is nothing new under the sun, there are necessarily many ideas which must be new to each generation, or, what is perhaps more to the point, the combination and application of these ideas to the working requirements of the time, invest them with a novelty which is sufficient to warrant the title of an invention. We must, therefore, expect to find in all branches a number of old friends with new or but slightly altered faces, and in Group XXII., comprising "Furniture and Accessories" (South Central Gallery), there is no exception to this rule. The smallness of the spaces allotted has, no doubt, prevented many would-be exhibitors from making an effort to be represented, as it would be impossible in such limited areas to obtain a satisfactory result. Owing to this the exhibits are numerically small also, and the indecision noticeable last year, as to which class or heading the various goods should come, again prevails; thus we find ironades and alloys in Group II.; household fixtures, Group III.;

* To be continued.

carpets and rugs, Group IX.; china and glass, Group XXIII.; and paperhangings in Group XXVI., and fancy goods classed also under this comprehensive arrangement. Furthermore, these subdivisions are often far apart in the building, and as some of the exhibitors are not yet ready, it becomes rather difficult to do otherwise than to follow a somewhat erratic course, and take them as they come.

The first on the list is Group XXII. (1,698), Messrs. A. Sanderson & Sons, 52, Berners-street, W., show the "Lionsdale Wall Decoration" and the Patent Ingrain Paper, which, although "washable, hygienic, and waterproof," looks much the same as any paper not credited with these characteristics. Some simple, yet fairly effective, wood panelling and lining (1,699), by Messrs. J. F. & G. Harris, 58, Wilson-street, Finsbury, may be noted, there being a wide range of colour obtained by the contrast of the various woods of a work-a-day useful kind, such as pine, mahogany, walnut, and others, with "not too much, but just enough" workmanship to make the most of the material. Messrs. C. Pratt & Sons, of Bradford, have some furniture and upholstery in a particularly small houndoir (1,703), in which sense of scale is lost, owing to the enforced crowding; the work is of unequal merit, the delicate plaster panelling to walls and ceiling being among the best. Messrs. W. Wallace & Co. send a combination bed-room suite (1,704), of simple design; some of the coloured inlay, however, would be better for a little more freedom of line. Old friends are recognised in Messrs. Cameron, Amberg, & Co.'s elaborate system of letter filing, the number of the stall being 1,706. There is a novelty (1,708) by Messrs. T. Wilkinson & Sons, of Birmingham, viz., their patent Pelican ware, or untarnishable electro-plate, decorated in colours, which is perhaps more curious than beautiful. Mr. James Allen, of Leeds (1,710), exhibits a chair of improved construction, for hotels, clubs, and general purposes, with immovable joints and without braces, or, in other words, larger than usual mortise and tenon joints are used instead. Now that so much attention is being called to the hardship imposed upon shop assistants, both male and female, by reason of the long hours and the prevailing prejudice against their sitting down during the day, it may be well to notice the pivot seats (1,712), by Mr. E. B. Fitton, of Great Malvern; these are specially designed for use behind shop-counters; here, however, an unfortunate selection has been made to illustrate a good idea, as some very poorly-constructed and finished examples have anything but an inviting look. We would suggest to one of the Early Closing Associations that their efforts could be well utilised in this direction by bringing the boon of a few minutes' occasional rest, so simple yet so great, before the notice of a vast number of people, and upon an occasion like this there would be an unusual opportunity of furthering their views. 1,713, by Arthur Foley, Fisherton Steam Cabinet Works, Salisbury, is a patent economic combination of chimney-piece and coal receptacle, and patent combined fender and coal vases to fit any size hearth; a placard calls attention to the fact that the limited space prevents due justice being done to the arrangement, and as the "arrangement" is in two tiers, it leaves the observer in doubt as to where the fireplace should be, and a few *repoussé* brass fittings do not tend to make the design any more clear; the workmanship, however, is satisfactory, though simple, and the desired explanation would probably be the same. Messrs. Gainsford & Co. show an improved writing-table (1,717), economical and useful, the lock to the centre drawer also fastening the locks in the pedestals. Above this hang two black-and-white drawings of interior decoration, both good in their way, and the same may be said of a similar subject in colour, such as we are accustomed to see elsewhere, for we believe this firm have only comparatively recently considered the subject of decoration. In 1,719, Messrs. W. B. Simpson & Sons, we find some very choice specimens of Anglo-Limoges enamels, with patented system of sectional jointing, as in stained-glass. The hearty and delicacy of these imperishable works in Mediaeval times are matters of renown, but now, by means of the system of jointing referred to, the composition of a subject can be carried to any scale without losing its characteristics, although the single "plaques" seem to attract greater artistic interest. The allegorical and poetical subjects are carefully chosen, and show able drawing

and manipulative finish, great care having been taken also to mount and surround the numerous works in such a way as to display them to advantage. Altogether it may be said that this exhibit is the most artistic and graceful we have seen for some time past, its value being emphasised by the particularly inartistic inventions frequently seen elsewhere. The next worthy of note is 1,722, by Messrs. Hampton, who send a small but good corner cabinet of oak, combined library steps and easels, on which are displayed two studies of interior decoration; a rich tapestry curtain helps to set off a useful and pleasant example of sound work. Patent wood mosaic is shown by (1,726) Messrs. William and Frank Brown & Co., Eastgate-row, Chester; this is formed of small blocks of different coloured woods end-grain upwards; the disadvantage of this is that it scratches very readily and would require constant oiling or polishing where a decorative effect is required, and this effect is its *raison d'être*. No. 1,727 is a new method of inlaying wood, particularly crude and raw, line and colour being as unsatisfactory as may be; the exhibit generally being unworthy of even the small space occupied. The New Patents Development Association (Limited), 49, Gleggall-road, Old Kent-road, have a creditable show of an unusual kind; a description of many lines in the catalogue may be summarised as "wood carving by machinery." There is some bold work, which, although missing the sharpness and "go" of manual labour, reminds us of much that may be seen in many an old church or hall after it has passed through the hands of even the most careful of restorers,—that is to say, after it has been pickled to remove the disfiguring paint; some portions look like leather, but if used at a distance from the eye the effect might be fairly good. Some specimens of painters' brushes and brushes for technical and manufacturing purposes are arrayed by Mr. Edward Ormerod, of West Drayton, Uxbridge (1,731), Messrs. Hinde Brothers (1,732), Horsey's Brush Manufacturing Co. (Limited), and Mr. John Masters. After passing a miscellaneous collection of travelling trunks and varied wicker work, we come to an ordinary collection of floor-cloth and linoleum (1,747) by Messrs. Hendry, Whyte, & Strachan, of Kirkcaldy; next to this is the (1,748) well-known "Lincrusta-Walton," shown by the Lincrusta and General Decorating Co. (Limited). Attention is here claimed for two novelties,—a patent combination mantel-piece with a sliding hinged grate screen, and new designs in their Lincrusta, i.e., the parts are specially bold and large, suitable for a great expanse of wall surface. The example given is a chocolate and dead-green dado, with a wall surface above of blue with a gold or rather bronze stamping of a large type, and suggesting a Persian pattern. The chimney-piece is of fumigated oak, with horizontal and vertical panels in high relief, the relief being the greatest yet obtained in this material. The screen to the grate is hinged so as to fold back, and then slides behind the jamb. When in use, this screen (which consists of four bevelled mirrors in framing) serves to hide the grate, which may thus always contain a ready-laid fire, no small advantage in a variable climate. Messrs. Story Brothers & Co., of Lancaster (1,749) show a new fabric in lieu of paper for the decoration of walls: this is of the nature of a printed cotton, and could apparently be fixed like an ordinary wall-paper, and be washable.

The Royal Pavilion has again been furnished by Messrs. Gillow, which is a guarantee of its fitness. The vestibule in the Arab style maintains the usual strongly-marked features, a Louis XIV. drawing-room contains among other luxuries some panels and chair-coverings of tapestry from the Royal Windsor works, and some inlaid cabinets and tables which have never been surpassed. The "Adam" dining-room looks thin in treatment occasionally; more might have been done with the ceiling, a feature which the "Adelphi Brothers" were seldom un-mindful of.

This concludes one section, which is by no means well represented, and bears no comparison either in quantity or quality to that of a like class in last year's Exhibition, the reason we have given, viz., the space allotted, probably accounts for the absence of many well-known names which we might reasonably expect to see; or possibly it may have been supposed that furniture did not present many points of contact with the professed object of the Exhibition.

Illustrations.

SCULPTURE AT THE ROYAL ACADEMY

WE give this week illustrations of the two monumental statues which form pendants to each other, as may be said, at the east end of the lecture-room at the Royal Academy: the late Lord F. Cavendish, by Mr. Woolner, R.A., and the late Dean Close, by Mr. Armistead, R.A. Both, as will be observed, are based on the same simple and suitable idea, the sculptured representation of the subject of the statue, lying as in his last rest, covered with full drapery which shrouds while slightly indicating the figure beneath.

It is right to mention that Mr. Woolner is of opinion that the expression and feeling of his work are seriously altered and impaired, in its present position in the Academy rooms, by being placed in too full a light, for which it was not designed. Only those who have compared the effect of the same sculpture under different conditions of light can fully appreciate the importance of such a complaint.

CHURCH OF ST. JOHN THE BAPTIST, KENSINGTON.

WE give a view of the interior of this church, from a drawing kindly furnished to us by the architect, Mr. James Brooks. The church is now in course of erection in Holland-road. Like all Mr. Brooks's churches, it is characterised by great solidity and massiveness of treatment, ornament being very sparingly used. In this example, it will be observed that in the purely architectural portion of the work—apart from furniture and accessories—the only carved ornament is the dog-tooth enrichment which is used to accentuate the capitals and the vaulting ribs. It is not implied that well-designed and executed carving, even profusely introduced (if in the right place), is hurtful to architectural effect and dignity, but that architectural mass and weight are the primary elements of dignified effect, without which no decorative accessories will give dignity and high architectural character to a building, and with which ornament is only a secondary consideration. The example of avoiding littleness of detail and seeking monumental expression in the first instance, which Mr. Brooks has consistently set in a number of churches built from his designs, has, we believe, exercised a considerable effect on public taste, outside of the architectural profession.

Whether the form of mediæval church here shown is the best adapted to the feeling and to the practical requirements of modern worship, is another and much larger question, in which others besides architects are concerned, and which we do not go into here.

DRAWINGS OF WENLOCK PRIORY.

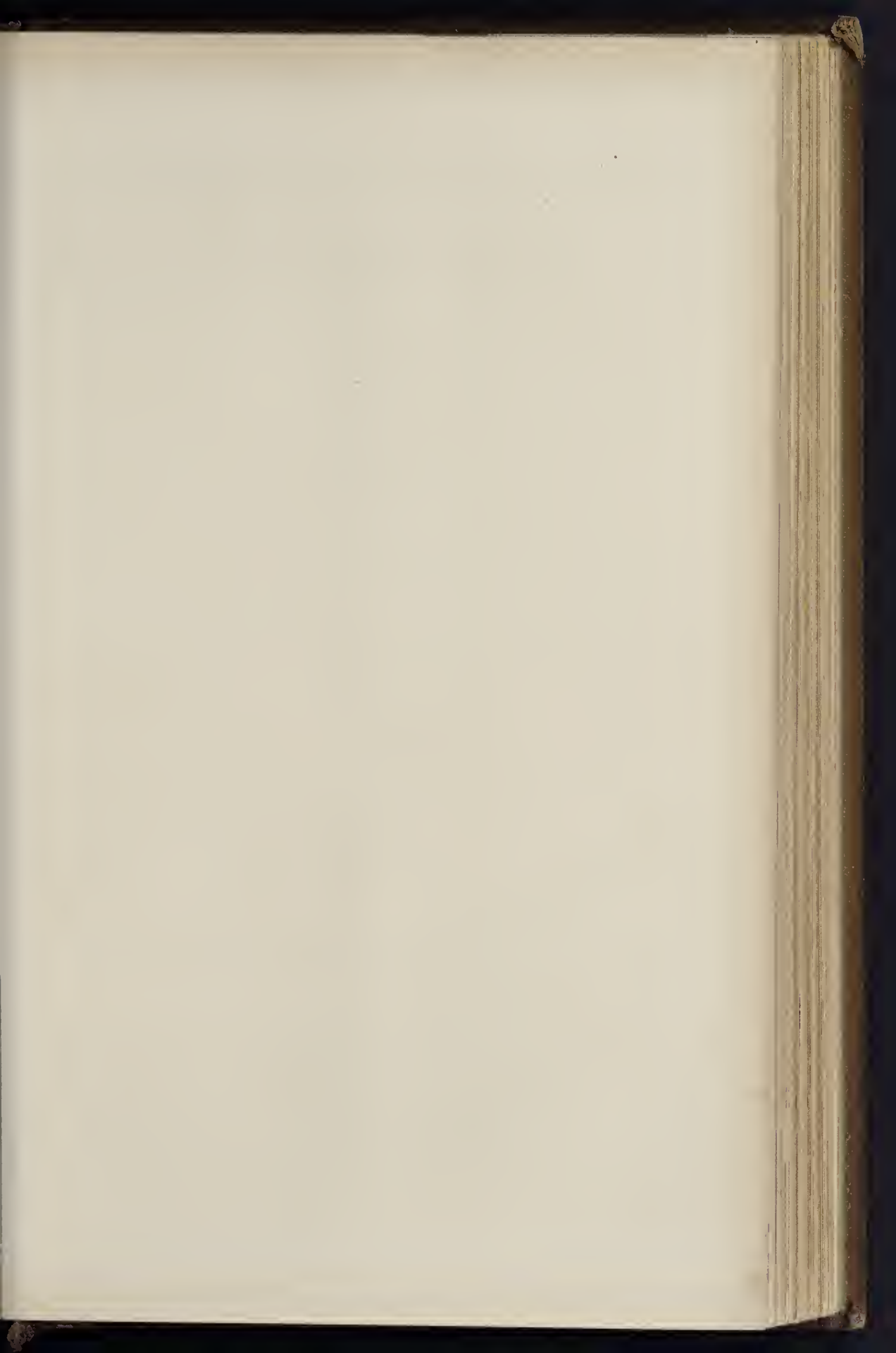
THREE drawings were submitted in competition for the Institute Silver Medal for measured drawings, and gained their author, Mr. T. J. Worthington, a Certificate of Honour. Mr. Worthington sends the following historical notes to accompany the drawings:—

"The beautiful ruins which are situated at Much Wenlock, in the County of Shropshire, are commonly known by the name of 'Wenlock Abbey.' This is a misnomer. It should be 'Wenlock Priory.' Wenlock, together with about thirty other religious houses, belonged to a class of priories owing allegiance to the great Burgundian Abbey of Cluny (now itself a complete ruin), situated about 50 miles north of Lyons. The order of Cluny, founded at the beginning of the tenth century, was originally Benedictine. Though thus in rank but a priory, and subject to a rigid and extortionate control, Wenlock was the oldest and most privileged, perhaps the wealthiest, of the religious houses of Shropshire.

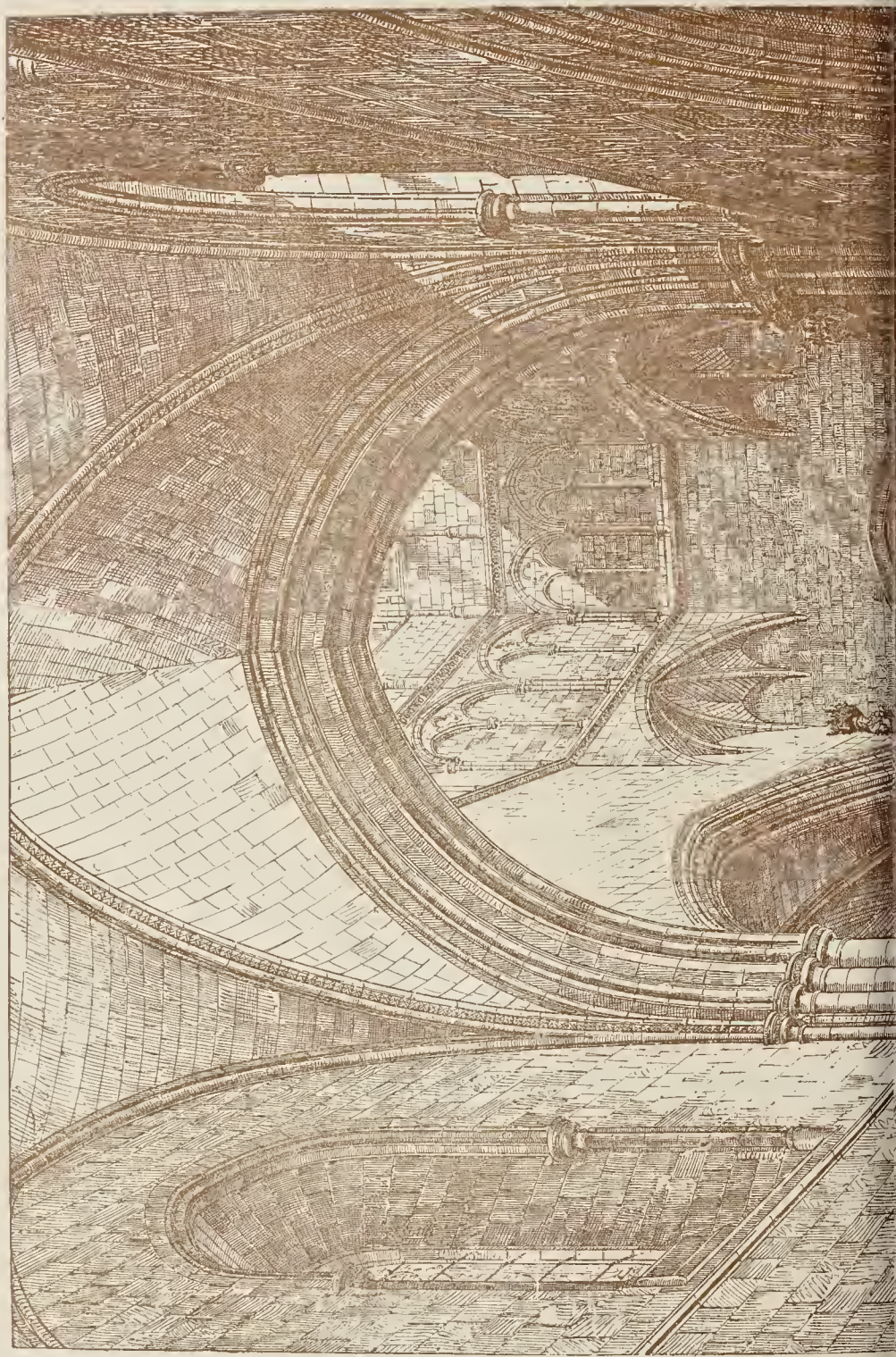
First Foundation.—The first foundation was by St. Milburga, granddaughter of Penda, King of Mercia, at the end of the seventh century, circa 680 A.D. This building was, however, destroyed about 874 by the Danes, who were then conquering Mercia.

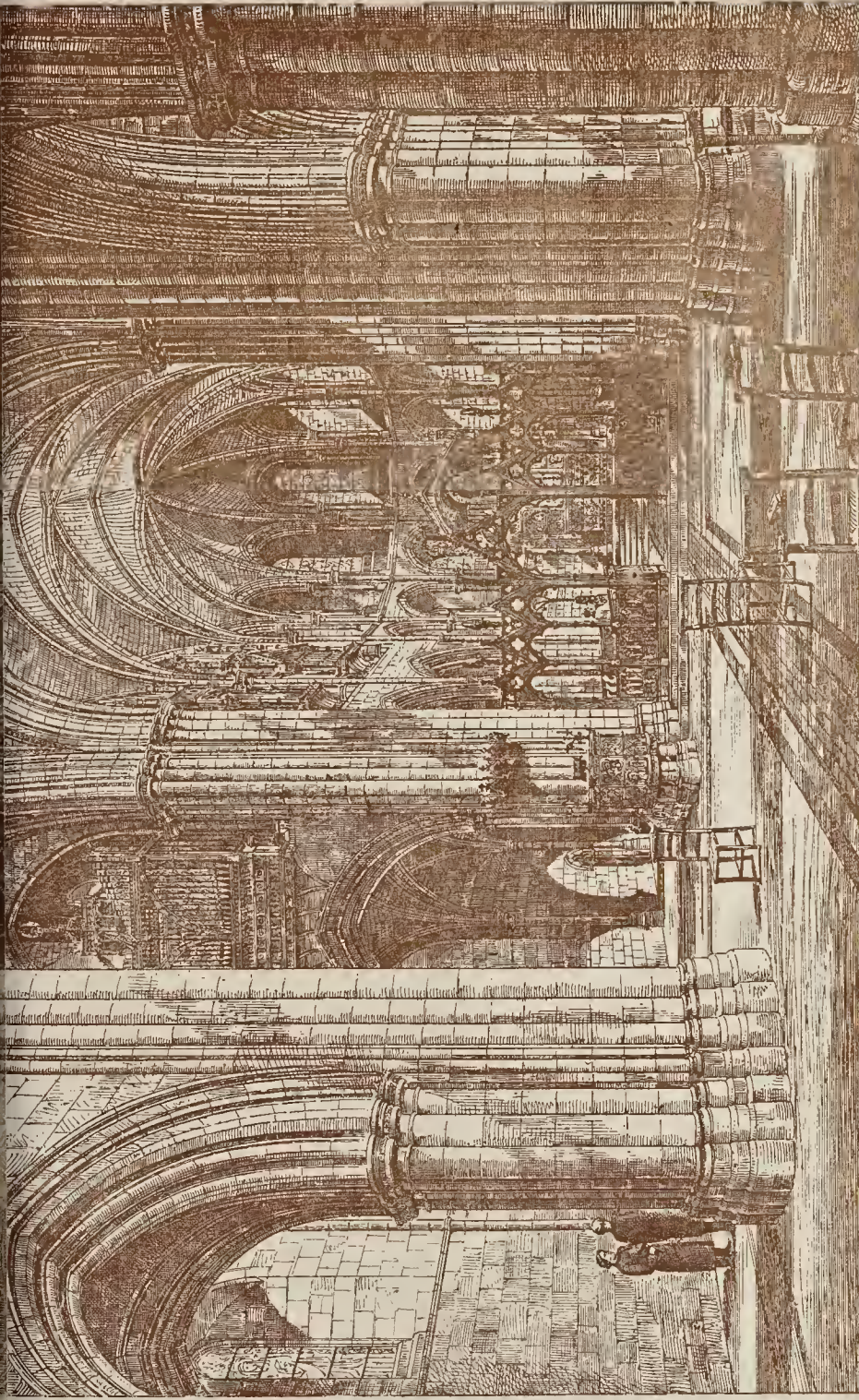
Second Foundation.—The second foundation was by Leofric, Earl of Mercia, who revived memories of the life and death of St. Milburga. His work was accomplished between 1017 and 1035, in the reign of Canute, as recorded in the Domesday Book.

Third Foundation.—The third foundation was



THE BUILDER, MAY 23, 1888.





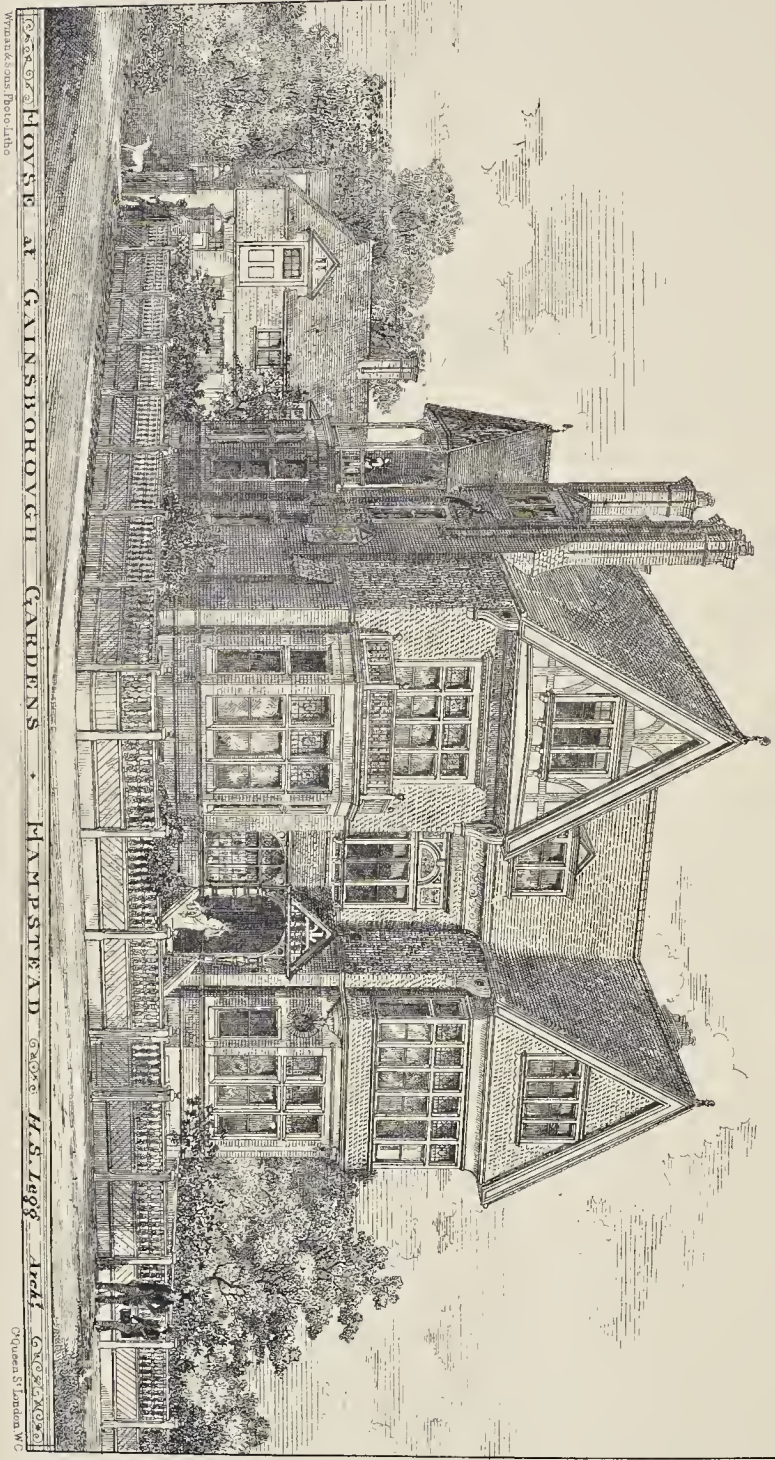
Church of S. John, ye Baptist, Kensington, East London, W.C. James Brooks, Architect.

WYNNE & SIMES, PHOTOGRAPHERS

Queen's St., London, W.C.

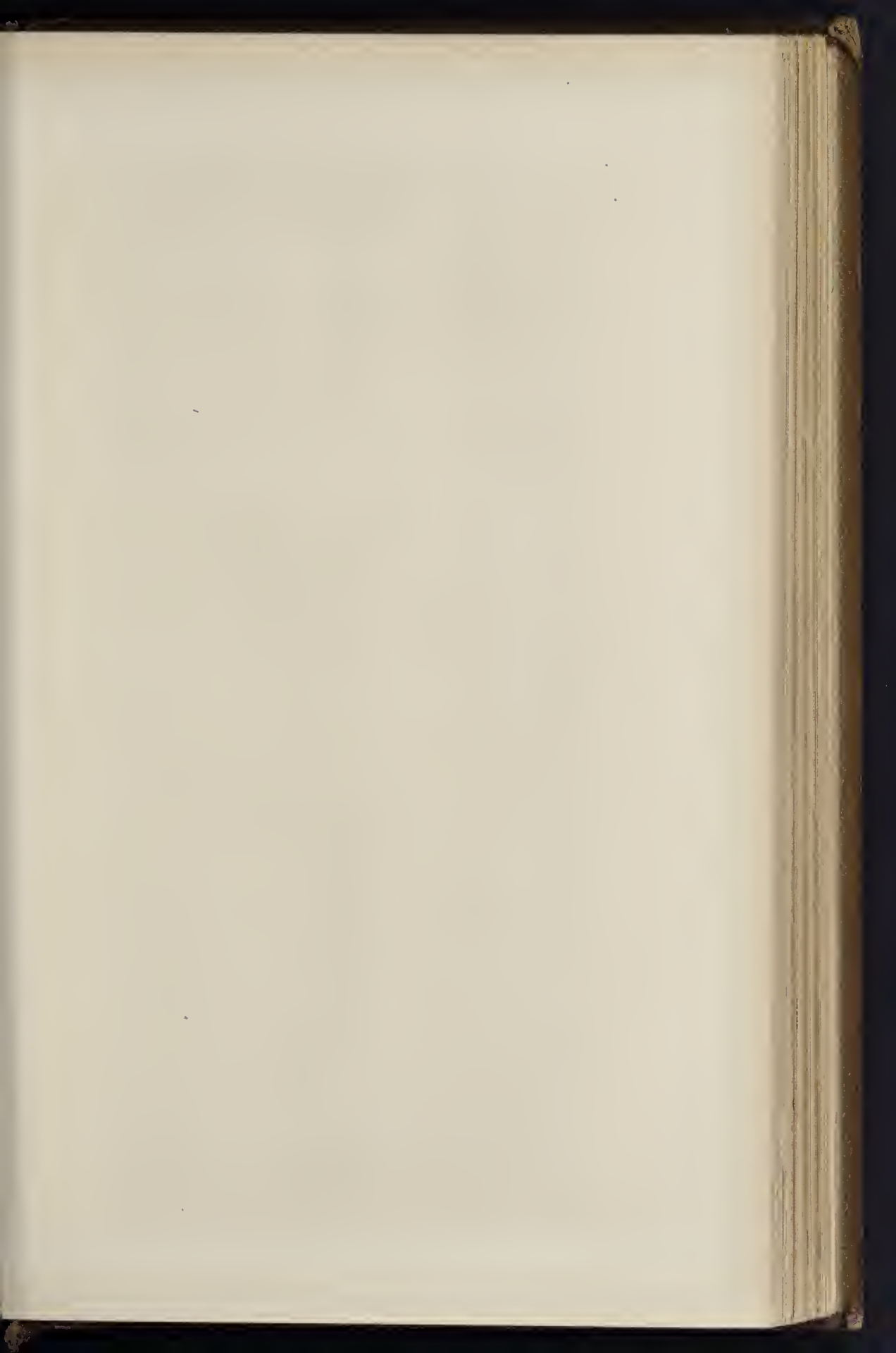






Plan of the HOUSE at GAINSBOROUGH GARDENS, HAMPSHIRE. Des. H. S. Legg. Arch. G. G. & G. G. Queen St. London W. C.







INK PHOTO. SPRAGUE & CO., LONDON

SCULPTURE AT THE ROYAL ACADEMY.

MEMORIAL FIGURE OF THE LATE LORD FREDERICK CAVENDISH.

MR. T. WOOLNER, R.A., SCULPTOR.



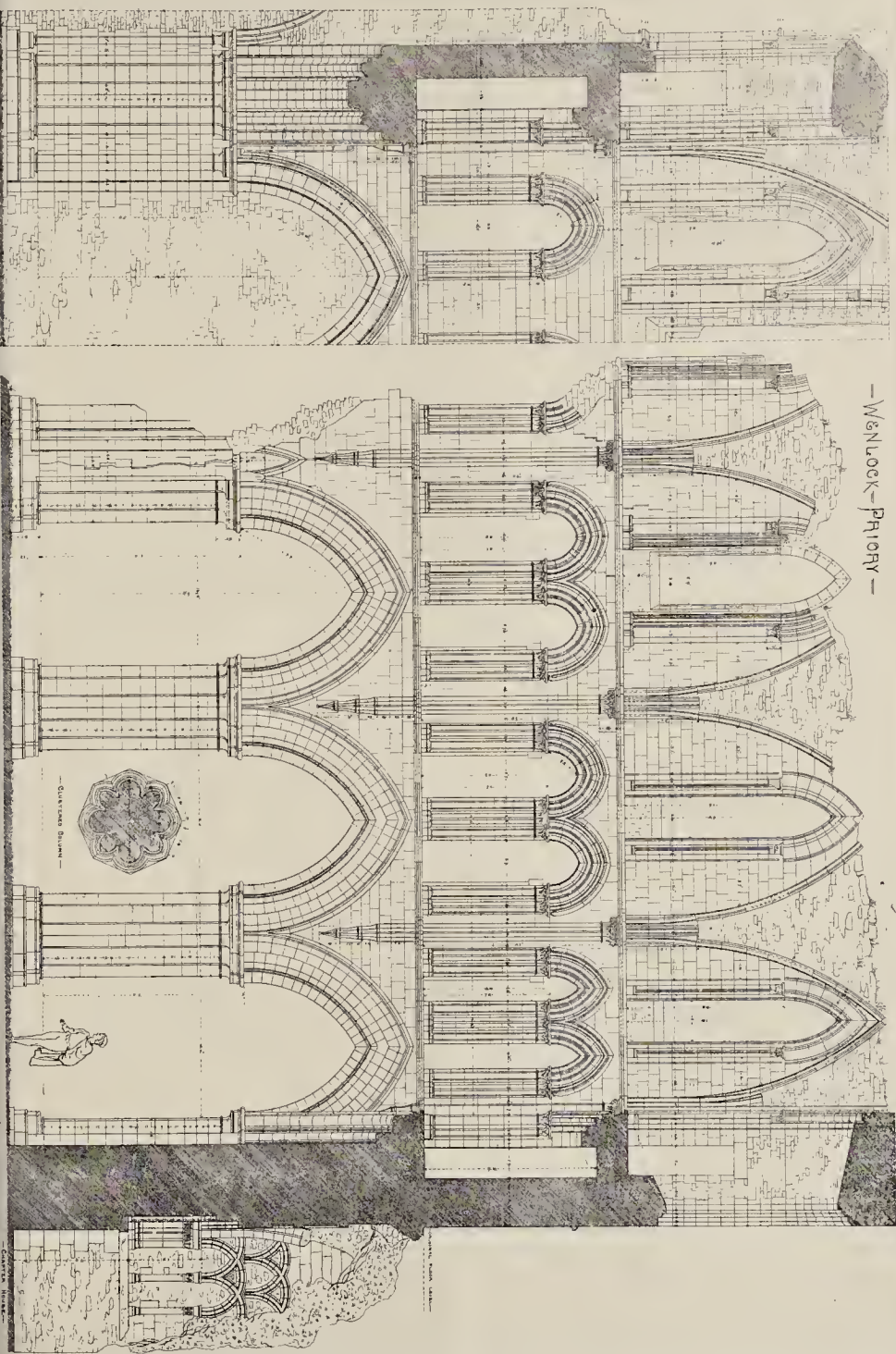
THE BUILDER, MAY 23, 1885.

THE BUILDER, SPRINGFIELD, MASS.

SCULPTURE AT THE ROYAL ACADEMY.
MEMORIAL FIGURE OF THE LATE VERY REV. DEAN CLOSE.

MR. H. H. ARMSTRONG, R.A., SCULPTOR.

—Walslock—Priory—



—South Transept—portion of South Elevation & Section through East Wall—

—South Transept—East Elevation & Section through South Wall—

—W. H. STUBBS—





about 1080, portions of which structure yet remain. Roger de Montgomery, a Norman, was in 1071 presented with the Earldom of Salop. The new Earl, between 1071 and 1086, rebuilt or restored the church of St. Milburga, at Wenlock. The year 1080 has been assigned as the specific year of this foundation of the Norman Earl, and with much probability, for Wenlock Priory was a younger house than Lewes, which was originated in 1077-8, and older than Shrewsbury, which was first designed in 1083. Of Earl Roger's charter nothing is known to exist. The particulars must be gathered from the Domesday Book, from which we learn that six years after its alleged foundation, i.e., in 1086, the monks of Wenlock were possessed of nearly all that had been owned by the church of St. Milburga, in the Confessor's days.

It was during the eleventh, twelfth, thirteenth, fourteenth, and fifteenth centuries that the Priory flourished, and to the eleventh and twelfth we may ascribe the beautiful and rich Norman architecture still to be seen in the rectangular chapter house, and traceable in the boss-covered bases of the choir piers. The nave, transepts, and tower were probably constructed at the beginning of the thirteenth century, and the Lady Chapel and the greater portion of the Prior's Lodge (now the residence of Mr. Charles Milnes Gaskell) at the beginning of the fifteenth century.

Wenlock Priory is one of the most picturesque ruins in the country, though the ruder portions of the original structure no longer exists, having gradually been quarried away during the last few centuries. Indeed, only delicate details can now be seen in the walls of the rectory of Much Wenlock, situated out half a mile from the Priory. The three walls of the south transept, the east wall of the north transept, the south-west portion of the nave, the rectangular chapter house, and the north and west walls of the choir, alone rise high above the ground to testify to the beauty and grandeur of this immense mediæval church. Traces can be seen of the whole of the choir and most of the nave, though the thick growing grass and vegetation greatly obscures the same.*

VILLA, GAINSBOROUGH GARDENS, HAMPSTEAD.

This villa, as shown by our illustration, is being erected and is nearly completed. It is situated near Well Walk, and adjoins the bath at Hampstead. Being on high ground commands an excellent view of the Heath one direction, and of London (in the distance) in another.

It has four floors, and contains the usual accommodation of a gentleman's residence of moderate size, having a tolerably large hall and staircase in the centre. It has also colonnades arranged at the east and south fronts, overhanging roofs, on purpose for the stables. Stables are also erected, as shown, in a rear.

The lower part of the walls and the chimneys are all executed in the best red brick of a dark pur. The upper parts of the walls are tiled with ornamental tiles, the proper effect of which, however, is not quite afforded by the view here given, being in bands of plain and ornamental tile-work. The millions and eels (where the latter are needed) are all best red Mansfield stone. Most of the ornamental joiner's work is of pitch pine. The floors are covered with Brosely tiles.

The exact cost of the building is not known at present, the work being done without a tract, but it is considered it will be about £100, including stables.

The villa is being erected for Mr. T. Clifford, under the designs and under the superintendence of Mr. Henry S. Legg, architect, of Christ's Hospital, London.

A large new Clock has just been erected at Asham Bois Church, Buckinghamshire, by Messrs. John Smith & Sons, Midland Steam Works, Derby. It is fitted with all the latest improvements brought out by this, and is guaranteed not to vary more than one second a month. The same firm are erecting large clocks with chiming machinery at Beaconsfield Church and for Winslow in the same county.

ROMAN REMAINS IN ALGERIA. ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The eleventh ordinary meeting of this Institute took place on Monday last, Mr. Ewan Christian, President, in the chair.

Mr. W. H. White (the Secretary) announced that the Institute had lost an Hon. Associate by the death of Sir Watkin Wynon.

Mr. Alexander Graham, Fellow, then read a paper entitled "The Roman Occupation of North Africa, with special reference to the Remains in Algeria." The following is an abstract:—

The author referred to this country as offering a great field for antiquarian research, from primitive times down to the Arab occupation, and to the great value of the numerous inscriptions, affording abundant material for a history of North Africa. Old writers do not furnish much reliable information about the towns, either Phœnician or Roman; but eighteenth-century travellers throw great light on the whole subject. Our indebtedness, as architects, is greater to Bruce than to any other explorer, on account of his careful drawings of some of the principal monuments, and his critical notes. The author then alluded to illustrated and other works by French travellers, and their general excellence, and then proceeded to explain the boundaries of the country known to the Romans as North Africa at the close of the third Punic war, showing how it was divided and what races inhabited it. The rise and progress of the Carthaginians were then traced to their final subjection to Rome, reference being made to the apparent absence of any influence exercised by Carthaginian over Roman art. The spread of the Roman colony was then traced from the sea to the desert, as evidenced by inscribed stones that strew the surface in every direction, sometimes where least expected. These stones form the real history of the country. There is a difficulty in assigning a precise date to some of the principal monuments on account of the fragmentary condition of inscriptions, but the reign of Severus may be credited with the largest number; a remark followed by an extract from M. Choisy's work entitled "L'Art de bâtir chez les Romains," explaining how the building art under the Empire made rapid advances, while Classic architecture, as an art, was declining. The author then referred to a map, showing all the principal towns in the colony of North Africa in the age of the Antonines, supplemented by a tabulated list of the principal cities, distinguishing the *colonia* from the *municipia*. Then starting from the eastern frontier of Algeria, that corresponded very nearly with the old boundary between Numidia and Africa proper, he tracked the Romans along the coast, and then into the plains to the slopes of the Aurès down to the military posts in the great Desert. Passing by Hippone, which has little left to interest us except as the scene of the labours of the good St. Augustin, the author touched at *Rusicada*, a place of considerable importance, judging from the numerous remains found there, drawings of the most important being exhibited on the wall. Then passing *Saldæ* and *Iconium* with slight reference, he gave a full account of *Julia Casarea*, the capital of Juba II., saying a few words about this remarkable man and all that he did to beautify the city of his choice. The author then alluded to *Tipsasa*, and gave a brief description of the few Roman remains to be found farther westward.* Returning by *Sitiffs*, in the plains, the author described the principal monuments at *Cicululum*, and then gave a full account of the remarkable mosaics discovered at Oned Alghenia, giving a little insight into the country life and habits of the Romans in the fourth and fifth centuries, and showing, by reference to inscriptions, how much encouragement was given by the emperors to the breeding and training of Numidian horses for the circus at Rome. A few words sufficed for a description of *Cirta*, the remains of the great Roman bridge there over the Roumel, and the tombs of *Præcilius* the silversmith, and of the family of *Lollius*. Then passing southward by the ruined monument known as *Es-Soumah*, the author described the principal remains of *Tiblis* and of the important town of *Calama*, referring also to the sites of *Khamisa* and *Medauri*, which, as yet, have

only been partly explored. Journeying southward a full description was given of the remarkable city of *Lambesis*, with its forty triumphal arches, its great establishment for an entire military legion, and of the many objects of interest still to be seen in the Museum there. Passing by *Verceduna*, the author gave an account of the ancient *Thamusas*, at the foot of the Aurès, describing the beauty of its situation and the striking character of some of the monuments, referring to the city as the Pompeii of North Africa. Continuing along the northern slopes of the mountains, the author gave a brief history of the ancient *Theveste*, its remarkable quadrifrontal arch, its little temple of Minerva and the ruined basilica of *Vespasian's* time that had been converted in the sixth century into a Christian Church. Passing over the Aurès the author completed his account of the Roman occupation of this part of the country by referring to the military posts far down in the desert. The value of these monumental remains was then considered; the author endeavouring to show that, although the triumphal arch, the great *Therma*, the basilica, and even the colonnade of the Roman are now no longer needed, yet the spirit that prompted these works is with us still, evidenced in a measure by our language, our literature, our laws, and even our festivals and calendar, concluding with a remark that, as citizens as well as architects, a study of the works of the Romans was of value as well as of exceeding interest.

The Chairman, in inviting discussion, remarked that Mr. Graham had brought before the Institute a fresh subject of considerable interest, illustrated by a series of drawings, which showed extraordinary industry, and were such as were rarely seen upon the walls.

Professor Hayter Lewis proposed a vote of thanks to Mr. Graham for his extremely interesting lecture, and magnificent series of illustrations. North Africa might be described as almost an unknown land, although it was within twenty-four hours' sail of Marseilles. Colonel Playfair, in his well known book dealing with the country, had given scarcely any plans, so that many of the drawings exhibited by Mr. Graham were of considerable interest, notably those of the mosaic which gave the façade of a Roman house. Every architect and archaeologist was very much puzzled and disappointed at finding that even in the great cities of the Phœnicians and Carthaginians, they got scarcely any Phœnician or Carthaginian remains. Mr. Davis, the British Consul, made some years ago at Carthage a series of excavations, with the view of unearthing old Carthage. In doing so he came upon a large number of mosaics, some of which were now in the British Museum. Mr. Davis believed that several of these mosaics were really Carthaginian, but he was entirely alone in that opinion; all the French and other archaeologists being of opinion that they were Roman, and possibly old Roman work. Even in the home of Carthage, at Tyre itself, large excavations were made some years ago by M. Renan, when the conclusion was arrived at that it was hopeless to recover the remains of the old Phœnician work there, because it had been buried under the *débris* of centuries. They would have had to search for it through the Mahometan, Roman, and Greek buildings, so that there was hardly any chance of recovering a large Phœnician work. Thus, at present, one's knowledge of Phœnician work amounted to little more than the knowledge of a few ornaments. At the same time they could well imagine that the Phœnician work must have been very grand, because Solomon, in his greatest work, employed a Phœnician architect, although he was connected in every possible way with Egypt, a well-known artistic land. Some extraordinary work was to be found in North Africa, dating before the time of the Romans; he alluded to the large Mausoleum of Medrasen, and to another termed the Tomb of the Christian Lady. If such works were met with in Etruria or Italy, they would be put down as Etruscan; while if met with on the West Coast of Asia Minor, they would be styled Pelagic. Then they came to the Roman works, and it was unnecessary to say anything about these, as the drawings spoke for themselves. He could not help, however, referring to the enormous extent to which Roman work was propagated in a comparatively small space of time over a large area. In any country of the old world Roman work was to be found, and work of a very

* Allusion was then made to the marble quarries of Numidia, and a brief account given of the principal marbles of North Africa, still to be obtained in large blocks and at a reasonable price.

peculiar kind, because, although the Romans used almost every form, they so altered it that no matter where it was met with, it had the stamp of the Romans upon it. He had found a very curious illustration of this a few months back in Greece. It had been generally supposed, until quite recently, that the circular temples, such as that of Tivoli, were pure Roman inventions copied from the Etruscan. This was not the case, however, for in Greece there had been found an exact copy, or rather original, of that form of temple. With the exception of the amphitheatre, he believed that every form used by the Romans was copied or adapted from the Greek, but was so altered and nationalised that in no part of the world could it be mistaken for anything but Roman work.

Mr. J. T. Wood, in seconding the vote of thanks, agreed with a great deal Prof. Hayter Lewis had said. He considered that the plans of Roman public buildings were worthy of the most careful study.

Mr. F. W. Percival agreed with Mr. Graham that the whole north coast of Africa offered a wonderful field for the study of Roman architecture. He was very much struck, in travelling in those parts, by the wonderful wealth of marbles. Over the whole of Tunisia the most marvellous variety of marbles was to be found, which might be made use of in the present day. The city of Kairwan, for instance, was a perfect museum of beautiful marbles. When the mosque there was built, the Roman cities in the neighbourhood had fallen into decay; the most beautiful marbles were therefore brought to the mosque, the remainder being built into the walls of the city and utilised as seats for the people. With regard to inscriptions, in every part of North Africa it was only necessary to excavate to arrive at a perfect treasure-house of inscriptions.

The vote of thanks was then carried by acclamation.

Mr. Graham, in replying, remarked that with regard to the Christian Basilicas, when he said that as far back as 328 their form was that of a cross with a cupola, he should rather have said it was that of a cross, the church itself at a later period being covered with a cupola. Referring to the tombs of Medrassen and of the Christian Lady, he had not mentioned these on account of the time at his disposal. He had, however, restored drawings of these tombs, which he had measured, besides some notes which he had made especially referring to the Medrassen, which was some two centuries earlier than the other. Professor Hayter Lewis, he believed, some years ago communicated a paper to the Institute on the subject of one of these tombs, and he would like to supplement the Professor's remarks by his own, which he would be happy to place at the disposal of the Institute. He would have liked to say a good deal about the Numidian marbles, having lately visited the great quarries, from which the Romans obtained their finest specimens. The quarries were extensive, the blocks of marble enormous, and the coloring very beautiful. These quarries were worked by a powerful Belgian Company, the manager of which informed him that it was contemplated to open a depot in London. At the meeting of the British Association this autumn, a valuable and exhaustive paper on the subject of Numidian marbles generally, would be read by Col. Playfair, and he hoped the Institute would have some one there to take notes for them. Mr. Percival had referred to Tunisia, many of the cities of which he (the speaker) hoped yet to visit, and to continue his observations as far as the borders of Cyrene. He wished that some of the members of the Institute would interest themselves in the matter. In a subject of this kind there was a wealth of intellectual delight, though the amount of reading requisite for a proper grasp of it was very great. Nothing could be more interesting than Roman history, and any one who would go a little out of the track,—which he must do,—would be well rewarded by what he saw and learned. If it should not be his good fortune to continue this first series of notes, he hoped it would be the good fortune of some one else to do so.

Westward Ho!—A new pulpit has been dedicated at Westward Ho! Church. It is octagonal on plan, and has been made by Mr. Harry Hems, of Exeter.

THE OLD WALL AT BLACKFRIARS.

ANOTHER, being the lower, portion of the old wall in Little Bridge-street has just been laid bare by the demolition, to its foundations, of the Cockin St. Martin's (or Cock) court, Ludgate-hill. That tavern stood at the south-western angle of the street and the court was named. The wall is now again visible to a depth of some 12 ft. or 14 ft. below the road surface at a spot over against Evangelist-court and a little northwards of Dolphin-court. Along the northern side of Pilgrim-street may be seen the continuation of the wall between its modern brick facing and the cheesemonger's shop, whereof the cellar rests against it, that stands opposite to the site of the Cock. In March, 1882, was pulled down so much of this wall as closed the roadway of Little Bridge-street into a narrow passage at its eastern and higher end. Our readers will perhaps remember the curious opening, with a recess for the deposit of burdens, cut through the wall; which opening communicated between St. Martin's-court and the Broadway opposite to the Blue Last beyond.

The Roman wall lay further eastwards, as is clear if only from the discovery in that direction of certain contemporary graves, which by the law must have been extramural. And this Blackfriars wall is not, as is commonly supposed, an actual relic of even the later wall that here, crowning the steep declivity at whose base ran the turbulent Fleet, protected London on the west. It is the wall which the Friars Dominican set up on their removal hither from Holborn, by Lincoln's Inn, temp. Edward I. The Black or Preaching Friars owed this their new settlement in Castle Baynard Ward to Gregory de Rokessli, mayor, a good friend to the Black and the Grey Friars alike. Another warm patron was Robert Kilwarby, archbishop of Canterbury, who contributed largely to the building of their monastery and church,—the latter conspicuous among the few fine churches of which London could then boast. They found high favour also with Queen Eleanor and her royal consort. The king, indeed, supplemented the gift to them of the ancient Montfitchett Tower for building material, by granting them a charter to demolish the existing London wall and to reconstruct it so as to include the new sacred precincts. For this work it is evident that the Friars used the original masonry. Thus it came about that the wall which until then ran due south between the Old Bailey and St. Martin's, Ludgate, to the Thames, turned westwards down the now Pilgrim and Little Bridge streets, and thence made a return southwards to the riverside at a spot between Water (antique Blackfriars) lane and the Fleet's mouth. After the fire at Ludgate-hill, 1792, a watch-tower was discovered, May 1st of that year, on the wall in this quarter. This barbaric, or burgh-kenning, stood about half the way down Little Bridge-street, say by the southern end of Dolphin-court. (See J. T. Smith's view, and that in Hone's "Every-day Book," vol. ii., columns 629, 630.) We find the tower's site marked in a plan by Hollar. We may add that a magnificent fragment of the London wall was unearthed three or four weeks since. It lies between the Church of Allhallows on the Wall and the corner of Blomfield-street,—formerly Brokers'-row,—and rested upon a level nearly 20 ft. below the neighbouring "made ground." Fresh buildings will soon conceal it from view.

ARCHITECTURAL ASSOCIATION. EXCURSION TO TILBURY.

The eighth Saturday afternoon visit this year by the members of this Association was to Tilbury, and took place on the 16th instant. The members assembled at Fenchurch-street Railway Station, and on arriving at Tilbury Station they first visited the new Tilbury Dock Hotel, where they were received by Mr. E. A. Grüning, the architect of the building, about three p.m. The hotel is now in course of construction, and Mr. Grüning explained the working drawings and the building. The contract has been undertaken by Messrs. Perry & Co., of Treadler Works, Bow, and it is estimated, the structure will cost about 35,000*l.*, exclusive of the foundations and basement. Mr. W. H. Perry is acting as clerk of the works. Owing to the nature of the site and soil, the hotel is erected on sheet piling. The piles are 14 in. square, and are driven to an average depth of 60 ft.

into the ground. Upon this piling the walls are built of stock bricks, with Fareham brick facings, but above the basement the walls are all of timber construction, and (externally) faced with plain and ornamental tiles by Doulton; this bearing lighter upon the foundations than brick construction. The basement consists of kitchens, and cellars, and lifts, the lifts are by Simpson. The ground-floor contains a large entrance-hall, which passes through the hotel due north and south; on the left are a reading-room, luncheon-room, and spacious bar; on the right are a large coffee-room, 86 ft. by 30 ft., exclusive of circular bay; serving-room, billiard-room, and principal staircase constructed of oak, 16 ft. wide; also three other staircases and offices. There are four floors above the ground-floor, besides attics, containing about ninety-eight bedrooms, with reception-rooms in addition. The iron girders and columns are by Messrs. Moreland, of Old-street, London, and the parquetry flooring is by Arrowsmith.

The party then visited the Tilbury Docks, which are in course of construction pursuant to an Act of Parliament obtained by the East and West India Dock Company upwards of three years ago (as noticed in the *Builder*, April 6th, 1882). The total area of the site of the docks is upwards of 500 acres, and is situated to the west of Old Tilbury Fort, by Gravesend Reach, and immediately facing the town of Gravesend. The main dock is 600 ft. wide, and is constructed on the plan adopted by the Mersey Dock Board at Liverpool, giving a maximum amount of lineal quay space, with a minimum amount of water space. The branch docks are each 1,000 ft. long by 300 ft. wide. The tidal basin is 17 acres in extent. The hydraulic engine-house is fitted with engines by Armstrong, which throw 640 tons of water per minute. The engineers are Messrs. Manning & Baines, and the present contractor are Messrs. Lucas & Aird. In the *Builder* for July 15th, 1882, and August 4th, 1883, will be found some further particulars of these very extensive works. Having explored the works the majority of the members returned to town by the 5 p.m. train, but several of them proceeded to view Old Tilbury Fort, and returned by the following train.

THE EAST LONDON INDUSTRIAL EXHIBITION.

WHITECHAPEL and South Kensington have at this season, a point in common. Each quarter has its own Industrial Exhibition "inaugurated" by royalty and enjoying aristocratic favour, for, in the Drill Hall, Whitechapel-road, will be found stalls conspicuous with the names of the Marchioness of Ripon, the Countess of Rosslyn, the Lady Edith Ashley, and other titled ladies, many of whom are actually in attendance to explain or to see the miscellaneous objects with which they are surrounded. The highest credit is, of course due to these ladies, who are thus devoting three precious weeks of the London season to the encouragement (as they deem it) of the industries of the East end. At the same time we think such support, which must savour of patronage, ought to be unnecessary, and that with management, careful but energetic, genuine East-end exhibition, representing what are really the distinctive industrial products of the quarter, would best promote the interests of the working classes if it were allowed to stand on its own bottom. The managers, however, would have to exercise a good deal of discrimination than seems to have been employed on the present occasion, when everything appears to have been accepted, and, might be expected, no classification of objects has been possible. The exhibition is chaotic and the catalogue bewildering. There may be—concealed in odd corners or overwhelmed with rubbish,—some rare specimens of art or inventive genius, but the general impression left upon the mind of the visitor is that of heterogeneous collection of stuffed birds, patent work counterpanes, and woolwork flowers, feebly and wonderfully made. A plaster exhibit what he terms "the model of a College made of Berlin wool, and somewhat resembling a Chinese joss-house. The grass around the building is intensely green and the industrial modeller has, with unconscious irony, written above it,—"Will last as long as most houses." Dr. Barnardo's boys are to be seen at White-

upon boots and shoes and firewood, and East-end philanthropy generally is well advertised. Day & Martin have a stall where the blacking sold is a contribution to the prize fund; and, marking, perhaps, the advance of civilisation,—no little space has been assigned to the tooth-powder of a local dentist.

The managers have recognised the fact (and the recognition is most important) that "boredom is the curse of the East End," and that, as at Kensington so also at Whitechapel, provision must be made for the mere lounge. In our visit we noticed a good many of all ages turning over the leaves of scrap-books which had been furnished for their amusement, or gazing at the curiosities lent by Mr. Jamrach. At intervals music of various kinds is performed and always secures approval,—in fact, the ear seems to have been better cultivated than the eye, for if the discord in colour which prevails were expressed in sounds there would be a general chorus of dissatisfaction.

But with all its shortcomings this East-end Exhibition has much to commend it, and will, we hope, be the precursor of something worthier of its name and less dependent upon the well-meant patronage of aristocratic stall-holders.

SCIENCE AND ART IN BUILDING.

LIVERPOOL ARCHITECTURAL AND ENGINEERING SOCIETIES.

THE following is an abstract of the paper read at the joint meeting of the above-named societies on the 13th inst. by Mr. Goldstraw.—The paper referred to the connection of science with building as "the application of exact knowledge of the nature of materials, and of the principles of mechanics to the planning and construction of buildings with a view to their safe and convenient use," whilst the connexion of art with buildings was said to be "the exercise of taste and skill in both design and execution for the purpose of producing a beautiful effect in the structure." Thus regarded, science and art, or utility and beauty, ought to be amalgamated in building work without neutralising each other; and the balancing of the two was the problem which every designer of buildings should endeavour to solve. For examples of this happy union reference was made to the dome of St. Paul's, the steeple of Bow Church, the Vienna Exhibition, and the arched vault over St. George's Hall. As instances where science had excluded art, mention was made of the Britannia Tubular Bridge and the new Tay Bridge. The man whose chief business it is to apply science to buildings is an engineer; but the architect must cultivate science and art together. The distinction between the two professions is very much an arbitrary one. Neither engineers nor architects have any exclusive right to the work of designing buildings and such like structures. There is no line of demarcation between the two professions. But there is a bond of union in the nature of their common pursuits.

ASSOCIATION OF

MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

THE Midland Counties' District of the above association had a meeting at Nottingham on Saturday last. The President, Mr. W. G. Laws, of Newcastle-on-Tyne, occupied the chair, and about thirty members were present.

Mr. George Winship, the Borough Surveyor of Abingdon, read a paper on "Some of the advantages and Results of the Supply of Water by Meters." He affirmed that the meter system effects a great saving in the quantity of water consumed, and tends to equalise its cost, whilst water-rates often fall very unevenly upon occupiers of property in a district. The cost of meters need not be taken into account, as directly a meter was attached to a service, payment at the rate of 10 per cent. began, and it was not essential that a large stock should be kept on hand. The cost of inspection under the meter system was also greatly reduced, because it was necessary to inspect fittings for the purpose of detecting waste. At Abingdon, under the meter system, the consumption of water was gallons per head; but if it were 15 gallons, very ordinary quantity, 90,000 gallons of wasted water would flow into the sewers, and here it was necessary to pump this to a sewage

farm, a heavy, unnecessary cost would be entailed on the ratepayers. Besides, a still more important saving would be effected, as only about one half of the land generally calculated to receive the sewage would be required. He did not wish to go into the question of the kind of meter best suited for registering small flows of water, but at Abingdon he had found Taylor's meter satisfactorily met all requirements. Consumers at Abingdon appeared thoroughly satisfied with the meter system as a basis of charge, and he had similar testimony from Malvern, where it had also effected the desired object, the prevention of waste, whilst the sanitary state of the town was second to none.

Mr. A. Brown, Borough Engineer of Nottingham, also read a paper describing five years' municipal work in that borough. He first dealt with the great extension of building, consequent on the rapid and progressive increase of the population, and then gave details of the roads and streets. There were altogether 146 miles, of which one and a quarter was paved with wood, and fifty were at present private property, but would be taken to by the Corporation almost immediately. He expressed himself strongly in favour of new streets being executed by the Corporation, as it secured uniformity, and the one fault was the strain and responsibility it threw on the borough engineer and his staff. The amount spent on private improvements in Nottingham during the last five years had been 210,000. Nothing equalled beech-wood pavement, which cost 14s. per square yard, but it should always be laid on a thoroughly good concrete foundation. He then alluded to Nottingham having the reputation of having originated asphaltic footpaths and asphaltic macadam roads, and described some laid by Mr. Thomas Smart, in the London-road, about 1840. Then he gave details of asphalt, of which an area equal to 20 acres had been laid down in Nottingham, within the last five years, at a cost of 1s. 4½d. per superficial yard. He next described the Back Valley sewer, executed to save the district from periodical flooding. It cost 40,000l., and was carried under Sneinton Hill, the cemetery, and the Midland Railway, direct to the Trent. Mr. Brown next described the mode of dealing with the sewage by the pail system, which was introduced into the borough about twelve years ago by the late Mr. Williams. There are now 21,155 pails in use, and whilst in 1881 the number charged was 1,294,860, in 1884 it was 2,240,899, an increase in four years of 73 per cent. In 1884 there were 40,000 tons of matter brought in pails, and the sales amounted to 75,000 tons, including ash-pits and privies, and produced 7,145l., about 1s. 6d. per ton. About 6,000 tons of dry material were carted to Fryer's destructor and burned. The destructors did their work thoroughly and well, and he had not seen anything that answered the purpose better. The pail system was an undoubted advance upon the old midden system, but that it is a perfect system could not be maintained. Having described the Lenton and Gregory boulevards, and the Radford boulevard, the principal new streets, Mr. Brown summarised the expenditure of five years as 667,000l.

In the subsequent discussion on these papers, Mr. Pritchard (Birmingham) admitted that meters would naturally curtail the consumption of water, but it was very undesirable on sanitary grounds to restrict the supply of water to houses. Waste could be quite as effectually prevented by house-to-house inspection and other means as by meters.

Mr. Gordon (Leicester) also held that to restrict the water supply for household purposes by anything like a charge according to the quantity of water consumed, was altogether wrong in principle. It was a retrograde step to advocate meters being used for any such purpose; and the cost would fall still heavier on the lower classes, who ought rather to be encouraged to use water freely for baths and other sanitary purposes.

Mr. Fowler (Manchester), Mr. F. Carter (Leicester), Mr. Comber (Kidderminster), and the President expressed similar views.

Mr. Godfrey (Leicester) opened the discussion on Mr. Brown's paper, and spoke in commendation of everything they had seen, except the pail system of dealing with the refuse. He admitted that it was well managed, but, though they had the pail system partially in use in Leicester, he must, as a member of that Association, denounce the system as wrong in principle from beginning to end. The mixture of

light ashes with the contents of the pails, done in Nottingham by lifting the seats, helped to prevent the decomposition of the matter, but in the majority of towns it was left until it was in a condition highly dangerous to the health of the people using the pails.

The discussion was continued by Mr. Lohley (Hansley), Alderman Ford (Nottingham), and other gentlemen.

BUILDING IN PRIVATE AREAS.

THE METROPOLITAN BOARD OF WORKS v. MOWLEM AND CO.

AT the Westminster Police-court, the above defendants appeared before Mr. D'Eyncourt to answer four adjourned summonses,—first, for laying out a road, passage, or way as a street without the consent of the Board; secondly, for laying out a footway of less width than 20 ft.; thirdly, for forming the same without being open at both ends; and fourthly, for building without giving direct communication between two streets.

Mr. D'Eyncourt now gave judgment. Having stated the facts, which appeared in our issue of the 9th inst. [p. 672], he said that he was of the opinion that the place was not a "street" within the meaning of the Metropolitan Local Management Act, nor a "new street" within the scope of that Act. No doubt the widest interpretation could fairly be assigned to the meaning of the word "street" in the various Acts; it included any footway, lane, square, court, alley, &c., whether a thoroughfare or not. Still, it appeared, in his judgment, that the right of public use was always contemplated. In this case the owners reserved the right of excluding the public at night, and they would also light and pave the place. He could not see why it should be held to be a "street," because it was not covered over. In the case of Lord Auckland v. the Westminster Board of Works, a case cited and relied upon by counsel for the defendants, old buildings had been pulled down (as in this case) and new ones erected, and it was decided that the Metropolitan Board of Works could not call upon the builder to comply with the requirements as to new streets, but must proceed in another way, first giving compensation to the owner for any change. In the present case great care had been taken to avoid a dedication to the public. He dismissed all the summonses, and allowed ten guineas costs.

Notice of appeal was given on behalf of the Metropolitan Board of Works.

CASES UNDER THE METROPOLITAN BUILDING ACT.

SOFT BRICKS IN EXTERNAL WALLS.

THIS case, heard before Mr. De Ruten at the Marylebone Police Court, raised a point under the Metropolitan Management and Building Acts Amendment Act, 1878. The District Surveyor for St. Pancras North (Mr. Alfred Bovill) applied for a penalty against Mr. R. L. Fedrich, builder, for having used in the construction of the external walls of two houses in Estelle-road, Gospel Oak, bricks which were not good, hard, sound, well-burned bricks, as required by the By-laws of the Metropolitan Board of Works.

The summons was first heard on the 22nd of April, the evidence of the District Surveyor being that the bricks used in the internal parts of the external walls of the houses in question, samples of which he produced, were not such as were required by the By-law.

In support of his case, defendant's counsel called Mr. H. H. Bridgman, architect, who stated that the bricks used and complained of by the District Surveyor were good, hard, sound, well-burned bricks. The bricklayer engaged in executing the work also gave evidence to the same effect. The Magistrate desired to have further evidence, and adjourned the case for that purpose, and on the adjourned hearing (April 29th), Mr. F. Wallen, District Surveyor for St. Pancras West, and Mr. F. Hammond, District Surveyor for North-West Islington, gave evidence in support of the complainant's contention.

The defendant called, in further support of his case, Mr. Francis Chambers, who stated that he had a large experience in building, and was a Fellow of the Royal Institute of British Architects, and one of the Examiners appointed by the Institute for the qualifying examination for the appointment of District Surveyor. He had inspected the buildings and found them built of good bricks. The work of the three samples produced was such as he would accept as acting for a ground landlord, but not such as he would permit to be used for a private client.

In answer to the Magistrate, Mr. Chambers stated he should object to the brick in question for the latter purpose on account of its appearance.

Mr. H. H. Bridgman, re-called, said that he considered that the worst of the three bricks produced satisfied the By-law.

Evidence to the same effect was given by Mr. Wright, and by an assistant to Messrs. Drivers, surveyors to the freholder.

The Magistrate again adjourned the case in order

to enable him to inspect the buildings. On the 30th of April, the Magistrate made an examination of the work, accompanied by the District Surveyor, and (on the part of the defendants) by Mr. H. H. Bridgman.

On the 4th inst. the Magistrate stated that having heard the evidence on both sides, and himself examined the buildings, and also, since, the number of bricks, he came to the conclusion that the complaint of the District Surveyor was well founded, but he considered the better plan to adopt was to give the builder time to amend the work, rather than impose a penalty.

The case was, therefore, further adjourned for twenty-eight days.

FEEES FOR GREENHOUSES.

On April 21st, at Lambeth Police, before Mr. Chance, Mr. George Elkington, District Surveyor of Peuge, summoned Mr. E. B. Haynes, nurseryman, of Beckenham-road, Peuge, for H. District Surveyor's fee due in respect of a greenhouse erected by the latter.

The plaintiff proved that the defendant had recently erected a greenhouse, 22 ft. 6 in. long, 12 ft. wide, and 5 ft. 3 in. in height to eaves, the lower part enclosed to the height of 3 ft., with brickwork, the upper part consisting of the usual sashes, &c. The building was about 12 ft. distant from the road, but within 10 ft. there were other similar greenhouses. He had tried to obtain notice from the defendant, who denied his authority. Failing to obtain notice he sent in his claim for fee as the structure was, in his opinion, in conformity with the Building Act. He now quoted numerous cases in which magistrates had held that greenhouses were buildings.

The defendant, in the course of a long argument, contended that the structure in question was exempt, as it was used for the purpose of his trade, and under his lease he could remove it, and also that it was exempt by its construction and by distance, as it was more than 30 ft. distant from other buildings except greenhouses.

The learned Magistrate having intimated that he was so far in favour of the plaintiff, the case was adjourned at the request of the defendant until the 14th of May.

At the adjourned hearing, the District Surveyor was represented by Mr. Milner Jutsum, solicitor. Mr. Chance, after hearing further arguments, decided that the structure in question was a building within the terms of the Act. He, therefore, made an order upon the defendant to pay the amount claimed, and allowed one guinea costs.

THE REFORM OF THE INSTITUTE.

SIR.—As several friends have again written me to inquire the manner in which I propose federating the members of the profession, I find it more convenient to write one instead of many letters, and shall feel, therefore, obliged if you will insert this reply. I have taken, and still take, the Law Society as my model. We all know that before a lawyer can practise he must be articulated and pass an examination (serving articles I would not press; if the candidate on examination proves he is competent, I would not inquire of the channel through which the knowledge came to him); he can then, by paying an annual tax, practise, and, whether he belongs to any association or not, he is bound by the rules of the Law Society. In the provinces associations are formed for convenience, professional questions are discussed, papers are read, and the proceedings resemble those at the central association. At the annual meeting of the Law Society, all members of the profession may attend. If they are members of the Law Institution, they have the privilege not only of voting, but of using both library and club (a club should be attached to our Institute, and would prove a commercial success). It is usual to elect prominent provincial members on the council of the central body, and all must be loyal to it. The new Charter should cover all existing architectural associations. Some may demur to this, as it might be a recognition of doubtful merit in some cases; but this done, and the stream kept pure by examination, time would purify the original body. Can anything be more simple? There would be a gain all round, and no sacrifice of independence. And as to federation, unless the Institute stultifies itself it cannot ignore it, since it has admitted the principle by electing leading men from the provinces, and notably the President of the Architectural Association. I press this question of examination and federation upon the profession earnestly, in view of the torrent of draughtsmen that will be let out upon us by the technical schools and the

Board schools. That is the day of reckoning with which we shall be shortly confronted, and although "too late" is a fashionable policy just now, it is far better for ourselves, and it will be better for the public, if we at once federate, organise, and close the door.

TUOS. E. KNIGHTLEY.

CHELSEA VESTRY-HALL COMPETITION.

SIR.—In last week's issue of the *Builder* [p. 705] you imply that the retiring-rooms at the end of the hall in our design have been added since the plans were sent in, to supply a deficiency in the original plan. Will you allow us to say that the published plan shows the arrangements submitted on the competition drawings, and that no alterations whatsoever have been made since the design was sent in? The retiring-rooms were shown in two ways,—in one placed in the basement under the end of the Vestry-hall, approached by stairs in the corners of the hall, and in the other placed on the ground-floor, shown upon a flap as an alternative arrangement. This may have been folded back when the drawings were examined for your report, and the arrangements thus overlooked, but how the first arrangement was lost sight of we cannot quite understand.

As your remarks may lead some people to suppose that either we had friends at court, or a special favour conferred upon us, and thus obtained an undue advantage over the other competitors, we shall be glad if you will kindly spare the space for this in your next issue. ARTHUR H. NEWMAN.

* Our remark referred only to the plan we published, which certainly left on us (and on others who were present) the impression of having no proper access to the stage end of the hall.

MIXING PORTLAND CEMENT WITH LIME MORTAR.

SIR.—A few weeks since (*Builder*, p. 567, ante) I reply to a correspondent I gave my experience of the above. I forget your correspondent's name, and the initial letter which I subscribed to my reply; but I wish to draw his and your readers' attention to the following extract from the second edition of the book of Mr. Thorold Rogers, M.P., on "Ensilage" and the construction of Silos. He says, pp. 99-100, after describing lime concrete in the proportion of one part of lime to seven parts of other materials (sand and gravel).—"The addition of one-fourth cement (meaning Portland or similar cement), the lime being reduced to three-fourths of one part, and the cement being added after the mortar is mixed, makes a much quicker setting and harder concrete." This corroborates my experience, as given in my letter to you above referred to, both as to the *modus operandi* as applied to mortar, and as to the result; the only difference being that I ganged the cement with sand and water before mixing it with the lime mortar.

THE ASHPITEL PRIZE.

SIR.—A letter from "A. B. C." in your last issue [p. 708] calls attention to the fact that the Ashpitel Prize has been withheld for two years; further, that the prize was instituted about 1873.

Now the first Voluntary Architectural Examination took place in 1862; would it not be a gracious act on the part of the Council of the Institute to make the reward retrospective, and to give the two prizes not awarded to those candidates who passed the most successfully in past years? A precedent for this would be found in the case of the Pugin students who this year had medals awarded to them going back to the first recipient of the prize.

X. Y. Z.

UNEMPLOYED LABOUR.

SIR.—One missing link in the problem of unemployed labour is the absence of any adequate means for the diffusion of intelligence with regard to the wants of employers. Prisoners and paupers receive help; surely the class of deserving poor who seek for work often in vain are worthy of our attention. The friends of the Collier's Bents Mission have for some time past been quietly working, getting suggestions for men whom they have previously tested. And they could to a much larger extent succeed in alleviating the hopeless misery of men who wear out their strength and resources in the fruitless search for work, if they were only promptly made acquainted with the requirements of employers of labour. Will you kindly assist in making it known as widely as possible that in future a Register will be kept at this Hall of the requirements of employers, and that we shall be happy to attend to and register applications from employers free of charge? Address: honorary superintendent, Collier's Bents Mission Hall, Southwark, S.E.

J. B. RUDDUCK, Secy.

May 20, 1885.

The Student's Column.

DESCRIPTIVE GEOMETRY.—XVI.

Draw the plan elevation and shadow of a dodecahedron in any position you please.

BY the means of a succession of elevations and plans we get the projections as in fig. 84; the shadow is nothing but the intersection of a prism by planes: we can find it by any of the methods described above. To construct the plan and elevation of the dodecahedron in its first position when resting on the plane of the plan, we first draw on the plan the pentagon 1, 2, 3, 4, 5 (observe we do not put the sign α , because 1, 2, 3, 4, 5 are the points themselves, not their plans). Suppose that the pentagonal faces of this solid, which are contiguous to the face 1, 2, 3, 4, 5, have all been folded down upon it, and you open them up to place them in position, their points will rotate round the different arries of pentagon 1, 2, 3, 4, 5, until their right sides are made to meet. For instance, if the pentagon 1, 2, 3, 4, 5 rotates round its side 4, 5, the point 1 will travel in space in a vertical plane, the horizontal trace of which is 1, α ; if the pentagon rotates round its side 5, 1, then the point 4 will rotate in a vertical plane, the trace of which is 4, γ ; therefore, the point 6 α , where the traces 1, α and 4, γ cross one another is the plan of the point 6 in space where the points 1 and 4 have met; in other words, it is the plan of the point 6 of the dodecahedron. On account of the symmetry of this solid we know that all the other angles will be on the same circle as the point 6, and therefore we can easily complete the plan of the dodecahedron. To find the heights of the points 6 and 11 above the plane of the plan, we make an auxiliary elevation with L' T' taken on the line 1, α , and we draw thereon the circles described by the points 1 and 2 of the base pentagon when rotating round its side 4, 5, from which circles we deduct the elevations 6 α and 11 α ; their heights α , 11 α , and γ , 6 α , give the heights to be carried on our elevation for all the angles of the solid which are on the same level. As the dodecahedron is symmetrical, we can then readily complete the elevation and draw thereon a slab, as in our diagram.

The second position of the solid is theoretically found by making it rotate round a horizontal axis A, but practically the exact elevation is re-drawn in any position we like, and a new plan is deduced therefrom. Again, the third position is the result of a rotation round a vertical axis, which simply shifts the plan without changing its form, but gives an entirely new elevation.

There are three shadows to be considered and two shades. There is, firstly, the shadow cast on the ground by the rectangular slab; secondly, the shadow cast on the ground by the dodecahedron; thirdly, the shadow cast on the slab by the dodecahedron.

The shades are those parts of the slab and the dodecahedron which receive no ray of light. The shadows on the ground will be marked (1); the shadows on the slab (2).

We have already used oblique projections. To find the shadows on the ground we shall make oblique projections of the slab and the dodecahedron parallel to the direction of the rays of light R α , R'. The outlines of these oblique projections are the outlines of the shadows on the ground, and both in elevation and plan the arries which correspond to the outlines of the shadow form the separating limits between light and shade.

As to the shadow which the dodecahedron casts on the slab, we know the arries which will cast it, for they belong to the limits of the shade, and their shadows on the ground will fall within the shadows of the slab. Angle 11, therefore, casts a shadow on the slab. We could find its shadow, 11 β , by cutting the slab by the vertical plane which contains the ray of light through point 11; then finding the point 11 β , where the ray cuts it on the elevation. This would be the regular way to follow in most cases, but here we have used an artifice which gives us a more rapid result. Observe on the ground X α is the point where the shadows of the slab and the dodecahedron meet; therefore, if we travel backwards on the ray of light from X α , we shall find a point X on the edge of the slab, which belongs to the shadow on the slab of the arrie 11, 10, of the dodecahedron. Likewise, if we prolong 10, 11, shadow of the arrie 11, 10, until it meet

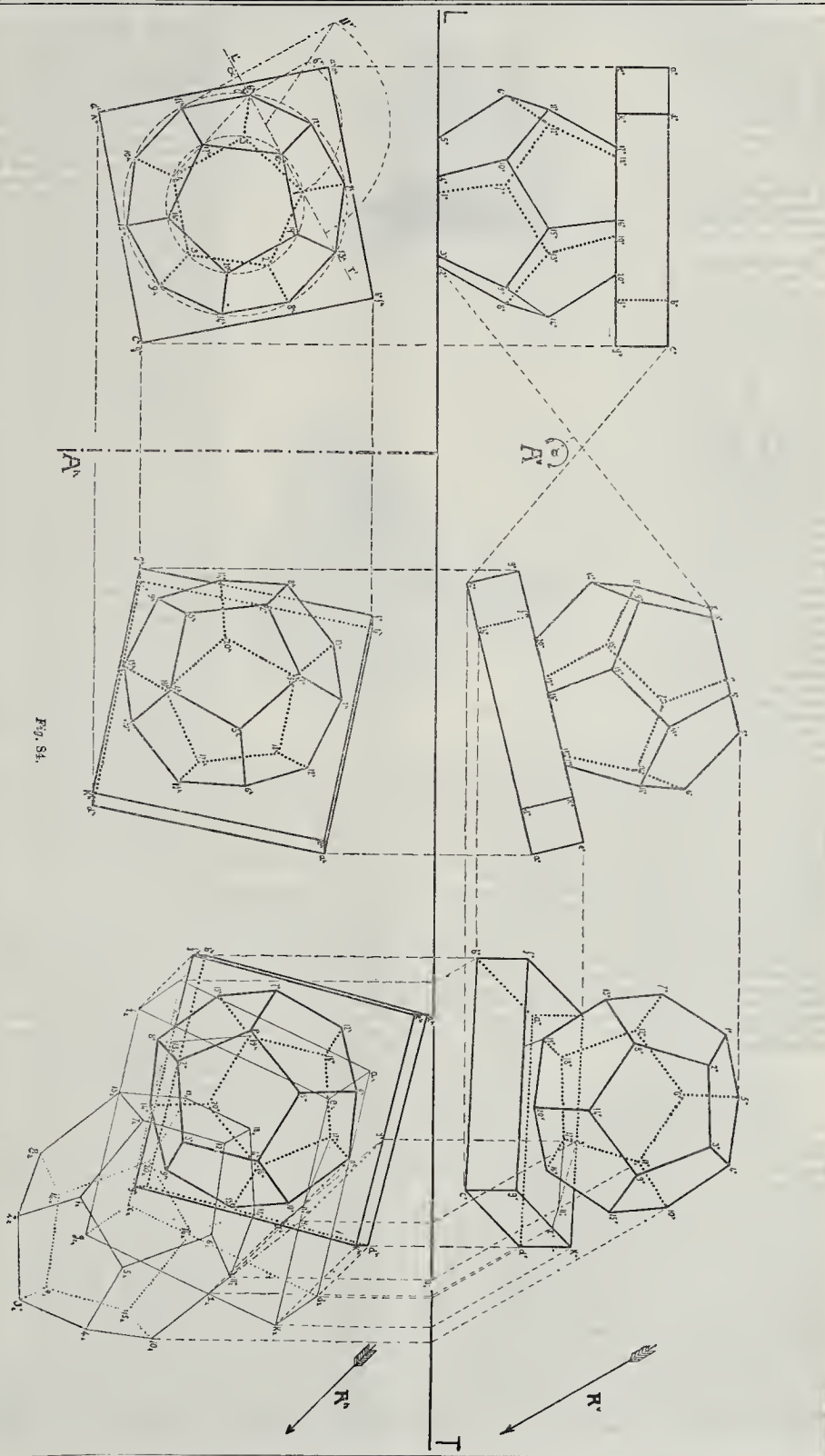


FIG. 84.

the shadow of the upper aris of the slab, we get a point, Y_2 , dealing with which as we did with X_2 , we obtain the point Y ; therefore the line $X Y$ is the shadow of the slab of the prolonged aris, 11, 10. At the intersection of the plan of the ray of light through angle 11, and the line $X Y$ we have 11's plan of the shadow on the slab of angle 11. By a similar operation for the point 13', we get the shadow point 13.

In the original drawing we have made for this problem on a large scale, we have used ink of different colours, so as to easily distinguish the different operations. The solid is drawn in black ink, the parts seen full, the others dotted; the projecting lines, both horizontal and vertical, are in red ink, whereas the auxiliary construction in the first projection is in blue ink, and so are all the lines of the shadow projection in the third position of the dodecahedron. In this drawing we have left out most of the projecting lines, and indicated the shadow projection of the solid by much thinner lines than the solid itself. So as not to confuse the projection and constructional lines of the shadow by etching, we give the effect of the last representation of the solid with shade and shadow apart, without any lines of construction, in fig. 85.

This problem ends that part of Descriptive Geometry which deals with lines and plane surfaces only. Candidates for admission to the Paris École des Beaux Arts are required to pass a severe oral examination in descriptive geometry up to this point, and have to present a complete series of careful drawings, called in French *épreuves*. Any students who have the intention of studying architecture at the Paris School may send in their names to Herbert D. Appleton, Esq., Hon. Sec. of the Architectural Association, 9, Conduit-street, and a class will be arranged for instructing them orally both in French and English, as well as directing them in the preparation of the requisite drawings.

We now come to the part of our science which treats of curved surfaces in general: cylinders, cones, spheres; surfaces of revolution, such as vases, caps and basins of columns; skew surfaces, to which belong various kinds of vaulting; helicoids, such as screws, handrails, and the soffits of winding stairs.

CHURCH-BUILDING NEWS.

Tintinhull.—The Church of St. Margaret at Tintinhull, near Yeovil, Somerset, has lately been re-opened by the Bishop of Bath and Wells after restoration. The church, which dates from the thirteenth century, though comparatively of small dimensions, contains examples of nearly all the different periods down to the Late Perpendicular. Among the noticeable features of the building are the early openings in the walls of the chancel filled in with Decorated tracery and a double piscina. The works of restoration have included the rebuilding the south wall of the chancel stone for stone; the removal of plaster ceilings throughout and western gallery; the re-roofing, re-seating, and repaving throughout, also heating apparatus and reglazing. A new four-centred traceried window replaces a debased window in the east gable. A good example of Jacobean woodwork is possessed in the dark oak pulpit reinstated on a new stone base. The works have been carried out from the drawings and under the direction of the architect, Mr. A. N. Hansell, of London, by Mr. Fred. Fane, of Stoke-

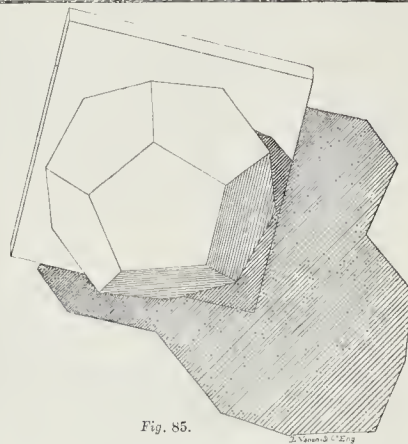
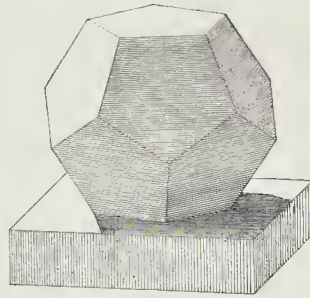


Fig. 85.

under-Ham, near Ilminster, contractor. The cost of the works to the nave was subscribed by the parishioners and friends in the neighbourhood; the chancel has been restored at the charges of the lord of the manor, Viscount Arbutnot. The glazing is by Mr. George Luxford, of Kentish Town; and the tile paving by Messrs. Malkin, Edge, & Co., of Staffordshire and London.

Streatham.—The new Church of St. Anselm is in progress, the memorial stone having been lately laid. The portion now erecting by Messrs. Bowyer, of Norwood, comprises chancel, vestries, and aisles, at a cost of 3,500l. The church, which is being built from the design of Mr. Withers, will, on completion, contain 1,000 sittings, at an estimated cost of 12,000l.

Rame (Cornwall).—The parish church of Rame, which overlooks the headland to which it gives a name, on the western side of the entrance to Plymouth Sound, was re-opened, after restoration, by the Bishop of Truro, on the 22nd ult. The work has been carried out at the sole cost of the Earl of Mount Edgcumbe, under the direction of Messrs. Hine & Odgers, of Plymouth. The church, which, though extremely exposed, is one of the oldest ecclesiastical structures in the country, consists of nave and chancel, with transept, porch, and vestry on the north side, and an aisle on the south. At the west end is a tower with broach spire of the thirteenth century, to which period the transept walls, a finely-proportioned three-light window, and the priest's vestry, with its original chimney-piece and narrow light overlooking the altar, also belong. A hagioscope commands the altar from the transept. During the restoration a portion of the altar-slab of the Early English church has been found, and a fragment of a still older church, namely, the carved tympanum of a Norman doorway. The aisle is fifteenth-century, and its wagon-roof has been restored, although nearly every timber was found displaced. New roofs of the same type have been constructed in the other parts of the church, as the old roofs were in a rotten and dangerous state; the ancient groin, however, at the intersection of the nave and transept roofs, has been

preserved. The new oak bosses have been carved by Mr. Hems, of Exeter, and at the point of intersection mentioned there is a large one, containing the Mount Edgcumbe arms. Buried under the former deal square pews were remains of the oak seating of the fifteenth century. These fragments, with some boldly-carved bench-ends, have been put together, and form a complete series of five ancient pews in the aisle. The new stalls, sedilia in sanctuary, and pews, are partly of oak and fir. The new pulpit, traceried, and for the most part open, is of oak on a stone base, and was made by Mr. Hasley, contractor, from the drawings of the architects. The ancient inscribed slabs have been relaid in the passages. The altar is of oak, the front being divided into seven carved panels. In the restoration of this church every fragment of old work (telling the story of changes in the past), which could be preserved, has been, from the Norman tympanum down to the quaint poor-box, of the seventeenth, and the font cover, with its gilded dove, of the eighteenth century. There is a new oak ligth-gate at the entrance to the churchyard, erected from the design of the architects.

Holywell.—The ancient parish church of St. James, Holywell, which has recently undergone enlargement and complete restoration at the cost of nearly 3,000l., has been re-opened. The work was undertaken by the vicar, the Rev. B. Williams, M.A., and from the plans of Mr. Mathew Wyatt, architect, of London, and it consists of the erection of an apse at the east end of the church, which forms a sacarium, a quasi-chancel having previously been formed by railing off a portion of the body of the church. The organ-loft, built in the tower, has been removed, and the massive masonry in the ancient part of the church, which previously was plastered, has been brought to view. The old pews have been removed. The sittings in the church, which are now free and unappropriated, are of oak and pitch-pine stained and varnished; the flooring under the seats is of wooden blocks, and the aisles are paved with tiles. A pulpit of carved walnut has been presented by Miss Jones, Tower Garden, Holywell; and a massive brass eagle lectern by Mr. Williams, of Chester, both of which were manufactured by Messrs. Jones & Willis of London and Birmingham.

Hawkesbury (Gloucestershire).—After undergoing extensive restoration, the ancient church of St. Mary, Hawkesbury, near Badminton, Gloucestershire, has been re-opened. The work of restoration was commenced in July, 1882, under the superintendence of Mr. William Wood Bethell, architect, of 7, Queen Anne's-gate, Westminster, by Mr. Gyde, builder, of Pitt-combe, near Stroud. The principal works which have been carried out are as follows:—Removing the whole of the plaster from the inside walls and roofs, except a few small portions of the Middleval painted work on the interior walls; relieving the gallery; putting a new oak roof on the nave, an exact copy of the old one, and covering it with lead; repairing the other roofs; altering and re-arranging the old oak seats; providing new oak stalls, sedilia, and altar-rail; laying wood block flooring under all the seats; re-laying the passages with the old paving stones and monumental slabs (the monuments remain untouched); repairing all the mullions, traceries, and string-courses and re-glazing the windows with cathedral glass; repairing the handsome stone pulpit; repairing the tower and fixing a lightning-conductor providing new oak doors, a tower screen wrought-iron chandeliers, &c. A heating apparatus by Grundy has also been provided. In carrying out the above works, among other interesting relics discovered may be noticed an Easter sepulchre; a double piscina; a monumental slab which once contained a brass; &c.

Stockton-on-Tees.—St. Paul's Church, Stockton-on-Tees, has just been consecrated. It is built in the Early English style, with nave and aisles, chancel, organ-chamber, two vestries and bell gable. It accommodates about 450 adults, at a cost of about 2,800l. The walls are faced inside and out with buff-coloured bricks relieved by red bands and quoins, and the dressings round the windows and doors are of white stone. The whole of the woodwork is of pitch pine. The chancel and gangways are paved with mosaic tiles. The windows are glazed with thick cathedral tinted glass, having borders of rich colours interspersed with roundels and relieved by coloured devices. The architect is Mr. J. P. Pritchett, of Darlington.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

39. Roofing Tiles. W. Finch. Tiles are corrugated, and butt against each at the top of the ridge. The meeting-faces of tiles are grooved for the purpose of forming ledges to carry down any water that may leak on them. The tile is first moulded with plain ledges, and then partially dried. The grooves are usual buttons and nail-holes are afterwards cut in a second mould.

34. Glass and other Roofing. C. Fowler, & Co. Sash-bars are rebated on the edge of the top and sheets of glass or slate, &c., are laid with edges in the rebates. The glass or other material is fixed by a strip of wood or metal, which is secured to the sash-bar, and between which and the layer of suitable packing is placed. Grooves run along the sash-bar on each side to carry the water condensing on the inner side of the glass.

55. Asbestos or other Millboard. R. L. W. Millboard is made impervious to the action of acids and of heat, and is rendered heavier by impregnating it while in a state of pulp with a large quantity of salt or other chemical substance of a nature. It may be thus used for fireproofing similar purposes.

47. Fire-grate. G. Dyer. Fire-bricks, instead of being round or square, made broad and thin, and inclined downwards to fire at an angle of about 45° to prevent the falling out when the fire is stirred.

43. Roofing Tiles. W. Vincent. Projecting lugs are formed on the upper edge of the backs of the tiles by which they are hung on the rafters. The corners are cut away and wedge-shaped pieces are formed of the backs of the tiles fit into these thus produced.

29. Roof Gutters. G. Kay. A screw or bolt by which the gutter-pipes are attached together at the joint is utilised to attach a pin by which they are fastened to the hangers on the roof.

APPLICATIONS FOR LETTERS PATENT.

By 8.—5,684, T. Helliwell, Glazing and Fixing of Glass, &c.—5,705, A. Blew, Fire Escapes, &c. also for Ventilating Buildings. By 11.—5,763, F. Walker, Improvements in Stairs.—5,767, G. Campbell, Improvements in Stairs.—5,769, G. Bodd, Ornamental Turning and Shaping Apparatus.—5,770, J. Shanks, Improvements in Lavatories.—5,773, H. Gull, Water-preventers.—5,774, S. Booth, Water Slide Chandeliers or Gasaliers.

By 12.—5,798, G. Croxther, Receptacle for Stains and Brushes.—5,801, C. Brother, Electric Bell Pushes, Contact Makers and Motors.—5,822, H. Haddan, Disinfecting Waters.—5,849, J. Pickford, Apparatus for Extinction of Fires.—5,855, A. Clark, Machine for turning off and boring Wheel Felles.

By 13.—5,868, A. W. Laxley and J. Langley, Combs for Gas Pipes and Pipe-cutting.—5,870, H. H. Giff, Chimney Tops.—5,896, J. Lewis, Improvements in Gas Burners.

By 14.—5,913, H. Waldron, Fixing and Securing of Knobs and Latch Lock Furniture.—5,916, J. Stalls, Improvements in Furnaces, Grates, and Fireplaces.—5,936, W. Lester, Astragal Sliding Bars for Roofs, Windows, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

17. E. Aldous, Ventilating Apparatus.—4,018, and E. H. Ludlow, Adjusting and Attaching of Knobs to Spindles.—4,314, J. Gibbard, Den Block Flooring and Lining for Walls.—6, W. Slidwick and J. Day, Latch Locks.—6, M. Conrath, Embossed Wall and Ceiling decorations.—4,449, T. Easley, Casement Stays.—6, G. Osborn, Apparatus for Printing on Wall, &c.—4,873, W. Leggett, Window and Door Sliding Bars.—4,911, I. Stiffert and T. Dykes, Sliding Grids.—5,042, J. Howlett and T. Orio, Water Waste Preventing Cisterns.—5,064, T. H. Hoarths and Checks of Grates and places.—5,102, H. Smith, Improved Paint or Cement.—5,613, F. Waite, Water Waste Preventers.—17,103, A. Mullor, Venetian Blind Laths.

41. W. Tapp, Improved Construction of Tiles for Roofs.—4,911, I. Stiffert and T. Dykes, Sliding Grids.—4,869, R. Duncan, Domestic Grates.—4,886, J. Eaton and F. Morris, Implements in Sliding Sashes.—4,901, W. Pinkerton, Hinges.—5,018, J. Walker, Cupboard Hinges.—5,086, W. Taylor, Circular Staircases.—5, S. Luke, Church Window Ventilators.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

46. H. Talbot, Ventilating Flue Bricks.—10, J. Forny and C. Keizer, Travelling Cart Hoist Apparatus.—10,622, C. Tebbutt, Bricks for Sliding Stables and Stable Yards.—10,705, A. Wood, Grilles for Protecting Shop Fronts.—

16,800, H. Marks, Self-acting Water Closets.—4,387, C. Marples, Attaching Nuts to Spokeshafts.—4,479, H. Ibbot-on, Opening and Closing Sash Windows.—10,429, W. Messert, Folding Shop-window Stand.—10,835, G. Gowing, Scraper for Cleaning Drains.—15,506, S. Owen, Improvements in Baths.—15,028, Baron de Liebhäber, Colouring Stone, Marble, and other Materials for Building.—79, W. Sanferson and T. Moffitt, Door Latches and Catch.—948, C. Longbottom, Door-knobs or Handles, and Fixing same to Spindles.—4,245, C. Longbottom, New Window-sash and Door Fastener.—4,539, H. Haddan, Improved Roof Covering.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MAY 11. By E. M. WHITTINGHAM. Ealing Park—An enclosure of freehold land, 6a. 3r. 27p. £2,760 By DOWSETT & WOODS. Chalk Farm-road—Nos. 24 and 25, term 45 years, ground rent 15s. 1,710

MAY 12. By ALVED RICHARDS. Westminster—An improved rent of 41l. 5s. a year, term 21 years. 300 By C. & H. WHITE. Lavender Hill—18, Gowric-road, 85 years, ground-rent 4s. 240

MAY 13. By RANDALL & BEARD. Shepherd's Bush—1 and 2, Sandringham-villas, 18 years, ground-rent 14s. 325 By E. F. FAYLER. New Barnet—A plot of 1 freehold land, 1a. 1r. 39p. 150

MAY 14. By JAMES GURNEY. Bucks, near Chesham—An enclosure of freehold land, 16a. 2r. 9p. 800 By DEBENHAM, TEBSON, & CO. Forest Hill—The residence, "Observatory House," 61 years, ground-rent 51l. 10s. 3,000

MAY 15. By GLASIER & SONS. Stroat Green—17, Grandville-road, 93 years, ground-rent, 16l. 18s. 670 Wandsworth Common—Rotherstone House, freehold 670

MAY 16. By WALKER & RUNZEL. Commercial-road, E.—No. 427, term 8 years, ground-rent 4s. 400 4, Exmouth-street, term 8 years, ground-rent 4s. 485

By ROBINSON & RUDKIN. Brixton—7, Brixton-rise, 82 years ground-rent 20l. £1,700 Edgware-road—No. 149, term 35 years, ground-rent 10l. 10s. 1,300 No. 153, 35 years, ground-rent 16l. 10s. 1,290 13, Oxford-terrace, 37 years, ground-rent 10l. 10s. 1,163 By BAKER & SON. Bermondsey—Ground-rents of 1,030s. a year, reversion in 65 years 28,200 Camberwell—Ground-rent of 24s. a year, reversion in 4 years 520

MEETINGS.

THURSDAY, MAY 22. Society of Telegraph-Engineers and Electricians.—(1) Mr. B. J. Farquharson on "ship-lighting by Glow-lamps, embodying Results of Trials on H.M.S. 'Colossus.'" (2) Mr. J. N. Shuttleworth on "Electric Lighting at the Forth Bridge Works." 8 p.m.

FRIDAY, MAY 23. Architectural Association.—Special Business Meeting. 7.30 p.m.

SATURDAY, MAY 30. Architectural Association.—Visit to Buchan Hill Mansion, Crawley, Sussex (Messrs. Ernest George & Peto, architects). Train from Victoria, 1.30 p.m. Civil and Mechanical Engineers' Society.—Visit to the new Blackfriars Railway Bridge. 2.30 p.m.

Miscellaneous.

Inventors' Institute.—On Monday evening last, at a meeting of this Institute, Mr. C. E. Spagnoletti in the chair, a paper "On Electric Tram-Cars" was read by Mr. A. Reckeuzann. The author said that whilst a single electric tram-car only existed in this country, a paper on the subject might be thought premature. This solitary example is, however, the latest and only practical form. After a comparison of horse, steam, and compressed-air traction with electrical traction, the difference between the electric tram-cars and electric tramways and railways was pointed out to be, that, whereas in electric tramways the energy is conveyed from the generating station to the rails or other conductor communicating with the motor which turns the car-wheels, the electric car carries its own energy within itself, and is quite independent of external influence, and the car can travel over any road or rail for whatever system, ordinary or specially designed. The Electrical Power Storage Company having acquired the patents of Sellon, Swan, and Volkman in addition to Faure's, have step by step improved the mechanical details of the storage batteries, until they have arrived at a thoroughly practical article,—but the prejudices created in the public mind by the early failures have to be overcome. The cell for the tram-car is contained in a lead-lined strong teak box. In it are placed twenty-one lead plates, weighing together 26 lb., including terminals and fittings. Sixty such cells, weighing one and a quarter ton, are required to propel a car with forty-six passengers for about two hours over a road with ordinary gradients, curves, and sixty stoppages per hour. A diagram was shown, representing the car which has been running at Millwall and Battersea. The electric motor has to convert the electric current into mechanical power. For tram-car propulsion it is absolutely necessary that the motor should have high efficiency, and, at the same time, be of small dimensions and light weight. The author's machine has, he contends, these qualifications. For the car there are two motors, each capable of working up to nearly nine horse-power and weighing 420 lb.; each motor is carried separately upon a small bogie, in such a way that each bogie forms a small locomotive-engine upon which the car rests. One axle of each bogie is a driving-axle; thus are actuated four small driving-wheels. The speed of the motors is high, about 1,000 revolutions per minute when the car is running at seven miles an hour. Thus it is necessary to introduce reducing gear between the motor shaft and the driving-axle. Variation of speed and power is obtained by means of a compound switch, which arranges the motor circuits so that the machines shall work in series, in parallel or singly. The late Mr. Louis Haghe.—The residence at Stockwell of this well-known artist, whose death we recorded not long ago, was sold by Messrs. Barker & Neale at the Mart, on the 19th inst. The property in question, which is freehold, and known as "Fern Lodge," 103, Stockwell-road, consists of an old-fashioned family residence, with well-lighted studio, and large garden in the rear, the whole covering an area of 26,500 square feet. It realised 1,990l.

"The Paragon Theatre of Varieties."

Such is the title of the new building which has been erected in the Mile End-road on the site of Lusby's Music Hall, which was destroyed by fire some sixteen months ago. The new building and its annexes cover more than an acre of ground. The following are some of the dimensions:—From the line of footlights to the back of the auditorium measures nearly 100 ft.; the hall proper is 60 ft. in width, with a promenade on each side of 20 ft., making a total width of 100 ft.; the height from floor to top of the domed ceiling is 60 ft., and from the line of footlights to the balcony and gallery front is from 55 ft. to 60 ft.; the stage opening is 34 ft. wide by the same number of feet in height; the depth is 64 ft., the height to gridiron is 60 ft., with a cellarage depth of nearly 20 ft., and a width across of about 100 ft. The principal entrance is from the Mile End-road. At the end of the entrance-passage is found the crush-room. Through this is seen the grand promenade, an apartment leading to the foyer, which is fitted with marble bars, a grill, &c. The foyer leads straight away to the promenade which surrounds the ground-floor of the theatre, and which, being a few feet higher than the floor whereon the seats are fixed, enables a spectator who is promenading round to have an uninterrupted and perfect view of the stage. The hall proper consists of the gallery, the balcony with twelve private boxes on a separate level, and, on the lowest level, the pit, stalls, and fan-tails. The gallery will accommodate about 800 or more. The architect of the building, the designer of all the decorative and other ornamental details, and the planner of the stage, is Mr. Frank Matcham, of Bedford-row. Messrs. Merryweather & Sons supplied the hydrants and fire-extinguishing apparatus; the gasfitting has been executed by Messrs. Vaughan & Brown; the upholstery by Messrs. Lyon & Son; the scagliola marble by Messrs. Bellman & Ivey; the marble work of bars by Mr. Salter; and the whole of the decorative plastering and painting by the Frame Makers', Gilders', and Decorators' Association. The general superintendence of the works has been in the hands of the architect and Mr. Wheeler, the foreman; Mr. Snow being the clerk of the works. The building was opened to the public on Thursday evening last.

Wind Velocities.—At the usual monthly meeting of the Royal Meteorological Society, held on Wednesday evening last, at the Institution of Civil Engineers, Great George-street, Westminster, Mr. R. H. Scott, F.R.S., President, in the chair, the following were among the papers read:—(1.) "Velocities of Winds and their Measurement," by Lieut.-Col. H. S. Knight, F. R. Met. Soc. The author, after describing the various ways of ascertaining the direction and velocity of the wind, makes several suggestions for the improvement of Robinson's anemometer. (2.) "On the equivalent of Beaufort's Scale in Absolute Velocity of Wind," by Dr. W. Koppen, Hon. Mem. R. Met. Soc. The author refers to Mr. C. Harding's paper, read before the Society in December last, on the anomalies in the various wind velocities given by different authors as equivalents for the numbers in Beaufort's scale, and, as illustrating the point, calls special attention to the want of agreement between the velocities obtained by Mr. Scott and those subsequently obtained by Dr. Sprung, and confirmed by himself.

Competition for St. James's (R.C.) Church, Manchester-square.—The (R.C.) Church of St. James, in Spanish-place, Manchester-square, originally the Chapel of the Spanish Embassy, is to be rebuilt on the opposite side of George-street. Sixteen R.C. church architects have been asked to submit designs, and most of them have accepted the invitation. The church only, exclusive of the adjoining buildings and of all furniture, is to cost 20,000*l.*, and is to be 158 ft. long and 80 ft. wide, and to afford accommodation for five altars and 2,000 worshippers, 500 of whom may be provided for in the triforium. Besides the church, the buildings are to include a confraternity chapel and a committee-room in the crypt, two sacristies, a tower, and a presbytery. The style is to be "Early English Gothic as practised in the twelfth and thirteenth centuries," and it is hoped that the church will be characterised by solidity, simplicity, stateliness, and spaciousness. The architectural assessor is Mr. Fergusson, but it seems his functions are confined to advising as to the architectural merits of the designs.

Neglected Nuisances and Typhoid.

If any point in the history of typhoid fever may be held to be established, it is the constant and essential relation which exists between that disease and the presence of sewage impurities. We cannot, therefore, but strongly condemn the blind neglect of cleanliness in a case which affords us the latest recorded illustration of this truth. The circumstances were the following:—An inspector of nuisances at Darlaston was required by the Local Board of Health, at the instance of the medical officer of the Board, to clear away an accumulation of sewage matter at the back of a house in which there were four cases of typhoid fever. The medical officer and the Board in so doing were of course only taking the first essential step in the treatment of disease,—the removal of its cause. The inspector, however, had other views. He saw no need for interference, and left matters as they were. Under such conditions no remedies could be expected to effect their purpose, and we are not surprised to learn that out of four persons attacked by the disease three died, an unusually high mortality for enteric fever. It must be evident to all that the censure which this official justly incurred at the hands of his employers is but a light one, unless it implies an assurance that like offences will be prevented in the future.—*Lancet.*

The Preservation of Marble Monuments.—At the last monthly meeting of the Vienna Society of Art Industry, Herr Bucher discussed the question, first raised at Munich, and subsequently taken up at Berlin, whether monuments of marble should be covered up during the winter months. He recapitulated the opinions and observations made by Professor von Pettenkofer, Herr Pecht, and the *Deutsche Bauzeitung*, from which it appeared that the real enemy of marble was the deposition of sulphurous acid from the atmosphere, which gradually changed the surface of the marble into gypsum, which was in its turn dissolved by moisture, and permitted destruction by frost, &c. Monuments would consequently have to be washed, and without this procedure even covering them up would offer no protection. The lecturer then pointed to the perfect preservation of the marble sarcophagus brought from Asia Minor by Count Lanckoronski, and now in the Austrian Museum, and finally threw out the suggestion whether the polishing of marble would not offer after all the best protection, not merely on account of the smoothness of the surface, which did not facilitate the accumulation of dirt, but because polishing renders the surface more dense.

Sales of Building Land at Norbiton and Walthamstow.—During the present week Mr. Richard J. Collier has held two successful sales of building land at Norbiton and Walthamstow. The sale on Monday evening consisted of several sites on the Norbiton Park Estate at New Malden, Surrey, the sale taking place at the Norbiton Park Hotel. The estate, which belongs to the London and Suburban Land and Building Company, has for some time past been lying idle, no sales having taken place for the last three or four years. There was a numerous attendance at the sale, and several of the sites, which have frontages of 30 ft., with a depth of from 190 ft. to 220 ft. were sold, the total proceeds of the sale amounting to about 1,700*l.* On Tuesday evening Mr. Collier held another sale of similar property, forming a portion of the Church-hill House Estate at Walthamstow. The sale took place at the Tower Hotel, Hoe-street, Walthamstow, when sixty lots were submitted to competition, the several lots having frontages of 18 ft., and a depth of 100 ft. Of the entire number of lots offered fifty were sold, realising an aggregate sum of about 3,200*l.*

Civil and Mechanical Engineers' Society.—A party of members of this Society visited the works of the new Hammersmith and Putney bridges on Saturday last, by the kind permission of the engineer, Sir Joseph Bazalgette, C.B. Messrs. Dixon & Thorne are the contractors for the Hammersmith Bridge, and Messrs. John Wardell & Sons are the contractors for the Putney Bridge. These visits proved most instructive and interesting, particularly the one to Putney, as in these days of iron construction it is seldom that an opportunity occurs for witnessing the erection of a masonry bridge upon the scale to be seen there. The constructive details of this bridge were very fully illustrated in the *Builder* for Jan. 3 last.

Portraits of Handel.—In connexion with the coming Handel Festival, the editor of *Magazine of Art* has arranged for the publication of an article by Mr. R. A. M. Stevenson on "Handel and His Portraits." Its purport is partly musical and biographical, and partly one of art criticism. It will be illustrated by engravings of the "Chandos Portrait," painted by Thornhill, from the Fitzwilliam Museum of the fine Grafoni, in the same collection, Mr. Henry Littleton's famous Ronbliaz, "Vauxhall Statue," as it is called; of Zinograph and interesting miniature, now the property of Mr. H. B. Lennard; of the engraving by Schmidt, which Hawkins thought the likeness of all; and (by permission of Howo) of the full length, painted by Howo for Charles Jenkinson, the librettist of "Messiah" and from the first an ornament of the "Music Room" at Gopsal.

Zinc Roofing.—The various work done to the roofs of the Hôtel Métropole, as to dormers, lunettes, mouldings to hips, curbs, has been executed by Messrs. Fredk. Braithwaite & Co., of the Euston-road, London. These manufacturers have devoted special study to the formation of zinc tiles, both square and circular. The difficulty regarding large zinc sheets allowing for expansion and contraction is overcome by the combination in fitting of pieces of zinc with peculiar language designed to exclude rain and promote security of fit (above, below, and at sides), so as to resist the most violent gales. Above 8,000 ft. square the square-shaped zinc tiles interlocking diagonally, and 10,000 ft. of those curved, are used in the immense expanse of roofing, besides nearly 5,000 ft. super. laid in sheets, and above zinc dormers and lunettes.

Liverpool Water-colour Society.—Liverpool Society of Painters in Water Colours, have, with the permission of the Corporation Arts Committee, secured two of the finest rooms at the Walker Art Gallery in which to hold their spring exhibition, viz. the first large room the new addition, where the fountain will play; also, the large room in which the collection of the Royal Water-Colour Society shown at the last autumn exhibition. They have also thrown the exhibition open to outsiders, several special invitations having been sent to the members of the Royal Water-Colour Societies and other artists of the country principally, many of whom have sent works. The exhibition opened to the public on Monday last. The list of exhibitors includes some well-known names.

Another Thames Bridge.—On Saturday the Teddington Local Board issued a public notice inviting tenders for the erection of a suspension bridge over the river Thames at Teddington, and a lattice girder foot-bridge over the lock-out adjoining the same, according to drawings and specifications prepared by Messrs. Pooley & Thompson, engineers. The project has been approved by the Thames Conservators.

TENDERS.

For the erection of the National Agricultural Kensington. Mr. Henry E. Cox, architect. Quantities by Messrs. Franklin & Andrews:—

Trollope & Son	£132,362 0
W. Brass & Son	149,477 0
Holland & Hannen	141,890 0
Hall, Beddall, & Co.	139,320 0
Kirk & Randall	139,000 0
Berry & Co., Ltd.	134,593 0
Lucas & Son (accepted) ..	131,573 0

For the erection of a house at Ascot, Berkshire, for Chas. Stonor. Messrs. Ernest George & Peto, architects. Quantities by Messrs. Stonor & Sons:—

Walls	£9,995 0
Hall, Beddall, & Co.	9,963 0
Nash	9,938 0
Brass	9,715 0
Bywaters	9,651 0
Longley	9,604 0
Higgs & Hill	9,438 0
Peto Bros.	9,174 0
Roberts	9,054 0
Stevens & Bastow	8,906 0
Stimpson & Co.	8,829 0
J. O. Richardson	8,733 0
Godard	8,642 0
Watson	8,611 0

For pulling down and rebuilding shop premises, No. 6 Great Portland-street, Oxford-street, for Messrs. Ket Messenger. Mr. T. G. Langridge, surveyor, 7, Cradock-street:—

Langridge & Sons	£1,964 0
Manning	1,884 0
Oldrey	1,784 0
Greenwood Bros.	1,697 0

COMPETITIONS AND CONTRACTS:

Epitomes of Advertisements in this Number.

COMPETITIONS.

Table with 5 columns: Nature of Work, By whom required, Premium, Design to be delivered, Page. Includes 'Huff Drive and Promenade, &c.' with a premium of 200 gu., 100 gu., & 50 gu.

CONTRACTS.

Table with 5 columns: Nature of Work, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page. Includes 'Pump and Vertical Boiler, &c.', 'Closets, Alterations to Windows, &c.', and 'Erection of a warehouse, Rockingham-street.'

Table listing contractors and their prices for 'For new schools, Broomsleigh-street, Hampstead, for the London School Board.' Includes T. Boyce at £12,100 0 0.

Table listing contractors and their prices for 'For the enlargement of schools, Collingwood-street, Tower Hamlets, for the London School Board.' Includes Holloway Bros. at £2,964 0 0.

Table listing contractors and their prices for 'For alterations and additions to Nos. 46 and 48, Stroud Green-road.' Includes Mutton Bros. at £411 0 0.

Table listing contractors and their prices for 'The erection of a warehouse, Rockingham-street.' Includes K. Coleman at £2,970 0 0.

Table listing contractors and their prices for 'For main sewerage and works connected therewith, at Pouchyndendmat. Mr. Thomas Roberts, A.M.Inst.C.E., engineer.' Includes White & Green at £1,696 11 6.

Table listing contractors and their prices for 'Listed for alterations, repairs, &c., to warehouses and Nos. 4, 5, 6, and 7, Great St. Thomas Apostle, street, E.C., for the District Railway Company.' Includes George Shaw at £2,614 0 0.

Table listing contractors and their prices for 'For the erection of factory in the Holloway-road, for Mr. A. Monk, organ-builder.' Includes Lidstone at £1,849 0 0.

Table listing contractors and their prices for 'The erection of a new church, at Llanvair, Carmarthen. Mr. E. H. Lingen-Barker, architect.' Includes Jenkins, Casgruen at £764 0 0.

Table listing contractors and their prices for 'For the erection of twelve cottages at Broadwater, Worthing, for Mr. J. B. Knowles. Mr. R. W. Moore, architect.' Includes Bridger & Son at £1,920 0 0.

Table listing contractors and their prices for 'Two houses at Honor Oak, for Mr. E. J. Powell. Alfred Howard, architect. No quantities.' Includes Brown at £1,491 0 0.

Table listing contractors and their prices for 'Accepted for building warehouse in Ewer-street, South-wark, for Mr. Church. Mr. T. Willis, architect.' Includes J. A. Taylor at £392 0 0.

Table listing contractors and their prices for 'Private residence and stabling at Streatham Common, for Mr. C. Meigh. Mr. Jesse Christian Jenkins, architect. Bank-chambers, Westbourne-grove, Bays-water.' Includes House at £2,319 0 0.

Table listing contractors and their prices for 'For building residence, stables, coachman's house, garden walls and lodge, at Brynawen, Breconshire. Mr. Stephen W. Williams, architect. Quantities by the architect.' Includes R. Davies & Son at £6,149 8 0.

Table listing contractors and their prices for 'Law business premises, Westbourne-grove, Bays-water. Mr. J. Christian Jenkins, architect. Bank-chambers, Westbourne-grove, Bayswater. For a portion.' Includes House at £1,900 0 0.

Table listing contractors and their prices for 'For the erection of new Mission Chapel, Hackney Wick. Mr. J. Weir, architect.' Includes Lathey Bros. at £1,594 0 0.

Table listing contractors and their prices for 'Listed for alterations and additions to Ambleside, Surrey, for Mr. J. Pascall. Mr. W. H. Wood, architect.' Includes Henderson at £316 0 0.

Table listing contractors and their prices for 'For alterations, &c., to the Seabright Music-hall, Hackney-road. Mr. J. G. Buckle, architect.' Includes W. Shurmur at £1,440 0 0.

Table listing contractors and their prices for 'For new Young Men's Christian Association building, Gile-road, Southampton. Mr. W. H. Mitchell, architect.' Includes Stevens & Sons at £1,439 0 0.

Table listing contractors and their prices for 'For proposed Congregational church, George-lane, Woodford, Essex. Mr. Thomas Arnold, Basinghall-street, architect. Quantities by Messrs. Curtis & Sons.' Includes Higgs & Hill at £3,980 0 0.

Table listing contractors and their prices for 'Accepted for rebuilding the Bricklayers' Arms public-house, at the corner of Fordham-street and Settles-street, Commercial-road, E., for Mr. W. T. Wackrill. Mr. J. T. Newman, architect. 2, Fen-court, E.C. Quantities by Messrs. Curtis & Sons.' Includes A. Reed, Stratford at £1,487 0 0.

Table listing contractors and their prices for 'For the erection of medical superintendent's house and registrar's office, Harrow-road, for the Guardians of Paddington. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities supplied.' Includes Belham & Son at £3,963 16 3.

Table listing contractors and their prices for 'For the completion of medical superintendent's house, lodge, &c., at the Western Hospital, Segrave-road, Fulham, for the Metropolitan Asylums Board. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities supplied.' Includes Proctor at £3,692 0 0.

Table listing contractors and their prices for 'For painting works at the Wandsworth Infirmary, for the Board of Guardians of Wandsworth and Clapham Union.' Includes Turtle & Appleton at £283 0 0.

For alterations and repairs to 4, Bennett-street, Tottenham-court-road, for Mr. J. Bickly Smith, Mr. C. V. Stevens, surveyor, 27, Southampton-buildings, Chancery-lane:—

T. Taylor	£233 0 0
Brown	232 0 0
Gould & Brand	237 0 0
Arnold	202 0 0
W. Crockett	200 0 0
Norris & Lake	175 0 0
J. Watkins	139 0 0
E. Parker	120 0 0
Wood & Harris	120 0 0
Sanders & Langley	120 0 0
S. Poulton	117 10 0
Groom, Rowland, & Co.	117 0 0
Dessily & Chard	105 0 0
Z. Ward	105 0 0
W. Feary	100 0 0
Hale & Twicken	100 0 0
Chas. Patterson (accepted)	85 0 0
F. E. Everitt	87 0 0
F. Roberts	87 0 0
T. Riches	74 0 0
Dunkley	67 15 0
Beach & Co.	67 5 0
Hindle	66 15 0

For alterations to Nos. 268 and 270, Edware-road, for the Hand-in-Hand and Insurance Society. Mr. Robert Willey, architect, 86, Ludgate Hill:—

Clarke & Bracey, London	£691 0 0
J. Woodward, London	634 0 0
Penny & Co., Ealing	598 0 0
Jones & Sons, Ealing (accepted)	485 0 0

For making-up carriage-way of Osian-road, Strand Green, for the Horsey Local Board. Mr. T. de Courcy Meade, engineer and surveyor:—

W. Porter, Hackney	£718 0 0
J. Finzey, Horsey	595 0 0
T. Adams, Tower-chambers	577 9 0
C. Taylor, Upper Holloway	559 0 0
F. A. Jackson & Sons, Finsbury Park	528 0 0
Aspinall & Son, Hoxton	522 0 0
E. Heard, Hoxton	510 0 0
W. T. Williamson, Green-lanes	494 0 0
Dunmore, Crouch-end	478 0 0
Alfred Walker, Upper Holloway	468 0 0
Mowlem & Co., Westminster	461 0 0
H. R. Treherne & Co., Battersea	289 0 0

* Accepted.

For the erection of shelter-houses on the Pier, Bournemouth, for the Bournemouth Commissioners. Mr. R. W. Peregrine Birch, engineer:—

Gilbs & Floy, London	£2,995 0 0
Young & Co., London	2,800 0 0
Treherne, London	2,768 0 0
James, Bournemouth	2,335 0 0
Rosser & Russell, London	2,198 0 0
Lawson & Donkin, Bournemouth	2,430 0 0
Jefferies, London	2,380 0 0
Crook, Southampton (accepted)	2,083 0 0

For the erection of hand-stand on the pier, for the Bournemouth Commissioners. Mr. R. W. Peregrine Birch, engineer:—

Ferry & Co., London	£238 0 0
Lawson & Donkin, Bournemouth	298 0 0
Cook, Southampton (accepted)	285 15 0
Peckhail, Bournemouth (informal)	274 0 0

For building a new bar and alterations to the White Hart, West Mersea, Colchester, for Messrs. S. T. Daniell & Co., East Donyland. Mr. J. W. Start, architect, Colchester:—

H. Woods, Peldon	£201 4 0
S. Start, Colchester (accepted)	193 14 0

For alterations at the Green Man, Cambridge-road, Bethnal-green, for Mr. F. Cokshred, Mr. Edward Brown, architect, Hanbury-street, Spitalfields:—

Mower	£196 0 0
Awley	490 0 0
Ayck & Todd	475 0 0
Jackson & Todd	475 0 0
Mar	447 0 0
Hawkins (accepted)	389 0 0
Steel Bros.	345 0 0

Plasterer's Work.

Warne	90 0 0
Pringle (accepted)	89 18 0
Rogers	59 14 0

Christian	88 10 0
Stedman (accepted)	87 0 0

For alterations and additions, to the Pelham Arms, Pelham-street, 8 with Kensington, for Mrs. Porch, Mr. H. J. Newton, architect, 17, Queen Anne's-gate, Westminster:—

Burman	£717 0 0
Gibbs & Fiew	608 0 0
Lamble	559 0 0
Walker	527 0 0
Steel, Dalston	489 0 0

Painter's Work.

Hellings	£5 8 0
Davidson	49 10 0
Heath, Bakers-street, Goswell-road	45 0 0

* Accepted.

For additions to house at Goring, for Mr. C. Weedon. Mr. J. S. Dodd, architect, Reading:—

Winkworth	£313 11 6
Smallbone	294 15 0
Higgs (accepted)	249 0 0

For new roads on the Goring Building Estate, for Mr. C. L. W. Gardner, Mr. J. S. Dodd, architect, Reading:—

Oliver	£632 0 0
Talbot (accepted)	469 0 0

Accepted for additions to house and shop at Goring, for Mr. Smith. Mr. J. S. Dodd, architect:—

Higgs	£367 0 0
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For cottage, bakery, &c., for Mr. C. L. W. Gardner. Mr. J. S. Dodd, architect:—

Smallbone	£329 0 0
A. W. Dodd	618 0 0
T. Higgs	588 10 0
T. Winkworth	518 18 6

For stables, &c., at Goring, for Mr. E. H. Baydon. Mr. J. S. Dodd, architect:—

Simmonds	£500 0 0
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The Builder.

Vol. XLVIII. No. 2088.

SATURDAY, MAY 30, 1886.

ILLUSTRATIONS.

Competition Design for the New Admiralty and War Offices: The Admiralty Courtyard.—Mr. P. J. Marvin, Architect	762-763
Sculpture at the Royal Academy: Autolyeus (Mr. E. Roscoe Mullins, Sculptor); Spartan Dancing Girl (Mr. G. A. Lawson, Sculptor)...	766, 767
Alfrick Church, Worcestershire, Enlarged and Restored; Exterior and Interior Views.—Mr. Aston Webb, Architect	770, 771
A Suggestion for the Treatment of the West Side of Westminster Hall.—By Mr. E. A. Hoffer, Architect	774
Double Piscina, Merton College Chapel, Oxford.—Measured and Drawn by Mr. H. D. Walton	775

CONTENTS.

Old and New Sarum	751	Design for Admiralty and War Offices	760	York House Water-Gate	779
The Aesthetic Analysis of Curves of Contrary-Flexure.—By W. Care Thomas	752	Sculpture at the Royal Academy	759	A Question of Valuation	779
Restoration or Repair?	752	The Church of St. Mary, Alfrick, Worcestershire	760	Provincial News	779
Notes	754	Westminster Hall	761	The Student's Column: Descriptive Geometry.—Part II.	780
Architecture at the Royal Academy	754	Double Piscina, Merton College Chapel, Oxford	771	Recent Patents	780
Notes at the Paris Salon	756	The Hotel Métropole	777	Recent Sales of Property	781
The Inventions Exhibited: Prime Movers—I.	757	Post-Boxes (Illustrated)	779	Meetings	781
The Lion and the Palm: Notes on Recurring Forms in Historic Ornament (Illustrated)	759	Baileys' Benevolent Institution	779	Proposed Art Museum for Bath	782
		Obituary	779	Sanitary Supervision of Hotels	782
		Temple Bar Gates	779	Miscellaneous	782

Old and New Sarum.



LOSE to the spot where the wild and desolate undulations of Salisbury Plain terminate on the south through the junction of the river Avon and its tributary, the Wily, stands conspicuous a steep hill, almost detached from the high ground of which it is a projecting spur. By nature it is adapted to be a fortress of a primitive race. By primitive races it was made a fortress. Perhaps the Britons were the first to occupy it. They were assuredly followed by the Romans. After them came the Saxons; in course of time it was stormed and held by the Danes. Gradually, as more permanent means of fortification were adopted, it became the seat of a city and castle, which, under the name of Old Sarum, has filled archaeologists and historians with interest, and has excited the derision of every post-Reform politician.

Imagine a space of ground, somewhat larger than Kennington Oval, forming a tolerably level summit to this steep hill. Just where his miniature table-land begins its abrupt descent to the valley on every side, imagine a huge circumscribing ditch, deeper and wider than the moat of many a castle; rising from the midst of the table-land picture another steep mound, also surrounded with a tremendous ditch; clothe the ditches with shrubs and trees; fringe the edges of the scarps with bushes; scatter a plentiful sprinkling of flints over the ploughed surface of the main platform; leave the summit of the central mound undulating and grassy; and you have the present aspect of Old Sarum. The ditches are the remarkable part; their width, their depth,—if strength depends upon such qualities,—must have rendered the place almost impregnable. It is said that we owe them to the Saxons, not improbably to Alfred the Great. Certainly later comers made use of them when the city began to arise, and they were rendered still more secure by the erection of a flint wall on the inner edge. One little fragment of this still remains, as devoid of detail and as much like concrete as the fragments of the abbey at Bury St. Edmunds. It is strongly defended, lying at the junction of several important roads, and in the heart of the country the theatre of the principal events recorded in the early history of the island, Old Sarum became one of the most important towns in the kingdom. The city grew till it led the whole of the little plateau. Further

than this it could not extend, for there was the huge fosse, and beyond it a violent descent into the valley. On the central mound stood the castle, dominating the whole town; sloping away from it were thickly clustered houses, all ending abruptly at the wall and fosse. Perched thus on the summit of the steep hill, Old Sarum must have looked very much like the little cities which figure in the backgrounds of Albrecht Dürer's pictures, only the tapering spires would be wanting, and the general appearance would be sterner, straighter, and more sombre than that of the later German cities. Beneath the walls of the city, in the plains where Salisbury now stands, William the Conqueror held a review of his victorious forces four years after the great battle of Hastings. Two years later than this the city was further distinguished by the removal to it of the episcopal see, which hitherto had been at Sherborne, in Dorsetshire, and presently a splendid cathedral was commenced. After fifteen years of labour it was finished and consecrated in 1092, in the reign of William the Red, and was worthy to be compared with any of the numerous cathedrals and abbey churches which were then rising throughout the land.

The city was now complete. It had its castle, its cathedral, and hishop's palace, its miniature streets of grim houses thrusting themselves up to its grimmer walls. Man had done his best; but Nature was against him. The stars in their courses fought against Old Sarum. The place was bleak. It was exposed to every wind of Heaven. The rude north wind, after racing across the petrified billows of Salisbury Plain, burst in fury against the lofty city. Its elevated situation made it the sport of every tempest, and only five days after the cathedral was consecrated a thunder-storm destroyed the roof of the tower, and damaged the walls. The soil was unkindly, and refused to produce much besides flint. There was very little water, and what there was could only be obtained at a high price. A canon of Salisbury, Peter of Blois, who lived in those days, records the absence of water and the abundance of flints. "The wind rages there," he also says, "but the nightingale is silent."

"Sevit ibi ventus, sed Philomela silet."

All this might have been borne had the city not been divided against itself, but the union of Church and State bred quarrels. All was well so long as the bishop of the cathedral was also castellan, but when the constablership of the castle was given to a layman jealousies arose. Perhaps a dissolute soldiery chafed at the constant reproach implied by the hameless life of the monks; perhaps the erring priests saw in the soldiers a tacit condemnation of

their own evil courses. But whichever way it was, the secular arm was the stronger, and on one occasion asserted itself in a very aggressive manner. The clergy, in accordance with their regulations, wound solemnly down the hill one winter's day to visit a church somewhere in the valley. The soldiers seeing the whole mass of them fairly outside the gates for at least an hour or two, holdly resolved that they should stay out a good deal longer than they expected. When the monks returned they found the gates closed, and, amid the fierce blasts of a long winter's night, they had to divert themselves as best they could. It must have been excessively aggravating. A solemn procession in winter is but a cold affair; and not all the awe of an ignorant peasantry would be able to compensate for the absence of a good warm fireside. But when, instead of the reverential salutes of the good country people, they were met by the rude taunts of an irreverent and unbelieving soldiery, and the unyielding exterior of their own iron-bound doors, their exasperation must have been complete. If this was to live on a hill, "in God's name," as Peter of Blois said, "let us descend into the level." We can picture good Bishop Poore gazing from a terrace of his exalted palace across the broad valley in search of some place where his monks might be free from the intolerable arrogance of the soldiers. Undoubtedly the most suitable place was away there where the Avon received its tributaries, for already those fair meadows had become the home of many men from the little city whose bounds it was impossible to extend. Some people say the precise spot for the contemplated cathedral was revealed to the Bishop by the Blessed Virgin herself in a dream; others that a bow was drawn at a venture from the castle walls, and that the place where the arrow fell was chosen. But not the strongest of all the tormentors of the monks could have shot an arrow from Old Sarum to the new cathedral, even though burning with the desire to shoot his reverend companions as far away as a man might.

Be this as it may, on the 28th of April, 1220, 128 years after the consecration of the large cathedral on the hill, the first stones of the new and larger cathedral were laid near the river by Bishop Poore, and in a space of forty years the whole pile arose, much as we see it now, to the level of the top of the roof. The growth of the town kept pace with that of the cathedral. In the seventh year of the building Henry III. granted a charter, making the new town a free city. Seventeen years later the great west road, the Icknield-street, was diverted from Old Sarum to the new Salisbury. From that time the elder place declined. It gradually became deserted, its walls fell to ruins; its

cathedral was taken down in 1331, after a life of some 240 years, and went towards the finishing of the new building at Salisbury; and by the time of Leland, who wrote about the period of the Dissolution of the Monasteries in Henry VIII.'s reign, "not one house, neither within or without Old Sareshyri," was inhabited. Much notable ruinous building of the castle remained, and the ditch struck him as "a very deepe and strong thyng," but the place was dead and half-buried. Since then the work of destruction has been going on; the "notable ruinous building" has entirely disappeared save for the scrap of walling already mentioned; and the terrible fosses, those "deepe and strong thynges" which frightened good Mr. Pepys in the dark, afford perennial pleasure to children going a blackherrying; and, if any one wishes to realise what a task it would have been to take the place by assault with heavily-armed men, let him scramble up the sides in his mean nineteenth-century dress.

Splendour as was the cathedral of Old Sarum, it must have been far inferior to that which we see to-day. Its site was wild, weird, and picturesque, but in a forbidding fashion; magnificent no doubt it was, but heavy and sombre, with small windows and huge piers, remarkable, considering the age in which it was built, but what a fierce age it was built in! The younger cathedral was the outcome of greater knowledge and increased refinement. Clustered shafts replaced the cylindrical columns of the nave; graceful triplets superseded the old bare circular-headed windows; clean, delicate vaulting ribs leaped from pillar to pillar, instead of the cumbrous framework of the Normans; and in course of time the wonderful spire soared up 400 ft. above the placid level of the Close. As a specimen of a splendid phase of English architecture Salisbury Cathedral is unique. It has all the virtues and shortcomings of that which we aptly call Early English. No style has ever expressed its purpose in fewer lines than Early English. Its utterances are all simple, direct, innocent, yet sometimes crude, like those of an intelligent child not yet self-conscious. In design, so long as everything is straightforward, nothing can be more satisfactory; but how when there comes a difficult little corner? Take the east window of the choir at Salisbury. To pretend that the early masters, with their broken-backed arches, have coped with the problem as successfully as they would have done had they lived in the Perpendicular era, is to do violence to the meaning of language. But in the graceful simplicity of their nave arcades and vaulting, they far surpass the pedantic, synchoidal, bebossed work of their successors. The nave at Winchester, save for the colour, is not to compare with Salisbury. It is in colour that Salisbury loses so much; the bare clean walls, and the windows innocent of all brilliancy, give it a cold air, which a rather scanty congregation does not tend to dispel.

One of the abiding wonders of Salisbury is its spire, 30 ft. higher than the cross of St. Paul's. It is not everywhere that this enormous height tells. Seen from the close, and carrying the eye up from precipice to precipice, till the smooth slope of the spire itself terminates in the cornice of the ironwork at the summit, the effect is most impressive. So, too, is the view from parts of Salisbury Plain, where the spire is seen shooting up from a hollow, which engulphs every vestige of the town and the body of the cathedral. Every one praises this marvellous work, but does every one who speaks of it with undiluted commendation really mean that he absolutely approves of the way in which the springing of the spire from the tower is masked by the pinnacles? Not as a matter of principle, but as a question of graceful contour? Is it not possible that many of the verdicts about particular architectural features here and elsewhere are the result of rather antiquated classification, like that, for instance, which, without appeal, points out the monument of Giles de Bridport as the finest in the cathedral? This verdict clearly was given in the palmiest days of the Gothic revival, and would

find many cavillers in these days of renescent Renaissance.

More than 200 years ago visitors were treated to a set story, as they are now, although no architectural theories had then been broached. Does not the following note, still visible in faded ink on the fly-leaf of a certain seventeenth-century "Concordance of Yeares," and written by an occasional visitor to the cathedral, smack strongly of the verger:—

"Our Ladey Church in Salisbury was built by 3 hishopes; the first was bushop poore, hee built 11 yeares; the second bushop Bingham, hee built 20 yeares; the 3 was bushop yorke and built eleven yeares; it was a building 42 yeares & have ben built 4 hundred yeares in the yeare 1662. It have as many Chapells in itt as monthes, as many doores as weeks, & as many windowes as dayes in a yeare, and as many marbell pillors as howers in a yeare. The lenth of this Church is on hundred 45 yards long and soe is the steeple; and the 22 of september 1623 there was 2 men at the toppe of him and did roost a shoulder of mutton. The prince of denmarke wa' there then."

The only man who is now allowed to climb this dizzy height, the last few yards of which have to be surmounted by an external ladder, is the man who oils the vane; but there is no record that he cares, on his annual expedition, to stay and roast a shoulder of mutton there, either with the countenance of the Prince of Denmark or without.

Few, if any, of the English cathedrals can vie with Salisbury in the beauty of its Close. The great extent of the smooth sward from which the cathedral springs abruptly, like the mountains from the Lake of Lucerne; the ancient trees whose shadows sparkle, on a sunny day, with every passing breath; the liquid music of the rooks; the screen of ancient houses which completely surround it and shut out the busy, profane world; all these combine to form an ideal picture of dignified, placid content. Here the noise of the "maddening crowd's ignoble strife" falls faint and musical, blended with the happy gurgle of the rooks or the distant peal of the organ. Not often is the stillness broken save by the demizens of the place. Perhaps twice on Sundays it is enlivened by a stream from outside its gates, called thither by devotion or its frequent substitute, the love of seeing and being seen. But the tide ebbs as quickly and completely as it flowed, and the Close returns to its normal state of repose. Ah! could one but cast away doubts and difficulties, fling the consideration of problems to the winds, refuse to listen to the dry voice of logic, accept the belief that what is right, and take up one's abode in Salisbury Close as a calm contented member of the Chapter! How could not one study architecture then,—the architecture of delightful books and white-handed dilettanti,—free from the miseries of disputed accounts, scamped work, and the untuneful chorus of committees!

THE ÆSTHETIC ANALYSIS OF CURVES OF CONTRARY-FLEXURE.

BY W. CAVE THOMAS.



HAVE taken the above theme for a casual exposition of an æsthetic analysis based upon the quantitative or mathematical theory of taste. The curve of contrary-flexure, alternation, or undulation is one very widely obtaining in the fluctuation of nature from one state to an opposite. It is the curve of easy transition. The curve has its analogues in the graduation of colour, light and shade, and music. It is even by a curve of this kind that trains are smoothly transferred from one line of metals to another.

Hogarth never got to the top of the notion of which his line of beauty was a vague *aperçu*. That line, as he conceived it, was constituted of two equal but reversed curves, and was, in the absence of moderate contrariety in its proportions, in no strict sense a line of beauty. The more beautiful curves of contrary-flexure are those in which the two curves are moderately differentiated in magnitude, and in character; those in which a long obtuse curve alternates with a short acute, and *vice versa*. This is the type of the cyma.

Dilettanti writers are very apt to affirm that there is no equality in nature. Nature, nevertheless, refutes them; she exhibits equality as well as inequality,—she gives us equal as well as unequal days and nights,—equal as well as unequal divisions in the human frame, and regular as well as irregular geometrical figures. Still, it may be admitted that equality is not her general tenour. She avoids extremes, and steers a middle course, between the polar opposites of parity and extreme difference.

Equality and greatest difference are the extremes of quantitative relation, of ratio, and may be expressed as 1:1 and 0:1. Between these polar extremes nature generally oscillates, seldom deviating, but within the limits of moderation, from her golden mean. This, which is the principle of rectitude in nature, should also be the principle of taste. It was long since regarded as the principle of morals by Aristotle, and modern writers on this subject are beginning to see that right conduct is proportioned conduct. We may go a step further, and show that correct taste is proportioned taste. Dufresnoy must have felt this when he wrote,—

"And taste, like morals, loves the golden mean."

Perfect taste alike rejects the extreme of equality and of inequality in the quantitative constitution of objects designed solely for its gratification. The limits of moderate variation of ratio are 1:3 and 2:3; 1:3 represents moderate divergence or inequality between two quantities, and 2:3 (1:1½) the moderate approximation of two quantities to likeness, sameness, or equality. The ratio of absolute indifference or neutrality between the extremes of quantitative relation is expressed by the mean ratio 1:2. It is this ratio of which alone it cannot be said that the relation between its two terms is either too equal or too different. The following is the skeleton scale of the infinite series of ratios:—

Compass of moderate ratios.		
Equality.		Greatest dif.
1:1.	2:3.....1:2.....1:1½.	0:1
Extreme.	Mean.	Extreme.

1. *Curves of Contrary-flexure composed of Segments of Circles.*—The circle is the geometrical figure of extreme equality, every point in its circumference being equidistant from one within. And its curve is the curve of extreme grossness to sense. The cultivated sense alike revolting from excess and defect, the too much and the too little, finds its concord in "the moderate." For these reasons the circle is not found to obtain to any great extent in works of consummate taste, for the circle and sphere are too equal, too constant in curvature, and too redundant in mass and contour. The circle, however, occurs in the horizontal sections of works of nature and of art. In works of art the circular in plan is mitigated in perspective and appears elliptical. Curves of contrary-flexure composed of segments of circles are, therefore, seldom found in artistic design; that composed of two semicircles is perhaps the most disagreeable of its genus. A curve of contrary flexure of two flatter segments, or of arcs of 90 deg., is far preferable, and is very much the proportion of Hogarth's line; but both the foregoing combinations contain too great an amount of equality or regularity in their curvature and their alternation. A much more agreeable line than either is that which is composed of two unequal segments whose chords, and whose arcs, are in the mean ratio of 1:2, and of such there may be two modes, *i.e.*, one in which the longer chord carries the obtuser segment, and the other in which it carries the acuter. In these combinations an element of moderate contrariety is introduced which æsthetically improves them.

2. *Curves of Contrary-flexure produced by Combinations of the Ellipse.*—The next series of curves of contrary-flexure and of æsthetic superiority, as it would naturally be supposed, would be combinations of the ellipse. And, just as æsthetically the ellipse supersedes the circle, in sensuous opposition, by the greater amount of inequality or differentiation in its curve, we should expect elliptical curves of contrary-flexure to supersede those of the

entirely old or entirely new; a piece of patchwork it may be called; but then all our old churches have been pieces of patchwork for centuries, and must continue to be so unless posterity is to be deprived of them altogether.

NOTES.

DISCOVERIES as to the ancient topography of Pergamos go on apace. Dr. R. Bohn thinks he has fixed the site of the Temple of Dionysos. Dio Cassius, who was himself at Pergamos, mentions a Dionysion (Dio Cass., xli., 61), and Caesar ("De Bell. Civ.," iii., 105) speaks of the adyta of the same temple. A theatre has been laid bare at Pergamos, and an inscription settles that it was dedicated to Dionysos, the leader (*καθηγεμών*). There is no space for a temple close to the theatre, so Dr. Bohn looks a little further afield. On the lower market-place, close to the west wall, the foundations of an oblong building, unmistakably a temple, have been excavated. Happily what that temple is placed almost beyond doubt by the discovery of architectural and sculptured remains built into a neighbouring Byzantine wall. From these it appears that the temple was a Doric prostyle, presenting certain peculiarities, which Dr. Bohn shows in detail in his reconstruction. The waterspouts of the cornice are sculptured very appropriately into satyr heads, unmistakable from their long pointed ears. A marble slab has also been found, decorated with somewhat naturalistic designs of vine branches with leaves and fruit. Dr. Bohn conjectures that this formed part of the frieze of the inner cella. His paper on the subject was read before the last meeting of the Königl. Preuss. Akademie, at Berlin, and is now published as a *tirage à part* from the *Abhandlungen* of the Society.

AMERICA, with its slender archaeological resources, yet ventures to put forth a periodical devoted exclusively to the promotion of archaeological study. The "American Journal of Archaeology and of the History of the Fine Arts," the first number of which has just appeared, covers a wide field,—antiquities, Oriental, Classical, Early Christian, Medieval, and American. The journal undertakes not only to notice and illustrate important works contained in public museums and private collections, but also to record and review the whole field of archaeological discovery and investigation, and to furnish reports of meetings, summaries of papers, reviews of books, &c. We are glad to see there are nine editors, two general and seven special; we think they will have enough to do. England is represented by Dr. Waldstein. The journal is to appear four times yearly. The first number, which may be supposed to be fairly representative, contains a paper on J. J. Middleton, whose only interest is, we suppose, that he was apparently the first American archaeologist (we hope the paper will not lapse into mere antiquarianism); a discussion by Dr. Waldstein of the central slab of the Parthenon frieze; an account of some inscribed sepulchral vases in possession of M. Feuillant, of New York, by A. C. Merriam; an article on the revival of sculpture in Europe in the thirteenth century; and a paper by A. R. Marsh, which is in fact an analysis of Dr. Dürrfeld's *mémoire* on ancient brick construction and its influence on Doric style, which we noticed in detail six months ago.

THE Lillebonne mosaic is to be put up to auction at the Hôtel Drouot, Paris, and will go to no one knows whither. M. E. Babelon does, therefore, good service to archaeology by securing, if not the safety of the original, at least, a careful reproduction in the *Gazette Archéologique*, the current number. The mosaic was found at Lillebonne, near Havre, and belongs to a class necessarily rare, *i.e.*, monuments of Roman workmanship found within the limits of ancient Gaul. The few mosaics with pictorial, as opposed to merely decorative subjects found in France, have too often suffered destruction

from their inconvenient size. The centre of the Lillebonne mosaic represents Apollo pursuing Daphne; the lower part of the face and most of the figure of Apollo are destroyed. The inscription above and below this central design runs "Titus Sennicius Felix, citizen of Puteoli, made this, and his pupil Amer, citizen of Carthage." The outside field divided into four parts, represents four hunting scenes; the start in the morning with a tame stag, taken as a decoy, two hunting scenes, and an invocation to Diana. M. Babelon recalls the similar representation (also probably coming from Carthage) on the Præneste Phœnician bronze bowl, the subject of the famous *mémoire* by M. Clermont Ganneau. We shall be interested to learn where this valuable mosaic goes to.

WHAT the Egyptian Exploration Fund has recently done for Egyptology is by now matter for European fame; what it has done, what we confidently hope it will do for the history of Greek art, and especially of Greek ceramics, is less well known. Happily the Fund has had for its chief promoter a scholar whose sympathies are wide enough to embrace both East and West. From Nebelrah has just arrived a case containing samples of the treasure-trove. With a wise liberality these specimens are shown to the public in the right-hand wall case of the fourth vase-room of the British Museum. In a few weeks more eight large cases are expected. When these appear we shall hope to notice and comment on the find in detail. Till then we must be content to point out that, to the student of ancient pottery, and specially that of the archaic period, the fragments already sent are of the first importance. We note in particular a fragment painted in delicate colours, with a chorus of female figures dancing hand in hand, another fragment of a woman figure inscribed in archaic letters on either side, some fragments painted with red-yellow designs like the early Ephesus pottery, another with a chimæra of novel pattern, some fragments which seem to us to be of the Dipylon style. All these are marked by a specially delicate naturalism. Of the black figured period we have a fragment with a negro's head, very carefully executed; and last, though no wise least, a cylix nearly complete with the design of Odysseus carried by the ram.

THE completion of the Canadian Pacific Railway is not only a prominent incident, even in these days of gigantic engineering undertakings, but is one that directly affects British interests, as being the first successful effort to bridge the North American Continent across Canadian territory, and thus bringing the resources of the Atlantic coast into immediate connexion with those of the Pacific. In the more southerly portions of the Western Hemisphere, the Americans have already done this by the building of three enormous trans-Continental systems, two of which place New York in direct communication with San Francisco,—the one *via* Chicago, Omaha, Ogden, and Sacramento; the other by St. Louis, Kansas City, Topeka, Santa Fé, and Los Angeles. The third and most recent runs from Chicago by St. Paul, Bismark, and Helena, to Portland on the Oregon coast, and is known as the North Pacific Railway. In point of distance, however, the Canadian system has the advantage of them all, the mileage from Montreal to Port Moody, in British Columbia, being only 2,870, while that from New York to San Francisco is 3,331 by the shortest of the United States lines, so that, as a matter of fact, the two largest American cities are nearer to the Pacific by the Canadian road than by their own. The moral effect of the completion of this great artery to the British possessions can scarcely be over-estimated, either for business or governmental purposes. Troops can now be conveyed from Halifax to Vancouver's Island in seven days; and it is not too much to say that the quelling of Riel's rebellion has, to a great extent, been facilitated by the proximity of the rails to the disaffected country. A vast area

is now made available for agricultural undertakings, while the wheat crops of the far North-West, the cattle of the Rocky Mountain ranches, the fisheries of the North Pacific coast, and the gold mines of British Columbia will be brought within three weeks of the English markets. By the establishment of regular lines of ocean steamers, as contemplated, the time now occupied between England, China, and Japan will be reduced by at least one third, while, last but not least, one of the wealthiest points in the British dominions, and the least guarded against Russian aggression, will now be fortified a hundred-fold, both actually and morally. The Canadian Pacific has forged another great link in the homogeneity of the confederation, and the establishment over the sea of a vast British kingdom as large as Europe, and more than half the size of the United States.

THE truth that there are always two sides to a shield is sometimes illustrated in a remarkable and unexpected manner; and although dirt (euphuistically defined by Lord Palmerston as matter in the wrong place) is constantly found as a practical element in social life, it is rarely that it has apologetics hardy enough to defend its presence. But this has now happened, and in such a forcible way that many people will begin to doubt the doctrine of cleanliness being next to godliness. It appears that, amidst the Crofters' question, somebody has been describing in the *Times* the filthy condition of Highlanders' houses generally, as being dark, unhealthy, and miserable, the occupants, both man and beast, having no light or ventilation save from the aperture through which the smoke escapes. However, a Highlander has started up to do battle for the beloved bottles in which he passed his early days, and to which he attributes all the blessings of his subsequent life, including a herculean frame and constitution. Not only, according to him, is the ventilation singularly effective, if rather draughty, but the continued inhalation of peat smoke, which generally brings tears to the eyes of the unacclimatised visitor, exercises marked beneficial results in protecting the lungs from consumption and other diseases that depend on various forms of parasite. This view is strongly corroborated by a Manchester physician, who points out that there certainly is a remarkable immunity from phthisis amongst the Highland race, and this he ascribes very largely to the inhalation of peat smoke, which contains many antiseptic ingredients, such as tar, creosote, and tannin, together with other volatile oils and resins. It is worth noting also that the Highlander whom an unkind fate afterwards drives into an ordinary chimneyed building, thereby lowering his stamina, loses his charmed existence, and becomes as liable as other beings of a lower order to the ills and diseases to which flesh is heir.

THE Vicar and Churchwardens of Great Bookham, near Leatherhead, have given notice of their intention to apply for a faculty for the complete restoration of the parish church, for which purpose a sum of 1,700*l.* has been subscribed. A description of the intended alterations has been affixed to the church door, with an intimation that notice of objection should be forwarded to the Office of the Commissary of the Diocese of Winchester for the County of Surrey, 23, Knight-riding-street, Doctors' Commons, not later than the 7th of June. The church was partially restored some years ago, when the south aisle was refaced externally, a new roof put to the chancel, and the stonework of the arcading in the interior scraped and pointed. The most conspicuous features in the church at present are two monuments, one on the north side and one on the south side of the chancel, to the memory of William Moore, of Polesden, the eldest son of Archer Moore, of Fetcham Park, one of the Lords Commissioners for Trade and Plantations in the reign of Queen Anne, and M.P. for Banbury, who died in 1746; and of Colonel Thomas Moore, a younger brother of Arthur Moore, who planted Fetcham Park and built the mansion, now the residence of Mr. J.

Barnard-Hankey, but who is chiefly memorable for an amusing squabble with Pope, who, he alleged, plagiarised his verses. These monuments, which are of considerable merit and are very characteristic of the art of the period, are proposed to be removed and to be refixed on the north wall of the north aisle. It is proposed to re-arrange the memorial tablets in the chancel. If any of these have marked the site of an ancient interment this is a step which should not be taken unless absolutely necessary. On the north wall of the north aisle is a tablet to the memory of Louis Bazalgette, who died in 1830, but was not buried there, but in Marylebone Church, London.

AT the Church of San. Giovanni in Laterano in Rome, the works in the transept consequent on the moving back of the east end of the choir, with its beautiful mosaics, are approaching completion. As far as lavish expenditure can go, all is being done, but that "all" is in the worst possible taste. Marble inlaid work of bad design, and gilding smothering every enrichment, are placed side by side with thirteenth-century mosaics, and the *tout ensemble* is as jarring as possible. The beautiful cloisters attached to this church are still divided up by partitioning and glazing, which certainly neither preserves them nor improves their effect.

AN exception to the general condemnation of Italian restoration should be made in the case of Orvieto Cathedral. The roofs of the nave and north aisle are being replaced, and the latter, which is nearly finished, really looks very well, and suits the character of the building. In form it is a lean-to, very much like one of the English fifteenth-century roofs, but with very much coarser details. The nave is to have a tie-beam roof, of much the same character and similar in design to the old one it is to replace. It is very probable, however, that, as at San Miniato at Florence, the timbers will be painted in very glaring colours.

THE Irrigation Commission in America has given an interesting account of windmill irrigation at Florin, about eight miles from Sacramento. It appears that formerly the neighbouring district was irrigated by channels led from the Sacramento river, previously to which time it had been impossible to obtain water by sinking wells, but since the saturation of the soil has taken place water is found at depths of 10 ft. to 20 ft. One particular farm visited had fifteen windmills on about 40 acres, which were cultivated chiefly with blackberries, strawberries, and table grapes. The first-named fruit were a variety as big as plums, and yielded about 4 tons per acre, as also did the grapes, which without irrigation could not produce one ton. The blackberries and strawberries are sold for 6 cents per pound at the nearest "canneries," but the grapes are carried by rail over 2,000 miles, as far as Chicago, where they fetch 30¢ per ton. The soil at Florin, although poor on the surface, is underlaid by a "hard pan" formation containing lime and other elements, which, being brought into contact with water, decomposes and makes a rich mealy subsoil for sustaining deep-striking roots like that of the vine. The cost of the windmills varied from 12¢ to 20¢, and that of the pump, with 50 ft. of piping, was about 3¢. 12s.

AN endeavour towards imparting an artistic and attractive aspect to a very plain (nay, ugly) interior, has been taken in hand by a number of the students of the School of Design, in Edinburgh. The interior in question is an appendage to a mission church just completed at the north-west angle of the Grassmarket of that city. It would perhaps be too much to expect that the interior of a Presbyterian church should be decorated with mural paintings, but no objection could reasonably be taken to such decoration in a Sunday school. The church is lighted from one end and one side, and the blank wall surface would have afforded a wide field for decoration; and it may probably, in the course

of time, receive such. It is, however, in the Sunday-school, which occupies the ground-floor upon which the church has been superimposed, that the scheme of mural decoration is being followed out. The schoolroom, which is to be used for other quasi-clerical purposes, is lighted by square windows with central mullions; the ceiling is flat, and it and the walls are finished in plaster. The wall surface has been spaced out in upright panels by broad black lines, and each panel is to contain a cartoon in red chalk, taken from Millais's illustrations of the parables which appeared in *Good Words* several years ago. The figures are life-size, and the drawings are to be fixed by an after process. To make the scheme of decoration homogeneous, the spaces between the cartoons should be filled in by arabesques in pale blue or neutral tint. This experience affords to the students an opportunity for working on a large scale. If successful, it may lead to others of a like nature.

THE Exhibition of the Society of Painter-Etchers is one of the best and most interesting collections ever seen in the Dudley Gallery. It is very various in character, and offers examples of the many styles in which the beautiful art of the etcher can be used; not all, however, equally admirable or desirable. We have always held that the special power of etching lies, in addition to its peculiarly beautiful tone, in the facility it gives for absolute freedom of line and hand, and thus for the freest expression of the artists' individuality of touch and manipulation. Accordingly we do not see the highest or best use of the method in such elaborately and almost mechanically finished and shaded works as, for instance, Mr. David Law's "Bridge of Sighs" (74), which is only doing what engraving can do as well, and with more solid and permanent results. The other extreme, of scratching over a drawing with black ropes rather than lines, as in Mr. Aikman's "In Glen Lyon" (86), is perhaps also an exaggeration in the endeavour after force and freedom. Perhaps Mr. Ernest George's "The Bridge at Prague" (185), and Mr. Frank Duveneck's free and aerial-looking Venetian studies, best represent what etching can do with subjects in which architecture is prominent. M. Ford's "Notre Dame" (24) is fine in its way, but it is an affectation of mystery and loss of detail. Among the more solid and clear, but still not over-worked, architectural subjects, Mr. C. O. Murray's "The Virgin Porch, St. Mary's, Oxford" (175), is a good example, and Mr. Haig's "At the Fountain of St. George, Evening" (196). There are some fine landscape studies, and a variety of work of great interest. We have merely touched on a few which illustrate our special point as to the proper powers of etching, especially when dealing with architectural subjects, which, we may observe, form a large proportion of the collection.

OUR correspondent in Paris referred, in a communication some weeks ago, to the series of studies of the costumes and uniforms of the French army, which M. Detaille has been executing for the work to be brought out under the title "L'Armée Française," the text by M. Jules Richard. These drawings are now to be seen at MM. Boussod & Valadon's (late Goupil's), in New Bond-street, and are well worth a visit from those who appreciate brilliant drawing of figure and costume, and who are interested in the history of military appointments. Some of the photo-gravure reproductions, in monochrome and colour, which are also exhibited, showing the form in which the illustrations will eventually appear, are marvels of reproduction. One or two of the coloured ones it would be really difficult to distinguish from the originals except for the slight reduction in size.

THE exhibition of engravings by Woollett, now on view at the Fine Art Society's rooms in New Bond-street, forms a good illustration of the powers of the greatest of the old school of English line-engravers. These works want, of course, the refinement and some of the aerial effect which has been attained in

modern engraving, but they are marked by a power and solidity and a patient thoroughness of execution, which is a curious, and, in some respects, a healthy contrast to the easier and shorter methods of much modern engraving, with its sensational effects of high lights and dashes and slashes, and dim suggestion of detail which is not worked out.

THE most notable work in the exhibition of the Society of British Artists is of course the portrait of Señor Sarasate by Mr. Whistler, which has given a sort of *iclat* to this year's exhibition. It is a masterpiece of character in portraiture, but the face is very cadaverous in colour, a sacrifice to the scheme of colour of the whole, which is called "an arrangement in black," and, not to clash with this, the colour is driven from the face and the shirt-front (it is evening dress) reduced to a dirty grey. The result is not pleasing as a portrait, but as a painter's study it is eminently clever and characteristic. The best thing we saw at the exhibition, besides this, was a semi-impressionist "Picture of a Little Girl" (51), by Mr. Harper Pennington. Mr. Wylie's "In the Essex Marshes" (344) is a fine landscape.

A CURIOUS example of the prevalent indifference of scientific men to art is furnished in relation to the recent unveiling by Sir Spencer Wells of a medallion portrait of the late Mr. Peter Squire, at the Pharmaceutical Society's House in Bloomsbury-square. A copy of the Pharmaceutical Society's *Journal* has been forwarded to us, in which six columns are devoted to a report of the proceedings and of the speeches, in the whole of which report there is not a reference to the name of the artist who produced the medallion, although it was commended as a very good likeness, and the artist's name was, as we find, specially mentioned by Sir Spencer Wells in his speech. We presume that the members of the Pharmaceutical Society believe that a medallion which is "a very good likeness" is secreted by some spontaneous process of chemical action. We will supply the omission by recording that the sculptor whose work was commended was Mr. Brock.

THE lucubrations of the "British Matron" in the *Times*, to which we referred last week, led to a considerable correspondence on the subject of nude pictures, including a great deal of nonsense on both sides; for the artists who wrote in defence were as illogical in their reasonings, and as completely missed the real point at issue, as most of their opponents. A characteristic light was thrown on the distinction between prudery and modesty by a letter from a lady, evidently a very different stamp of person from the "British Matron," who said that her daughter of seventeen, who had before looked at and criticised the pictures at the Grosvenor, saw with surprise the correspondence in the *Times*, and exclaimed, "Why mother, we saw nothing improper at the Grosvenor." The correspondence had, however, the effect of eliciting a really valuable and thoughtful letter in the *Times* of Monday, the 25th, from a correspondent signing himself "H.," who has the rare faculty of seeing both sides of the question, which the artists mostly have not. We hope his letter has been read, marked, learned, and inwardly digested by both painters and public.

Huddersfield.—On the 9th inst. the memorial stone of a new junior mixed department to the Mount Pleasant Schools, Huddersfield, was laid by Mr. J. E. Willans, J.P., chairman of the Finance and Works Committee of the Huddersfield School Board. The original school was erected about ten years since. The new department will accommodate 460 children of both sexes, in the first and second standards. There is also a room for teaching cooking to fifty of the older girls. In the new works are included extensive playgrounds, and also covered play-sheds for the infants' department, and sundry alterations to improve the old buildings. The contracts have been entered into to the amount of 5,411£. The style of the building is Early Gothic. The architects are Messrs. Henman & Harrison, of London.

ARCHITECTURE AT THE ROYAL ACADEMY.*

If the truth must be told, the exhibition is not this year very strong in the department of domestic art. There are no works of exceptional importance in point of magnitude, and the smaller works are not distinguished by any great originality of treatment. If the walls were stripped of some half-dozen drawings there would really be nothing left for special comment, so far as this branch of architecture is concerned. As the footman in *Punch* thought it high time "some new hanimal was invented" to give the jaded appetite a fillip, we are tempted to think that the time is ripe for a new man who shall give to our house architecture a fresh impulse. This may be ingratitude; but it is, at any rate, human nature. Was it Edward III. who requested the literary lights of his Court to "boke some newe thing"? "Newe things" ever were and ever will be in request, and architects must not expect to escape the common fate. We tire of the best art if it is a repetition of the same art. When Columbus first made his egg stand on end it was doubtless looked upon as a very pretty feat; but when every one could accomplish it, and its only excitement of novelty had worn off, we may be sure that his companions soon discarded, and perhaps derided the stale trick. The architectural gallery is full of the work of second-hand Columbuses. We must, of course, except from these remarks the always original work of Messrs. Ernest George & Peto, artists in a double sense. The houses they build are every way excellent, and the drawings which they contribute are always amongst the freshest and most interesting in the room. But the houses are not like the drawings, and consequently the drawings are not true illustrations of the houses. As a fact their cornices are, like every one else's, ranged in scrupulously level lines, their chimney-stacks are in reality carefully plumbed, and do not totter to their fall and in hopeless disrepair; their casements are not "crazy" and their roofs do not "sag." Nor do the servants of the house hang out their hearthrugs from the outer walls or display their lingerie to break the long lines of balustrade and balcony. Even South Kensington has not carried its aestheticism to this pitch. Nay, we have even noticed that Mr. Ernest George's own beautiful residence is as correct and decorous in these respects as the most Philistine of its neighbours. It is only in his drawings that these aids to the picturesque are seen, and we would be the last to wish them away. There have been architects who could make exquisite drawings, but who could not translate their designs into bricks and mortar, and there have been others who could build divinely, but could not make such a picture of their works as would have a ghost of a chance with the Hanging Committee. In Mr. Ernest George we have an architect who can do both equally well, and long may he live to delight us alike by his buildings and his draughtsmanship.

The "House at Ascot" (1874) gains a special interest by the addition of an attached chapel, which is apparently designed to accommodate an outdoor congregation of (perhaps) tenants as well as the members of "the family." The axis of the chapel forms a very obtuse angle with the drawing-room front from which it projects,—an obliquity which is not, we think, expressed in the perspective. Ever since the house built by Mr. Shaw for Mr. Goddall, in which the studio was so aligned, the arrangement has been a favourite one. And where considerations of aspect,—such as obtaining a north light for the painter,—are present, the arrangement is not only defensible, but commendable. In the present case, the exact orientation of the sanctuary cannot have been the motive, and the departure from the right angle is too slight for attention in that respect. It is, of course, possible, that the object was to broaden the prospect from the drawing-room window, which fills the re-entering angle where the chapel and the drawing-room meet; or the arrangement may be merely fanciful, and, if so, savours a little of affectation. The plan of this house should be studied carefully, for it is perfect. To appreciate its great merit, the student has only to compare it with the plan on 1,945, which is also a design for a country house, by, we

should imagine, a very young man. The Ascot plan has all the agreeable quaintness which we desiderate in a country house, but comfort and convenience are never sacrificed, or even jeopardised, and light and air permeate every corner of it. Externally, the changes are artistically rung on features familiar in all this artist's works. The long series of flat gables, the bracketed oriels, the quarry glazing, the hanging tiling, the dodgy little windows in unexpected places, and at all sorts of levels,—we have them all once more. This species of design scarcely rises to the level of high art, being a revival of a manner which was a couple of hundred years ago accomplished by the unaided workman. Nevertheless, the difficulty of attaining a due soberness without dullness, and a becoming piquancy without a Cockneyified fussiness, is greater than most people think. That it is difficult is proved by the fact that, whereas so many attempt it, so few succeed. Woolpits (1,765) and Collingham Garden (1,854) are more ambitious, and, we think, less successful designs. But we can never be sufficiently grateful to the school of architects who give us these pleasant effective combinations of agreeable colour and picturesque outline. The real old English houses are fast vanishing, and it is a matter for sincere congratulation that their place is being filled by worthy successors, and that the country is not to be given over to the dreadful monotony of ugliness which so recently held undisputed sway in the land.

The Restoration of Naworth Castle, by C. F. Fergusson (1,844-7 and 1,883-6) is shown in two series of brilliant pen sketches by Mr. E. F. C. Clarke, which are deservedly hung where they can be well seen. This is unfortunately not the case with Mr. Halsey Ricardo's single contribution (1,808), "Westgates," near Charlwood, Surrey, which is too high for due examination. For this reason we cannot follow the plan at all, and can only say that the house is homelike and quiet in treatment, and late Tudor in style, artistically composed, and quite satisfactory in its general effect. It strikes one as an odd circumstance that only one small chimney-stack is seen. This fortunately comes in the precisely right place for the grouping of the building, and we must take the author's word that the others are duly accounted for.

The additions to Stowell Park (1,756 and 1,757), by Mr. J. Belcher, are shown in a beautiful geometrical drawing. An old and very fine Early Tudor house has been extended with so much of the feeling of the old work that it is difficult to say where the old ends and the new begins. We should have liked a plan in further explanation; but the only sure way to exhibit the plan is to draw it on the same sheet as the elevation, for we find that the committee are very apt to reject plans if separately sent, be they ever so interesting.

In 1,945 Mr. Fitzroy sends a "Design for a Country House," which, so far as the elevation goes, shows careful study of old work and much facility of composition and draughtsmanship.

With a reference to Mr. Flockhart's "House and Studio, Abhey-road, St. John's Wood" (1,742 and 1,745), we must close our remarks. As a design it is admirable for effective grouping and appropriate detail, and as an example of free pen-and-ink sketching it is a veritable *tour de force*. There are some other designs and drawings in the gallery which would deserve a more particular notice but for the fact that they are little more than repetitions, appearing under different names, of what we have before carefully analysed. So strong a resemblance do they bear to the previous works of the same authors that our first impression is that they are old acquaintances, and that in spite of their fixed rule the Royal Academy has admitted drawings after previous public exhibition.

Woodford (Essex) School Board.—This Board, having decided to enlarge their Churchfield Schools, consulted Mr. Edward Tedman, C.E. (who has, as surveyor to the London and Suburban Sanitary Association, just carried out a new system of ventilation and sanitation at these schools), and instructed him to prepare plans of a new infant school to accommodate 200 children. These plans were examined by the Board at their meeting on the 22nd inst., and approved, the architect being instructed to obtain the approval of the Educational Department, and to obtain tenders for the work, to be submitted to a future meeting of the Board.

NOTES AT THE PARIS SALON.*

CONTINUING our remarks on *genre* paintings, it is in that category that we must place the "Faust" of M. J. P. Laurens, a small picture of sober and harmonious colour,—a picture well fitted to console us for the "tableaux érotiques" which the jury tolerate, to the great prejudice of art and artists. Accordingly, in the mere interests of M. Henri Pille, we pass in silence a Rabelaisian scene unworthy of his talents, and which he entitles "Tentation." As to M. Roll, what does he wish to prove in his picture of a nude woman caressing a black bull in a sunlit landscape? It is the fancy of a painter taken with the play of light and shade on the flesh; but that sort of study belongs to the *atelier*, and not to public exhibitions.

The landscape and animal painters form a very numerous party in the class of *genre*. Among the first, M. Pasini, with his small finely-finished scenes, and M. Guillaumet, with his broadly-painted Algerian subjects, remain both of them faithful to the East. M. François, for his part, is eternally Italian; while MM. Harpignies, Emile Bréton, and Harmoteau, transport us here and there to those green fields of France, the poetry of which M. Jules Bréton also knows so well how to render. Here, again, we must distinguish the old school, represented by MM. Ciceri, Carzon, Bellel, and Vidal, whose mannered works bear an unmistakable date; and the young artists, such as MM. Paul Collin and Pelouze. The latter exhibits a cliff scene, bounded by the distant sea, of great simplicity of composition. This picture, and the views in Holland of M. Grandis, the luminous sea-paintings of MM. Bondin and Lapostolle, and the Breton landscapes of Madame Elodie Lavilette, merit especial mention among this group of painters, who love open air and the changing movement of the sea. MM. Lepine and L. Loir, they do not leave Paris, and confine their ambition to reproducing the various perspectives of the Seine, and the many aspects of the panorama of the Tuileries.

Among the animal paintings may be mentioned the cattle of MM. Barillot, Bonnefoy, Marais, and Julien Dupré, the dogs of M. de Penne, the powerful "attélagés de hœufs" of M. Princeteau, and the "toro colante" of M. Aimé Morot, a veritable reminiscence of Goya, which transports us to the Spanish bull-fight at once.

We may class among the *genre* painting the marvellous paintings of objects of art made by M. Blaise Desgoffe, from the collection of Sir R. Wallace. Why does he not confine his talent to this inimitable painting of jewels and precious stones? By the side of the still-life pieces of MM. Volland, Philippe Rousseau, and Bergeret, the fruits of M. Desgoffe went truth and texture. They are of agate, like the dish which supports them.

Portraits.—Under this class we must evidently place the graceful profile which M. Henner, the painter of pearly-toned nymphs, has given under the title "Fabiola." We prefer the portraits of M. Paul Dubois. This eminent sculptor often abandons the clay for the palette, and then reveals himself as a colourist of the first order. There is masterly power in his head of an infant standing out from a crimson background, which gives force and effect to an exquisite piece of modelling. His harmonious portrait of a young woman, entirely in brown tones, is more seductive than the brilliant colouring of M. Carolus-Duran. It would be unjust, nevertheless, not to praise the latter for the great ability with which he arranges his draperies and laces, and makes the lights flash from the silks. In his "Portrait of Miss . . ." the head with the aureole of blonde hair is charming in expression, but it has not the calm and masterly simplicity of the works of M. Delannay.

"Autour d'un Piano" is a collection of curious portraits of solid execution, which M. Fantin-Latonar has grouped with admirably studied realism. Very remarkable also is the portrait which M. Jean Sarjent exhibits this year. Perhaps he has cut out a little too hardly this silhouette of a young lady in a grey dress relieved against dark oak woodwork. Mr. Whistler's "Portrait of Lady Archibald Campbell" recalls the painters of the Spanish school. The sombre dress and the ottor fur are almost indistinguishable from the tone of the background, the head alone forms a luminous point

* See p. 607, 650, 664, 720, ante.

* See p. 721, ante.

and detaches itself, fine and graceful, from this artificial obscurity. There is remarkable talent in this portrait, which the public like little and do not understand at all.

Here you come to a picture at once political and impressionist. M. Raffaelli has represented M. Clémenceau at a public meeting, standing with his hand resting on a red tablecloth and surrounded by electors, certainly true to the life, in the triviality of types which they represent. This sensational picture, however, will not class M. Raffaelli among the great modern painters. With a different method, M. Jôhê Duval, who is a "classique," has arrived at nearly the same results. His colleagues of the Conseil Municipal of Paris, sufficiently true as to likeness, are shown in cadaverous and very disagreeable colours. In mentioning the study by M. Brosnan, entitled "Chez Soi," the charming head by M. Chartran, the elegant figure in Louis XV. costume by M. Léon Comerre, and the two finely-finished works by M. Mathey, we shall have mentioned, we believe, the most interesting portraits of the Salon. We have resched besides the limits of our space, which will not allow us to mention the drawings, water-colours, pastels, and engravings, which include, nevertheless, a great deal of interesting work; and there are many other things which we have been obliged to pass over. We hope, nevertheless, that among the 3,000 pictures exhibited this year we have made so impartial a selection as to indicate at once the high qualities of some, the errors of others, and the general sum of the talent displayed by the painters of the Salon of 1885.

Sculpture.—This essentially monumental art demands Municipal and State competitions to allow it free scope for development. This kind of encouragement has been slack of late. For two years the Municipality has made few purchases and the State still less; the artists, wearied of labour which brings nothing, and alarmed at expense without results, are discouraged in the fight and dare not put forth their powers for the Salon; and the present exhibition is thus inferior to its predecessors. There are many reproductions in marble and bronze of works already known, but few new and original productions. Considering the demands of the budget and the deficit in the *octroi*, what will become next year of the credit of the city in the fine arts, already too restricted in the present year?

Monumental Sculpture.—We notice first in this category the "Triomphe de Sillêus," by M. Dalon, a group full of spirit, but somewhat brutal in its feeling, though very interesting and composed with a feeling for decorative effect. We prefer, however, the memorial statue of "Blanqui" by the same artist, the rigid form of which is designed with great power beneath the shroud whence issues an emaciated arm. The head has an expression of suffering, and the crown of thorns placed at the feet symbolises the vicissitudes through which the old revolutionary has passed. The marble statue of "Madame la Duchesse d'Orléans," mother of the Comte de Paris, which M. Chapu has executed for the Chapel at Dreux, contrasts by its calm beauty with the nervous work of M. Dalon. This latter monument is of remarkable execution and fine sentiment. The same qualities are apparent in the figure of the young woman whom M. Mercier shows us veiled and sleeping. There is a sweet and melancholy feeling in this charming figure entitled "Sonvenir," which is to adorn the tomb of Madame Chas. Ferry, daughter of M. Allain Targé, Ministre de l'Intérieur.

This is a decisive year for M. Daillon, whose marble figure "Reveil d'Adam" is a work in a great manner, the property of the City of Paris. It is also for the municipality that M. Paris has executed his "Le Temps et la Chanson," a fine group in marble, and M. Vital Cornu his marble statue "l'Abondance"; and for the municipality also are commissioned the "Héran d'Armes" of M. Courdounier, the "Marat" of M. Baffier, and "L'Avengle et le Paralytique" of M. Michel. M. Daillon has also a group entitled "Bonheur," which merits special mention. Another work to be noted is that of M. Demaille, in which the principal figure, draped in antique fashion, seems protecting two young children, while with the other arm she embraces a young girl who regards her

tenderly. This group, entitled "Protection," has a fine decorative outline, and the manner is full of calm and noble expression. We like less the marble bas-relief by M. Hector Lemaire, intended for the Mairie of the Sixteenth Arrondissement, and which personifies "l'Hygiène." The general aspect is too flat, and the main lines are crushed by the architecture which surrounds it.

Among the commemorative monuments, numerous enough this year, figures the bronze statue of Francis Garnier, intended for the town of Saïgon. M. T. Noël has perfectly rendered the expressive head of the brilliant officer of marines killed in the first Tonkin expedition. We may mention also a group which M. P. Ogg calls "baptême gaulois," a young woman making her child kiss his father's sword. This is a work in a fine style; but unfortunately a little further on we meet with "La Sentinelle Gauloise" of M. Desca, the "Cuerriers Gaulois" of M. Quinton, the "Fierté Gauloise" of M. Vital Cornu; and in spite of the talent of these artists, we find, as in the rooms above, the "gaulois" idea somewhat overworked. It becomes monotonous. We must not forget the bronze statue of Cencral Joubert, intended for the town of Bourg, an energetic and stirring work by M. Aubé.

Genre Sculpture.—As in painting, so in sculpture, one can easily remark the tendencies of the modern school, which puts aside antique formulas to attack resolutely the realities around it. One may say that in this branch of art the revolution is already partly accomplished, although it is more difficult for the sculptor than for the painter to render the realism of fact with due regard to the decorative principle of his art. A too faithful interpretation essly borders on triviality, and that is why the "Jacques Bonhomme" of M. Baffier, with his well-developed muscles, his hard and wrinkled torso, and his grimacing head, is only a vulgar and disagreeable study. On the other hand there is the "Jeune Mère" of M. Chrétien, whose elegant form is so perfectly modelled under the coarse clothing of the peasant. The "Premiers Pas" of M. Henri Plé is equally a modern subject, graceful and well treated. Lastly, the robust blacksmith of M. Cauteris, personifying "Le Travail," is the work of an artist who knows how to give to a leather apron and the folds of a blouse the elegance of line indispensable to his art.

Among the *genre sculpture* we must class the "Molière Mourant" of M. Allouard, the elegant "Salomé" of M. Schenewerk, the "Diane Chasseresse" of M. Falguière, a work of great talent, but of which the posture and action are too exaggerated to please. We must mention also a delightful statuette in ivory by M. Moreau Vauthier, "La Peinture," heightened with gold-work and precious stones.

We terminate this rapid review by the series of busts and medallions which always occupy a considerable place in the Salon. Among the first, let us name that of the painter Harpignies by M. Helle, the bust of M. Antonin Proust by M. Rodin, who also exhibits some magnificent medallions; the bust of M. Coppée by M. Delaplanche; that of the architect Cuirain by M. Thomas; that of M. Marmontel by M. Barrias; that of Emile Augier by M. Francesci, &c. But space is wanting, and we must conclude by noticing the admirable medallion commemorative of the Hôtel de Ville by M. Chaplain, of which we hope shortly to give an illustration.

There are in this branch of art, as will be gathered, works of great merit, though in a lesser number than last year. We have given above our idea as to the causes of this momentary arrest of the onward movement of an art which is nevertheless very remarkably represented at the Salon. Yet one may say that in spite of certain deficiencies, the modern school of French sculpture continues worthily the traditions of Pradier, Rude, and David d'Angers, and that French sculpture is still the sound and robust art of which France has so many masterpieces, and of which France has just reason to be proud. R. B. FENWICK.

Association of Municipal and Sanitary Engineers and Surveyors.—The Lord Mayor has signified his intention of receiving and entertaining the members of this Association on the occasion of the annual meeting, which is to be held in London at the end of June.

THE INVENTIONS EXHIBITION.

PRIME MOVERS.—I.

OUR greatest of prime movers, the steam-engine, and its modern ally, the gas-engine, may, on the whole, be said to be fairly well represented at South Kensington; but the same cannot be affirmed of their predecessors who utilise the natural forces of wind and water—entirely absent. This is probably a case of the "survival of the fittest," but it is nevertheless to be regretted, as the use of water-wheels, turbines, and hydraulic engines, where a good fall or pressure of water is attainable, is of very great commercial value, unless the site be an isolated one. Windmills, too, may be made extremely useful for irrigation and drainage, and they have an advantage of requiring little or no skilled attention.

Returning to the steam-engine: during recent years the attention of the majority of engineers appears to have been devoted rather to simplifying and perfecting existing types than to venturing on fresh and unknown lines; this may, however, in a measure be attributed to the severe and long-continued trade depression under which the country has suffered, which has reduced the amount of money manufacturers can afford to devote to experimental purposes to a very small sum. We do not, however, wish it to be understood from this remark that invention with reference to prime movers has been at a standstill. The chief departures have been in the rapid development of the compound system in steam-engines, which, in addition to marine and stationary, is now to be found in portable, vertical, and locomotive engines. What are known as high-speed engines have also been considerably developed, and although they may be held to be as yet in their infancy, the value of some of them as motors for certain kinds of duty has been sufficiently proved, and still more interesting results may be looked for. Gas engines, too, have much advanced and come largely into use, and for small powers,—say up to 8-h.p.—are, without doubt, very valuable as motors. They are also interesting from the fact that unlike steam-engines they do away with the use of water as a medium for developing power, and are one step nearer the goal that engineering science has long striven for, viz., development of the heat contained in fuel directly into useful effect. Hot-air or caloric engines have made but little progress, although for very small powers they may be worked with economy.

The means of transmitting power from the prime movers to the receivers or machines driven have lately increased considerably, compressed air, water, and electricity now being added to the older methods of belts, ropes, toothed and friction gearing, &c. Most of these, but not all, are represented in the Exhibition.

Locomotive engines are not largely represented, as with the exception of Mr. Weh's compound, which we have already noticed, the exhibits are confined to a contractor's locomotive, fitted with a new form of valve gear, exhibited by Messrs. Manning & Wardle, of Leeds; and two steam tram-car engines by Messrs. Merryweather and Wilkinson respectively, with a small double bogie locomotive by the Fairlie Engine Co., Westminister.

A large horizontal engine, fitted with Wheelock Patent Expansion Gear, is exhibited by Messrs. Daniel Adamson & Co., of Dukinfield, near Manchester. The main frame of this engine is of the present popular girder type, which possesses some advantages,—notably cheapness of construction,—but also some disadvantages, upon which, however, we need not enter here. Perhaps the most important feature about the engine is the cut-off gear, which possesses, at any rate, the merit of extreme simplicity. The working parts are very few, and one eccentric works both the main steam and cut-off valves. The chief novelty claimed for this gear is, we believe, the suspension of the valves on hardened steel gudgeons and bushes; consequently the friction, and, therefore, the power required to work them, are reduced to a minimum.

The valves are all placed at the bottom of the cylinder, and effective arrangements are thus easily made for relieving them of water, &c. This is an improvement over the ordinary plan of placing valves above and below the cylinder, as a leakage may be taking place past the stems valves and into the exhaust for a considerable time without detection. In the Wheelock

* Yet this is in a year when, as our correspondent observes, less public encouragement than usual has been given to sculpture. What a lesson for our Government! —En.

engine this is rendered practically impossible by arranging the cut-off valves behind the main valves, so that, when they are open to the exhaust, before the steam can pass into the pipe, it must leak past both the cut-off and main valve faces.

The main valves are worked directly from the eccentric rod by levers keyed upon the valve spindles and the cut-off valves by a positive motion, obtained by means of bell-crank levers and a stirrup-link attached to a lever and riding on a loose collar. The cut-off valve has a concave face with double opening. This engine was in motion, but without driving anything, which is a pity, as it does not permit an inspection of the action of expansion gear under suddenly varying loads; but the makers inform us it has been largely tested in America, and in this country, for driving saw-mills, rolling-mills, callendering, &c., where the duty is intermittent and very severe, and that it will maintain a uniform rate of speed under all ordinary conditions.

Messrs. John Fowler & Co., of Leeds, exhibit several engines, including samples of their compound semi-fixed type. This class of engine has come largely into use of late, and, whether used as a fixture or a portable, presents several advantages not found in high-pressure engines of the ordinary construction. Chief amongst these is its economy in working: this is secured by using compound or high and low pressure cylinders, the steam in the hoiler in the first instance being maintained at a high pressure, say 120 lb. or more per square inch, and after being used in the high-pressure cylinder, it is expanded down to a low-working pressure in the low-pressure cylinder. Another advantage of this arrangement is that automatic expansion gear, which in some cases is of complex construction and liable to get out of order, is done away with; at the same time great steadiness in working is secured. Messrs. Fowler's engines combine strength and simplicity of design with excellent workmanship. The hoiler being required to work at a high pressure is made of steel, with an internal fire-box of Low Moor iron. The top of the fire-box is made circular, which, while adding to its strength, prevents the accumulation of sediment. We noticed that the hoiler was extremely well and carefully stayed, an example that might be copied with advantage by some other makers we could mention, as in high-pressure hoilers of this construction it is, to say the least, a matter of the highest importance. In utilising these engines for winding and similar purposes, Messrs. Fowler holt the bed-plate on to a wrought-iron tank, which being sunk in the ground the necessity of expensive foundation is avoided. In feeding the hoiler a separate donkey-pump, in conjunction with an injector, is used, instead of an ordinary feed-pump worked by the engine; the action of the engine in winding being intermittent, a more regular supply of water to the boiler can thus be secured. The winding drums and gearing are of steel, combining, as far as possible, strength with lightness.

An automatic expansive horizontal steam-engine is exhibited by Mr. R. Ogden, Ashton-under-Lyne (Ogden & Livesey's patent), which presents some features of novelty, notably in the construction of the cylinder. This consists of a pipe with flanges in lieu of a cylinder of the ordinary shape. The advantages claimed for this arrangement are that the expansion and contraction are uniform; that cylinders may be renewed very cheaply, the same valves and boxes being used again, and another, which we should consider a very duihous advantage, viz., that the cylinder waste-water taps are done away with, that duty being performed by the exhaust ports. Corliss valve gear is used. This engine has some good points in design, but instead of the cylinder being bolted to the end of the bed-plate we much prefer the old-fashioned plan,—still adhered to by some leading firms,—of an extended bed-plate with the cylinder resting on it. For small powers, a cylinder bolted on may pass, but for large powers we certainly,—to say the least,—fail to see any tangible advantages in the plan.

Messrs. J. T. Marshall & Co., Limited, Nottingham, show a compound under-type semi-fixed engine. The engine is mounted on steel girders, and the crank-shaft, plunger-blocks, and ash-pit, on which the fire-box rests, are in one casting. The piston-rod guides work in circular guide-boxes, and the governor is of the crossed-arm loaded type. The engine is

neatly designed and made, but presents no special feature of novelty.

A considerable number of other under-type engines are exhibited, but there exists between these such a remarkable family likeness that, having already described that of Messrs. John Fowler & Co., it may be considered a good representative of the whole.

The largest engine in the Exhibition is that exhibited by Messrs. Hicks, Hargreaves, & Co., of Bolton. It is of the Corliss type and fitted with Ingles's valve gear, and indicates some 150 h.p. at 60 lb. pressure. The cylinder is 20 in. diameter by 4 ft. stroke, is steam-jacketed, and built up with separate valve-chests. For driving, rope gear is employed, the fly-wheel being grooved for that purpose; the running of this engine is remarkably steady, and its general design is good, combining as it does strength with simplicity. In the same stand is an automatic barring engine for starting large engines when they stop near the dead centre: hitherto this has in most cases been done by hand, and is found very hard work. It would be difficult to describe the action of this engine without drawings; but, we may say briefly, it is fitted with a worn-wheel which gears into a toothed wheel attached to the fly-wheel of the large engine, and is so arranged that when it has set the large engine in motion, it immediately disengages or throws itself out of gear. The chief novelty of the engine is that both the falling in and out of gear movements are automatic, and the makers claim that theirs was the first engine made for this purpose in which the driving parts are arranged to throw out of gear by the starting of the main engine.

The electric light machinery is driven chiefly by under-type compound horizontal engines, fitted with automatic cut-off gear, and locomotive boilers, constructed by Messrs. Davey, Paxman, & Co., of Colchester. As these are the same as those used at the Health Exhibition, further description will be unnecessary. We noticed the hoilers and pipes were covered by what was apparently a very excellent non-conducting composition for the prevention of radiation and the condensation of the steam in the pipes. A novelty in the way of automatic steam cut-offs was exhibited by Messrs. Chapman & Reed, of Holloway. In this engine the ordinary steam-chest, slide valves, and rods, are entirely dispensed with, and the steam enters directly on to the piston, and is acted on at either end of the cylinder by the cut-off gear. By this arrangement the full boiler pressure is admitted at once to either end of the cylinder. In conjunction with this gear is used a sensitive form of governor, in which worm-gearing is employed altogether. The engine possesses several features of interest, the development of which we shall look forward to with expectation.

Amongst high-speed engines, the Armington-Sims engine, exhibited by Messrs. Greenwood & Bailey, of Leeds, attracted our attention, being of a type not usually utilised for high speeds, viz., the horizontal. In constructing high-speed engines after this fashion, the makers have evidently borne in mind the necessity of counteracting the increased wear and tear, vibration, &c., consequent on the high speed of running by combining in its construction, increased strength in the framework, larger area of bearings, and the best quality of workmanship and materials. The automatic cut-off is attached directly to the valve-rod, and varies the point of cut-off from the commencement to seven-tenths of the stroke without changing the lead. The makers claim that the variation in speed from an extremely light load to the full power of the engine does not exceed two per cent. If this result can be verified in practice when driving difficult machinery,—such as saw-mills,—it will speak well for the engine, it being a result rarely if ever attained. An engine of this type, with a cylinder 6.5 diameter by 8-in. stroke, is speeded to make 350 revolutions per minute, or a piston speed of 460 ft. per minute. These engines should be of service for electric lighting, ventilating, &c., purposes, where high speeds, without intermediate gear, are essential.

A somewhat remarkable novelty in the way of high-speed engines is the "Tower Spherical," exhibited by Messrs. Hernan & Proude, Newton Heath Ironworks, Manchester. To clearly understand the mechanism and action of this engine, a long description and drawings would be necessary, and even with these its working would not be by any means easy to comprehend,—in fact, it may be almost called a mechanical puzzle. We

may say, however, that it consists "of a system of parts contained within a sphere, and so united as to enable them under the action of steam pressure to impart rotary motion to a shaft." It is said the idea of its construction occurred to the inventor through watching the relative motions of the three parts composing a universal joint, and these motions of the engine may be said to be founded strictly on geometrical principles. In all high-speed engines one of the chief difficulties is the matter of lubrication. In the engine under notice, this has been got over with much ingenuity. A chamber in the bed-plate contains the lubricant, in which is immersed a small plunger pump. The plunger is raised by a slow and intermittent ratchet motion from the main shaft, and in its downward stroke is driven by a worm on the shaft, causing it to descend promptly. By this means a definite small quantity of lubricant is injected at adjustable regular intervals with perfect certainty; and, being applied by the quick stroke of the plunger, it is made to enter all the oil passages, instead of being absorbed by the oil only.

These engines have been tried for many months under varying and trying conditions, and with remarkable results, the working parts, which we inspected presenting no signs of wear. An engine, 7 in. diameter, is speeded to make 650 revolutions, and for electric lighting and other purposes where a self-contained high-speed engine is required, we predict a prosperous future for the "Tower Spherical."

Messrs. Davey, Paxman, & Co., of Colchester, exhibit a single-acting compound quick-speed engine for driving dynamo direct from the crank-shaft, also a double-acting compound vertical engine for driving dynamo by means of gearing.

Messrs. D. & W. Robertson, London, show a small horizontal engine with suspended governor. As to the advantages to be derived from this arrangement we are not at present quite clear.

Messrs. Galloway, of Manchester, have two large engines driving the machinery in connexion with a number of Lancashire hoilers, fitted with Galloway cross tubes. These hoilers should be of special interest to builders and saw-mill owners, as nothing can be better for driving wood-working machinery, for, being provided with ample fire-grate surface, they may be utilised for burning all kinds of waste wood; they are also easily cleaned, repaired, and managed. By the use of the cross-tubes the heating surface is increased and the circulation of the water improved. In Messrs. Galloway's hoilers the tubes are fixed so that they are nearer together at their lower than their upper ends; the strength of the back flue is thus considerably increased. The compound horizontal engine which was used for driving the machinery at the Health Exhibition has similar employment now, and we certainly prefer its general arrangement to the new engine recently erected.

At the stand of Messrs. Durham, Curchill, & Co., London, we noticed some practical-looking piston-ring packing. The makers claim that by its use a free yet steam-tight piston is obtained. It has a direct vertical and horizontal thrust, with neither thrust dependent on the other. This result is said to be obtained by the use of one spiral spring, or a series of compound springs. The compound spring is made out of a single rod, and is without sharp bearing points, these being flat vertically, and curved horizontally to the same radius as the inside of the piston rings. As a rule we object to the use of spiral springs when there is great variation in temperature or any constant and severe strains on them, as there is little doubt that in the first case the nature of the steel becomes altered, and they are liable to breakage, and in the second they become weakened and ineffective. The makers assert that for piston-rings they have stood all ordinary tests.

Messrs. Cochran & Co., of Birkenhead, show one of their vertical steam boilers, arranged with horizontal flue tubes; part of the shell is cut away at each side of the boiler above the fire-box, and tubes are fitted across. The space between the tube-plate and the shell of the boiler forms the combustion chamber on the one side and the smoke box on the other; doors are fitted to both sides of the tube-plate, that on the combustion side being lined with fire brick. By this arrangement the tubes may be more easily cleaned and repaired than in the case with the vertical multitubular form, and the boiler altogether must be pronounced a decided improvement on these, and can be recommended for small powers and where space is an object.



Sicilian Mosaic

Fig. 6.



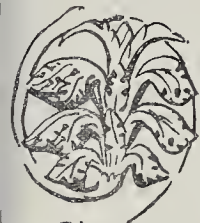
French tile

Fig. 7.



English tile

Fig. 8.



Pisa

Fig. 9.



Monreale

Fig. 11.



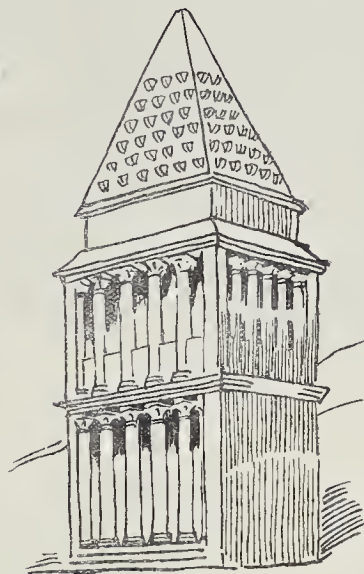
Charbon
(stained glass)

Fig. 12.



England:

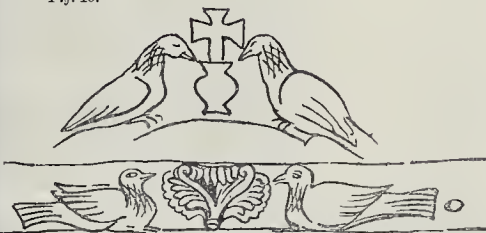
Fig. 10.



SYRIA

Tomb at Hama 4th Cent.

Fig. 13.



WINCHESTER & EAST MEON:

Fig. 14.

THE LION AND THE PALM.*

NOTES ON RECURRING FORMS IN HISTORIC ORNAMENT.

THE early German School, which we should call Byzantine rather than Romanesque (the latter having become by usage identified with the decaying school of Rome) arose under Charlemagne, the influence coming chiefly from Ravenna and Venice, at Aix-la-Chapelle he had a church built obviously founded on St. Sophia.

It was in Byzantium that the ancient art of casting in bronze was remembered; the fine lion of Brunswick, of the tenth century apparently, was removed from Constantinople by Henry the Lion, and two of the series of great bronze doors which led up to those of Ghiberti were brought to Italy. At Hildesheim are probably the earliest of these bronze gates made outside the Eastern Empire. They were made by Bishop Bernard after he had returned from Italy in the suite of the Emperor Otho; these doors bear large knockers, a ring depending from the jaws

of a lion, finely modelled in an Eastern manner. On the choir-screen of the same church we have niches covered with channelled domes of the Byzantine type; and the spandrels are filled with affronted birds with intertwined necks.

The next bronze doors we find at Augsborg, 1070; these are not so fine, but the designs are more to our present purpose, five or six of the panels being charged with lions, centaurs, and the lion and calf.

In Apulia in the twelfth century, there was a school of art of which the Pisan is an offshoot (Niccolo Pisano was probably born at Amalfi); here at Troja and Trani are some very fine gates by Barisannus 1150-79.

Bonnanno's doors at Pisa follow in 1180; the bottom panels have a row of symmetrically-placed palms. Both Barisannus, of Trani, and Bonnanno, cast gates for the cathedral of Monreale, in Sicily.

I shall not dwell on the Venetian school, as its Saracenic character has been sufficiently pointed out by Mr. Ruskin. In Florence and other Italian cities it will be found that the germinating principle is Eastern, but just as

the perfected Greek lost almost all traces of its origin, so it is with the great matured schools over Europe in the thirteenth century.

The most highly developed art of the twelfth century was probably that of Sicily; and it is at the same time the most evidently Eastern,—here the mosaics burst forth in sunset splendour, and in them we find beasts, birds, and palms wrought to an immense scale.

At Monreale in mosaic we find, as far as I know, for the first time, the bird and tree reduced to that more conventional form in which it spread to France and England, principally in encaustic tiles (these being, as has been well pointed out by Viollet-le-Duc, and amply substantiated by the form of some of the patterns of our Western substitute for mosaic). (See figs. 6, 7, and 8.)

In Jacquemart's "History of Furniture" there is illustrated a magnificent coronation robe now at Vienna; this bears an immense and truly Assyrian horn, and on either hand fierce conventionalised lions tear prostrate camels. This work bears the inscription (in Arabic), "Made in the happy city of Palermo

* See p. 722, ante.

... in the year 1181 of the era of our Lord Jesus the Messiah."

About this time, the palm finally stiffened into that form which became the ornamental foliage of Gothic Europe until the thirteenth century, and which with us was the origin of the "Early English" trilobed form: this is exactly parallel to the Greek anthemium, on which, perhaps, it is partly based, both varieties being found on the baptistery doorway at Pisa. (See figs. 9, 10, 11, and 12.)

Sicily under the Normans, Venice, and Spain transmitted the Eastern influence, and this was supplemented by the long residence of the Crusaders in Syria. It was probably in Sicily that the Byzantine style took that last imperfect step which entitles it to be called Gothic, and in the fully-developed and magnificent variety of Gothic to be found there the features can be traced back to Syria, where five or six centuries before the column became a colonnette: the cornice was transformed into corbel table, or string; and the pilaster became a buttress strip.

In France the Roman tradition lingered long, influenced by the East, from the time of Charlemagne. In the north-west of Europe, as far as it had not been modified by the same influence, the art was Scandinavian, a primitive offshoot from the East. Aquitaine was the centre from which radiated the new thought. At Limoges, in the tenth century, a commercial colony was founded from Venice, and at Périgueux the domed church of St. Front was built in imitation of St. Mark's, and other works Viollet-le-Duc says,—"Ont reçu leur influence directe de l'Orient." At Périgueux also, early in the eleventh century, was built a fine tower, surmounted by a conical spire, copied probably from the ancient campanile of St. Mark's, this spire, like many that followed it, is scaled exactly like the curious structure at Baghdad, called the Tomb of Ezekiel (figured in Foxier and Pullan's "Byzantine Art"). It will be sufficient to draw one of the Syrian tombs (fig. 13) to point out the source whence came the Italian campanile and the French spire. These tombs of Syria (see De Vogüé) are themselves a continuation of the tradition which built the pyramid-tombs of Mausolus and others.

For central type of the Byzantine churches of France, let us take Aries and St. Gilles,

especially the western portals, of which I have photographs before me. The columns are "diminished," and stand on lions. The acanthus-leaved capitals are of the crisp Syrian type, and have enormous cushion abaci,—all sure signs of their origin.

With us, as I have shown above, the palm developed into the Early English foliage; we find it while yet plainly the palm universal in the twelfth century. On the font at East Meon (1100) we find this form with the birds on either hand, but at Winchester (1110) the cross takes the place of the heathen tree of life (fig. 14).

A font in Berkin Church, Yorkshire, is surrounded by a series of panels, in most of which are lions devouring other beasts. At Exeter we find another instance, also the birds and an elephant; and in a late wall-painting in the Chapter House at Westminster are two other Eastern animals. They are affronted with a tree between, and in black letter is written **broandary: kamepl.**

To make an end: if we trace up any of the lesser arts we shall be directly led to the East. The finest pottery made in Europe was the Spanish copper lustre, which was introduced by the Arabs from Persia.

Medieval ivories are derived from the Ninevites through the Greeks.

The enamels of Limoges, which were, I suppose, introduced by the Venetians of the eleventh century, are of Byzantine and Oriental origin, as is also the art of the gem-engraver and lapidary.

Every tissue and stuff, from cloth of gold to printed cotton, is from the same source; and some directly from Persia, and others through India.

I would say that I have not endeavoured to show that we owe our arts to Asia in that its civilisation was before that of Europe; but rather as the perennial source from whence our ideas have come, as well in design as in language and mythology; and I have made an essay towards a theory of coherence in the history of art in attempting to show that there have been in the main but two great cycles of Western art. The first, in its germ Assyrian, and in its perfection Greek; the second, commencing as Persian, and culminating in Gothic.

W. R. LETHBRIDGE.



A Slab from Xanthus.

Illustrations.

DESIGN FOR ADMIRALTY AND WAR OFFICE.

THIS is a perspective view in one of the courtyards as it would have appeared in the design by Mr. P. J. Marvin which was submitted in competition for the New Admiralty and War Offices, had the design been carried out. The present drawing, of course, was not submitted in the first competition, from which perspectives were excluded, but like some others we have published and shall publish, has been made since to the author's intentions.

The illustration is reproduced from the water-colour drawing now in the architectural room at the Royal Academy.

SCULPTURE AT THE ROYAL ACADEMY.

We give this week illustrations of two of the most prominent and most able pieces of work in the Central Hall of the Academy Exhibition, the "Spartan Dancing Girl" of Mr. G. A. Lawson, and the "Autolykus" of Mr. E. Roscoe Mullins. We have commented sufficiently on both in our article on "Sculpture at the Royal Academy" (p. 717, ante). Mr. Lawson, however, sends us a few words which will assist in explaining the *motif* of the work:

"My intention in the 'Dancing Girl' was to give the feeling of perfect rest after (supposed) vigorous exertion; the unconscious abandonment and grace of a supple figure. 'Spartan' would account for the nude treatment, for, as you know, in the Lycrigan games the youths and maidens contended in the games nude; running, dancing, &c. In short, my aim may be summed up by 'purity and grace'; the idea of repose after healthy athletic exercise being sensibly distinct from that of the ordinary type of 'dancing girl repose,' of which we have had so many examples.

We asked Mr. Lawson for his reason for the differentiation of "Spartan" in the title of the work, which he gives as above. But in sculpture there is of course much more scope for the logical employment of the nude figure than in painting, because the form of art is much more abstract and ideal, and less imitative, than painting. Thus in Mr. Mullins's clever and expressive work, the object is to give the abstract idea of a certain type of human character. Dress would remove it from this abstract character, and fix it to a certain epoch and locality, which is exactly what is not wanted. Of course also the expressiveness of the actual figure, and the interest of modelling it, is far greater than that of modelling mere coverings. After the nonsense that has recently been written on the subject, a word or two on the point may not be out of place.

We should add that Mr. Mullins is anxious to have it understood that his figure is designed to be seen all round, and is not advantageously seen in its present position against the wall of the Gallery at the Academy.

THE CHURCH OF ST. MARY, ALFRICK, WORCESTERSHIRE.

THIS little church, by no means without interest, having fallen into a very dilapidated condition, required considerable repairs in order to preserve it.

The western portion of the nave is Norman, and retains its original windows, and will remain unaltered.

The north wall further west was in an unsafe condition, being much out of the perpendicular, and has been frequently buttressed up, and a portion of this is being removed for the new transept and vestry.

The general works include the removal of the plaster ceilings, bringing to light the original oak trussed roofs; the junction of the chancel and nave being marked by a half-timbered screen forming a chancel arch, and characteristic of Worcestershire work; in addition to which will be an oak chancel screen, the lower part of which is original, and was found on the removal of the high pews.

The space under the turret is being thrown into the church, and the upper portion enclosed with an oak-screen to form a ringing-chamber.

The church will be heated with hot-air by Mr. Constantine, of Manchester; the general contractor being Mr. J. Inwood, of Malvern; and the architect Mr. Aston Webb, of Westminster.

WESTMINSTER HALL.

IN preparing this design for *refronting* Westminster Hall in contradistinction to *restoring* (?) the grand old piece of national architecture, the author's chief aim has been to produce something to harmonise with the work of Sir Charles Barry, at the same time to fill up the hiatus which intervenes between St. Stephen's Hall and New Palace Yard.

The present aspect of this portion of the building is disgraceful, and the scheme herewith illustrated (by raising the parapet on the west side of the Hall to a considerable height, finishing it with enriched open panelling, the centre portion in each bay giving light to the interior, if required, in lieu of the hideous dormers now obtaining on the roof) would add the necessary dignity to the old Hall, in which it will still be deficient if the contemplated works are carried out.

By entirely removing the huge and worse than useless buttresses (for they do not help to support the roof timbers) and by substituting others of less projection and double in number (corresponding to the roof trusses inside), and by erecting the pinnacles to the height shown; the Hall would by such means be incorporated in the general design of the new palace.

Even supposing that the remains were ample to the purpose of erecting similar buildings to those which once stood here, the question would arise,—Is it desirable that such should be re-erected, and (by standing at the salient point of interest) catch the eye, to the utter detriment of that uniformity which a new front would at once and for ever realise?

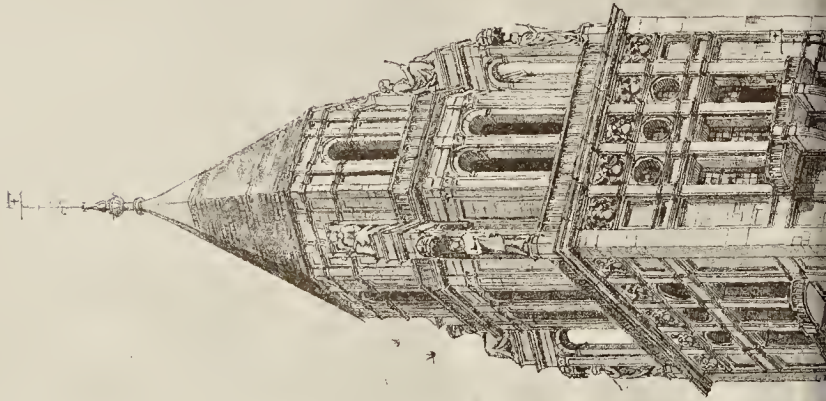
One of the best views, if not the grandest view, of the New Palace is obtained from a standpoint near the fountain. Any unbiassed person taking up this position cannot help seeing that the elevation between St. Stephen's Hall and New Palace-yard is extremely mean and undignified, and the erections to be added thereto will tend to increase this effect. At present there are only the massive buttresses, but when the cloisters are introduced the result will be to dwarf the Hall still more.

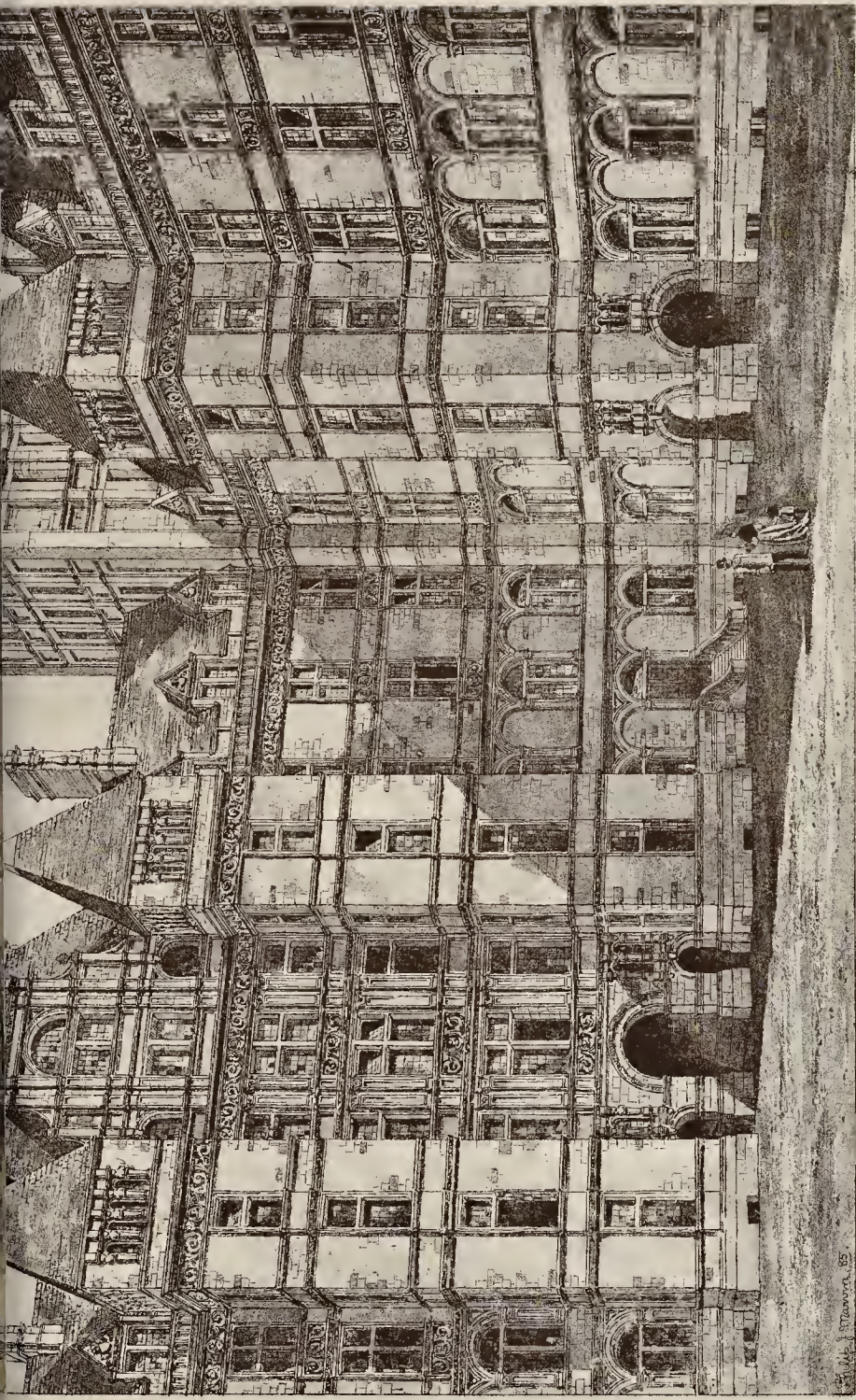
The restoration mania is now, it is to be sincerely hoped, nearly carried to its utmost limits. If such notions of preservation had entered the heads of our ancestors, we should have had little if any change of style. Repairing a twelfth-century building in the fourteenth would have resulted in dead twelfth-century instead of the then living style.

Take, for instance, the destruction of the Chapel of St. Mary, at the east end of the Abbey opposite. Henry VII. and Sir Reginald Bray did not hesitate to remove it to make way for the sumptuous resting-place of the former. Many other cases might be referred to where



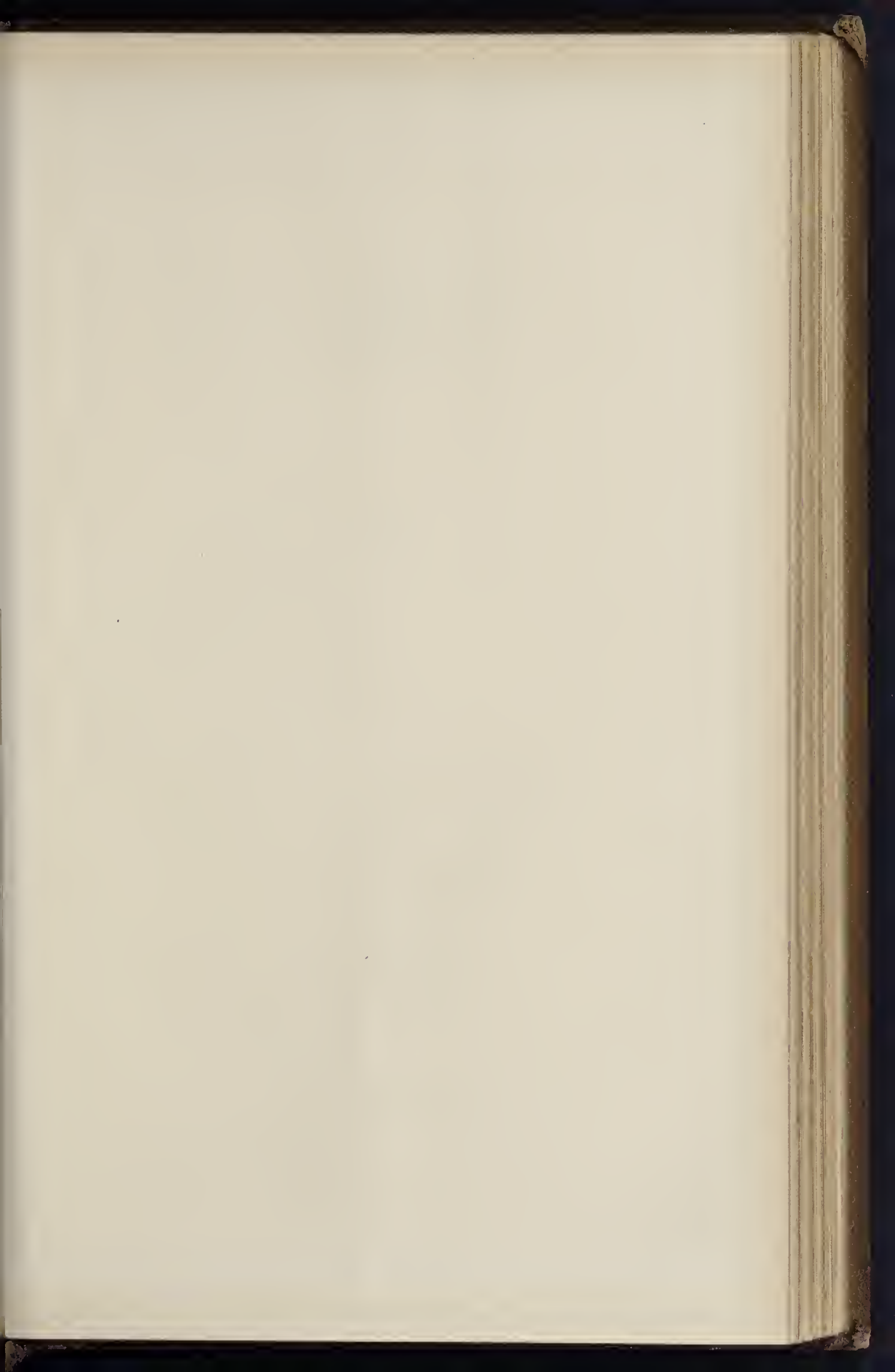
THE BUILDER, MAY 30 1885.

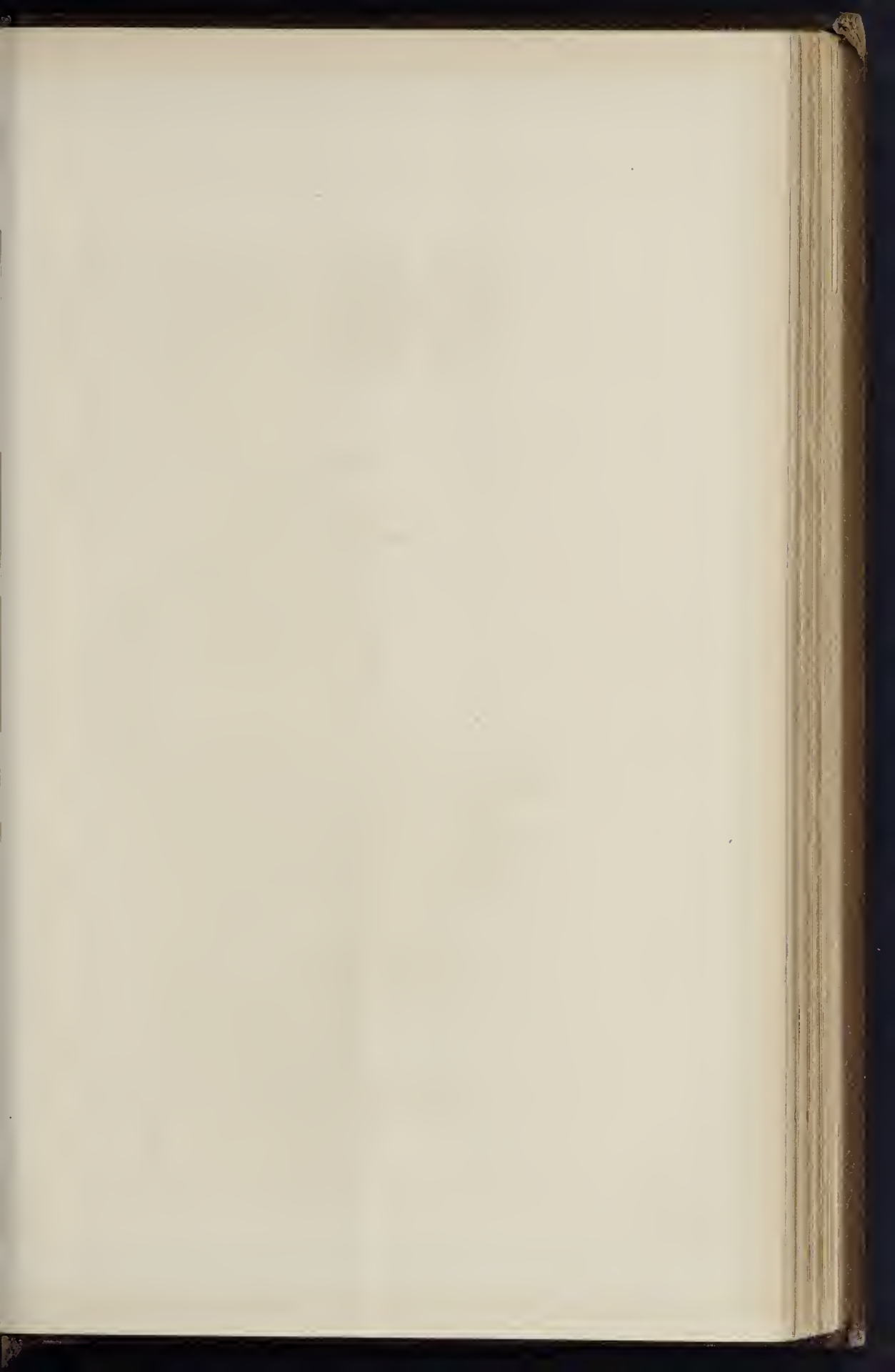




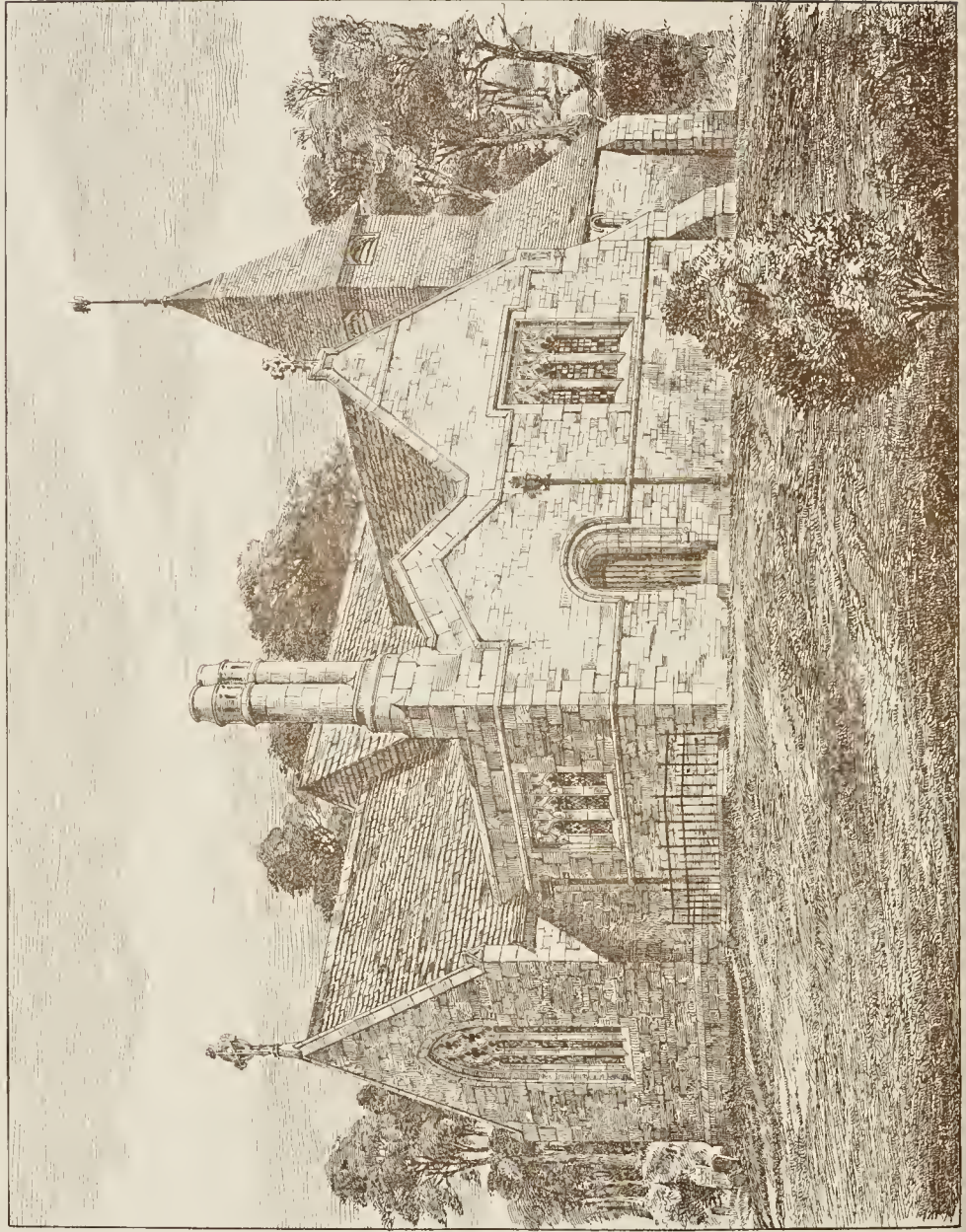
INK PHOTO. SHREVE & CO., LONDON

COMPETITION DESIGN FOR THE NEW ADMIRALTY AND WAR OFFICES, MR. P. J. MARVIN, ARCHITECT.
THE ADMIRALTY COURT-YARD.





THE BUILDER, MAY 30, 1885.



ALFRICK CHURCH WORCESTERSHIRE, ENLARGED AND RESTORED EXTERIOR VIEW — MR. ASTON WEBB, ARCHITECT.





INK PHOTO, SPRAGUE & CO LONDON

SCULPTURE AT THE ROYAL ACADEMY.

AUTOLYCUS,

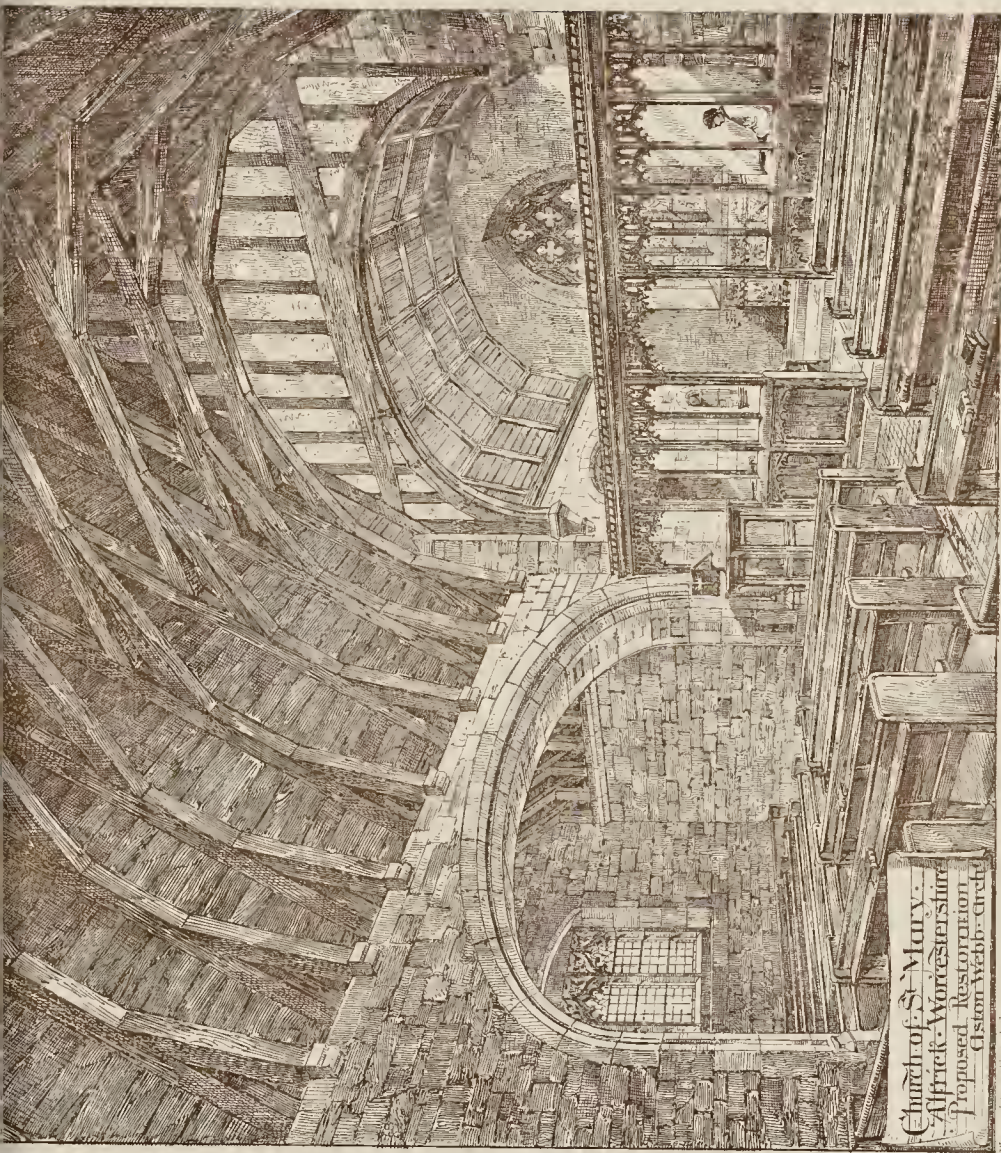
"A SNAPPER-UP OF UNCONSIDERED TRIFLES."

MR. E. ROSCOE MULLINS, SCULPTOR.



INK PHOTO. SPRAGUE & CO. LONDON.

SCULPTURE AT THE ROYAL ACADEMY
SPARTAN DANCING GIRL.
MR. G. A. LAWSON, SCULPTOR.



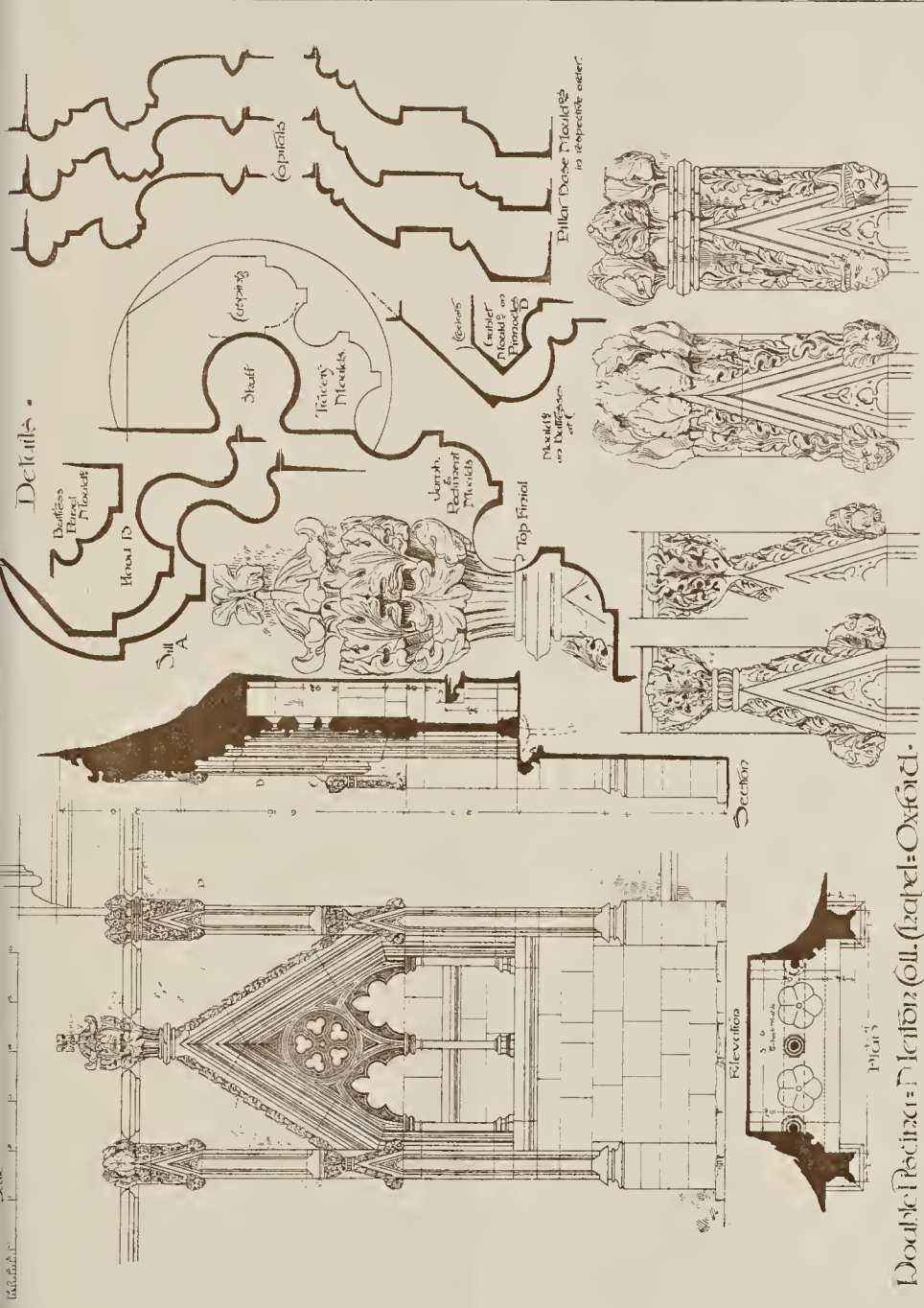
Church of St. Mary,
Warwick, Worestershire.
Proposed restoration
G. S. Webb, architect.

W. Marshall & Sons Photo Litho

Church of St. Mary, Warwick



Details.



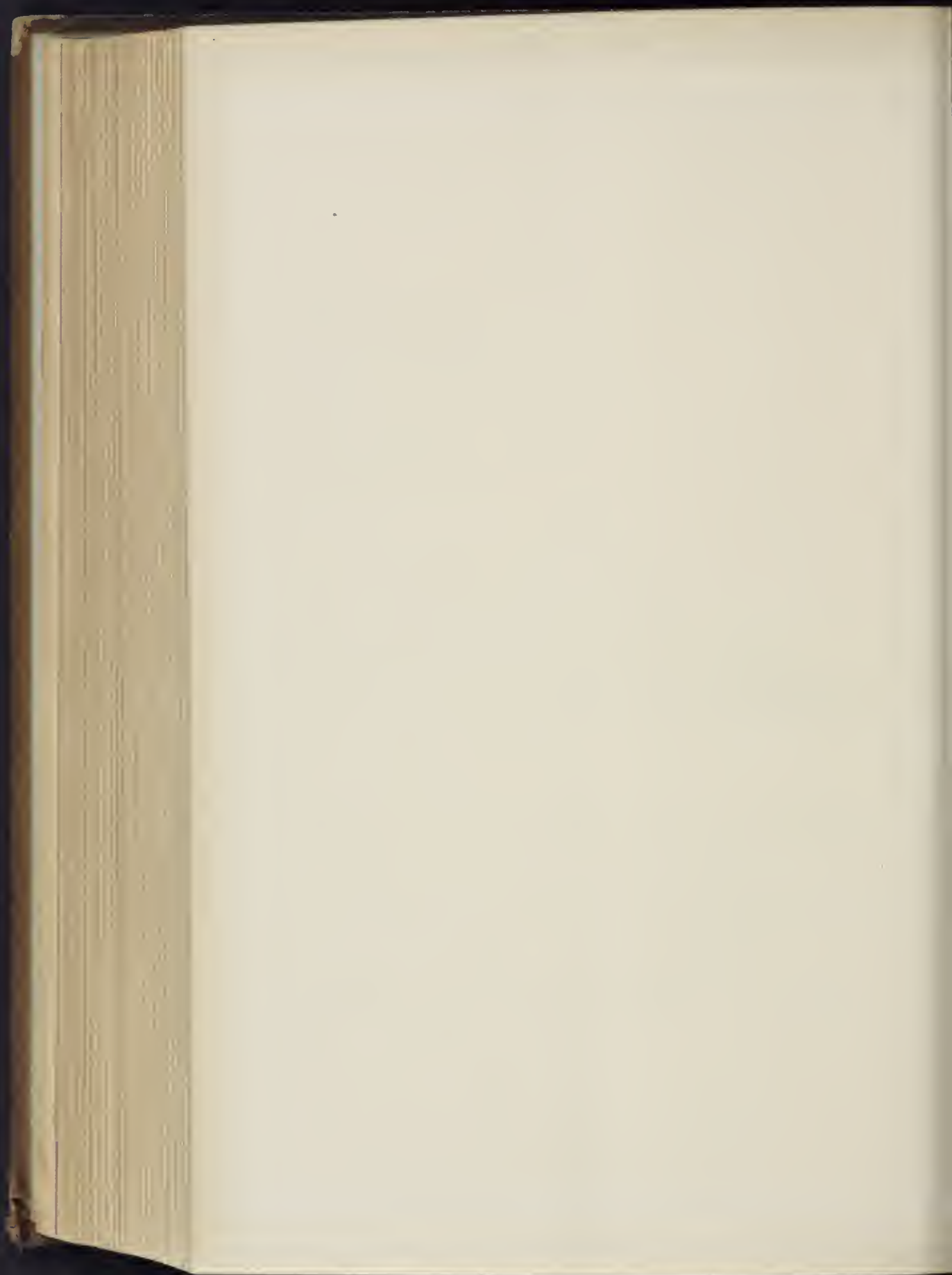
Double Piscinae, Chapel of Oxford.

Measured and Drawn by Mr. H. D. WALTON.

Wynant Sons Photo Litho

Architectural Association Travelling Studentship, 1885.

© Queen's College, London, W.C.



the exigencies and requirements of the times, rising above all misapplied sentiment (if any existed), led to new features and forms of architectural development.

The original idea of Sir Charles Barry to enclose New Palace Yard is, like all his schemes, grand enough, and worthy his genius; but I am inclined to think that by hiding the old Hall from the public, it would not be so satisfactory as retaining the open space, especially as the clock tower could not then be seen to such advantage as it is at present.

EDWARD A. HEFFER.

P.S.—Much more might be said on this burning architectural question of the hour. For instance, the unfortunate *low level* of Westminster Hall floor will be more apparent when the intended building is projected towards St. Margaret-street. The difference in the levels of the Hall and street will then be measured by the eye, and the result will be anything but satisfactory.

. We give Mr. Heffer's design as an interesting and clever suggestion, conceived in a true architectural spirit, and therefore worth publication at a time when the subject is being discussed; not as necessarily endorsing it, or recommending its adoption. We believe, however, that he is correct in his surmise that the old flying buttresses do not in reality play any part in supporting the roof; and in regard to the general idea, there is no question that an architect of the late Medieval period, if he had found the decayed buttresses left on his hands, and thought that he could do something better and more suitable himself, would have cut them away without thinking twice about it; and those who do not recognise that know nothing really of the spirit of the ancient architects whose works they profess to reverence.—Ed.

DOUBLE PISCINA, MERTON COLLEGE CHAPEL, OXFORD.

THE beautiful double piscina stands at the end of the south transept of Merton College Chapel, and is of the same period (late thirteenth century) and style of workmanship as the sedilia in the chancel. The drawing from which the illustration is reproduced is one of a set for which its author, Mr. H. D. Walton, was awarded the Architectural Association Traveling Studentship for this year.

THE HÔTEL MÉTROPOLE.

This vast hotel opens for the reception of visitors on Monday next. The size and importance of the building are such as to demand some description at our hands. While there is a great deal of good work to be seen in the interior, and while the sanitary and other utilitarian arrangements appear to be well calculated to insure the comfort and health of the guests and the easy and smooth working of what may be called the administrative service of the establishment, we greatly regret that externally the building is not, architecturally speaking, more worthy of its site. We certainly cannot agree with the encomium of one of the daily papers,—that the design of the elevation is imposing; it is anything but that. Making allowance for the difficulties which beset the architect of such vast hotels,—for the necessity of piercing the façade with a countless number of windows, and for the necessity, from a commercial point of view, of utilising every valuable site to an extent which would be incompatible with any material setting-back of portions of the building,—making allowance, we say, for all this, we cannot but feel that neither great architectural opportunity has been lost. The design as a whole is common-place and the detail coarse, with the exception of the sculptured spandrels over the principal entrance towards Northumberland-avenue, which have been executed by Mr. H. H. Armstead, R.A., and which logically represent "London." On the one side is a female figure with a shield containing the City Arms, with St. Paul's Cathedral in the background, while on the opposite side is a figure of "Father Thames," with shipping and the Tower of London in the rear. Some of our readers may remember that two years ago* we called attention to the sham legis-

lation which was supposed to give to the Royal Institute of British Architects the power to veto any designs for proposed buildings in Northumberland Avenue. At that time Sir James McCarell-Hogg, Chairman of the Metropolitan Board of Works, stated in the House of Commons, in reply to a question put by Mr. Story-Maskelyne, that "the design for the Hôtel Métropole was submitted to the Institute of British Architects, as required by the Act of Parliament, but after due consideration the Board did not think it necessary to put the tenant to the expense of carrying out the alterations suggested by the Institute, having regard to the fact that the plans* for the building had already been amended in accordance with the recommendations of the Board's Architect, who was himself then a member of the Council of the Institute." This reply seemed to us at the time to show (as we then remarked) such an extreme disregard for the requirements of an Act of Parliament that we turned to the statute† where we found the following words, which, as it seemed to us, gave the Institute no power to interfere at all.—"The architectural elevations of all buildings to be erected under this Act . . . shall be submitted by the Board to the consideration of the Council of the Royal Institute of British Architects previous to the commencement of any such buildings." The italics are our own, and the clause was shown to be a mere farce by the answer given to Mr. Story-Maskelyne by the Chairman of the Metropolitan Board of Works at a subsequent sitting of the House of Commons.‡ Sir James McCarell-Hogg admitted that the Board had received a letter from the Institute stating that "in the opinion of the Council, the design of the building, more especially as regards the ground-story, is unworthy of its intended position, and that the said design should be considerably modified before approval be given to it by the Metropolitan Board of Works"; but he contended that the Board had not evaded the conditions imposed by Act of Parliament, as suggested by Mr. Story-Maskelyne. "The wording of the Act," the Chairman of the Board went on to say, "was intended to convey no more than the suggestion of friendly consultation between the Board and the Council of the Institute, without binding the Board to carry out the suggestions of the Council." Without stopping to question the correctness of Sir J. McCarell-Hogg's interpretation of the intentions of the Legislature (which is certainly open to question), we hope that if in future our legislators are sufficiently enlightened to insist on some provision for ensuring tolerable buildings in prominent positions, they will profit by the lesson of the present *fiasco* and make the provision a reality and not a sham. We have recurred to this subject as so long because we feel that the lesson which it unfolds is one which ought not to be forgotten. But we now pass on to speak of the interior of the building, which contains a great deal of very satisfactory work. The building occupies a site which, roughly speaking, is the shape of an isosceles triangle, the rounded apex abutting on the Victoria Embankment. The principal frontages are towards Northumberland Avenue and Whitehall-place, that towards the first-named thoroughfare being about 315 ft. long, and that towards Whitehall-place being about 312 ft. long. There is also a frontage of 140 ft. to Scotland-yard. The building also abuts for about 120 ft. on the offices of the Ecclesiastical Commissioners. The site is about an acre in extent, and the hotel is said to be the largest in Europe. The height of the building is 118 ft. from basement-floor to parapet in front of towers, and about 150 ft. to top of Mansards. Without counting the rooms in the Mansards, the building contains eight stories, with the addition of a mezzanine towards Whitehall-place. The ground-story, which is faced throughout with Portland stone, rests upon a grey Aberdeen granite base, but all the stonework above the first floor (except cornices, sills, balustrades, chimneys, and other exposed portions) is of Bath stone, from the quarries of Messrs. Pictor & Sons. The roofs are constructed

* We understand that what is meant by this word is "designs" or "elevations." We believe that the only alterations made in the design by Mr. Vulliamy consisted in the deletion of some of the windows and in carrying up coupled pilasters instead of single ones in those parts of the elevations under the Mansards, so as to broaden and emphasise the design to some extent of intervals; and no doubt, so far as it goes, this is an improvement.

† The Charing Cross and Victoria Embankment Act, clause 30.

‡ See *Builder*, June 9, 1883, p. 787.

of wood and iron, with every possible precaution against the spread of fire, such as Parian skirtings, window linings, &c., the only exposed wood-work being the doors, and roofed for the greater part with zinc tiles.

The basement, which is 15 ft. high, and well lighted, contains two large billiard-rooms, two smoking-rooms, a servants' dining-hall, boiler-house, machinery rooms, lavatories, hair-dressing department, large wine-cellars, workshops, &c. The ground-floor contains, on the side facing towards Northumberland-avenue, the grand *salle à manger*, 105 ft. long by 45 ft. wide and 25 ft. high, and extending from the vestibule and entrance-hall in Northumberland-avenue to the Scotland-yard corner of the building. This fine apartment is divided up into spaces resembling the nave and aisles of a church by two rows of columns with Corinthian capitals with marble pedestals, supporting massive girders which carry the division-walls and corridors of the superstructure. To the left of the great entrance-hall is a large lobby, giving access to the grand staircase and lifts for passengers and luggage; to a reception-room, 47 ft. 6 in. by 33 ft.; and to a corridor giving access to another vestibule, Moorish in style, from which the library and drawing-room are entered. The library is 34 ft. 6 in. by 27 ft. Occupying the corner of the building at the junction of Northumberland-avenue and Whitehall-place with the Embankment is the drawing-room, a very fine apartment, measuring about 50 ft. by 40 ft. A good part of the remainder of the ground-floor frontage towards Whitehall-place is occupied by bedrooms, with a corridor between them, the rooms on one side of the corridor looking on to and being lighted from the street, and those on the other side getting light from the light-courts in the interior of the building. Owing to the great height of the principal apartments on the ground-story towards Northumberland-avenue, it has been easy to get in a mezzanine floor towards Whitehall-place, and is also devoted to bedrooms. The bedrooms on the ground-floor and mezzanine extend along the Whitehall-place frontage as far as the Whitehall-place entrance, the vestibule of which gives access to a secondary entrance-hall and staircase. To the left of this entrance-hall is the large Banqueting Hall, or "Whitehall Salon," about 80 ft. long by 42 ft. wide, with a circular bay at the Whitehall-place end. At the inner end of this hall is an elliptical recess or alcove for a dais; this alcove is top-lighted, and is decorated with some paintings by Mr. C. J. Durhan, hereafter referred to. Beyond this hall, and lighted on one side by an intervening light court and on the other side by windows looking on to Scotland-yard, is a large public dining-room, about 44 ft. by 36 ft. The remainder of the Scotland-yard portion of the ground-story is occupied by the service entrance and stairs, by still-room, serving-room, pantry, &c., with the necessary lifts, and other accommodation. Behind these rooms, and approached from the grand *salle à manger* and from the great entrance-hall, is a secondary *salle à manger*, called the Oak Salon, and measuring 49 ft. by 44 ft. This apartment, as well as an adjoining room (which is to be used as a private dining-room, and is to be known as the King's Room,—44 ft. by 22 ft., with a recess or alcove on one side), are not reached from the larger of the four light-courts, through stained-glass soffits, lights. Carried up in the centre of the building, between two of the light courts, is what may for convenience be called the sanitary block, containing water-closets, baths, &c., so that every water-closet has a window opening to the external air. The first and second floors are mainly occupied by bedrooms, some of which have sitting-rooms and dressing-rooms *en suite*. Each suite of private apartments is provided with its own bath-room and water-closets. The third, fourth, fifth, sixth, and seventh floors are nearly all taken up by bedrooms and sitting-rooms, of which the total number is between 500 and 600. The kitchen is on the fifth floor, and is very large and lofty. It is top-lighted. Adjoining is a large bakery.

Having now described the general arrangement of the building, we proceed to give a few details of its constructive and decorative features. The foundations are of Portland cement concrete, carried down in some parts (especially where the site covers ground reclaimed from the river by the Embankment works) to the extent of 35 ft. below the pave-

* See *Builder*, May 19, 1883, p. 636.

ment level. The footings are extended, and the walls are built in Portland cement up to the eills of basement, with about forty miles of stout iron hoops, 2 in. wide, embedded therein. The whole of the remainder of the structure is built with blue lias ground lime. Nearly all the bricks used in the building are the excellent light red bricks from the Ellistown works, near Leicester. Staffordshire blue bricks are used for piers and in other positions where great weights have to be borne. The light courts are all faced with the excellent white glazed bricks supplied by Messrs. Cliff & Sons, of Wortley. As a large number of flat-headed window-arches had to be put in, specially-made skewbacks of the same material were made, so as to save labour in cutting to form the abutments. The two principal staircases, which go from top to bottom of the building, are of fireproof construction, and are on the same principle as those constructed at the Grand Hotel and at the First Avenue Hotel, by Mr. Holloway, and which has been previously noticed by us in terms of commendation. They are of concrete, made of Portland cement and coke breeze, stiffened with iron internally, the treads and risers of the grand staircase being of marble up to the second floor, and those of the secondary staircase, near the Whitehall entrance, being of oak up to the first floor. The soffits of these staircases are panelled and very nicely moulded and finished in Parian cement. The service stairs, which go from top to bottom of the building, are of hard York stone. The corridors (of which there is a total length of $1\frac{1}{2}$ mile, and which have also been designed by Mr. Holloway), have their floors and side walls, from top to bottom of the building, constructed of fireproof concrete of the description before referred to, and the ground and first floors, and all the kitchens, bakery, &c., on the upper floor, are of fireproof construction throughout, on Dennett's system. The floors of the grand *salon* and of several other of the larger apartments in the building are of cement and coke breeze laid on top of the concrete. This makes a capital flooring surface where it can be carpeted. The same material forms the floor of all the corridors. Down the centre of each corridor runs a channel for the passage of gas-pipes, electric light and electric bell wires, &c. All the corridors will be covered with a thick felt carpet, so as to deaden the sound of footsteps, and so ensure quietude. In the upper floors the skirting-boards, window-linings, &c., are all executed in Parian cement, so as to reduce the amount of exposed woodwork to a minimum. Other precautions against the spread of fire are seen in the hydrants which, always fully charged with water, occur at frequent intervals in the corridors. There are about 1,100 tons of constructional ironwork in the building, all of which has been supplied by Messrs. Handyside & Co., of Derby, including some steel girders used to span the banquetting-hall, or "Whitehall Salon," as it is to be called, and which, by the way, has a very good oak floor, so that it may be used as a hall-room. Architecturally-speaking, the interior of this room, which is Renaissance in style, is perhaps the least satisfactory of all the large interiors. The detail exhibits one or two anachronisms, which we will not stop to point out now. Before going on to speak of the artistic effect of the interiors, however, we must say a word or two in praise of the ingenuity and skill exhibited in the planning, which reflects great credit upon its authors.

The building exhibits the practical working-out of several valuable "notions," as our American cousins would call them, for the saving of time, labour, and inconvenience, and so maintaining internal economy of administration. One of the most interesting of these are the "hot-water and boot boxes" provided in connexion with all the bedrooms. This, we believe, is the result of a suggestion made by the managing proprietor of the establishment, Mr. Gordon, and it has been very well worked out by his builder. In the corner of each bedroom nearest the door is a wooden pedestal covered with a hinged lid. By lifting up this lid the occupant of the room can deposit his boots in a receptacle about 12 in. deep. Access to this receptacle is obtained from the corridor by a small door, on opening which the chambermaid can remove or replace the boots of the occupant of the room, or can deposit a can of hot water. By this means not only is the convenience and privacy of the occupants ensured, but the corridors are not littered, as they often are in

other establishments, by cans of water and "too, too many pairs of shoes." Another admirable contrivance which is likely to be appreciated by the chambermaids, at any rate, consists of a small semaphore signal which will be raised outside each room whenever the occupant touches the "push" of his electric bell. In a building of some considerable length, and it is often likely to happen that when the chambermaid is at the end of the corridor remotest from her room she may hear the bell of the numbered indicator. Now without the aid of the small semaphore raised outside each room when its bell is rung, the maid would frequently have to traverse the length of the corridor to look at the indicator and then to return possibly to the remotest end of the corridor to the room where her services were required, instead of being able, as she will be by its aid, of at once seeing where she is wanted. Among other contrivances likely to be conducive to the convenience of visitors may be mentioned the bolts of the water-closets, which when fastened on the inside automatically display on the outside the word "engaged."

Tanks in the upper part of the building give a water-storage capacity of 30,000 gallons. There are two hydraulic lifts for passengers, working side by side, but independently of each other, in a square space enclosed by the grand staircase. These lifts work in a strong and well-designed framing of iron columns and stays. In order to obviate the unsightliness of the greasy guides and rams, and to partially conceal the cages in their ascent or descent, Mr. Holloway has, inspired by a happy thought, devised and worked out a method of filling in the iron-framed enclosure containing these lifts with perforated sheet zinc panels. The perforations consist of well-designed flowing arabesque patterns, and being glazed on the external face, and divided by mouldings of dark-coloured wood, this metal screen has a very rich effect, according to the walls of the rich marbles with which the walls of the staircase, hall, and vestibule are lined and decorated. Mr. Holloway has also adopted in this building the method which he devised for the admission of fresh air (warmed when necessary by steam pipes) into the larger apartments of the Grand Hotel and other buildings with which he has been connected. In the grand *salon à manger* of the *Hôtel Métropole*, for instance, the fresh air is admitted through the tops of the pedestals of the columns which divide that apartment longitudinally. The bedroom sashes are all provided with a simple ventilator invented by Mr. Alfred Holland, the manager of the Grand Hotel, which we described a year or two ago, and which is called the "Lazy" ventilator.

We have only a small space in which to speak of the decoration and character of the principal apartments of this monster *caravanseraï*. The large dining-hall or grand *salon à manger* is Italian in style, with marble dado and pilasters, and richly-decorated ceiling and walls. The smaller dining-hall, or Oak Salon, is panelled in oak. It is Renaissance in style, and devoid of elaborate detail. The walls contain large panels filled with French hand-woven tapestry. A rich frieze of Lincrusta-Walton, of bold design, surmounts the oak panelling. Adjoining is the "King's Room," which is lined with oak of a darker colour than that of the Oak Salon. It is Jacobean in character, and is more elaborate in detail than the room last mentioned. There are portraits of King James I., and of Raleigh, Bacon, Ben Jonson, and other celebrated men of his reign. These are painted in oil, and are the work of Mr. Albert W. Holden. The Whitehall entrance and staircase are treated entirely in oak, and are Renaissance in character. The Whitehall Salon, otherwise known as the Banquetting Hall, is Italian in style. In the alcove at the inner end of the hall are three paintings executed by Mr. C. J. Durham, representing scenes at an Italian marriage festival. This hall and some of the adjacent rooms have been temporarily retained by the Junior Carlton Club during the rebuilding of part of their premises in Piccadilly. Close to the grand staircase is the Reception Room, decorated in the Italian style. The tapestry in the four panels has been specially made at the Royal Windsor Tapestry Works, and represents views of the royal palaces. The *avorini* or cupids in the frieze have been painted by Signor Cordeña, a Spanish artist, while the birds, flowers, and smaller panels with cameo

centres (after those in the Gallery of Apollo in the Louvre) have been painted by M. Monblond. The Library, adjoining, is a fine oak-lined apartment, Elizabethan in style, panels of embossed leather being introduced. There is a boldly-designed plaster-frieze above the panelling, the ceiling being of oak. The vestibule adjoining is Moorish in style, and contains a great deal of costly work, imported from the East. The drawing-room is a richly-decorated apartment in the Louis Seize style, the decorations being after those in the Salon Rosso at the Tuileries. The hand-painted silk panels, representing musical trophies, with cameo medallion portraits of celebrated composers, have been executed by M. Monblond, who was employed on similar work at the Tuileries. Among other noteworthy apartments in the building is the Marie Antoinette chamber, on the first floor, which is stated to be an exact copy of Marie Antoinette's *boisoir* at Fontainebleau. The painted panels in this room were specially executed for Messrs. Maple & Co. by M. Galland, a well-known Parisian artist. Altogether the furnishing, upholstery, and decoration, which have been in the hands of Messrs. Maple & Co., reflect great credit upon that firm. The furniture, so far as we saw, is good in design and execution, and there is a pleasing variety of it, no two rooms being precisely alike either as to furniture or decoration.

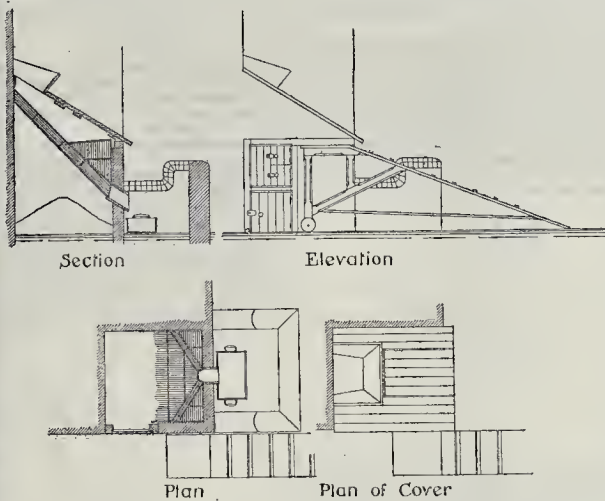
The whole of the structure has been carried out by Mr. G. H. Holloway, as builder for the proprietors (no contractor being employed), and under his personal supervision and direction. He has been ably assisted by Mr. W. Spencer, who has had charge of the preparation of the joiners' work (all of which we examined being very satisfactory), and by Mr. Parrall, who has acted as general foreman. The architects of the structure are Messrs. F. & H. Francis and J. E. Saunders. The entire furnishing of the building has been carried out by Messrs. Maple & Co., who also fitted and decorated the drawing-room, library, reception-room, the oak *salon*, the king's room, the Whitehall entrance, the grand *salon à manger*, and Whitehall *salon*. All this firm's work is characterised by great excellence. The marble and mosaic work is by Messrs. Burke & Co. The decoration in the grand entrance vestibule and staircase is by Messrs. Clayton & Bell, who also executed the stained glass throughout the building. The stonework and carving are by Mr. F. G. Anstey. The constructional ironwork is by Messrs. A. Handyside & Co.; and the iron balustrading of the principal staircase by Messrs. Braun, and Messrs. Richardson & Ellison; that of the Whitehall staircase is by Messrs. Sanson & Co. The hot-water service and kitchen fittings are by Messrs. Benham & Sons. The sanitary appliances and baths are by Mr. George Jennings. The passenger and service lifts are by the Hydraulic Engineering Company, of Chester. The electroliers are by Messrs. B. Verity & Sons. The gas mains and fittings throughout the building are by Messrs. Hulcutt & Co. The outside lamps and self-regulating burners are by Messrs. Snagg & Co., Limited. The zincwork is by Messrs. Braly & Co. The art-work is by Messrs. Simpson & Sons, and Messrs. Wilcock & Co., of Barnantofts, Leeds. The locks are by Messrs. Hobbs, Hart, & Co.; the bricks by the Ellistown Brick Company, and Messrs. J. Cliff & Sons; the fireproof floors by Messrs. Dennett & Ingle; the graining by Mr. Osmond; the fire appliances by Messrs. Merryweather & Sons; the electric bells by Messrs. Adams & Sons. The basements are illuminated by daylight, as far as may be, by means of Hayward's patent prismatic pavement lights.

The following are a few statistics as to the materials, &c., used in the construction of the building, the cubical contents of which are upwards of 5,000,000 ft., viz.:

88,750 ft. cube of stone; 6,617,000 bricks; between 30 and 40 miles of hoop iron; between 8 and 9 miles of $2\frac{1}{2}$ in. by $\frac{1}{2}$ in. bond iron; 151,750 ft. cube timber; 1,100 tons constructional ironwork; $1\frac{1}{2}$ mile iron channelling; 10 miles lathing, 1 yard wide; $5\frac{1}{2}$ mile cornices; $5\frac{1}{2}$ miles skirting; $1\frac{1}{2}$ mile length of corridors; 42 miles electric bell wire; between 6 $\frac{1}{2}$ and 7 miles gas barrel; 5 miles electric-light wire; 400 squares of roofing.

* The corridors are taken above the ground-floor to the seventh floor inclusive.

† These figures only give the materials used up to December 31st last, so that in some instances they have now been largely exceeded.



An Improved Dust-bin.

DUST BINS.

As this subject is now attracting attention elsewhere, we give a plan, section, and elevation of a dust-bin, from a model kindly lent to us by Mr. T. W. Erle, who has employed this arrangement at his own house. Mr. Erle writes:—

"The cinders, &c., as will be seen, are shot into the funnel at the top, and screen themselves by 'racing' down the wires, which are fixed. If the wires were movable, there would be a risk of their being taken out by some perverse slut, and of all sorts of putrescible refuse being thrown into the receptacle. The folding-doors prevent any dust from rising. The essential point of any good arrangement for the screening of the cinders is that it should be, as in this case, self-acting; that is to say, that it should give no trouble whatever. The ashes are removed by a shovel through the lowest door at the side. The smaller doors above this are for putting in broken crockery or other such refuse, which would not pass through the sieve, but would be out of place amongst the cinders. Two doors are more convenient for this purpose than one. Usually it is only necessary to open one. If any wet refuse were to be shot into the funnel, it would clog the wires, and would have to be picked off by hand. To introduce, by hand, any such refuse through the small doors at the sides would be a troublesome and unattractive process. According to my experience, it is never done; but if it were, I should fasten up the doors at the side (excepting the one at the bottom, which it would be impossible to misuse), and have broken hardware, &c., put at the side of the dustbin.

The slope, as will be seen, is easily moved away at a moment when access to the doors is required. Any girl can do this."

BUILDERS' BENEVOLENT INSTITUTION.

AN election of pensioners on the funds of this Institution took place at Willis's Rooms, St. James's, on Thursday last, Mr. Stanley G. Bird, President, in the chair. There were three vacancies,—two for men and one for a woman, and there were five candidates, of whom four were men. The following is a list of the candidates, with the number of votes polled for each, according to the report of the scrutineers and Messrs. Geo. Plucknett, J.P., and Thos. Birling, viz.:—John Richmond Bisley, Brompton; aged 74, builder (third application), 83 votes; Reuben Hurren, Notting-hill, aged 66, builder (third application), 1,170 votes; James Robert Rawley, Kingsland (formerly a subscriber to the funds of the Institution), aged 64, plumber, &c. (second application), 1,588 votes including 20 allowed for subscriptions; and Wm. Thornton, New Wandsworth, aged 66, miller (second application), 676 votes. Mrs. Caroline Harrison, of Lisson-grove, widow of Atwater Harrison, being the only candidate for the female's pension, she was elected, as a matter of course.

The Chairman declared the successful candidates to be James Robert Rawley, Reuben Hurren, and Mrs. Caroline Harrison.

A vote of thanks to the Chairman, moved by Mr. Plucknett, and thanks to the scrutineers and other gentlemen who had taken part in the proceedings, brought the meeting to a close.

OBITUARY.

M. Théodore Ballu.—The death is announced at Paris of M. Théodore Ballu, one of the architects of the Hôtel de Ville, who died on Friday morning of a malady from which he had been suffering for some little time past. He was born in 1817, and was a pupil of Hippolyte Lebas at the School of Fine Arts, where he succeeded in gaining the Grand Prix de Rome for architecture. Upon his returning from the Villa de Medici, and after a visit to Greece, he completed the Church of St. Clotilde, which had been commenced by Gan. Among his subsequent works may be mentioned the Churches of the Trinity and St. Ambrose, as well as the restoration of the tower of St. Jacques de la Boucherie and the Church of St. Germain l'Auxerrois. In 1873, when the Municipal Council opened a competition for the reconstruction of the Hôtel de Ville, he participated in it in collaboration with M. de Perthes. They gained the first prize, and were charged with the execution of the great work, to which he devoted all his powers.* M. Ballu, who was a Member of the Institut de France and Inspector-General of Diocesan Edifices, was elected as an Honorary and Corresponding Member of the Royal Institute of British Architects in 1876.

TEMPLE BAR GATES.

STR.—Can any of your readers inform me whether there is truth in the report that the curved wooden gates which once adorned Temple Bar have been allowed to lapse into decay? If so, it would be curious to know who is responsible for this neglect.

OLD LONDON.

YORK HOUSE WATER-GATE.

STR.—May I offer a suggestion as to the preservation of this beautiful relic of the taste and skill of Inigo Jones, which is now almost lost, and utterly useless in its present position? Why not remove it to the west end of the ornamental water in St. James's Park, opposite Buckingham Palace, where it would be seen to the greatest advantage from all points, and where it might even be restored to its original use, namely, a gate from whence to embark in boats on the water? If, however, objection should be taken to this latter part of the proposal, the gate would still remain an elegant ornament to the margin of the west end of the lake. The cost of removal of so small a structure need not be a very heavy item.

G. BYNG GATTE.

* The following illustrations of this building have appeared in the pages of the *Builder*, viz.:—External view, vol. xxxix., 1880, p. 323; interior view, Hall of Fêtes, vol. xliii., 1882, p. 402; and Council Chamber, vol. xlv., 1883, p. 463.

A QUESTION OF VALUATION.

STR.—I shall be greatly obliged if some kind friend and reader of the *Builder* will give me replies to the following questions at the earliest possible date, viz.:—What is the present value of a tithe-rent charge, commuted at 11%, payable annually? Also the present value of a land-tax assessed at 9s. the year? ONE IN A FIX.

PROVINCIAL NEWS.

New Brighton.—At this watering-place, at the mouth of the Mersey, a "Palace" and Winter Garden have been formed containing a large room for entertainments, 198 ft. long by 104 ft. wide in the centre, and 25 ft. high throughout. The walls are built in brick, with brick in cement piers, and the whole area is covered with a flat compound iron and concrete roof or floor, which is (average) 7 in. thick, having but 2 in. fall each way from the centre over the entire area, with a water outlet at the four corners. This roof and floor is carried upon cast-iron columns in bays, 30 ft. 6 in. by 22 ft. 6 in., upon brick in cement piers about 16 ft. below the floor-level, upon a foundation of concrete below ebb tide. Over the 30 ft. 6 in. span between columns and column in the width of building, rolled compound riveted girders, 2 ft. deep, stretch from side to side, supporting 12-in. girders which run the length of the room, and over all transversely are rolled joists, which are embedded in concrete, finished with Soyssal asphaltic rock. This portion of the contract has been executed by Messrs. Homan & Rodgers, of Manchester and London; and the internal plastering of walls and ceilings by Messrs. Tanner & Son, of Liverpool. A grand organ fills one end of the room, and the floor is laid with pitch-pine for dancing; the flat roof over is used for the same purpose and for skating, and constructed to carry a moving weight of 2½ cwt. to the foot, and was tested before use with a slip gauge below, and some hundreds of weighted bags of sand on one bay, and a body of workmen. The deflection was three-tenths of an inch on the 22 ft. 6 in. girder, which went back to the normal position after the weight was removed, and the whole has been thoroughly tested by crowds from time to time without producing the slightest crack in the ceilings below. From this room to the right are small concert-halls, aviaries, grotto, and other entertaining rooms, and on the left is a promenade conservatory, 135 ft. long by 59 ft. 6 in. wide filled with beautiful exotics and surrounded by vinerias and azalea and camellia houses, the whole being warmed with some 1,000 ft. of hot-water pipes. These buildings have been executed under contract by Messrs. McKenzie & Moncur, of Edinburgh; and the cement floors and tiled pavement by Mr. R. Lowe, of Farnworth. The dancing area, being about one acre on floor and roof, is brilliantly lighted at night by gas and electricity. The whole has been designed and carried out under the personal superintendence of Mr. T. C. Ebdy, architect, of Birkenhead. Upwards of 60,000, has been spent on the undertaking.

Toxteth Park, Liverpool.—The alterations to the offices of the Toxteth Park Local Board, situate in Lark-lane, Toxteth Park, Liverpool, have just been completed by the contractor, Mr. John Carruthers, of Toxteth Park, from the designs of Mr. John Price, Assoc. M. Inst. C.E., engineer and surveyor to the Board. The cost, including some fittings and furniture specially designed, has been 450*l*.

Bolton.—Mr. Jonas Proctor, M. Inst. C.E., having resigned his appointment as Borough Surveyor to the Bolton Corporation, has commenced private practice, and taken into partnership Mr. H. L. Hinnell, formerly his pupil, and late of the Borough Engineer's Office, Nottingham. Mr. Proctor has been retained by the Bolton Corporation to complete the Hacken Ornal Sewage Works, for the Borough and Rural Sanitary Authority.

Rochdale.—The new premises of the Manchester and Liverpool District Bank, which have just been opened for business, are situate at the corner of Hind Hill-street and Market-street, in the side space just opposite St. Luke's Church. The building faces both streets, the bank entrance being at the corner, and is Classic in style. The banking-room is spacious and well lighted. The safe is made of steel, and surrounded with thick concrete, and approached by double fireproof doors by Messrs. Chubb. This

safe contains another of Messrs. Chubb's patent cash safes. Attached to the bank is a manager's house. The whole of the place is heated with hot water, and great care has been bestowed upon the ventilation, both as to the admission of fresh air and the extraction of foul air. The premises have been designed and carried out under the superintendence of Messrs. Maxwell & Tuke, architects, Manchester and Bury, by Messrs. Diggle Bros. of Heywood. The block floors and ceramic tile work have been done by Mr. L. Oppenheimer, of Manchester; the hot-water by Mr. J. Downham, of Bury; the grates by Mr. John Kershaw, of Heywood; and the bank fittings by Messrs. Beahans & Company, of Manchester.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

**I.
OF SURFACES IN GENERAL.
Curved Lines and Tangents.**

ALL curved lines can be exactly represented by two projections. They belong to two distinct categories. Firstly, *plane lines* or lines which are entirely contained in planes, such as a circle for instance; secondly, *lines of double curvature*, which are not contained in planes, such as the thread of a screw.

The *tangent* to a curve in any point is the limit of the direction of the cords which join that point to another point infinitely near to it. We conclude thereby that the projection of a tangent is also tangent to the projection of the curve; for, if on curve C we draw the cord *a b*, we see that when the point *b* nears *a* so will *b^h* near *a^h* in the projection, and when *b* becomes infinitely near to *a* so will *b^h* be infinitely near to *a^h*; and the cord *a^h b^h* prolonged will be tangent to the projection C^h in the same time as the cord *a b* becomes a tangent to the curve C itself. (See fig. 86.)

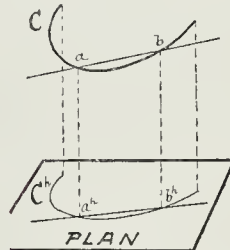


Fig. 86.

The use which is made of infinitely small dimensions and the notion of limits belong to the higher grades of mathematics, such as differential and integral calculus, and may seem strange to some students; but, in this second part of Descriptive Geometry we cannot escape using them also, and the student should do his best to grasp at once these ideas in the above simple example.

Generation of Surfaces.

All surfaces can be engendered by the motion of a line either of constant or variable form. For instance, suppose we cut a surface by a series of parallel planes infinitely near to one

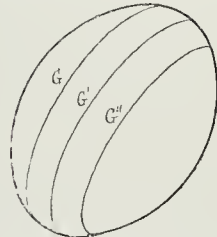


Fig. 87.

another, and get thereby the lines G, G', G'', G''', &c., we can look upon these lines as the different positions of a line G, which engenders the

surface. We call that line the *Generator** of the surface. (See fig. 87.)

Principal Examples of the Generation of Surfaces.

Cylinders are generated by a straight line, G, bound to remain always parallel to a given line, K, and to touch another line, D, we shall call the *Director*. This is the definition of cylinders in general, what is commonly called a cylinder is only a special case in which the director is a circle, and the generator is perpendicular to the plane of the directing circle; such a cylinder is called a *right cylinder*. (See fig. 88.)

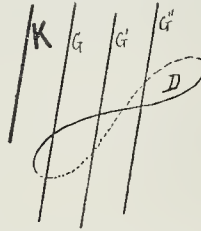


Fig. 88.

Cones are generated by a straight line, G, bound to pass through a point, *s*, named the *apex* of the cone, and to touch another line, D, called the *director* of the cone. Again, this is the definition of cones in general, of which the ordinary cone is but a special case, which is called a *right cone*. (See fig. 89.)

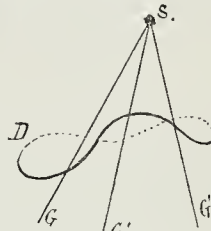


Fig. 89.

The directors of both cones and cylinders can be any line of their surface, but generally plane lines are selected, such as are formed by the section of the cone or the cylinder by a plane, and then the director is called the *base* of the cone or cylinder. We beg also to remark that cylinders are but cones where the apex, S, is situated at an infinite distance, and that we shall find, therefore, great similarity in the treatment of these two surfaces.

Surfaces of Revolution are engendered by a line, G, which revolves round an axis, A, to which it is bound. In this motion all the points of G describe circles; these circles are the sections of the surface of revolution by planes perpen-

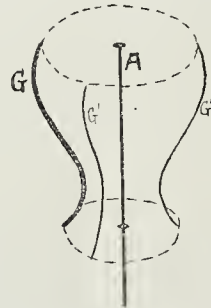


Fig. 90.

dicular to its axis. The generator can be any line of the surface, but generally a *meridian* is selected for the generator G, that is, the section

* The standard works on Geometry use the words "generatrix" and "directrix," because a line belongs, both in French and in Latin, to the feminine gender; but we see no obligation in the English language to follow this example, and as the plural "generatrices" and "directrices" is inconvenient and strange we prefer in this popular paper to use the masculine form of "generator" and "director."

of the surface by a plane passing through the axis A. (See fig. 90.)

Tangent Planes.

If through a point, *m*, of a curved surface we draw a series of curves, such as *m a, m b, and m c*, the tangents to all these curves will be in the same plane; this is what we call the *plane tangent to the surface in m*.

In fig. 91 we have taken the points *a* and *b* on another generator G' of the surface; now, when the generating curve G' is taken infinitely near to the generator G, then the cords *m a, m b, and m c* become the tangents to the curves *m a, m b, and m c*; and, as the cords were contained in one plane, so are also the tangents. This remark is not restricted to any particular curves selected, but applies to any three curves whatsoever which cross one another in one point of the surface; therefore it holds good for all the curves, and we conclude that all the tangents to the surface in the point *m* are in one plane.

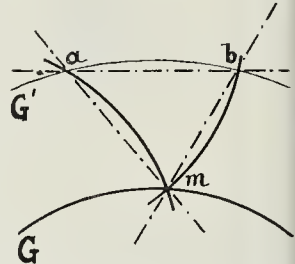


Fig. 91.

Planes tangent to cones and cylinders contain a generator of their surface, and are, therefore, tangent all along that line. In fig. 92 *Sa* and

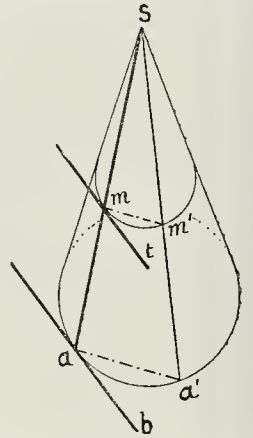


Fig. 92.

Sa' are two neighbouring generators of a cone; they are contained in one plane. When these generators are taken infinitely near to one another the plane which contains them becomes tangent to the cone, for the cords *m m', a a'* have become the tangents *m t* and *a b*, and the generators have become united into one, namely, the generator *Sa*. We have said already above that the arguments applied to cones hold equally good for cylinders.

**RECENT PATENTS.
ABSTRACTS OF SPECIFICATIONS.**

350, Inlating Wood. H. Forester.
The design is cut in the wood in the usual way, and is then filled in with a plastic composition, which afterwards hardens in place of the wood or ivory commonly employed.

3,991, Fireplace or Grate. W. Rooke.
The frame is cast with a chamber at the back, in which are arranged a series of gills to warm the air which passes through it, and which is carried away by pipes fitted into sockets cast on the top of the chamber to assist in warming other rooms. Fire brick back and cheeks are fixed in recesses in the casting. A false grate is fixed in front of the frame by means of countersunk screws.

By WINESTANLEY, HOWWOOD, & Co. Limehouse—27 and 29, Dion-street, 84 years, ground-rent 11l.	240l
By DEBENHAM, TAWSON, & Co. Denmark Hill, Love-walk—the residence, "Corn- wall House," 63 years, ground-rent 10l.	1,600
By FILLIERS, LBA, & DAVIES. Finchbury—23, Wilson-street, 71 years, ground- rent 42l.	1,150
New Southgate—9, Holmesdale-road, 35 years, ground-rent 5l.	130
By EDWIN SMITH & Co. Belsize Park—27, Buckland-crescent, 60 years, ground-rent 10l.	1,500
By BURN & SONS. Brentwood, near—"Bannister Farm," 31a. 2r. 25p. freehold.	850
Malden—1, 2, 4, 10, and 11, Derby-villas, 79 years, ground-rent 24l. 10s.	1,080
By E. HOLSWORTH. Homerton—10 and 21, Marian-street, freehold.	275
Dalston—59 and 60, Malvern-road, 60 years, ground- rent, 10l.	750
8, Rilson-road, 57 years, ground-rent 5l.	435
Hackney—203, Richmond-road, 59 years, ground- rent 7l.	340
8, Anton-street, 61 years, ground-rent 6l. 10s.	333
Stoke Newington—1, Derwent-terrace; and 67, Brook-road, 88 years, ground-rent, 7l.	400

MEETINGS.

SATURDAY, MAY 30.

Architectural Association.—Visit to Buchan Hill Man-
sion, Crawley, Sussex (Messrs. Ernest George & Peto,
architects). Train from Victoria, 1.30 p.m.
Civil and Mechanical Engineers' Society.—Visit to the
new Blackfriars Railway Bridge. 2.30 p.m.
Edinburgh Architectural Association.—Annual excursion:
to Inchochuil, Doubristle, Dalgety, and Aberdeen.

MONDAY, JUNE 1.

Surveyors' Institution.—Annual General Meeting, 3 p.m.
Followed by Annual Dinner (at Holborn Restaurant),
4.30 p.m.
Society of Engineers.—Mr. Henry Fajls on "Port-
land Cement." 7.30 p.m.
Clerks of Works' Association.—Mr. G. R. Webster on
"A Simple Method of Perspective Drawing" (second
paper), 8 p.m.
Inventors' Institute.—8 p.m.
Royal Institute of the Architects of Ireland (Dublin).—
Council meeting.
Edinburgh Architectural Association.—Annual General
Meeting, 8.30 p.m.

TUESDAY, JUNE 2.

Institution of Civil Engineers.—Annual General Meet-
ing (under Revised By-Laws) to receive the Report of the
Council, and to Elect the Council for the ensuing year,
8 p.m.
Society of Biblical Archaeology.—(1) The Rev. H. G.
Tomkins "On the Topography of Northern Syria, with
Special Reference to the Karak Lists of Theonius III." (2) Mr. Theo. G. Pinches "On Specimens of the Familiar
Correspondence of the Babylonians and Assyrians." (3)
Professor A. H. Sayce on "The Site of This." 8 p.m.
Birmingham Architectural Association.—Ordinary Meet-
ing: Nomination of Officers. 7.30 p.m.

WEDNESDAY, JUNE 3.

Builders' Foremen and Clerks of Works Institution.—
Ordinary Meeting, 8.30 p.m.

THURSDAY, JUNE 4.

Society of Antiquaries.—Ballot for Election of Fellows,
8.30 p.m.
Royal Archaeological Institute.—(1) Mr. F. C. J.
Spurrell on "Some Early Sites and Works on the Margin
of the Thames (tidal portion)." (2) Mr. John E. Price
F.S.A., "Comparative Notes on Roman Remains at
Hitchin and Airedale." (3) Mr. R. S. Ferguson, F.S.A.,
on "Elizabethan Standard Weights and the Casside
Bushel." 8 p.m.

FRIDAY, JUNE 5.

Institution of Civil Engineers.—The President's Con-
cessions at the Inventions Exhibition, 9 to 12 p.m.

Miscellaneous.

Society of Arts.—The results of the Society
of Arts' examinations have just been published.
There was a satisfactory increase in the number
of candidates, 1,208 having presented them-
selves at 44 centres, whereas last year there
were 991 candidates and 38 centres. Of these
1,206 candidates 953 passed and 255 failed.
The number of papers worked was 1,321; of
these 145 took first-class certificates, 410 second
class, and 474 third class, while to 292 papers
no certificate was awarded. Eleven of the
thirteen subjects set down for examination
were taken up. In two no examination was
held, as the requisite number of candidates (25)
did not present themselves. The largest number
of papers worked (396) was in book-keeping.
Other favourite subjects were:—Arithmetic,
171; English (including composition and corre-
spondence and précis writing), 118; short-
hand, 253; theory of music, 243. In French
there were 96 candidates; in German only 28.

Great Eastern Railway, Essex Lines.—
The construction of the railway, about nine
miles in length, from Shenfield, near Brent-
wood, to Wickford, authorised by the Great
Eastern Railway General Powers Act, 1883, is
about to be commenced. The contract, which
includes the erection of stations at Shenfield
Junction, Billericay, and Wickford, has been
let to Mr. T. D. Ridley, of Harwich and Middles-
brough.

Domestic Electric Lighting.—The *Electrical Review* of the 16th inst. gives a detailed
account of an electric lighting installation lately
set up at Westwood House, Sydenham, the resi-
dence of Mr. Henry Littleton, the principal of
the well-known music publishing firm of Novello,
Ewer, & Co., which has recently been rebuilt
from designs by Mr. J. L. Pearson, R.A. This
rebuilding has been carried out by Messrs.
Voitch & Close. Westwood House and two
smaller houses, occupied respectively by Messrs.
Augustus and Alfred Littleton, stand in
grounds of about nine acres in extent, and
towards the latter end of last year Mr. Little-
ton finally decided to adopt the electric light,
placing the arrangements for illumination
entirely in the hands of his son, Mr. A. Little-
ton. The prime mover is one of the "Otto"
8 horse-power (nominal) gas engines, running
a few hours a day for charging accumulators.
The dynamo is a shunt-wound "Phoenix" of
Paterson & Cooper's manufacture, giving at its
normal speed 110 volts and about 50 amperes.
The accumulator-room is a spare loose horse-
box, well suited for the purpose. Here are
placed 100 galled cells, 1½ horse-power type
of the Electrical Power Storage Company's
secondary batteries, with the latest improve-
ments, and coupled up in twos. The lamps
used are made by Messrs. Woodhouse & Rawson,
and are chiefly of 20-candle power. The opera-
tions of fixing the lamps, wiring the houses,
laying the main cables, and generally carrying
out the work connected with the installation,
was undertaken by Messrs. Paterson & Cooper,
and this has been completed to the entire satis-
faction of Mr. Littleton. The various switches,
fusable plugs, and measuring instruments, are
from the same firm, but Messrs. Paraday & Son
have supplied all the fittings for Mr. Augustus
Littleton's rooms, and Messrs. Barkentin &
Kroll, of Regent-street, have designed very
original and unique fittings in hammered copper
and iron for Westwood House. The two small
houses are lighted throughout with about twenty
lamps each, and Westwood House will contain
more than double that number, and including
those for a small theatre, the total will be
nearly 400 lights. The whole installation will
be in charge of a youth of about eighteen years
of age, who will, however, spend but half his
time in this work. It is stated that since the
beginning of January, when a portion of the
lamps were first put into use, no hitch of any
kind has occurred.

A Proposed Art-Museum for Bath.—
A case before Mr. Justice Chitty in the Chancery
Division last week raised questions as to the
validity of bequests contained in a codicil of
the late Miss Holburne, of Bath, executed
three days before death, whereby she gave the
collection of the late Sir Thomas William
Holburne, consisting of antique plate, china,
&c., to certain persons for their own use abso-
lutely, and also a sum of 10,000l. and her
residuary estate to the same persons. She also
gave the house to them in which she lived.
These persons admitted that the testatrix in
making the gifts intended that they should act
as trustees and form an art-collection for Bath,
and that the 10,000l. and residuary bequest
was intended for the maintenance and protec-
tion of this collection. They produced corre-
spondence to that effect, showing such intention
on the part of the testatrix, and also that she
had during her lifetime contemplated buying
Sydney House, Bath, for the purposes of a
"Holburne Museum," and endowing it with
10,000l., but the negotiations fell through. The
questions were whether the gifts in the codicil
fell within the prohibitions of the Statute of
Mortmain, precluding testamentary dispositions
of land or houses, or money to be laid out in
land or houses, or of money to support or endow
houses or land. Mr. Justice Chitty said that
the first question was whether the gifts were
charitable gifts within the legal meaning of the
term. A public purpose of general utility, to
the exclusion of private business, was obviously
intended by the testatrix, as was shown by the
correspondence. It was intended that the
museum should be in Bath, and for that city,
and kept there. The question then arose
whether the gifts necessarily implied the pur-
chase of a house. His lordship thought not,
for the testatrix seemed to have successfully
avoided using any language which would justify
any such conclusion. It would be no breach
of trust for the trustees to hire a room in
which to have the collection in proper and
careful custody.

Overhead Wires.—Notwithstanding the
recommendations contained in the report of the
Select Committee on Telephone and Telegraph
Wires, which has just been issued, that the erec-
tion of overhead wires should be continued
subject to proper regulation and supervision,
care should be taken that the rights of the
public are not encroached upon. The Com-
mittee propose to authorise the Postmaster-
General to give notice of intention to erect
telegraph lines before obtaining the consent
of the road authority, such notice being public-
ly posted. All persons objecting are to send
the objections within a stated period. Such
objections should be referred to a competent
tribunal, empowered to authorise the erection
of the line on just conditions, and to make
orders as to the costs occasioned by the objec-
tions. This tribunal may be the county court
judge, with an appeal to the Railway Commis-
sioners, as at present, within a limited time.
Provisions of existing Acts inconsistent with
these suggestions are to be repealed, especially
the provision requiring the Postmaster-Gen-
eral to obtain the consent of every occupier with
30 ft. of the pole. It will be seen from the above
that far too much and additional power is
proposed to be placed in the hands of the
Post Office, as against the public. Private
rights cannot be too jealously guarded, whether
against monopolies or the State. Persons who
have had experience in resisting those who
powers are only too well aware how difficult
and how expensive it is to act by legal means
against them.—*Iron.*

Wings.—It may be taken for granted that
the introduction of wings into ornament
design was due directly to their symbolic mean-
ing. What more suggestive of the heavens
above, and all that pertains to it, than wings?
Once, however, admitted, they soon assumed
very important place in virtue of their abso-
lutely ornamental character,—and held it.
Accordingly we find that in the ornament of a
periods great decorative use is made of the wing
from the winged globe of early Egyptian art
symbol of eternity, to the winged love of modern
French design, symbol only of frivolity. Al-
yet, for all the ornamental character of the
wing, there has always been a difficulty in satis-
factorily combining it with animal forms
which nature had not made structural provis-
ion for it. The happy thought, at whatever ear-
ly period it occurred to man, was one of those
inspirations more poetic in its conception than
easy to realise in plastic form. The realistic
is almost inevitably a degradation of the ideal.
This is less the case in the earlier and more
archaic art, which touches us by its naïveté
whereas in work of later date we should
rather the comicality of it. What was possible
to the artist of the old world is not possible
to us. We may not attempt what came natural
to him to do, because to us it is not natural.
Art Journal.

Sanitary Supervision of Hotels.—The
Sanitary Protective League of New York City
has originated an entirely new sanitary move-
ment. It has prepared a Bill, which it will
introduce and get passed by the State Legislature,
and provides that in all towns and cities in which
there are Boards of Health, the owners and
keepers of all hotels and lodging-houses shall
apply to such Boards for sanitary certificates,
which shall certify to the good sanitary con-
dition of their houses. These certificates shall
not be granted to houses which have not
freedom from dampness of site or cellar, prop-
er drainage and plumbing, absence of foul ar-
dorous odours, adequate supply of water,
direct light in sleeping-rooms, and at least
600 cubic feet of air-space for each occupant.
Each innkeeper must obtain and display the
certificate, as failing to do so subjects him
damages for sickness of occupants during such
negligence, and, in case of death, the executor
of the deceased have cause for action.—*Sanitary
Record.*

Lostwithiel.—A site which has been vacant
for some years, adjoining the United Methodist
Free Church on the Bank, is about to be utilised
for the erection thereon of a minister's house
with a shop and premises at the angle of the
site to Queen-street and Bodmin-hill, a sub-
stantial space being allowed at the north end for an
extension hereafter of their church as may be
found expedient. The plans have been prepared
by Mr. A. E. Skentlebury, architect, of Lost-
withiel. The cost will be about 700l., and the
contractor is Mr. J. Reed, of the Kirkby Building
Yard, Plymouth.

the Mersey Docks and Harbour Board.—The usual meeting of this Board, held on the inst., Mr. Littledale directed attention to purchase by the Works Committee of certain machinery for a swing bridge, and for the reasons why this change had been decided upon. He complained that the bridge joining the connection between the east and west sides of dock "K" at its northern end had been long since ordered. He also inquired whether the swing bridge was in substitution of the other kind of bridge, and what would be the cost of the alterations in the quay walls to give the bridge. He concluded by moving the recommendations of the committee of its stand over for a week in order that the question might be inquired into. Mr. Lyster, the engineer, entered into a brief explanation, but Mr. Littledale contended that of his questions had been answered. As, however, there was no second to Mr. Littledale's motion, it fell to the ground, and the votes were confirmed. Mr. Littledale subsequently directed attention to the report of the pier on the deflection of the west wall of Brookbank Dock and moved that the report be made at the time of the bursting of a water-pipe, referred to by the engineer, be laid before the Board, and also that the works committee be requested to report that at which said bursting of the pipe occurred, and at the time the pressure of water was shut off, contending that neither the bursting nor the age of a water-pipe could, in the course of very short time, cause a deflection in the wall to the extent of 430 ft. in length. The deflection from the weakness of the construction

of the wall, and he therefore asked for the production of the report in order to test the accuracy or the inaccuracy of his statements. The Chairman explained that originally the report was only a verbal one, and its accuracy had since been fully confirmed by Mr. Lyster. If, however, it was wished to carry the discussion further, it would be necessary that the motion should be seconded. Mr. Littledale finding no second, his motion fell to the ground, and he remarked that "there is a day of reckoning coming for all that."—*Liverpool Journal of Commerce.*

A Memorial Brass, by Mr. James Forgyth, has just been placed in Prestwich Church containing the following inscription:—"In loving memory of Henry Mildred Birch, B.D., formerly Fellow of King's College, Cambridge, and Assistant Master of Eton College. For thirty-two years Rector of this Parish, Canon Residentiary of Ripon Cathedral, Chaplain in Ordinary to the Queen, also Chaplain and sometime Tutor to His Royal Highness Albert Edward Prince of Wales. Born January 12th, 1820; died June 29th, 1881."

British Archaeological Association.—At the meeting on Wednesday, May 20th (the Rev. Dr. Sparrow Simpson in the chair), it was announced that the annual congress would be held early in August, at Brighton, for the purpose of paying visits to many places of interest in West Sussex. Among these will be Arundel Castle, by permission of his Grace the Duke of Norfolk; the Roman pavements at Bignor, Chichester Cathedral, Steyning, Shoreham, and Sompting Churches, and many others.

For the erection of new additions to St. Giles's and St. George's Workhouse, Bloomsbury, for the Guardians of the Poor. Messrs. William & A. Boreford Pite, architects. Quantities by Messrs. Gardiner, Son, & Theobald.—

Dove Bros.	£11,975 0 0
G. Stephenson	11,837 0 0
W. Timms	11,760 0 0
J. W. Falkner	11,543 0 0
E. Conder	11,393 0 0
J. Mowlem & Co.	11,219 0 0
Colls & Co.	10,910 0 0
Perry & Co.	10,938 0 0
G. H. & A. Bywater	10,888 0 0
Holland & Hannen	10,888 0 0
Higgs & Hill	10,834 0 0
W. Downs	10,773 0 0
J. T. Chappell	10,688 0 0
Edmund Toms	10,519 0 0
Peto Bros.	10,786 0 0
J. Grover	10,715 0 0
Patman & Fotheringham	10,752 0 0
Mark Patrick & Sons	10,717 0 0
W. Brass & Son	10,655 0 0
J. Smith & Sons	10,493 0 0
J. Simpson & Son	10,380 0 0
J. B. Axford	10,225 0 0
Lathey Bros.	10,200 0 0
B. E. Nightingale	10,143 0 0

For the erection of new infant school buildings at Llanelly, South Wales, for the Llanelly School Board. Mr. E. H. Lingens Barker, architect, Hereford.—

D. Davies, Llanelly	£2,029 0 0
J. Evans, Llanelly	1,633 0 0
G. Mercer, Llanelly	1,399 5 0
D. C. Jones & Co., Gloucester	1,385 0 0
T. & J. Brown, Llanelly	1,378 0 0
D. Phillips & Llewellyn	1,369 17 0
C. Edwards, Leominster	1,355 0 0
Thomas, Watkiss, & Jenkins, Swansea (accepted)	1,300 0 0

For the erection of the Havelock Arms public-house, Gray's Inn-road, Holborn, for Mr. James Bacon, Mr. C. Young, architect, Strood Hill, Rochester. Quantities by Mr. J. H. Wall, 1, Walbrook.—

S. Salt	£3,845 0 0
T. Gregory	3,597 0 0
Jackson & Todd	3,378 0 0
H. L. Holloway	3,337 0 0
G. Gates	3,156 0 0
Lathey Bros.	3,319 0 0
Mattock Bros.	2,268 0 0
J. Higgs	3,093 0 0

For rebuilding offices, No. 5, Union-court, Old Broad-street, E.C. Mr. Alfred Conder, architect, Palace-chambers, Westminster. Quantities supplied by Mr. Harold G. Jackson.—

Brown, Son, & Bloomfield	£2,025 0 0
Kirk & Randall	1,887 0 0
W. Brass & Son	1,793 0 0
Lavrance & Sons	1,741 0 0
Mark Manley	1,737 0 0
W. Tongue	1,731 0 0
S. J. Ferrard	1,733 0 0
J. Grover	1,715 0 0
J. Morter	1,693 0 0
J. Woodward	1,690 0 0
G. S. Williams & Son (accepted)	1,677 0 0

[The amounts given are net, after allowing for old materials.]

For alterations and additions to No. 14, Burton-street, Bevis-works, for Capt. Stewart, Mr. R. Fabian Russell, architect, Mount-street, W.—

Woodward	£1,246 0 0
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For the erection of detached house, Belzize-lane, Hampstead, for Mr. J. Metcalf, Mr. R. Fabian Russell, architect.—

W. Smith	£1,150 0 0
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Accepted for alterations and additions to the Tower of the Winds, Chilworth, near Southampton, for Mr. C. Simpson, Mr. W. H. Mitchell, architect, Southampton.—

Marshall & Bosc	£2,760 0 0
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For alterations to Tidesy's Stables, Belzize-lane, Hampstead, for the London Parcels Delivery Company, Limited, Mr. W. Seckham Witherington, architect, 79, Mark-lane.—

R. Priestley	£975 0 0
F. Mark	809 0 0
Maxwell Bros.	779 0 0
Larke & Son	760 0 0
C. F. Kearley	747 0 0
T. Elkington (accepted)	736 0 0

For the erection of a cleft oak fence, Broad-lane, Tottenham, for the Tottenham Local Board.—

Edwards, Braughing, Heris	£320 0 0
Humphreys & Son, Tottenham	265 0 0
Taylor & Brooking, Dorking	265 0 0
J. Bloomfield, Tottenham	247 0 0
G. L. Wilson & Co., Tottenham	226 15 0
J. Foscock, Wood-green	226 0 0
Osborne, Stevens, & Co., South Wharf, Paddington (accepted)	209 9 9

Accepted for the erection of a new cistern reservoir at Kenilwick, near Tottenham.—

Pack Bros., Torquay	£378 0 0
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For extension and completion of outfall sewer, construction of tank, cool-bed, grays, &c., at the Royal National Hospital for Consumption, Ventnor, for the Board of Management.—

J. Ball	£2,169 0 0
Ingram & Sons	1,598 10 0
J. Jolliffe	1,600 0 0
G. Hayles (accepted)	1,412 7 0

Accepted for alterations and alterations at Church Grange, Leek, for Capt. Colville, Messrs. W. Sugden & Son, architects.—

W. Collis, London	£401 10 0
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COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Construction of Schools	Northfleet School Bd.	£5, 15s.	June 23rd	ii.
Construction of Schools	Bristol School Board	1st and 3rd, 20 to 18 gs.	July 20th	ii.
Designs for Labouring Classes	Liverpool Corporation	50l. and 25l.	August 1st	ii.
Designs for the Piers	Bournemouth Com.	100 gs., 60 gs., & 25 gs.	August 19th	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Construction of Footpaths, &c.	Met. Board of Works	Official	June 2nd	ii.
Light-Iron Fencing, &c.	War Department	do.	do.	xix.
Construction of Channeling	Southeast Local Board	A. Cayton	do.	xix.
Construction of Clock	Levisham Bld. of Wks.	Official	do.	xix.
Construction of Painting and Chaining	Leads Union	do.	do.	xix.
Construction of Painting, &c.	Midland Railway Co.	A. A. Langley	June 5th	ii.
Designs for Staff Accommodation, &c.	Met. Asylums Board	M. Wyatt	do.	ii.
Designs for Telegraph Office, Gloucester Docks	Com. of H.M. Works	H. Jarvis & Son	June 8th	ii.
Construction of General Repairs, Herze Bay	Sch. Metro. Sch. Dist.	do.	do.	xix.
Construction of Whitewashing, &c.	St. George's Union	H. S. Snell	June 9th	ii.
Designs for Baths and Laundry	Com. for Pub. Baths, &c.	Official	do.	xix.
Construction of Additions to Malt Houses	St. James's, Westminster	P. Phipps & Co., Lim.	June 10th	xviii.
Bells and Machinery for Lighthouses	H. H. Stipes & Co.	do.	do.	xix.
Construction of Ketting, &c.	Dublin Port & Dock Bd.	B. B. Stoney	do.	xix.
Construction of Urial, Lotherby	Church Congress Missn.	G. Rake	do.	xix.
Construction of Passenger Station, Bishop Auckland	Southgate Local Board	C. G. Lawson	June 11th	ii.
Construction of Schools and Buildings	Commissioners of Sewers	Official	June 12th	ii.
Construction of Fittings and Fittings	North Eastern Railway	W. Bell	June 17th	ii.
Construction of Fittings, &c., at Schools	Admiralty	Official	June 18th	ii.
Construction of Fittings, &c., at Schools	Hampton Wick Sch. Bd.	R. T. Elean	June 20th	ii.
Construction of Fittings, &c., at Schools	London School Board	Official	June 22nd	ii.
Construction of Fittings, &c., at Schools	Grinds, Bethnal Green	A. & C. Harston	June 23rd	ii.
Construction of Fittings, &c., at Schools	Board of Directors	do.	June 24th	ii.
Construction of Fittings, &c., at Schools	Bristol U. S. A.	Official	July 1st	xviii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor Assistant	Boro. Surveyor, Gidham	100l.	Not stated	xvi.

TENDERS.

For new offices, at the corner of Blomfield-street, on wall, for Messrs. Waterlow & Sons, Limited.

Edwards & Emanuel, architects, 2, Finsbury-circuit	£27,070 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	26,840 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	26,777 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	26,469 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	27,501 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	26,843 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	25,656 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	25,590 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	25,449 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	24,443 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	23,979 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	23,975 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	23,780 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	23,730 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	23,500 0 0
Edwards & Emanuel, architects, 2, Finsbury-circuit	23,500 0 0

For the enlargement of the Girls' Industrial Home, Ipswich. Mr. E. T. Bishopp, architect and diocesan surveyor.—

T. Thwaites	£3,339 0 0
J. & A. Brown	3,050 0 0
F. Dupont	2,850 0 0
R. Girding	2,742 0 0
E. S. Smith	2,659 0 0
Geo. Kenney	2,494 0 0
O. Gibbons	2,450 0 0

For the erection of eight shops and dwelling-houses, in the King's cross-road. Mr. M. S. Kelly, architect. Quantities by Mr. Mark W. King.—

G. Masters & Sons, Austerley	£7,517 0 0
Kilby & Gayford, London	6,234 0 0
E. S. Conder, London	5,608 0 0
J. & J. Greenwood, London	5,631 0 0
Riley Bros., London	5,759 0 0
C. Byron, London	5,699 0 0
J. & H. Coles, London	5,497 0 0
E. Burch & Co., London	5,531 0 0
H. R. Ockenden, London (accepted)	4,901 0 0

For works and fittings required for the Shaldon Water Supply, for the Teignmouth Local Board. Mr. George Crow, Surveyor to the Board:—

Table with 2 columns: Item description and Price. Includes Building Well, Reservoir, and Machinery. Total amount £2,004 18 9.

Table with 7 columns: Item description (5-inch Main, 4-inch Main, 3-inch Hydrants, 6-inch Cocks, 5-inch Cocks, 4-inch Cocks, 3-inch Cocks) and Price. Total amount £1,900 0 0.

For alterations and repairs to the Oxford and Cambridge Stages, No. 2, New Oxford-street, for Mr. James Martin, Mr. Arthur W. Saville & Mr. W. J. Martin, joint architects, 69, Strand. Quantities supplied:—

Table with 2 columns: Builder's Name and Amount. Includes Hollamby & Hobbs, Lambie, Anley, Walker, Spencer & Co., Cook, Ward & Lambie, Royal (accepted), Heath, Sanders & Sons, Helling, H. Warne, Watts & Co., Winn, Pragnell (accepted).

For the erection of building at the waterworks, Wellingborough, for the Wellingborough Local Board of Health. Mr. F. Sherman, surveyor:—

Table with 2 columns: Name and Amount. Includes J. Silen, E. Brown, Clayton Bros., M. Harrison, T. Berrill, O. Henson, R. Marriott, J. Underwood.

For finishing two houses and shops, with stabling on land behind, in the High-road, Kilburn, for Messrs. Broad & Co. Messrs. New & Son, surveyors:—

Table with 2 columns: Name and Amount. Includes Pryor, Kilburn, Scrivener & Co., Tennant, Wilkesden, Longmore & Co., F. Mark, Thomas & Rutland, J. Allen & Sons, Kilburn.

Accepted for making alterations at the Union Offices, Tetley House, Wakefield, for the Wakefield Guardians. Mr. William Watson, architect:—

Table with 2 columns: Name and Amount. Includes George Favcott, A. M. Craven, John Brooke, Thomas Naylor.

Accepted for painting, &c., inside and out, the Clayton Hospital buildings, Wakefield, Mr. William Watson, architect:—

Table with 2 columns: Name and Amount. Includes Charles Turner & Sons.

Accepted for rebuilding a block of houses and shops in Kirkgate, Wakefield, for Mr. J. O. Stratford, Mr. William Watson, architect, Wakefield:—

Table with 2 columns: Name and Amount. Includes Samuel Storey, C. F. Rycroft, J. C. Tattersall, John Lloyd, S. Atkinson, Charles Turner & Sons.

Accepted for fittings for the gymnasium at the Blind Asylum, Manchester. Mr. C. Heathcote, architect:—

Table with 2 columns: Name and Amount. Includes J. Wilson, jun., Hulme, Manchester.

For the erection of new Mission Chapel, Hackney Wick. Mr. J. Weir, architect:—

Table with 2 columns: Name and Amount. Includes Jarvis & Sons, Skiller & Sons, Rider & Sons, W. Shurrum, Lathey Bros., J. D. Hobson, J. Holloway.

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ILLUSTRATIONS.

New Buildings, Brighton College.—Mr. T. G. Jackson, Architect.....	796-797
Chapel, King's College, Aberdeen University: Door in Screen, and Sketch of Canopies of Stalls,—Measured and Drawn by Mr. J. C. Watt.....	800, 801
Plans and Elevations of Chapel and Tower, King's College, Aberdeen University.—Measured and Drawn by Mr. J. C. Watt.....	804, 805
Sculpture at the Royal Academy: "Play."—By Mr. S. Fry.....	808
Grotesques at Notre Dame, Paris.—Drawn by Mr. Reginald T. Blomfield.....	809
Polytechnic School, Charlottenburg: Portion of Exterior, and Principal Staircase.....	811

CONTENTS.

Judges and Hearings of Interest and Fame.....	785	King's College Chapel, Aberdeen.....	794	Compensation Case: Universal Marine Insurance Company v. The City Commissioners of Sewers.....	814
Pumps for Contractors' Purposes.—By M. Powell Esq.....	786	Sculpture at the Royal Academy: "Play," by Mr. S. Fry.....	794	Curves of Contrary Flexure.....	814
The Library of Eunomus at Pergamos.....	787	Grotesques from Notre Dame, Paris.....	794	Italian Silver Gray Slates.....	814
Notes.....	788	Obituary.....	794	The Paragon Theatre, Mile End-road.....	815
The Ipswich Exhibition: Prime Movers.—II.....	789	The New Polytechnic School at Charlottenburg, near Berlin (Illustrated).....	811	Provincial News.....	815
Editor from Paris.....	791	Architectural Association.—Excursion to Crawley.....	812	Church Building News.....	815
The Metropolitan Drainage Outfalls.....	792	Archaeological Societies.....	812	The Student's Column: Descriptive Geometry.—Part II.....	818
Architectural Societies.....	792	Portland Cement: Society of Engineers.....	812	Recent Sales of Property.....	817
Correspondence Items.....	793	Magnetic Inductors and Bridge for Testing Lightning Conductors.....	812	Meetings.....	817
The Architectural Association.....	793	Cheap, if not Expeditious, Building: Country v. Building.....	814	Miscellaneous.....	817
An Artistic Law Case at Sima.....	794	The Architectural Association.....	814		
Brighton College.....	794				

Badges and Bearings of Interest and Fame.



VER first and foremost on the long and glorious roll-call of the chivalry of the Middle Ages, investing history with all the charm and glamour of poetry and romance, appearing to us as a creation from the pen of the "Fairy Queen" rather than a veritable warrior incarnate, the hero of our youth, and the admiration and wonder of our maturer years, the very embodiment of daring and adventure, we hail "The Red Cross Knight," with his white coat of arms charged with the crimson emblem of our faith.

Familiar as these grand old arms will be to every one, we must just note that the Templar's cross ends in eight points, differing therein from that of St. George, which is carried through to the borders of the shield and shows no points. The renowned banner of these guardians of the Temple was their "Beauseant," black in the upper half and white in the lower, and it is generally understood that this signified their fierceness to foes and graciousness for friends.

They bore two badges, the "Agnus Dei" carrying the Red Cross banner, and a horse with two knights on his back; this latter was typical of their poverty when first instituted a state from which they soon passed to acquire great wealth, and Boutell mentions as curious fact that the "Pegasus" of the barister Templars of the present day is derived from it, the two riders having been mistaken for wings.

The order was finally abolished in the year 1312, after an existence of some two centuries, and its overthrow was accompanied by the most frightful cruelties; and perhaps this persecution has made the Red Cross heroes the dearer to us. They were accused of the most absurd and horrible crimes, but the acquisition of riches undoubtedly led to their suppression and a general scramble for the plunder. Whatever faults may attach to the Templars, they will ever remain a conspicuous and romantic feature of historic fame, and may we not say slightly varying Pope,—

If to their lot some human errors fall,
Look on their shield and you'll forget them all!"

But as the "Red Cross Knights" fade from our view, there arise before us their brothers in arms bearing the "white cross," the banner of the "Knights of St. John of Jerusalem," a bearing at least equal in renown, but perhaps

not so popularly known as the one we have been discussing.

These "Hospitaliers" were founded as an order in the last decade of the eleventh century (about the year 1092), and their white cross is also of eight points, and now familiar to us as the "Maltese Cross," from the knights having settled in Malta in 1530. It was borne upon a black ground. The order was suppressed in England in 1559.

We learn from history (and we learn it with the greatest reluctance and regret) that quarrels broke out between the bearers of the red and white crosses, which culminated in a pitched battle in 1259, from which conflict scarcely a Templar was left to tell the tale. Would that this dark page could be forever torn from the records of these famed champions of Christianity; but our paper is an heraldic one, and we must not linger too long on history even of such deep interest as this.

It seems "a far cry" from the crosses of our Crusaders to the next important bearing; but "The Bear and Ragged Staff" of the Warwick family has played a conspicuous part in our country's annals, and has furthermore been immortalised by Shakspeare. It is said to have been derived from the Nevilles and the Beauchamps. The origin is dubious, and goes back to "The Round Table" of King Arthur.

A most historic and interesting augmentation is to be found on the arms of the Duke of Norfolk, representing a Scottish demi-lion rampant pierced through the mouth by an arrow, and thus recording the disastrous defeat sustained by James IV. at Flodden, and the finding of the king's body after the fight pierced with arrows. This charge was granted to the Earl of Surrey, who was in command of the English army on that occasion.

The arms of the City of London is a white shield charged with the red cross of St. George, and in the first quarter is a red sword. The cross of St. George is said to be the most ancient of all the numerous crosses of heraldry. The sword in the City arms is a matter of dispute; one side claiming it as an augmentation granted to Walworth for striking down the insurgent Wat Tyler, while others say it was given to Philpot, who followed up the blow by despatching the rebel with his sword; but it is also thought that the emblem of St. Paul is the charge in question,—a solution that seems the more feasible of the three supposed sources, and the one that we prefer to believe.

The arms of Jerusalem are interesting partly from its being an infringement of the rules of English heraldry that "metal shall not be placed upon metal"; upon a silver shield is charged a gold cross between four crosslets of

the same (said to symbolise the five wounds of our Saviour), and conveying an allusion to the thirteenth verse of the sixty-eighth Psalm, "Though ye have lien among the pots, yet shall ye be as the wings of a dove covered with silver, and her feathers with yellow gold."

Amongst coats of arms innumerable, some of them of great beauty and very appropriate to their purpose, there is nothing more beautiful nor more happy in its adaptation than the arms of the Sees of our Australasian colonies, the shield being charged with the four stars forming the constellation known as "The Southern Cross," and to most of us dwellers in the northern hemisphere known by hearsay only. We believe that this arrangement of the stars adorns the walls of the mortuary chapel of Bishop Selwyn in Lichfield Cathedral, with other references to his missionary life at the Antipodes.

For paths we know of nothing more touching than the motto of the unfortunate Courtenays, a noble family of Devonshire,— "Ubi lapsus, quid feci?" "Whither have I fallen, what have I done?" Such was their reward for devotion to the bouse of Lancaster.

The crest of the Dudleys of Northamptonshire was a remarkable one, and it was the result of a most remarkable event. It appears that one of the family had some dispute with a neighbour over a piece of land, and it was decided that they should "fight it out" as to which was the lawful owner. On the day appointed for the combat the Dudley ancestor was too ill to attend, but his daughter armed herself, and met the neighbour, and, after a stiff encounter, overthrew him; and for this exploit was assumed a woman's bust rising from a ducal coronet, with hair dishevelled, bosom bare, and a helmet on her head. The name of this amazon was Agnes Hotot.

Sir Cloudesley Shovel, the great admiral of Queen Anne and William III., had a special grant of arms from the latter monarch, blazoned as follows: "Gules, a chevron ermine between two crescents in chief argent, and a fleur-de-lys in base or." The two crescents are to commemorate two memorable victories over the Turks, and the fleur-de-lys one over the French. Lower, in his "Curiosities of Heraldry," pronounces this to be one of the most appropriate coats he had ever met with.

As a sample of the bad taste often displayed in arms alluding to the profession or pursuits of the original bearer, Lower gives the instance of Bishop Hooper, of Gloucester and Worcester, the champion and martyr of the Protestant faith (whose statue is to be seen at the former place, adjoining the cathedral), who bore "a lamb in a burning bush, the rays of the sun descending thereon proper."

Of all extraordinary "supporters," the same

authority mentions two lawyers as chosen for that purpose by Sir George Gordon, a celebrated jurist, and the first Lord Aberdeen, and adds, "Every man to his taste."

The Stanley crest of "the eagle and child," born by the Earls of Derby, is a remarkable one, with a legend attached to it of the king of birds having taken an abandoned infant to its nest out of kindness, where it was discovered alive and well fed; but the story does not hold water, and many different versions are given. The crest itself is well known and frequently met with, and Cussan mentions having come across it as a public-house sign in the hamlet of Whitwell in Hertfordshire, and thereby finding out that the Stanleys had, at one time, been possessors of the manor, and although it had been some three centuries ago, local tradition had thus preserved this memento of the family, and he adds, "I only adduce this instance to show how extended are the historical lessons which may be learned by even a superficial knowledge of armoury."

At the interesting church of Elford, in Staffordshire, we meet with this Lathom crest (as it is at times called) with a singular effigy of "The Stanley Boy," with the fingers of the right hand raised to the temples, and the left hand holding a tennis ball, the inscription "Ubi dolor, ibi digitus" (where the hurt there the hand), thus showing the cause of his death.

The Lanes of King's Bromley, Staffordshire, bear an historic and royal augmentation for the devotion of the family to Charles II., whose life was probably saved by Jane Lane after the battle of Worcester; it consists of the royal arms on a canton added to the original shield, and for a crest "a strawberry horse bearing between his fore legs the royal crown."

Some of our Welsh neighbours are profuse in their numerous quarterings; the Lloyds alone have thirty-five, according to Ellen J. Millington, some going back to Edward I.'s reign, and an enumeration of a few of them is not very pleasant reading. The first, for instance, has "a chevron between three dead Englishmen's heads in profile, coupéd and bearded proper"; and the second "a Saracen's head erased at the neck proper." The crest is "a dead Englishman's head in profile, coupéd and bearded."

For this selection of a Welsh coat we are indebted to the lady above-mentioned, in her work entitled "Heraldry in History, Poetry, and Romance."

The arms of Shakspeare, granted to the father of the immortal poet, are of the allusive or punning order, and the blazonry is "Or, on a bend sable, a spear of the first," and the crest, "a falcon grasping a spear," is a very pretty one.

Chaucer has for crest a tortoise, and the arms are "Party per pale argent and gules a bend counterchanged."

Sir Walter Scott's crest was a woman holding a golden sun in one hand and a silver crescent in the other, the motto being: "Reparabit cornua Phœbe." His coat contains crescents and mullets or stars, with buckles and muscles.

We close this all too scanty sketch for such a comprehensive subject with the following extracts, the first from the preface to that most charming and valuable work, "Moule's Heraldry of Fish" (so beautifully illustrated by his gifted daughter), and the second from that rare and far-reaching research of Lower, and entitled "The Curiosities of Heraldry."

"To the architect heraldry affords an unlimited extent of enrichment in exterior sculpture; and the judgment of C. Barry, R.A., the architect of the House of Lords, has admitted it as an important feature in the principal façade of that splendid edifice. The introduction of arms in windows and pavements also renders it necessary that the architect should be acquainted not only with the rules, but with the peculiar character of the heraldry of different periods."

"The architect who should attempt to raise some stately Gothic fane, omitting the well-carved shield, the heraldic corbel, and the blazoned grandeur of 'rich windows that exclude the light,' would inevitably fail to impart to his work one of the noblest charms pos-

sessed by that noblest of all styles of building, and produce a meagre, soulless abortion."

If we cannot quite endorse this rather too sweeping conclusion, we can at any rate feel, with the enthusiastic writer of it, that heraldic distinctions form not only a most interesting, but a most picturesque and poetic manner of defining the historic relations of buildings and of those who have erected and inhabited them.

PUMPS FOR CONTRACTORS' PURPOSES.

BY M. POWIS BALE.

It cannot be denied that much annoyance and loss often arise through want of knowledge or judgment in the selection of a pump of a type best suited to the requirements of the user. We purpose giving here a few notes on the pumps we consider more especially adapted for contractors' purposes, with some general hints as to working and the points of construction to be desired in them.

In selecting a pump the features to secure, as far as possible, are simplicity, strength, and easy access to the working parts. Pumps of somewhat complex construction are in use which give high results theoretically, but, as a rule, these are rapidly counterbalanced by the extra cost of renewals, breakdowns, &c.

Where very large quantities of water have to be raised, as in mines, the Cornish or beam pumping-engine is undoubtedly the best and most powerful system to employ, but as comparatively few contractors have much occasion to use Cornish engines, we shall not extend our remarks in this direction, but pass to the contractor's pump *par excellence* for low lifts,—say up to 20 ft.,—viz., the centrifugal. For raising considerable quantities of water to a moderate height, it is one of the simplest and most useful forms of pumps made. For lifting water containing foreign matter, sand, leaves, &c., it is much superior to ordinary direct-acting steam pumps, as the steam valves of these latter are very liable to be thrown out of order, or the water ways to become choked. The working parts consist briefly of a series of curved discs or blades, which are made to revolve in a cast-iron case, in a similar manner to a fan-blower. The revolution of these blades produces a partial vacuum in the case, which brings up the water. On the proper proportion and construction of these curved blades the effective working of the pump chiefly depends. Motion is usually imparted by a belt, but a high-speed rotary engine is sometimes coupled directly on to the disc spindle; the great objection, however, to most of these engines is the large amount of steam they consume. For purposes of irrigation, a wind-mill or horse-gear can be used.

In the most advanced form of the smaller centrifugal pumps the main body of the pump is attached by a quadrant bracket to the bed-plate. It can thus be readily swivelled round to any angle it may be desired to work at. This arrangement will be found very convenient for foreshore work, or in awkward situations. At the same time the joints of the suction or discharge pipe need not be disturbed.

The casing of the pump should be arranged so that one side may be taken off to allow of the inspection or cleaning of the pump disc, and hand holes arranged with bayonet-jointed covers, fitted on either side of the suction-pipe, so that any obstruction may be readily removed. To dispense with the use of a foot valve and to save the trouble of charging the pump with water by hand, a small air-exhauster can be fitted and driven from the main-pump disc spindle by a belt. A check valve being fitted to the end of the discharge-pipe, the air is readily exhausted from the pump and pipes and the pump charged with water. The foundation-plate should be cast in one piece, the bearings be of ample area, and efficient means of lubrication secured. For the general purposes of a contractor these pumps are not surpassed by any other, bearing in mind their simplicity of construction, little liability to disarrangement, and low first cost. Rotary pumps

have also the advantage of great certainty in working. Wrought-iron suction-pipes are preferable to cast as they are lighter and less liable to breakage. It will be found convenient for surface drainage and such like work to mount the pump on two wheels; if, however, it can be fixed below the source of supply it will work better, as it does away with the suction. A pump of ample capacity for the work to be performed should be employed, and a broad flexible leather or India-rubber band should be used for driving. It is important that care be taken that the pump is made to run at its proper working speed, which will vary according to the height of the lift.

Another extremely useful pump for contractors' use is the chain. This is of simple construction, and will stand a great deal of rough usage without getting out of order. It is only adapted, however, for raising water to a moderate height, say 50 ft. The pump consists of an endless chain, and discs made to revolve round a wheel mounted in a framing of cast-iron. The chain and discs are arranged to pass down into the water, and up through a wooden or iron tube, carrying with them a certain amount of water, which is delivered into a trough or tank at the ground level. This form of pump is well adapted for lifting sewage, and it will lift,—without choking,—sand, mud, leaves, &c. The discs pass up the pipe horizontally, and should have a clearance of, say, $\frac{1}{2}$ in. to $\frac{3}{4}$ in. They may be made of wood, leather, india-rubber, or iron, as may be most suitable to the work.

The discs should be arranged about 10 ft. apart; putting them nearer does not add to the efficiency of the pump. The speed at which the chain is driven will depend somewhat on the nature of the water being lifted, but the speed for general purposes should be about 250 ft. per minute. A slight drawback to this pump is that it has (of course) a certain amount of slip in working, which has been calculated at about 20 per cent.; but this is to a great degree counterbalanced by its certainty of action and low first cost.

For light sinking purposes, owing to the constant liability to flooding, bucket-pumps are largely employed, but where the quantity of water has been pretty well ascertained, barrel pumps may be used with advantage. In selecting a barrel-pump care should be taken that the pump barrel, glands, valves, &c., are of gun-metal, and that covers are provided for their ready examination. For deep sinkings, wooden connecting-rods, clamped with iron, may often be used with advantage. The pump-rods should, in all cases, be arranged with guides, as they work much stiffer, and are less liable to bend or get out of truth. An air-vessel should be fitted to the rising main, as the flow of water is more equal, and the pump is relieved from shocks that may arise. The suction-pipe should have a foot valve and strainer. Very great care should be exercised in fixing the pump-plunger and connecting-rod exactly in a vertical line. Should they be out of plumb the valves will probably soon be broken to pieces. In fact, in one case we have known a valve to be broken to pieces and be brought to the surface with the stream of water.

Hard wood staging to support the pump is perhaps preferable to iron, as it is more readily fixed or renewed. Where pump gear is fixed at the top of a well or sinking, especial care should be taken with the foundations; and that the pump gear is perfectly level and free from vibration in working if it be driven by an engine and belt: the centre of the driving-wheel should be at least 18 ft. off.

There is a great variety of mechanical arrangements for pumping, especially suited to varied circumstances of site, depth, and nature of water, motive-power, &c. For contractors' purposes, where the usage is generally rough and the water not of the cleanest, the complex or delicate forms of direct-acting or reciprocating steam pumps should be avoided; many of them also consume a large amount of steam. Where, however, the water is clean and a large quantity of it has to be raised a considerable height, they are of great value, as this duty cannot be satisfactorily performed by either

the centrifugal or chain pump. It must be premised, however, that they are under skilful management.

In direct-acting pumps the steam valves require careful attention, and are somewhat liable to get out of order; those worked by tappets have the advantage of being rather more reliable than steam-moved valves. With regard to ram pumps the ordinary slide-valve arrangement is to be recommended. To secure steady and even working a tolerably large and heavy fly-wheel should be employed. In all piston pumps it is a matter of the utmost importance to their efficient working that the piston should be perfectly leathered and packed, and, consequently, completely air-tight. Long-stroke steam-pumps are generally to be preferred to short, as there is less change in the direction of the pump-piston, and, consequently, less inertia to overcome; and the water lost through the valves is, practically, the same in both cases. It is important that its motions are properly cushioned, and that it will start at any point of stroke on dead centre. When the pump has to be fixed a considerable distance from the boiler, and where the condensation of the steam in the pipes must necessarily be great, compressed air may be used instead of steam with advantage, although the cost of its production in the first instance is greater than that of steam, probably about 50 per cent. or even more; but, by its use, steam pipes are done away with, also their cost of fixing, flexible hose being used in their place. This is especially valuable when blasting, as the pump may be mounted on a suspended platform or on wheels, and it and the hose moved out of the way when a "shot" is fired. For rough usage we can recommend leather pump-valves and a simple fibrous material, such as hemp for packing, as these can be readily renewed without special skilled labour. India-rubber valves are quite unsuited for lifts above say 250 ft. For contractors' use we prefer to employ, wherever possible, the centrifugal or chain pump, as being better suited to the nature of the work than most of the direct-acting piston-pumps.

For working in difficult situations, or keeping foundations free from water, the pulsometer pump will be found of considerable service, and, as it has no delicate parts, it may be used for raising muddy water, &c., without detriment. It does not require skilled attention, and may be suspended by a chain, and can thus readily be employed to keep water under whilst deep-well or other permanent pumps are being repaired.

When it is necessary to raise water from one level to another, the work being of a temporary character, and it is not desired to go to the expense of a pump, a steam water-raiser or elevator can be used. This little apparatus consists briefly of pipes at right angles to one another for steam suction and delivery. The steam enters at one end, and creates a partial vacuum in the suction and delivery pipes, which will suck up water from a depth of about 20 ft. It can also be used for forcing, and will force water about 1 ft. high for each 1 lb. of steam pressure employed. It is very important that the suction-pipe used be perfectly air-tight, and a rose should be fixed on the end of it.

The disadvantage attending the use of this and other water-raisers and pumps which rely for their action on the formation of a vacuum by means of the steam used, is the loss through the extra steam required to work them, which is very considerable in many cases.

A number of hand-pumps more or less adapted for contractors' requirements are made, and some of these are very indifferent productions. To secure durability and efficiency in working they should in all cases have bored barrels and gun-metal valves and hockets, and a brass lining to the pump barrel is a decided improvement. A wrought-iron pump is much to be preferred to cast, as it is stronger and more portable, and it should be galvanised and supplied with a sliding suction-pipe to suit variable depths. Where water has to be raised from a considerable distance, the working barrel can be taken beneath the ground level,

and in lieu of a single handle the pump can be arranged with double lever handles for two or more men to work at. We recommend for these pumps pipes with flanged in preference to screwed joints, and the sliding suction-pipe should be fitted with a galvanised wrought-iron strainer. These pumps are, of course, only suited for small contracts.

All suction-pipes should be well tested, and the joints made perfectly air-tight; much trouble and loss is often caused through the leakage of the air and consequent failure in the working of the pump. In arranging the pipes avoid all bends as far as possible, as the friction of the water through the pipes is largely increased by them. If the pump has to draw above 6 ft. vertically, it would be well to have a retaining valve fitted in the suction-pipe close to the water.

The speed of the water through the pipes should not exceed 250 ft. per minute, as the friction in the pipes increases in the proportion of the square of the velocity. It therefore follows that if pumps are driven at a very high speed a considerable loss of power through friction occurs. When long lengths of pipe have to be used, allowance must be made for friction, and it is therefore advisable to select a pump somewhat larger than is absolutely required for the work.

In long lifts it is very important that the pipe joints should be very carefully made, otherwise with heavy pressures leakages are very liable to occur. It will pay well to have all joint flanges planed. We have seen joints made with a lead ring wrapped round with lamp cotton stand extremely well, but where the head of water exceeds 500 ft., we can strongly recommend the joint as shown by fig. 1. In



Fig. 1.

this joint the lower pipe is recessed, and the upper one made with a corresponding projection; a cord of gutta-percha is inserted between the flanges, and squeezed flat, when the bolts are tightened up. This joint has stood pressures of upwards of 700 lb. per square inch. Our illustration (fig. 2) repre-

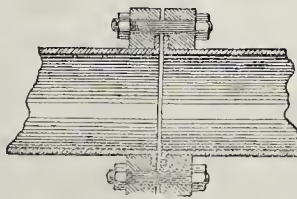


Fig. 2.

sents another joint well adapted for pipes carrying compressed air, as it will be found perfectly tight in working, cheap, and readily fixed. The ends of the pipe are flanged, and an india-rubber washer inserted between them; they are then brought tight together by means of the bolts. These pipes should be made of wrought iron of good quality, so that should it be necessary to replace or joint them, they may be cut at any point, heated, and turned up by a smith, which is an advantage over screwed pipes, as they when cut have to be screwed at the ends to join them; at the same time, the

threads of the screws are apt to become worn, and make a leaky joint.

Owing to exigencies of site in using steam pumps it is sometimes necessary to fix the boiler at a distance from the pump, the consequence is there is very considerable condensation in the pipes. This can, however, be greatly modified by covering the pipes with non-conducting material; where, however, there is much water, such as is often met with in sinking operations, a suitable covering is at present not very easy to find. What is wanted is a hose to slip over the pipe and keep the heat in, and be not affected by it on the inside or by the water on the outside. India-rubber hose will keep the water off, but is itself more or less affected after a time by the heat of the pipes.

In lieu of the above, although somewhat troublesome to fix, we can recommend the following as being cheap and effective:—Box up the pipe in a triangular box neatly jointed at the angles, and fill in the vacant space with "silicate cotton" or "slag-wool,"—a non-conductor made from blast furnace slag,—which should be rammed tight. Asbestos packing is also very good for this purpose, but more expensive.

We need hardly say that, whatever pump is employed, all bearing surfaces should be well lubricated, and we can recommend the following mixture as giving very excellent results:—Good lard oil, 75 parts; plumbago, powdered very fine, 25 parts. This will be found to put a fine surface on the inside of steam cylinders, and can be used with advantage in most kinds of bearings.

THE LIBRARY OF EUMENES AT PERGAMON.



THE chief laurels of the Pergamene excavations have rightly been awarded to Dr. Humann, but an aftermath of glory remains for Dr. Conze, who, in his study at Berlin, has discovered the undoubted site of the great library of Eumenes. Archaeologists all knew that Pergamos boasted a library of many thousand books, that its fame as a literary city was little behind its repute as a health resort; they knew, further, that it was Eumenes who turned to such good account the "Attalæe conditiones" of his predecessors; that this same Eumenes "built the city, and out of his love of magnificence and beauty erected buildings as offerings to the gods, and founded libraries and made Pergamon the splendid abode it now is." But though the great altar was brought to light with such great rapidity, the site of the great library, scarcely less famous, has remained until quite recently undetected. At the last meeting of the Prussian Academy of Sciences, Dr. Conze read a paper, in which he proved beyond doubt the exact spot where the library is to be found. His paper is printed in the current "Berichte" of the Academy, pp. 1,259-70. What he maintains is briefly this. Behind the temple of Athene Polias, to the north and to the east, enclosing a considerable space, ran a colonnade two stories high. The arrangement of the colonnade and its position in relation to the temple can be seen in the authorised restoration of the Acropolis. Such alterations as have to be made in this restoration, and which we have noted elsewhere, do not affect the arrangement of the colonnade. Behind the north side of this colonnade ran a number of rooms, some in the upper, some in the lower, story. The rooms in the upper story are four in number, and the most easterly one is the largest. Within this room, on the north, west, and east sides, is a low piece of masonry, somewhat like a bench. On the north side it broadens out to the width of a basis large enough to hold a good-sized statue. On this basis originally stood the great statue of Athene, which is now placed with the other Pergamene marbles in the Assyrian room at the Berlin Museum. It stands at the far end. On the north and east walls, to the inside, have been found a regular series of holes. These, Dr. Conze thinks, contained the hooks on which the shelves for the

books were fastened. The statue of Athena would be very appropriate in such a place,—at least, so Juvenal thought:—

“*Hic libros dabit et foras mediamque Mineram.*”

An additional proof of the existence of this library is afforded by some inscriptions found within the precincts of the Athene temple; they originally belonged to portraits of Alceus, Herodotus, Homer, &c., and had reference to the literary studies that were carried on at Pergamos.

The discovery of this library, and the certainty of most of its architectural conditions, has a special interest, because it enables us to reconstruct in thought other libraries of the ancient world. This Pergamene library consisted of one large room and a number of smaller ones behind a colonnade, very like in arrangement, as Dr. Conze says, to the cells of monks running behind the cloister. Such probably was the form of many of the great libraries at Rome, that of Lucullus, Asinius Pollio, and the like; such was the library in the Roman forum, and that of Hadrian at Athens; such was the library at Herculaneum, famous for the papyrus rolls it has preserved. It is right to say that the conjecture so firmly established by Conze had been made before, as he himself is the first to own, by Christopher Belger.

NOTES.

THE next meeting of the Institute of British Architects, on Monday, the 8th, is expected to be a very representative one. The Royal Gold Medal will be presented to Dr. Schlie-manna, who is coming from Greece especially to receive it. Mr. Charles Barry will present to the Institute the portrait, painted by Mr. Holl, of the late President, Mr. Horace Jones; and the medals for the Soane Medallion, the Tite Prize, the Institute Medal, and the medals of merit gained in the competition for the Pugin Travelling Studentship. The actual Pugin medal for the year is not presented till after the completion of the student's tour, and the handing in of the sketches made during the tour; and the same applies to the Godwin Bursary medal. A large meeting is expected.

THE funeral of M. Théodore Ballu, the eminent architect, took place at Paris last week with unusual ceremony. The procession passed from the mortuary, a beautiful little building designed by the lamented artist himself, in connexion with the Church of La Trinité, one of his most important and successful works, to the cemetery of Père Lachaise, where his coffin was placed in the family monument, another work of his own, of charming antique sentiment. The pall-bearers were M. Kaempfen, Directeur des Beaux Arts (representing the Minister of Public Instruction and of the Fine Arts); M. Alphan, Directeur des Travaux de Paris (representing the Prefect of the Seine); M. Bouguereau, President of the Académie des Beaux Arts; M. Guillaume, the sculptor, representing the family and friends of the deceased; M. Bailly, President of the Société libre des Artistes Français; and M. Questel, President of the Société Centrale des Architectes; these two last being, like M. Ballu himself, Members of the Institut de France and Honorary Members of the Royal Institute of British Architects. These six delegates pronounced each a discourse. It is sufficient here to mention the eloquent *extempore* speech in which M. Alphan engaged, in the name of the Prefect of the Seine and, of the Conseil Municipal of Paris, to proceed as quickly as possible with the completion of the Hôtel de Ville after the designs for the interior decoration left by the deceased.

MR. PANSON, the senior Vice-President of the Royal Institute of British Architects, will attend the Congress of French Architects to be held next week in Paris, as the representative of the Institute.

THERE is a hot controversy going on at York in regard to what should be done with the superfluity of ancient churches, for which there appear, from all accounts, to be no sufficient congregations, and a meeting was held at the Corn Exchange, York, last Saturday night, under the auspices of the “Society for the Protection of Ancient Buildings,” to protest generally, after the manner of that Society, against everybody and everything. Mr. William Morris addressed to the meeting an eloquent protest against pulling down or removing old churches, and said that if these churches were pulled down “York would be a very commonplace city.” On the other hand, a gentleman, Mr. W. H. Hargrove, who spoke in support of the action of the Archbishop in the matter, accused the “S. P. A. B.” of having circulated the grossest inaccuracies in respect to the intentions of the Archbishop and the committee acting under him, and of having stated that half the churches in York were to be pulled down, when no such measure was contemplated. We cannot, of course, decide on hearsay report; we can only say that if the agents of the Society for the Protection of Ancient Buildings have circulated gross inaccuracies, it is exactly in accordance with their conduct on several other occasions, in regard to which we have been in possession of the facts. Not that we believe the Society would deliberately circulate what is not true, but that they are so utterly run mad on their hobby that they cannot wait to ascertain facts. We are taking means to get authentic information, and reserve our judgment till then. The anti-restoration party seem extremely exercised about a meeting held on the Monday after to promote the restoration of St. Crux Church, “when the Restoration Committee were requested to take steps to ascertain whether the promised subscriptions would be renewed for a new church, instead of a restoration of the old one.” The meeting went so far as to burke the restoration scheme and vote the return of the money. Whether they are right or wrong depends on the present state and the architectural and practical value of St. Crux Church. If it is dilapidated and unsuited for its present purpose, the proposal to build a new one is exactly what a meeting of Medieval churchmen would have sanctioned, at all events.

IN a paper read by Mr. Head at the recent meeting of the Iron and Steel Institute, a very interesting statement was given of the values of the by-products obtained at the gas works of the United Kingdom, as compiled by the late Sir William Siemens. They were given as follows:—

Colouring matter	£3,350,000
Ammonium sulphate	1,947,500
Pitch (325,000 tons)	365,000
Cresote (25,000,000 gallons)	208,000
Crude carbolic acid (1,000,000 tons)	100,000
Gas coke (4,000,000 tons, after allowing 2,000,000 for consumption in working the retorts), at 12s.	2,400,000
	£3,370,500

Taking the cost of the coals,—say 9,000,000 tons at 12s. per ton,—at 5,400,000l., there would be still left over and above the sum of nearly 3,000,000l., the excess value of the products. The practical result of this is, that the gas is obtained for nothing, and, indeed, it was stated that in a certain Yorkshire town the actual cost of the gas was only 1d. per 1,000 cubic feet. But by the use of the Siemens' gas producers, either the gas may be very greatly enriched or the extraction of tar and ammonia very much increased; while, in many districts, the coal costs nothing like 12s. per ton, or even half of it. Some of the northern coals are especially favourable for the recovery of sulphate ammonium, varying from 20 lb. to 26 lb. per ton of coal; and as the value of the ammonium sulphate is about 20s. 6d. per cwt., the recovery of 23 lb. is equivalent to 4s. 2½d. for every ton of coal used in gas producers. Simple folk, who are not manufacturers or proprietors of gas-works, but only compulsory gas-consumers, may, perhaps, be excused for thinking that it would not be unreasonable to

hope that some of the very substantial advantages gained by science should come their way occasionally, and that they should participate in the illuminating millennium, either by the reduction in the general price of gas or a very considerable improvement in the quality. Both these things are *desiderata* to the householder.

THE fifth annual report of the Executive Committee, and the third annual report of the Committee on the American School of Classical Studies at Athens, give evidence of substantial, though not very striking results. Excavations at Assos were carried on from February to November of the past year. The Agora of the city and the Nekropolis were explored, and the great Baths (of which we gave detailed notice in a past number), the Heroon, and the Stoa. A great number of inscriptions have been copied, a series of photographs made, and, for a time, this was all. The American School succeeded ultimately, however, in coming to terms with the Turkish Government, and an experiment was made by which one-third of the discoveries were to be the property of the excavators. Some important pieces of archaic sculpture have accordingly found a home at Boston, among them a heraldic sphinx from the east end of the Temple of Athene Polias, and a fragment of sculpture representing Herakles contending with Centaurs. The architectural fragments are of great importance for the study of non-religious Greek architecture. A full account of the excavations is in preparation by Messrs. Clarke, Bacon, & Koldewey. The cost of the whole undertaking is reported at 19,121 dol. (not much under 4,000l.). In the second year of the school the number of students were only two, the directorship held at first by Prof. Goodwin passed into the hands of Prof. Packard. He fell ill, and has had to rely largely on the help of Dr. Stenet. Among the treatises which have been completed by the school are the Assos inscriptions, by Dr. Stenet, and the Erechtheum, by Fowler; also in connexion with the school, a work by Mr. J. Stillman, on “Prehistoric Walls in Italy and Greece.” This work, so ably carried on by America, should rouse in English archaeologists a spirit of wholesome emulation.

THE statue of the closely-draped Venus, known as the “Venus Genetrix,” has long been a puzzle to archaeologists. Several replicas exist, one at Florence, one in Rome, one, the best known, in the Louvre. We are justified, then, in supposing that the original of the type was a statue famous in antiquity. A certain analogy has been noted between the head of this Venus Genetrix, of somewhat archaic style, and the head of the Hippodamia in the Olympian east pediment. Hence, M. Reinach, in publishing a small terra-cotta statuette which reproduces the same type, hazards the opinion that we have in all these replicas an echo of the famous Aphrodite of the Gardens (*ἡ κήρυκας*) of Alkamenes. Quite independently, Mrs. Mitchell arrived (“Hist. Greek Sculpture” p. 320) at the same conclusion. Probably both were led to this belief by the fact that the Alkamenes Aphrodite was specially noted for the delicate beauty of the hands. Though the coincidence of opinion is striking, we believe the original type of the Venus Genetrix must be looked for quite elsewhere. Dr. Curtius reminds us of a far more famous Aphrodite, namely, the draped Aphrodite whom Praxiteles made (*velata specie*) for the inhabitants of Cos, the rival of the nude Aphrodite chosen by the Cnidians. Now, it is a significant fact that the terra-cotta replica which M. Reinach publishes comes from the necropolis of Myrina. From this same necropolis have been taken as many as twenty small replicas of the Venus of Cnidus, by Praxiteles, and one of his *Epos*; why not then also one of his Venus of Cos? The almost ostentatiously draped character of the figure lends itself to this attribution. The subject comes up again, owing to the publication (in the *Gazette Archéologique*, 1885, fol. 11) of a small bronze statuette representing this type. It also was found in Asia Minor and is now

the property of M. Lavedorte. Praxiteles types would very naturally be found in Asia Minor, types of the date of Alkames scarcely.

THERE is to be found at Piacenza, in a remote quarter of the town, some of the loveliest terra-cotta work in Italy. It is in a cortile, part of the old Palazzo del Tribunale. Only a portion of one side is intact, the remainder having been bricked up between the columns, which are of granite, the caps and bases of stone (the former of beautiful shape). The arches and cornice are terra-cotta, with most delicately-designed ornament. The whole thing is in a lamentable condition. The court-yard is only used as the playground of a few children, and the rooms on one side are converted into stables and water-closets, as any one who pays the place a visit will soon discover, that is to say, if he is in possession of what the Italians do not seem to have,—a nose.

M. ROY'S excavations near Tunis, which for some time past he has privately carried on, have been rewarded by a considerable measure of success, both as regards architecture and sculpture. He has brought to light the peristyle of a large building, and within its precincts has found several marble statues of large size. M. Roy proposes to publish his discoveries in the "Bulletin Trimestriel des Antiquités Africaines," for the appearance of which we must wait for further particulars.

BY order of the Victorian Government a large scheme for irrigating the Tragowel Plains from the River Loddon has lately been investigated. The area to be watered amounts to 238,000 acres, and the project is estimated to cost 164,588*l.*, or nearly 44*l.* per square mile, or equal to 12*s.* 6*d.* per acre. If to this be added 7½ per cent. for interest and sinking fund, and assuming the working expenses at the rate of 3,500*l.* per annum, the annual cost per acre would be 4*s.*, allowing one-third of the entire area being irrigated each year. The channels designed for the scheme will, when running full, discharge 330 million gallons, or 48 million cubic feet, in twenty-four hours, with which volume it is calculated a depth of 6 in. may be distributed to 80,000 acres,—one third of the entire area,—in thirty-six days.

JUDGING by the description given of New Caledonia, its soil must be a veritable mine of mineral wealth, but for agricultural purposes, it is said, it will not produce more than sufficient for the wants of the country itself. Of metals, however, it apparently possesses the greatest variety, there having been found up to the present time gold, silver, nickel, copper, cobalt, chrome, antimony, iron, and galena. Not a tenth part of the country as yet been prospected, but 485,000 acres have already been bought or leased. Nickel is the most plentiful of all the minerals, being found nearly everywhere, and after many speculations in commercial speculations, it has become the basis of the colony's industry, and on its whole future depends. Up till now, however, the progress of the colony has been very slow,—a fact which it is somewhat difficult to reconcile with its reported valuable mineral capabilities.

WE quote from the Berlin *Philologische Wochenschrift* the report of a discovery which, if it be true, is of the greatest interest. We are bound to say that the *Wochenschrift* itself expresses grave doubts, which we readily endorse. From Carnuntum, in lower Austria, comes the news that a fragment of tinted pottery, apparently a piece of a Greek vase, has been discovered, and the design presents nothing less than a careful reproduction of the famous Hermes of Praxiteles. Archaeologists have been busy about conjectural restorations of the group,—the restoration makes Hermes hold a bunch of grapes in the right hand. A small statuette, embodying this ideal, and we think impossible, motive is to constantly seen, to our great regret, at the British Museum, where it doubtless misleads

countless visitors. A far more simple and congruous restoration gives Hermes a long caduceus in the right hand. This view has been supported with much learning, and a long catalogue of analogous monuments, by Mr. A. H. Smith, in the *Hellenic Journal*. The reputed vase fragment supports neither view,—it places in the missing hand a thyrsos. Such a restoration would be very satisfactory. We repeat, however, that we fear the reputed "find" is too good to be true. The fragment, true or false, has passed into the hands of Dr. Rollet, of Baden. If genuine, it will no doubt be speedily published.*

THE discoveries of the last few years, both at Sparta and Delos, have led most archaeologists to the conclusion that many of the peculiarities of early archaic sculpture are due to its derivation from a previous wood technique. Dr. Brunn, in a paper on "Tectonic Style" in the *Sitzungsberichte der Bayerischen Akademie der Wissenschaften*, seizes upon this notion, and in his usual suggestive original fashion applies the principle much more widely than its original advocates conceived of. Early sculpture was dependent for its existence on the softer material, wood, and long after stone had come into use the traditions of a woodworking school prevailed. In the sculptures of Assyria, where, as it seems, from the outset soft stone was chosen as the material, we see no such influence, and in Asia Minor schools, which seem to have depended a good deal on Oriental tradition, we see very little trace of anything of the sort. It is in the Peloponnesian school, with its square, thick-set character, its absence of rounded surface, and flowing line, that, according to Dr. Brunn, the influence of the post and beam and the plank of the early wood images (*κωνία*) is most apparent.

THE excavations of the French at Nemea during the past year have resulted in nothing of importance. Better fortune has attended their work in Elatea. Close to the remains of the temple they have found a basis inscribed with the name Athene Kranaia, thus fixing with certainty the already presupposed dedication. Outside the sacred precincts have been found also many fragments of vases and painted architectural remains. Inside the temple a number of fragments of sculpture were brought to light, and some vases inscribed with artistic names, Ergophilos and Polykles, also a number of inscriptions, including a long decree. To the north of the temple were found a number of fragments in bronze and terra cotta.

THE "Εβδομαχος (No. 61) publishes in a rough woodcut a recently-discovered gem, on which is engraved a design representing a male figure sunk upon his knee. The figure bears on his back the winged love-god. In the "Anthology" (ii., 255, 4) there is a somewhat vague description of a statue of Herakles by Lysippos, in which the hero is represented stripped of his arms and lion-skin, and tamed by love:—

"τις ἐὶ σ' ἔπεισεν
ὁ πτόρος ὄντως ἐς βαρὺς ἄθλος Ἔρωι."

It is just possible that we have in this gem an echo of the statue of Lysippos. We know so lamentably little of this sculptor that every scrap, even of inference, as regards his style is precious.

THE Architectural Association seem to have had a pretty sharp fight on the question of raising their subscription from half a guinea to a guinea, at their last meeting, and adjourned the consideration of the subject. We print a letter from Mr. Sedding about it in another column. The step is rather a serious one. The strength of the Association has been in numbers and in the valuable and practically almost gratuitous architectural education they have afforded to many poor students. We understand, however, that it is contem-

* Since writing the above we learn that the fragment has just appeared in the last issue of the "Archaeologische Epigraphische Mittheilungen aus Oesterreich."

plated that if the raising of the subscription is carried, a great advance will be made in the educational scheme, and the services of learned lecturers and Professors will be obtained towards this end.

ON the north side of the magnificent Church of Santa Croce, in Florence, there is an arcade which was originally part of the church, but which has for some years past been tenanted by carpenters and small shopkeepers. These have all been cleared away, and it is proposed to form a loggia nearly the whole length of the nave. This ought to be a great improvement. It will, however, very largely increase the stock of beggars at present attached to the church. Hitherto, there being no porch, they have not been so numerous as in most well-ordered churches. When the new loggia is completed, however, it will form a nice shady place for these pests to lay in wait for the unwary traveller.

WE are glad to learn from the Athenian correspondent of the *Athenæum* that Mr. Peoprose is engaged in further researches there, on the site of the Temple of Jupiter Olympius, a work which he is undertaking on behalf of the Society of Dilettanti.

THE mosaic of Lillebonne, to which we referred the other day, purchased in 1879 for about 1,000*l.*, taken from Lillebonne at the close of a curious legal suit and restored at Paris, in the studio of M. Faccina, mosaic-worker, under the direction of M. Chas. Lucas, architect, at the cost of about 750*l.*, was sold on the 16th of last month for 76*l.* to the Museum of the city of Rouen, where it will go to keep company with the fine mosaic found about twenty years ago in the forest of Bourthérolde. Fortunate museum of Rouen, to possess these two mosaics, so precious in the history of art!

THE appearance of serious cracks in the Ansidei Madonna since it was placed in the National Gallery is matter for great regret, and it calls for careful consideration as to the cause of this injury. It has been attributed to the dry atmosphere of the National Gallery causing the planks on which the picture is painted to shrink. We should hesitate to say that the National Gallery is over-warmed, which is the reason assigned in some quarters; but whatever the cause, the painful fact is undeniable, and we are astonished at Sir F. Burton's letter in the *Times* denying that there has been any change in the condition of the picture, and referring only to "a slight crack high up on the spectator's right, which was manifest enough [at Blenheim] to all who preferred to search for trifling blemishes in a great work rather than absorb themselves in its beauties." This is nonsense, and Sir F. Burton must fancy people have no eyes. There is a great and formidable crack on the left of the spectator, which no one could "absorb himself" sufficiently to ignore, and which was certainly not there when we saw the picture the first week it was in the National Gallery.

THE INVENTIONS EXHIBITION.

FRAME MOVERS.—II.

POWER rock-drilling for sinking, quarrying, and general contractors' purposes has during recent years made very great progress, with the result that,—except for small contracts,—hand-labour, which is both slow and costly, has to a great extent been abandoned in favour of power. The powers chiefly employed for driving rock-drills are steam and compressed air; the former does exceedingly well when the drill is not too far away from the hoiler, but in deep shafts or workings, where the steam has to be conveyed a considerable distance, it is difficult, if not impossible, to utilise it owing to the condensation which takes place in the pipes conveying it. Under these circumstances compressed air is employed: this is produced by means of steam-engines specially constructed for the purpose, of which several examples are to be found in the Exhibition. Amongst these may be mentioned one by Messrs. Hathorn &

Co., of London, which presents several features of interest, and appears to have been well thought out; the main frame is self-contained, which, with an extended bed-plate, insures steadiness in working, and it may with tolerable facility be moved from place to place, which is no mean advantage. The engine has two steam, and one air, cylinder, with two crank-pins, which form a throws for the slide-valves; the inlet valves are of cylindrical form, with central guides, and are automatic in their action. Springs for working the valves are disposed with, which is an advantage, as they are apt to clog or break, and their action is to a greater or less extent affected by constant usage, and by severe changes of temperature. The valves are so arranged that they may be examined without breaking the cylinder cover joints, which is an improvement. The air-compressor may be worked by means of water-power if available, the steam cylinders, of course, in that case being omitted. As showing the efficiency of compressed air for rock-drilling purposes, it may be as well to mention that a drill driven by it has pierced hard rock at the rate of 5.51 in. per minute.

Messrs. Walker Bros., of Wigan, exhibit an air compressor of massive construction. The engine is mounted on a box bed-plate with tank underneath. The air cylinders are placed in a line with the steam cylinders, and are jacketed with cold water. The air is brought below the floor-line, and the makers claim especial efficiency for the air-valves. The outlet-valves are fixed in the cylinder-covers. The air-cylinders and valves are so arranged that all the compressed air is expelled from the cylinders at every revolution. The general design of the engine appears to have been carefully thought out, and the workmanship is excellent.

Amongst the gas engines is to be seen a new form of horizontal, exhibited by Messrs. Andrew & Co., of Stockport. In this engine two cylinders are placed in line, the crank-shaft, connecting and piston rods working between them. One cylinder is used for compressing the charge, and the other for the ignition and explosion which takes place at every revolution, and considerable steadiness in working is thus assured. The valve for regulating the admission of the gas is of somewhat novel construction, and consists of two cones mounted on one spindle, which is controlled by suitable governor gear. The main frame of the engine is cast in one piece.

The "Otto" gas engine, by Crossley Bros. Limited, Manchester, is well represented. The operation of these is sufficiently well known to render a description unnecessary. One or two fresh departures have, however, been recently made, including a new self-starting arrangement, and the introduction in some of their engines of twin cylinders, in which there is an impulse at every revolution. This arrangement is to be recommended where extreme steadiness in running is required. A small-power vertical engine, which takes up little floor space, is also shown.

The British Gas Engine Company, 11, Queen Victoria-street, E.C., exhibit a rather extraordinary looking novelty in the shape of a gas engine, from which Mr. Atkinson, the patentee, expects great things in the way of economy. We may have something further to say about this at a future time.

Messrs. Korting Bros., of London, exhibit a "Korting-Meckfeld" gas engine; this is of the vertical type, and is arranged with the working cylinder open at the top,—this is also used as a pump to draw in and compress the charge of gas and air. The different valves are actuated by cams fixed on a supplementary shaft driven from the crank-shaft of the engine by toothed gearing, and it makes half the number of revolutions of the crank-shaft. The chief novelty of the engine, however, is the valve through which the mixture of gas and air is drawn into the ignition-chamber, and is so arranged that the mixture does not vary in proportion. The ignition is arranged to take place immediately the piston has passed the dead centre, and the piston is forced upwards on the return stroke, the exhaust valve is opened by a cam on the intermediate shaft, but part only of the waste gases are allowed to escape, the remainder being mixed with the next charge. The engine is compactly designed, and would appear to be useful for small powers.

A small vertical non-compression gas engine (Wither's patent) was shown by Messrs. Beynon & Cox, of Torquay; it is simple in construction,

but does not present any special feature of novelty. The charge is admitted by a single piston-valve worked by a cam, and there is an explosion at every revolution; the cylinder is provided with a water-jacket. As the charge is neither compressed nor wire-drawn the consumption of gas in this engine must necessarily be considerable.

Messrs. Wood, of Bolton, exhibit a horizontal engine of the Corliss type. In driving they adopt the rope system, the fly-wheel and a pulley being grooved for that purpose. The pulleys made by Messrs. Wood have wrought-iron arms, and a split and hooped boss; they are made much lighter than ordinary cast-iron arms, and can be run at a high speed. The exhibitors claim that owing to their lightness they adopt, and by method of casting which they adopt, and by splitting and hooping the boss, all contractive strains are avoided, and they can be worked in conjunction with toothed gearing without danger of "backlash." The system of driving by rope gearing has of late years been considerably extended, and amongst other advantages claimed for it is, that power may be conveyed from the driving wheel of the engine directly to several floors at once,—the number and size of the ropes being regulated according to the power to be transmitted; this often avoids the use of a considerable amount of intermediate gearing.

A Root's water-tube boiler is shown by the Patent Steam Boiler Company, Birmingham. In this boiler the principle of construction is the sub-division of the water and steam into tubes of small diameter,—small diameters being superior in strength to large ones. The tubes used are 5 in. diameter, and are made without riveted joints; and, being independent one of the other, the overheating or expansion in one part does not affect another. The water is contained within the tubes. We like the plan of placing the pipe-joints outside the boiler, as any fracture or leakage may readily be detected. In conjunction with this boiler Stollwerck's feed-water purifier is used. This consists briefly of two cylindrical chambers of sufficient capacity to cause a slow circulation of the water through them with room to collect the sediment thrown down. The water having passed through the first chamber is carried through a pipe to the front of the second chamber, where it is diluted with water and steam fresh from the boiler, which throws down a further deposit.

The use of feed-water heaters is considerably extending, and we can strongly recommend their adoption, as all waters contain a greater or less quantity of carbonate or sulphate of lime, &c., which, if not deposited, incrusts the boiler, cause a great loss of fuel, and renders the boiler plates or tubes much more liable to be burned, as the deposit prevents the contact of the water with the surface of the plates, consequently the heat of the fire cannot readily reach the water and be absorbed by it; the plates therefore become burned.

Messrs. Duncan Bros., Queen Victoria-street, London, show a simple reversing gear, in which the slide valves work on an intermediate plate with crossed ports. It is well adapted for launch engines, and does away with the necessity of link motion.

Messrs. Perkins, of London, have one of their compound donkey-engines, for working at a pressure of 500 lb. per square inch. Although this system of extreme pressure has now been introduced some years, we cannot help remarking on the very little progress it has made. We believe this engine is the sole representative of it in the Exhibition.

Messrs. Aylving & Porter, of Rochester, exhibit a well-designed traction-engine, fitted with spring wheels, so arranged that the whole weight of the engine is elastically supported. A noteworthy feature in the construction of this engine is the arrangement of the side-plates of the fire-box, which are extended upwards and backwards in one piece, and provide bearings for the crank-shaft, driving-axle, and counter-shaft. The driving-wheels are fitted with compensating motion, for turning short curves. For general contractors' purposes this engine can be commended, as it combines strength and portability, without cumbersome or complicated.

Hot-air motors are exhibited by Hayward Tyler & Co., Luton; Britannia Co., Colchester; Bailey & Co., Salford. These are all for small powers, and this last one is arranged to work from a gas-jet instead of with coke or small coal.

A tramway engine, worked by compressed air

on the Mekarski system, is to be seen in the grounds. Compressed air at some 450 lb. per square inch is employed; this is generated by a high-pressure compressor, manufactured by the General Engine and Boiler Co., London.

The corrugated furnace-flues for steam boilers, exhibited by Mr. Samson Fox, of Leeds, are worthy of notice as being a departure from the beaten track. It is claimed by the inventor that this form of flue gives not only greater heating surface, but considerably greater strength than the ordinary form.

Messrs. Burnsted, of Hedsford, exhibit a Chandler's patent high-speed engine, driving a dynamo direct by means of rope gear. The dynamo makes some 1,500 revolutions per minute, and provision is made for tightening up the ropes by means of a tension pulley. A special feature about this engine is the method employed for securing constant lubrication of the governor gear. This consists in providing a basin, through which the governor-spindle passes, which is partly filled with water made from steam condensation. On this water the oil is allowed to float, and thus lubricate the working parts. A waste-pipe is provided for carrying away any surplus water. The crank and cylinder are oiled in a similar manner, and this plan seems to have surmounted in a great measure a difficulty found in all high-speed engines, viz., that of efficient lubrication.

Messrs. Kitson, of Leeds, and Messrs. Thames Ditton, also exhibit high-speed engines, viz., that of efficient lubrication.

Messrs. Goodfellow & Mathews, of Hyde, near Manchester, show a high-speed compound tandem triplex engine, especially designed for driving direct, electric lights, fan-blowers, and high-speed machinery generally.

A "Census" patent vertical boiler is exhibited by Mr. H. Fletcher, of Gateshead-on-Tyne. The shell of this boiler is of the ordinary cylindrical type, but the fire-box consists of two truncated cones, the upper of which is inverted, and the two are joined together at their smallest diameters. In lieu of the ordinary cross tubes, diagonal tubes are fitted between the sides and the crown of the upper cone. Two uptakes are used, and it is claimed for this arrangement that the heated gases impinge on the whole of the heating surface, spreading out into the upper cone, and surrounding the diagonal circulating-tubes. By this arrangement ready access is given to the crown of the furnace and other parts for cleaning and repairs.

We were struck with the easy working of a very small but very useful "prime mover" in the shape of a hydraulic engine for blowing organs, exhibited by Mr. Blennerhasset, of Vernon-street, King's Cross, London. Two cylinders, somewhat after the fashion of a steam-engine, are employed, and the ports and slides are cut in such a way that the water is "wire-drawn," and the closing or opening of the ports is gradual, consequently the shock usually felt in engines of this class when the water is cut off suddenly, is removed and the necessity of employing an air-vessel is done away with. There is an arrangement for preventing the organ from being overthrown.

A somewhat novel method of driving a dynamo has been adopted by Messrs. Brunett, Lindley, & Co., of Manchester. This consists of making the pulley on the dynamo of compressed paper to secure increased adhesion, and causing the fly-wheel of the engine to come into direct contact with it and drive it by friction. To increase the contact if necessary, screwed rods are fitted from the crank-shaft of the engine to the dynamo shaft, and by tightening up the nuts almost any degree of adhesion may be obtained. They also exhibit a new form of governor gear (Lindley's Patent) attached to the vertical compound engine alluded to above: the novelty consists in the use of tension-springs attached directly to the revolving weights, in lieu of the levers and joints usually employed. It is claimed for this plan that the friction in working is considerably reduced, and that increased sensitiveness and simplicity in working is obtained. As a rule, we are not in love with the use of spiral springs,—at any rate, where the duty is severe,—as we have known more than one case where, owing to great variation in temperature, the springs have broken in use, and others where, the work having been very intermittent and severe, the springs have after a time become weakened and lost their elasticity. When these governors have been tested for a length of time under these conditions, say for driving, sawing machinery, callendering rolls, iron rolls, and such like, we should be better

able to judge as to the value of the invention. A very useful addition is the speed regulator attached to this governor, by turning which the speed of the engine can be instantly increased or decreased as may be required.

Messrs. Holman, Bros., of Cambrone, have, amongst other exhibits, an air-compressor, which combines several good points in its construction. The pistons of the steam and air cylinders are adjusted so as to have the maximum pressure of steam on the one when the other is compressing the air at its highest point, which allows the engine to be worked expansively and at a uniform rate of speed. The air-cylinder is jacketed with a cold water jacket. Springs are dispensed with in working the inlet and outlet valves.

Amongst the few water motors exhibited we noticed a turbine, by Messrs. Easton & Anderson, of Erith. This was arranged for working a centrifugal pump. Both these are made adjustable for varying falls of water or power required by raising or lowering the fans into or out of the annular troughs by which the fans or working blades are surrounded, the edges of which partially close both the receiving and discharging apertures.

A Ritchie's Patent Turbine is shown by Messrs. Duncan, Bros., of Queen Victoria-street. It is claimed for this wheel that, owing to the shape of the vanes and buckets, the water enters the wheel at its highest velocity and leaves it at the lowest, and that the gate is so formed that the angle of the water, as it enters the wheel, is the same whether the gate be opened more or less. Messrs. Hockey & Co., of Chard, show a Rotary Motor actuated by water. A very considerable number of adjuncts connected with prime movers are exhibited, such as valve-gears, feed-water heaters, boiler-feeders, safety-valves, piston-rings and packing, boiler-coverings to prevent radiation, and *id genus omne*. Many of these possess merits, but the exigencies of one space prevent more than a passing notice.

The exhibits relating to the means of distributing the power of prime movers are not very numerous. The Kirkstall Forge Company, of Leeds, exhibit specimens of their speciality, rolled black shafting, with friction couplings and adjustable bearings. The exhibitors claim that this shafting possesses 20 per cent. greater torsional strength, and 33 per cent. greater flexional strength, than ordinary turned shafting. The reasons they give for this are,—that it is rolled so straight round and true, that it does not require turning. We are not in a position to deny this statement, and with the special care taken in the manufacture, it may possibly be true, but we certainly should not recommend our readers to try the experiment of using the ordinary black shafting of commerce without turning.

An apparently effective frictional clutch pulley and coupling is shown by Messrs. Stern & Co. (Limited), of Glasgow, together with a Clerk's patent gas-engine, fitted with self-starting gear, but the operation of this latter is sufficiently well known that a detailed description is unnecessary.

Medart's patent wrought-iron pulleys are exhibited by Messrs. Richards & Co., of Manchester. A commendable feature in these pulleys, and one not usually found, is the support given to the rim of the pulley by the extension of the base of the arms where they join the periphery.

Wrought-iron pulleys are coming rapidly into use, and are to be preferred, especially where a number of pulleys running at high speeds are required, as they should combine the maximum amount of strength with the minimum amount of weight. Care should, however, be taken in selection, as we have heard of some of fanly construction springing in working. Where large power has to be transmitted, they should in all cases be made with double arms.

The Patent Power Pulley Company, of Manchester, show specimens of their pulleys, which are made of wrought or cast iron; but the peculiarity of construction consists in their having a number of holes made through the rim of the pulley. The advantage claimed for this arrangement is that the slip of the belt is greatly modified by the rapid discharge of the air through the perforations, and, therefore, the belt and the pulley have absolute contact. Before pronouncing an opinion as to the value of this plan, we should prefer to see the pulley tried under varying conditions against ordinary flat-faced pulleys, the

amount of slip and power transmitted being accurately measured.

Wrought-iron pulleys possessing more or less merit in construction are shown by Messrs. Mackie & Co., of Reading; Messrs. Hall, of Dartford; Mr. Macheth, of Bolton; and others.

In concluding our notice of the prime movers at South Kensington, we may add that although the display cannot be held to be entirely representative, there is nevertheless much in this section that should interest and instruct not only the engineer and student, but the public at large, and prove a capital school of technical information.

LETTER FROM PARIS.

STEINHEIL, the well-known glass painter; Regnier, the great actor who maintained so well the honour of the French theatre; De Neuville, the admirable painter of our soldiers and their heroic deeds; Ballu, the eminent architect of St. Ambroise, Le Trinité, and the Hôtel de Ville; and lastly, Victor Hugo, the immortal poet whose obsequies Paris has been solemnising, such is the death-roll of this month, which has seen successively disappear some of our greatest artistic lights.

We should have to greatly enlarge the usual scope allotted to these letters to undertake any adequate funeral eulogy on the great genius whom France has just lost. We can but give a few lines to the description of the last honours paid to his mortal remains, at their last halting-place between the Arc de Triomphe and the Pantheon.

With its grand architectural lines and exceptional situation, the Arc de Triomphe formed a very appropriate framework for such a funeral ceremony, and under its lofty vault was constructed the catafalque, 22 metres in height, the outline of which was visible far off, from Neully to the Louvre. Great mourning banners sprinkled with silver, antique tripods disposed around the place, scutcheons bearing the titles of the works of the poet; these formed the decorations contrived by M. Ch. Garnier for the monument where the body of Victor Hugo lay in state on Sunday, previously to being transported on the following day to the Pantheon, the Catholic temple which a recent decree has consecrated afresh to the sepulture of great men, and the decorations of which contrast singularly with the new destination which the French Government has given to the Church of St. Genevieve. The decoration of the cupola, it is true, symbolises the apotheosis of the patron saint of Paris; but as, in 1831, the "Gouvernement de Juillet," while "laicising" the Pantheon, had left intact the paintings of Baron Gros and Gérard, it may be presumed that the Republic of 1850 will in its turn respect those celebrated works.

Will it show itself equally impartial to the mural paintings of Puvis de Chavannes, Théodore Maillot, Henri Lévy, Jean Paul Laurens, and Cabanel, to which M. Charles Yriarte devoted an eloquent article lately in these same pages? Will it maintain intact the admirable mosaic of the choir, for which Hébert designed the cartoons? Let us hope, for the honour of French taste, that Parliament will comprehend that above the region of religious dissensions and political strifes there is an unchanging artistic truth and beauty, and that the Pantheon of great men may equally remain the museum of the artistic genius of the epoch as displayed in sculpture and painting.

For the moment, as it was impossible to do away with the emblems of the Catholic culte, all that was done was to drape the principal façade with black, and to mask the decorations of the choir under funeral hangings.

To return to our obituary: M. Steinheil, who died suddenly a few days ago, was the brother-in-law of Meissonier. He leaves behind him a considerable array of artistic work. The restoration of the windows and mural paintings of the Ste. Chapelle, executed in 1850, will have sufficed to ensure his reputation.

Alphonse de Neuville was too well known in England to render it necessary to recount his numerous works. We may recall here only the "The Taking of Bourget," the "Dernières Cartouches," the "Combat at a Railway Station," and the Panorama of Champigny, executed in collaboration with M. Detaillé; works which would alone suffice to make the reputation of this remarkable artist, cut off in the fulness of his powers; for De Neuville was only forty-nine years of age.

As to M. Ballu, his name will remain attached to a whole series of monuments to which he has devoted his talent and his whole life. Afflicted with a cruel malady for the last three years, he has nevertheless worked up to the last moment, and has barely had the satisfaction of putting the finishing touch to the municipal palace which he was commissioned to build immediately after the incendiary work of the Communists in 1872. He was a pupil of Hippolyte Lebas and student of the École des Beaux Arts, won the "grand prix d'architecture" in 1840, was member of the Institut (where he succeeded Vandoyer), commander of the Legion of Honour, and "Inspecteur Général des Travaux diocésains." He was born in 1817. He constructed successively the churches of Ste. Clothilde (commenced by Gau), Ste. Ambroise, Le Trinité, and lastly the Hôtel de Ville, of which the interior decoration is still unfinished. He leaves two sons, one of whom has already shown himself a worthy successor of his father in the profession.

During the past month has been laid the first stone of the new "Lyceé Louis le Grand," intended to replace the old Collège de Clermont, in which, by the way, Victor Hugo studied. The construction of this University building has been entrusted to M. Lecœur. It will stand behind the Luxembourg, a few paces from the Observatory and the Pantheon. A similar ceremony is announced for the 3rd of August next, when the first stone of the new Sorbonne will be laid. The architect, M. Menot, who gained the commission in the public competition opened by the Municipality of Paris, has kindly promised to give the *Builder* a perspective view of the future building as early as possible.

There will take place also shortly, on the occasion of the "Fête Nationale," the inauguration of the statue of Pinel, the celebrated lunatic physician. The monument, the work of the sculptor Ludovic Durand, is being erected opposite the Salpêtrière Asylum, on the Boulevard d'Hôpital.

Two other inaugurations will take place this month. One is that of the "Liberté" statue which M. Bartholdi executed for New York, and of which the American colony here have offered the city of Paris a reduced copy in bronze, 8 metres high. This is placed temporarily at Passy, in the Place des États-Unis. It will ultimately be placed, in the guise of a beacon, at the extremity of the Ile des Cygnes, opposite the Champ de Mars. Lastly, last Sunday there took place, at Villers Cotteret, the inauguration of the statue of Alexandre Dumas the elder, a remarkable work by M. Carrière Bellense.

We must not forget to mention the sculptor's competition, opened by the municipality of Paris, for the erection of a statue to Étienne Dolez, the celebrated printer and philanthropist, who was burned alive in 1846, in the Place Maubert, as a heretic. The statue, which will mark the place of his suffering, will be executed by the successful competitor in the competition, M. Guilbert, to whom we owe also the statue of M. Thiers, which is erected at Nancy.

To complete the information contained in a former letter, we may record that the exhibition of the works of Eugène Delacroix has produced, deducting expenses, 80,000 francs, a sum which will allow of the erection of a monument which M. Dalon has been commissioned to execute to the memory of the celebrated painter. No sculptor could be better fitted to do justice to the work and to interpret the expressive physiognomy and marked features of the great artist.

Last week the vote for the "Grande Médaille d'Honneur," in the section of painting at the Salon, took place. At the second round of voting, M. Bougreaud obtained the medal by 72 votes. As to the sculpture section, after three votings without a definite result, it has been decided that the médaille d'honneur for sculpture will not be awarded this year. Lastly, M. Lalou, the young architect whose restoration of the Altis at Olympia has already received its just appreciation in these columns, has carried off the médaille d'honneur in the architectural section; so that our presumptions in his favour have been fully realised.

This subject leads us to speak of the happy innovation introduced by the new Under-Secretary des Beaux Arts, M. Turquet, in respect of which the Government have suppressed the triennial Salon attempted to be created in 1858.

The next of these exhibitions should have opened on the 1st of May or June in 1886, but the experiment already has shown the inutilty of the undertaking, and the decision of the Government cannot but be approved.

We may remark, in passing, the re-opening of the Musée des Arts Décoratifs, and the two exhibitions of higher artistic interest installed, the one at the École des Beaux Arts, and the other at the Tuileries, Salle des États. The first includes only portraits signed by modern masters; the second, which will last to the 30th of June, is opened for the benefit of the orphans of Alsace-Lorraine. One may see in that collection *chefs d'œuvre* of almost every period from the earliest to the present day.

We must remark also on the new collection of furniture with which the Museum of Cluny has been enriched, including some marvellous examples of Spanish art of the sixteenth and seventeenth centuries. We must not omit either to mention the arrival in Paris of the delegates of the Commissioners of Sewers, who have come over from London to study our system of subterranean communications, and especially the telegraphic and telephonic apparatus in the *égouts* of Paris.

At the moment of writing this letter, we learn that the jury of the *Salon* has not awarded the first-class medals for painting this year. The first medals for sculpture have been awarded to M. Daillon for his work "Le Reveil d'Adam," bought by the Municipality of Paris (the merits of which we have already made known to our readers), and to M. M. Desca, Croisy, Cales, and Roly. The awards of the jury in regard to architecture were not divulged when this letter was sent off.

THE METROPOLITAN DRAINAGE OUTFALLS.

For some weeks past the officers of the Metropolitan Board of Works have been conducting experiments at the outfall of the southern main drainage works at Crossness, for the purpose of discovering the best mode of purifying the London sewage. The quantity of sewage dealt with is that of a million gallons in each twenty-four hours, Sundays excepted, and also omitting part of Saturday. A million gallons of sewage per day throughout the year would correspond to a metropolitan population of about 25,000, and so far the experiment possesses sufficient magnitude to afford useful results. It would appear that a large majority among the members of the Board feel sufficiently satisfied with what has been done to decide them in favour of pressing forward. It is perhaps unfortunate that the operations are complicated by the necessity of providing for the deodorisation of the whole of the London sewage during the ensuing summer. This will involve the adoption of chemical treatment of an imperfect and temporary character, to be carried on both at the Crossness and the Barking outfall. To meet the difficulty, the Board have lately authorised an expenditure of 10,000*l.* in addition to sums previously voted; and this extra sum would be obviously insufficient were it not that there is a large stock of chemicals on hand. That which leads of especial interest to these proceedings is the evident expectation of the Board that they will ultimately find themselves in the position of being able, by chemical means, to purify the whole volume of the London sewage. An active and prominent member of the Board, Mr. Solway, has incidentally mentioned that to make arrangements to do so would cost a million of money, and occupy two years of time. Of course, London has already paid for its drainage works. Now, having brought all the northern sewage to one point, and all the southern sewage to another, there remains the task of so treating the enormous aggregate that the Thames shall suffer no pollution from its presence.

The chemical method proposed for the accomplishment of this notable undertaking has been devised by Mr. W. J. Dibdin, the Board's chemist, who has also had the benefit of consulting with Dr. Dupré on the subject. Associated with Mr. Dibdin is the Board's engineer, Sir Joseph Bazalgette. These three authorities were engaged together during the spring of last year in experimenting on the sewage at the Western Pumping Station at Pimlico. Some useful facts were then ascertained, but the operations

were interrupted by the necessity of promptly deodorising the sewage at the outfalls. The broken thread has since been taken up again, and the chemical process has been more fully tested. Chemistry is not all that has to be brought to bear on this problem. When the solids in the sewage have been precipitated, there is the deposit to be dealt with,—the almost impracticable "sludge," difficult to dry, even in a partial degree, and hard to get rid of in whatever form it may be presented. Those who believe in the manual virtue of the precipitated matter may have it as a gift. At least, we presume the Metropolitan Board would be very glad if a fleet of barges would come day by day and carry off the entire stock, especially if the drying or semi-drying of the staff were not insisted upon. It has been proposed to barge the sludge down the river and cast it into the depths of the German Ocean. To this there would be objections, and the cost is reckoned at 37,000*l.* per annum, in addition to a capital outlay of 130,000*l.* for the barges. Instead of drowning the sludge it has been proposed to burn it, and another plan is to bury it. Out of all the schemes it is to be hoped that one will be found available, without offence, and without extravagant cost. The bare precipitation seems to present less that is problematical. It must be acknowledged that the quantities are startling. A grain in the gallon is ten tons in the day's sewage. This fact is enough of itself to shut out many chemical processes which look very pretty in a laboratory, but which are quite hopeless at the mouth of a metropolitan outfall. Mr. Dibdin uses 3.7 grains of lime and 1 grain of proto-sulphate of iron per gallon. In the joint report presented to the Metropolitan Board by Sir J. Bazalgette and Mr. Dibdin, it is calculated that the whole of the sewage can be thus precipitated, the sludge disposed of, and the effluent deprived of all offensive odour by a supplementary process during the summer months, at a total capital expenditure of a little under 1,000,000*l.*, and at an annual outlay of 100,000*l.* As a penny in the pound on the rateable value of the metropolis will produce 120,000*l.*, the financial prospect is not very distressing.

The Royal Commissioners who have reported on the main drainage outfalls have recorded their opinion that mere precipitation will not be sufficient to prevent the sewage from rendering the river offensive. They speak of "injury to fish and danger to wells." If fish will live in the effluent before it enters the river, there will be very little to fear in this respect. As for the wells, if they receive no harm from the sea-water which mingles with the Thames below Blackwall, they are not likely to be damaged by the effluent from the sewage works. The Thames, as affected by the outfalls, has no relation to any drinking supply. Hence the effluent need not possess the purity which otherwise might be demanded. But the Royal Commissioners consider that the effluent, if discharged at the present outfalls, ought to be filtered through land. This is a formidable proposal, and one which it is to be hoped may be avoided. If filtration cannot be adopted, owing to the want of land or its high price, the Commissioners recommend that the effluent should be taken down to the estuary of the Thames and there discharged into the river. Of course, if filtration is necessary, it must be accomplished, or the alternative plan adopted. But wisdom seems to suggest that the chemical treatment should first of all have a trial. If it proves insufficient, no serious harm will have been done. Land may then be bought, or the requisite conduits constructed to carry the effluent down the river. Experience, however, may show that these further proceedings are unnecessary, and there can be no doubt that a fair effluent will have a very different effect on the river compared with the raw sewage which now flows into it, with all its enormous hulk of solid and putrefying matter.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—On Saturday last the members of the above Association paid a visit to the new Liberal Club now in course of erection in Edmund-street, from the designs of Mr. Cossins. Amongst those present were Messrs. Cossins, W. H. Kendrick (vice-president), Victor Scruton (hon. sec.), A. Hale, F. Bailey, T. W. F. Newton, O. Essex, H. H. McConna, O. E. Bateman, A. J. Craddock,

J. Goodman, W. Midgeley, &c. Before inspecting the building, Mr. Cossins conducted the members to the clerk of works' office, where an inspection was made of the plans, sections, and elevations of the club, the arrangement and disposition of the various apartments were discussed, and much interest was shown in a novel device in case of fire, consisting of an iron hand-rail ladder running externally from the top of the building to the bottom. Under the guidance of Mr. Cossins the members then visited the whole of the building.

Liverpool Architectural Society.—The first meeting of the recently inaugurated Junior Debating Club, membership of which is free to all professional non-practising members (i.e., assistants and students only) of the Society, was held on the evening of the 1st instant, at the Society's rooms, No. 9, Cook-street, when Mr. Walter H. Brierley read a paper entitled "Piffalls," detailing the many errors the young practitioner is liable to, and showing how they may be avoided. Mr. James Nicholson was voted chairman for the evening. There was a good attendance, and an interesting discussion, in which Messrs. J. B. Hinks, E. P. Hinde, R. Holt, C. J. Anderson, C. R. Chidson, W. N. Stephenson, T. J. Dalziel (visitor), G. Hornflower, and the chairman took part, followed. The next meeting will be held June 15th, when Mr. S. J. Dalziel will read a paper entitled "Early Gothic Vaulting."

Edinburgh Architectural Association.—The series of Saturday afternoon visits in connexion with this Association was brought to a successful close for the season on Saturday last, when a party numbering over sixty members and friends made their annual excursion to Inchcolm Abbey, Donibristle House, Dalgety Old Church, Aherdour Castle and Church, under the leadership of Mr. Hippolyte J. Blanc. The party left by special steamer in the forenoon, and on reaching the island of Inchcolm the company assembled in the chapter-house, where an interesting paper sketching the history of the monastery and abbey was read by Mr. Blanc, and by a plan prepared from a survey of the buildings, together with a number of photographs, specially taken, the various features of the structure were illustrated in order. In connexion with Donibristle Mr. Blanc sketched the history and incidents pertaining to it, from its possession by the Abbots of Inchcolm down to the period of the fire in 1857, drawing attention to the fine specimen of hammered ironwork in the fine old gates and staircase railing; and of Dalgety, now a ruin, he noted its association with the Abbey of Inchcolm, as a chapel of ease, it is stated. The party next proceeded to Aherdour Castle, which, with its interesting and characteristic detail, was described and examined from the original keep with Norman and Gothic features, to the additions in succession down to the seventeenth century. The old church in ruins, comprising nave, aisle, and apse, was next visited. Mr. Blanc noted that as an example of very early work in Scotland it was most interesting, and could be made instructive to the archaeologist by a judicious clearance of the rubbish and debris in which it lies buried. At the close of a very enjoyable day a hearty vote of thanks was accorded Mr. Blanc for his series of instructive papers.

SURVEYORSHIP ITEMS.

West Suffolk.—An adjourned meeting of the West Suffolk Quarter Sessions was held on the 27th ult. at the Shire Hall, Bury St. Edmund's, for the purpose of appointing a county surveyor for the western division of the county. Mr. N. Barnardiston presided, and there was a large attendance of justices. The Finance Committee has received 68 applications for the post. Of these 68 gentlemen they selected four, the election ultimately falling upon Mr. Frank Whitmore, Chelmsford and London.

Hampstead.—Mr. Frederick Stone, of 31, John-street, Bedford-row, has been appointed Deputy District Surveyor for Hampstead, by the Metropolitan Board of Works.

Sculpture at the Royal Academy.—In the article on this subject in the *Builder* of May 23rd, the bust of the late Mr. Fawcett in the Academy was, by an oversight, attributed to the wrong artist. The bust, which is a very able one, is the work of Mr. H. R. Pinker.

THE ARCHITECTURAL ASSOCIATION.

A SPECIAL business meeting of the members was held on Friday, the 29th ult., to consider the report of the committee upon a scheme for amending and consolidating the work of the Association. Mr. C. R. Pink, President, occupied the chair.

The following new members were elected:—Messrs. B. Pithick, P. J. Dawson, J. C. T. Murray, E. G. Braybrook, and E. C. Bateman.

Votes of thanks in connexion with the late visit to the new Tilbury Docks were accorded to Mr. Grüning, the architect; to Messrs. Manning & Baynes, the engineers; and to Messrs. Perry & Co., the contractors.

The Chairman then said that the members had met to transact some important special business, and he would not by any prefatory remarks intervene between the meeting and its object. At the same time he would be wanting in a due sense of the honour they had done him if he did not avail himself of the opportunity of thanking them for his election as President for the ensuing session.

Mr. J. A. Gotch proposed the adoption of the report, which had been taken as read. He remarked that the object of the whole movement had been to simplify and systematise the work of the Association, so that any one on joining could see at once the best course to pursue so as to derive the greatest benefit from the classes and opportunities offered by the Association.

Some of the clauses of the report were of slight importance, while others contained the gist of the proposed alterations, which were mainly as follow:—The object aimed at was, first, to divide the work of the Association broadly into two classes, the advanced and the elementary. One of the most important features was that there should be a Committee of Advice, whose duty would be to advise persons joining the Association on the particular course of study they should pursue. This he considered to be one of the fundamental changes. Another important proposition was for the appointment of a committee of outside visitors, to be elected each session from all the classes. It was intended that the visitors should be men of eminence in the profession. At present the visitors were merely past grand-masters of the Association, and it was now proposed that some men of acknowledged eminence should, of their great kindness, attend the classes, and give instruction to the aspirants after fame. It was also proposed that there should be a permanent committee in connexion with the classes, so that the Secretary or President would be present to carry on the work of the classes from time to time, and this committee would be *ex officio* members of the committee of advice. These were the principal changes. It seemed to be the general opinion that the work they had tried to do in the elementary classes had been rather too ambitious, and it was proposed to somewhat lower the aim. The Elementary Class of Design was to be divided into two sections,—one for the study of ancient examples, and the other for design based upon ancient examples. The lectures on the history of architecture and on construction were also intended in future to proceed *pari passu* with the work of the classes. Another important innovation was the Class for the Study of Quantity-taking and Specification-writing. It was intended, moreover, that the study of Planning should be taken from the Class for Specification-writing, and placed where it ought to be, with the study of Design. Stress was to be laid on the strict carrying out of the rule as to members contributing to the work of their classes. One of the great prizes which the Association offered, viz., the Travelling Studentship, was to hang upon the recipient having gone through the work of the session. It was proposed to elucidate these matters by means of a chart showing the sort of curriculum which the Association offered. He might add that it was intended that no member of the Elementary Classes should be eligible to compete for prizes after he had attended two sessions in that class, which would be an inducement to get on as soon as possible. Arrangements were to be made for visiting buildings in progress of completion, and that during office hours. The proposal to extend the library would be hailed by all with gratitude, and a place where the members could read the professional journals, and get a cup of tea or coffee at a fixed tariff, would be a great advantage. Mr. Gotch concluded his

remarks, which were very well received, by formally proposing the adoption of the report.

Mr. John Slater, B.A., seconded the motion. He believed that the committee of advice would be an extremely good thing, and many of them would have been glad if they could have applied to such a committee in their early days. He considered that this report marked rather an important era in the history of architectural education. A great stride was made when the Institute established the Obligatory Examination, the advantage of which had not been so thoroughly appreciated as it ought to have been. If it were known to the public that it was necessary before a man could become an Associate of the Institute that he must have shown some knowledge of the subjects in which he was to practise, it could not fail to raise the status of the profession. Study and education must be good to a man, no matter what branch he practised in, and anything that could be done to systematise the course of study would be a great boon to the younger members of the profession. To his mind the present seemed to be the time for doing this.

The meeting then considered the report clause by clause, when a long discussion ensued, in which Messrs. Cole A. Adams, J. Donglass Mathews, H. Stannus, Aston Webb, H. W. Pratt, Stokes, Morgan, and others, took part.

A few changes and additions were made, and the report was adopted *nem. con.* in the following form:—

“1. That there shall be two defined divisions of study in the Architectural Association, to be called the ‘Elementary Division,’ and the ‘Advanced Division.’

2. That a Chart, as here given, be drawn up, explanatory of this principle for the use of Students and others.

CHART.

Elementary Division.		
Sec. I.—El. Class of Design.	El. Class of Construction.	Lectures on History and Construction.
See pages *	See pages *	See pages *
Advanced Division.		
Class of Design and Colour Decoration.	Class of Construction and Advanced Class of Construction.	Class for Quantity-taking and Specification-writing. Class for Land-Surveying.
See pages *	See pages *	See pages *

* Here would be indicated the pages of the Brown Book.

3. That a Committee of Advice, whose names shall be published in the Brown Book, be appointed by the Committee each session, whose duty it shall be to recommend to members on application the particular course of study it would be advisable for them to pursue in the Architectural Association.

4. That a Circular be published containing General Suggestions, the Chart, &c., for the guidance of Students and others, and the same be also included in the information afforded by the ‘Brown Book.’

5. That there shall be a Committee of Visitors appointed each Session to all the Classes, to conduct the work of the same. The Visitors to be *ex officio* Members of the Committee of Advice.

6. That the Classes be arranged in the following order, viz.:—

7. *Elementary Class of Design.*—Section I., for Study of Ancient Examples; Section II., for Design based upon Ancient Examples.

8. *Elementary Class of Construction.*—The subjects to be treated in a more elementary manner than has hitherto been adopted, but on the same principle.

9. *Lectures on the History of Architecture and Lectures on Construction.*—That the principle of *visd voce* questioning be adopted at the Lectures, and the subjects treated of, to work in conjunction (as far as possible) with those set down in the Classes.

10. *Class for Design.*—Conducted on the same lines as at present.

11. *Class for the Study of Colour Decoration.*—Conducted on the same lines as at present.

12. *Class of Construction and Practice.*—Conducted on the same lines as at present.

13. *Advanced Class of Construction and Practice.*—Conducted on the same lines as at present.

14. *Class for the Study of Quantity-taking and Specification-writing.*—That a New Class be formed, and that Planning, which has hitherto been taken conjointly with Specification-writing, to be now omitted from this Class, and embraced in the work of the Class of Design.

15. *Surveying Class.*—To be conducted on same lines as at present.

16. That Members of the Elementary Classes be eligible to compete for prizes in their Class during their first and second sessions only, but not after having attained the age of twenty-three years after the last meeting of the Session.

17. That the Rule as to Members contributing to the work of the Classes in future be strictly observed. That the amount of work in the various Classes be reduced.

18. That in awarding marks in the Classes of Design, greater stress be laid in future on the quality of the Draughtsmanship.

19. That the Session shall commence on the first Friday in October, and finish by the end of April or beginning of May.

20. That the Essay Prize be of the value of 5*l.* 5*s.*, and be accompanied by the presentation of a Silver Medal; that the A. A. Design Prize be of the value of ten guineas, and be accompanied by the Silver Medal.

21. That under necessary regulations, arrangements be made for the inspection of Buildings in progress by individual members during working-hours, and also to practical workshops, and if means are forthcoming, to provide technical and experimental instruction.

22. That after the year 1886 Candidates for the Travelling Studentship be required to show that they have passed satisfactorily through one or more of the Classes, except in the cases of Country Members, which shall be referred back to the Committee. That the names of the holders of the Studentship be published in the Brown Book, and that the satchel of each Student, which by the existing condition of the Competition becomes the property of the Architectural Association, be framed with the name of the Student and date of his year, and hung in the rooms of the Architectural Association.

23. That it is desirable that the Library accommodation be extended and be opened to Students on evenings in the week, and a General Meeting Room be attached where the professional journals, &c., can be seen, and tea and coffee obtained at a fixed tariff.

24. That the distribution of Prizes and delivery of Addresses be in future omitted at the *Conversazione.*

25. That at the Annual General Meeting the prizes shall be distributed, the President shall deliver his address (as heretofore) and that short Addresses be invited from the Senior Members of the profession.

26. That the following alterations be made in the Rules:—Rule 3, on 6th line, after ‘Classes’ to insert ‘and Lectures.’ Rule 35, on 3rd line, after the words ‘shall be’ to omit those to the end, and substitute ‘placed at the disposal of the Members, the Prizes shall be distributed, the President shall deliver an Address, and short Addresses be also invited from Senior Members of the profession.’ Rule 40, on 2nd line, after the word ‘Session’ to omit the words to the end of the Rule. Rule 41, on 2nd line, to substitute ‘May’ for ‘June.’

Mr. Cole A. Adams moved that the subscription should be increased to £1. Is., pointing out the great advantages offered by the Association, and believing that no one would grudge to assist in its development. The Association must advance with the times, and the increased amount of funds would be applied in providing technical instruction, in improving the library, and possibly in printing and publishing their papers. Out of 1,000 members to whom circulars were sent, 100 had replied, 60 being more or less in favour of the increased subscription, while 40 were decidedly against it.

Mr. Aston Webb seconded the motion, adding that it was necessary for the extension of the work of the Association.

Mr. J. D. Mathews strongly objected to the resolution. He had never connected with the Association for twenty years as treasurer, and he had never had any difficulty in meeting the expenses. The work was carried on at an almost nominal cost, and he must differ entirely on this matter with the proposer of the resolution. The success of the Association had been caused by the fact of its being purely self-supporting.

An amendment was proposed and seconded that the matter should stand over for future consideration.

In the discussion which followed Messrs. Gotch and Slater supported the original resolution, which was opposed by Messrs. Surr, Leberton, H. Yorke, Brodie, and Stannus.

Mr. H. W. Pratt proposed a fresh amendment, to the effect that the increased subscription be for town members only, defining the radius as twenty miles around London.

This amendment was seconded by Mr. W. Pite.

Mr. Cole A. Adams replied, amidst cries for an adjournment. The first amendment being put, 41 hands were held up in its favour and 41 against. Tellers were then called for, but, while they were being chosen, the chairman gave his casting-vote in favour of the original resolution. Tellers were still called for, but the demand was eventually withdrawn.

Mr. Stannus then moved the adjournment

of the meeting for a fortnight, when they would be less heated, and this, being seconded by Mr. Baggally, was put to the vote and carried. The proceedings then terminated.

AN ARTISTIC LAW CASE AT SIENA.

THERE is at present proceeding in the Assize Court of Siena a trial of somewhat more than ordinary interest concerning the theft of a work of art of considerable value. The work in question is a magnificent *piriale* or vestment, resembling a large mantle, and is worn by high-church officials on great occasions over the ordinary surplice, entirely covering the body.

This *piriale* is of thirteenth-century workmanship, and was one of four manufactured at the same time. Of these four two have been destroyed; one is, according to report, in London; and the other is the one at present under consideration. It was presented by Pope Pius II., secularly known as Aeneas Sylvius, of the Piccolomini family,—a family well known in the records of Siena,—to the Cathedral of Pienza, a small town in Tuscany, about fifty miles south of Siena, where he was born, and was one of many works of art with which he enriched his native place.

It is rumored that the destruction of the two out of the four *piriales* was caused by the habit of the Mediaeval Italians of hanging such valuable draperies from their windows on the occasions of festivals, &c., exposing them to every shower of rain, and then putting them away in a damp condition.

About two years ago an exhibition of works of art was held at Siena, and amongst the objects exhibited was the said *piriale*, which attracted much attention. In fact, soon after the exhibition an offer was made,—it is currently reported in Siena of 12,000*l.*, but this on examination turns out to be a myth,—to purchase it by Dr. Clifford, the Roman Catholic Bishop of Bristol. Soon after the exhibition it disappeared, and no more was heard of it until it was offered for sale by a Florentine antiquary to a French nobleman, who seeing the great value of it began to ask awkward questions, in the course of which it was elicited that it had been stolen and sold to this antiquary,—who had valued it at 70,000 francs,—for 2,000 francs.

A man and a woman were brought up charged with the theft, and the trial was held at Siena. The case against the woman failed,—so a second trial is proceeding against the man, who is a member of the *carabinieri* or *gendarmes*. The robbery appears to have been perpetrated in a very cunning way, as in order to get at the plunder it was necessary to obtain three keys, which were in the possession of three different persons. It is, therefore, to be supposed that the position of the accused as guardian of the peace was of some assistance to him in his craving after articles of *verbe*.

The writer of this article,—by the courtesy of the judge presiding at the second trial, whose acquaintance he had made,—was allowed, together with two English ladies and a gentleman, to inspect the *piriale*. The manner in which this inspection was permitted is somewhat amusing, and will appear strange to those who are accustomed to the sedate proceedings of our own courts of law. At the commencement of the day's proceedings the party above mentioned were ushered into court, and then shown to reserved seats between the jury-box and the dock occupied by the prisoner. After various formalities, such as the calling over of the names of the jury and the unsealing of various envelopes containing the keys which had been obtained for the purpose of the theft, at the invitation of the judge they were requested to ascend to the bench to inspect the *piriale*, which was displayed on chairs arranged in front of the bench, the case meanwhile being stopped. After a hurried inspection of about a quarter of an hour, polite bows were made to the judge, the party retired, and the case was allowed to proceed.

The *piriale* is semicircular in shape, measures at the diameter about 3½ yards, and is of exquisite workmanship. It is divided by flowing lines into irregular panels, which are embroidered with figures illustrating various Biblical subjects, there being about twenty-five of these panels, as nearly as could be guessed from so short an inspection. The panels are bordered with leaves and geometrical pat-

terns, exactly resembling in colour and design those that are to be found in illuminated missals of the thirteenth century. The figures are worked in very rich tints, the whole of the needlework being executed in silk and gold embroidery.

The question as to whether the Church of Pienza has the power to sell this valuable piece of Mediaeval needlework is in dispute, there being a law in Italy that no valuable articles of *verbe* are to be sold without the consent of the Government, so that it is extremely doubtful whether the second *piriale* will find its way, as the only other existing one has done, to England.

Illustrations.

BRIGHTON COLLEGE.

BRIGHTON COLLEGE was founded in 1845, and moved to the present site in 1847, where the first part of the school buildings was erected by Mr. George Gilbert Scott. Further additions were made by the same architect in 1854, 1859, and 1862. After the death of Sir G. G. Scott the college appointed as its architect Mr. T. G. Jackson, who was formerly a pupil of the school, and under his direction the play-ground was levelled and a cricket pavilion built in 1883, and an extensive scheme has been prepared for the completion of the college buildings, part of which is now in progress of being carried out. The entire scheme includes the erection of a new chapel to replace the present building, which is too small, a large schoolroom, additional classrooms, an entrance tower, four boarding-houses, a sanatorium, and gymnasium and lavatory.

The whole of these will be grouped within the college gates, and will form three sides of a spacious quadrangle of which Sir G. G. Scott's buildings will occupy the fourth. One boarding-house is now finished and occupied, and a second is in progress and will be completed within a few months. The gateway tower and porter's lodge are being carried up at the same time.

The materials employed are brickwork and terra cotta for the exterior faces, and flint facing with terra cotta for the walls that face inward to the quadrangle. It is believed that the superior durability of terra cotta will enable it to resist the trying climate of the south coast better than the ordinary building stones.

The illustration is taken from one of two drawings exhibited this year at the Royal Academy.

KING'S COLLEGE CHAPEL, ABERDEEN.

THE tower of this chapel, with its curious and picturesque "crown," will be remembered by all who have ever been in Aberdeen. The whole building is exceedingly characteristic, with its occasional pier or wide mullion up the centre of the windows, its foreign-looking hutch-finals, and its picturesque variety of fenestration and tracery. The careful measured drawings by Mr. J. C. Watt, which we publish nearly entire, and which gained a medal of merit from the Institute of Architects, form a valuable record of an extremely interesting building.

The following extract from the writings of John Spalding, recording in old Scottish spelling the disaster to the "crown," and its rebuilding in 1633, may be of interest here:—

"Vpone Thursday the sevint of Februar thair began ane gryt storme of snaw with horribill heiche wyndis, quhilk wes notit to be vniuersall throw all Scotland. Thir hideous wyndis wes markit to be suche as the like had never bein sein beir in thir pairtis, for it wold overturne countrie menis housis to the ground, and sun personis sddantlie smorit within but relief. It also threw down the staitle croun biggit of curious ashler wark, af of the steipill of the Kingis college of Old Aberdein, quhilk thairefter wes re-edefit and biggit wp lile inferior to the first."

SCULPTURE AT THE ROYAL ACADEMY.

"PLAN," BY MR. S. FRY.

WE give a facsimile, somewhat enlarged, of a pen-sketch of this work which the sculptor has been kind enough to send us. The group is in terra cotta, and, as we have already remarked, is a very successful example of the combination of modern feeling and realistic treatment with true sculptural effect.

GROTESQUES FROM NOTRE DAME, PARIS.

THESE figures stand at the angles of the south-west tower of Notre Dame, Paris, emphasizing its termination. I cannot vouch for their strict accuracy, as they have been made from such extremely rough notes as I was able to make on the spot; and I regret to find on comparison with Méryon's etching of the "Siryge," that my version of the creature resting on his elbows beyond the hooded birds is entirely incorrect. Still they give some idea of these masterpieces of "the true grotesque" works which show in every stroke of the chisel that they belong to the finest period of Gothic sculpture.

The energy of idea that could realise such fantastic imaginations as these is peculiarly Gothic. The sacred subjects that glorify the west fronts of the great cathedrals form an unequal parallel to the sculptured myths of Greece, but here in the grotesque we have a new element in art for which no prototype can be found in mature Greek, Egyptian, or Assyrian art. The point is that it is in mature work, as this Gothic work undoubtedly is, for it would be no answer to this to produce the crude efforts of primitive art, and it seems certain that the wild poetry of such figures as these would have been, one cannot say beyond the power, but outside the range of a first-rate Greek artist. He could not have conceived of that mixture of the foul and beautiful, of the sublime and horrible, which Gothic art has created.

An analysis of the mental condition of the men to whom such thoughts were possible would form an interesting study in psychology, but our ignorance of Mediaeval thought is still too great to admit of it on any historical method. Possibly it resulted from the strenuous vigour and imperfect culture of the races that superseded the older civilisation. But whatever its origin, it is the announcement of a new departure in art, of that romantic tendency which has formed so important a factor in modern European thought.

R. T. BLONFIELD, M.A.

OBITUARY.

Mr. John Parnell.—We much regret to record the death of Mr. John Parnell, senior member of the well-known firm of Parnell & Son, builders and contractors, Rugby. His demise took place after a long and painful illness at his residence, Brookfield, Rugby, on the 17th ult., in the 69th year of his age. He was one of the largest employers of labour in the neighbourhood. About forty years ago he commenced business in a small way, but the business gradually extended until the firm became one of the best known in the Midland counties. The firm was extensively occupied in works for the London and North-Western Railway Company, and the new station contract at Rugby was gained in competition by them recently, and the works are now rapidly proceeding. The firm has also carried out extensive works under most of the foremost architects of the last quarter of a century. For example under Mr. A. Waterhouse, A.R.A., the firm has executed several important works, the most notable being the new St. Paul's Schools at Kensington, and the new Congregational Chapel at Hampstead, both being very creditably completed by them. They have also done a great deal of work in the shape of barracks and military depôts for the War Department. They employed from 1,500 to 2,000 persons. While doing so much work in various parts of the country, they have ever been mindful of their native place, and all the work in the way of joinery and machine-work that could be done there has been executed at Rugby, where a staff of upwards of 100 men are continually kept employed. About eighteen years ago Mr. Parnell built for himself his residence at Brookfield, Rugby. He leaves a widow, two sons, and three daughters to mourn his loss. The funeral took place at Rugby Cemetery, on the 20th ult. Following the body were Mr. W. Parnell, of London, and Mr. J. Parnell, of Rugby, his sons, Mr. Allan and Mr. Heenan, his sons-in-law, and numerous other relatives and friends, besides clerks and foremen in his employ, and about 150 workmen.

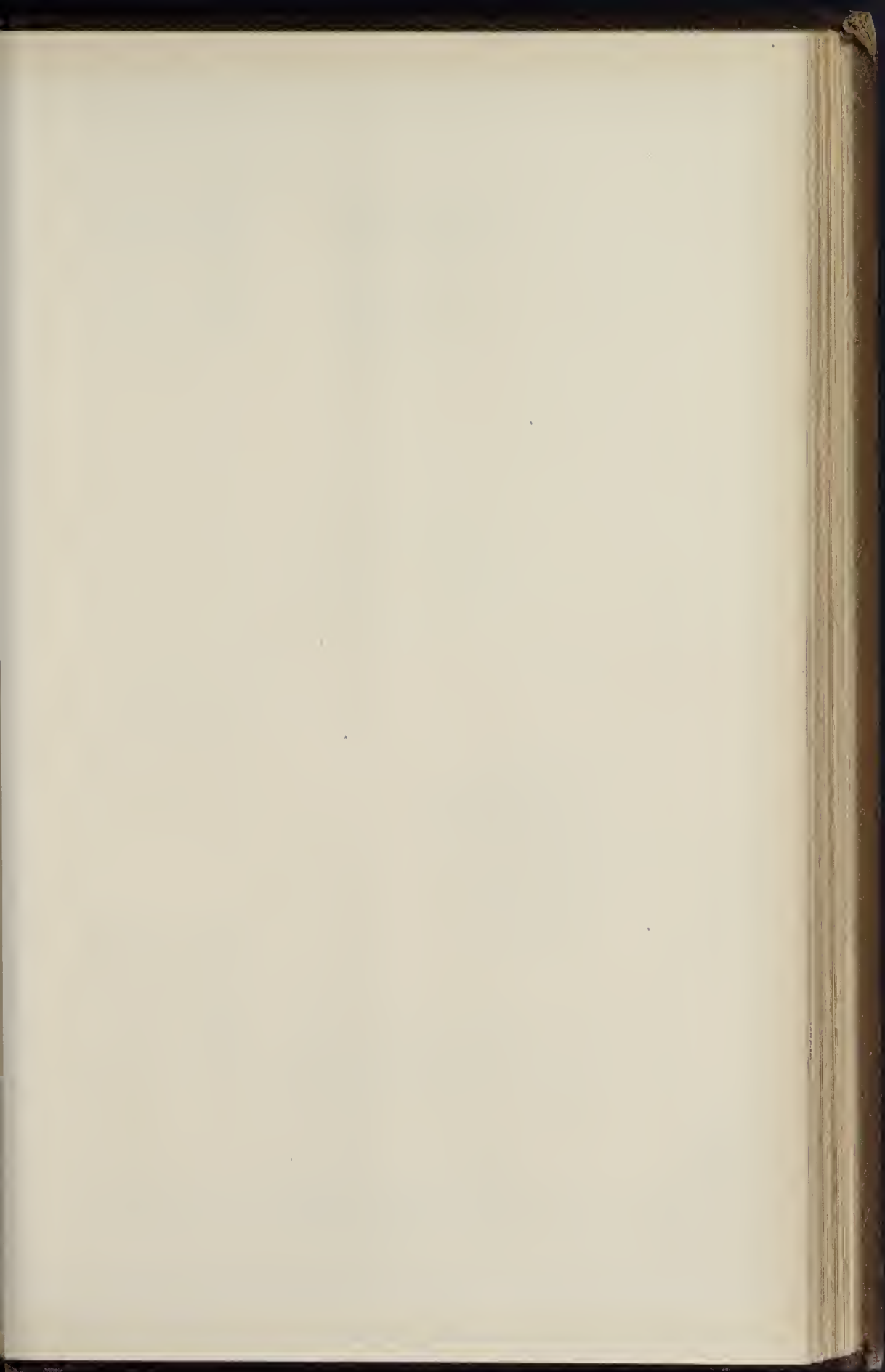
The Gray Memorial at Cambridge.—Last week a statue of the poet Gray, the work of Mr. Thornycroft, was unveiled at Cambridge.





SCULPTURE AT THE ROYAL ACADEMY: "PLAY."—By MR. S. FRY.

From a Sketch by the Artist.



CHAPEL AND TOWER, KING'S COLLEGE ABERDEEN UNIVERSITY.



From the North West.

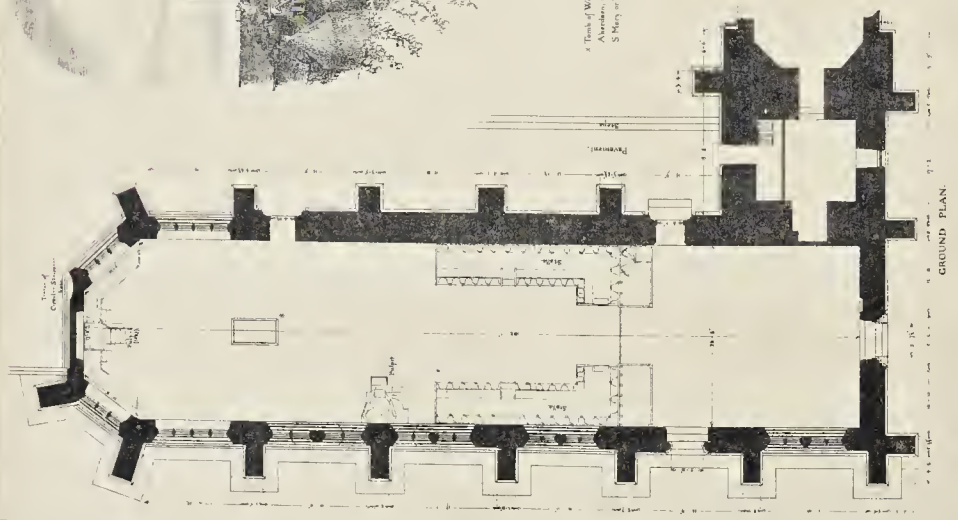
† Tomb of William Episcopalian Bishop of Aberdeen, who founded the College of St Mary in the same College in 1849.



Back Part of Chapel.

Note: The Lintels were built in 1850, the stone work in 1853, and the tower by one C. Thomas in 1854.

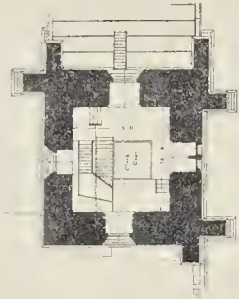
Note: The openings in front of tower are modern.



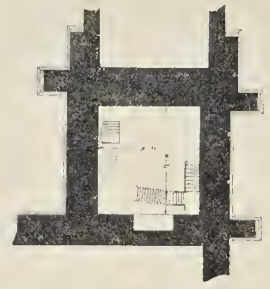
GROUND PLAN.



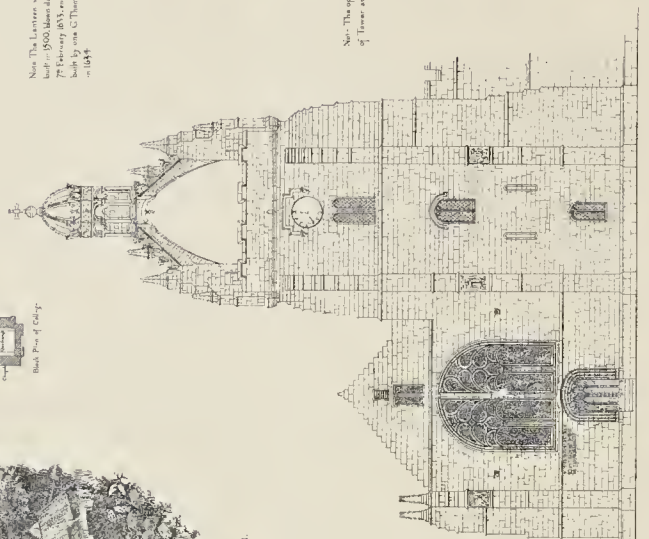
PLAN at C.



PLAN at B.

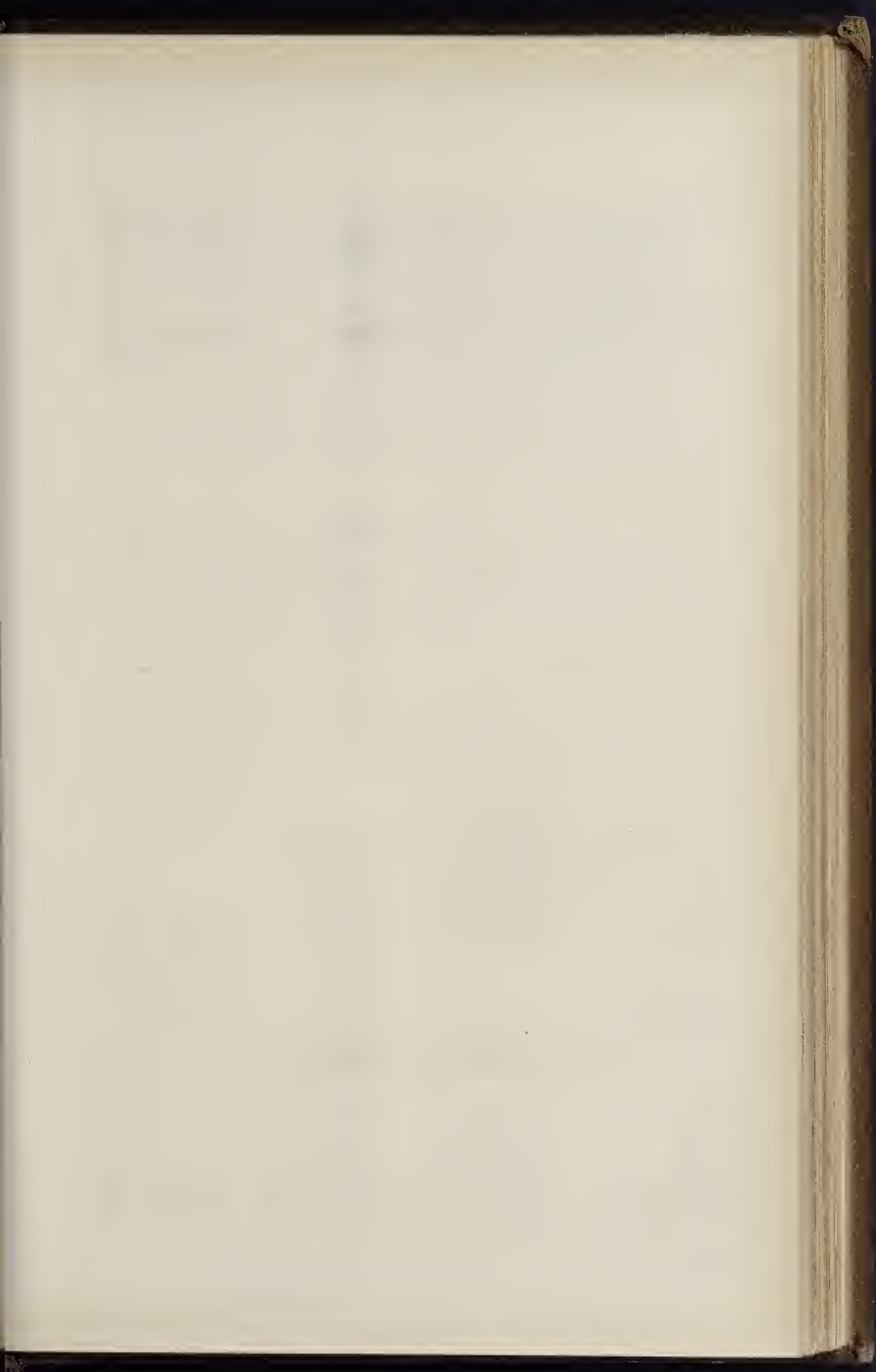


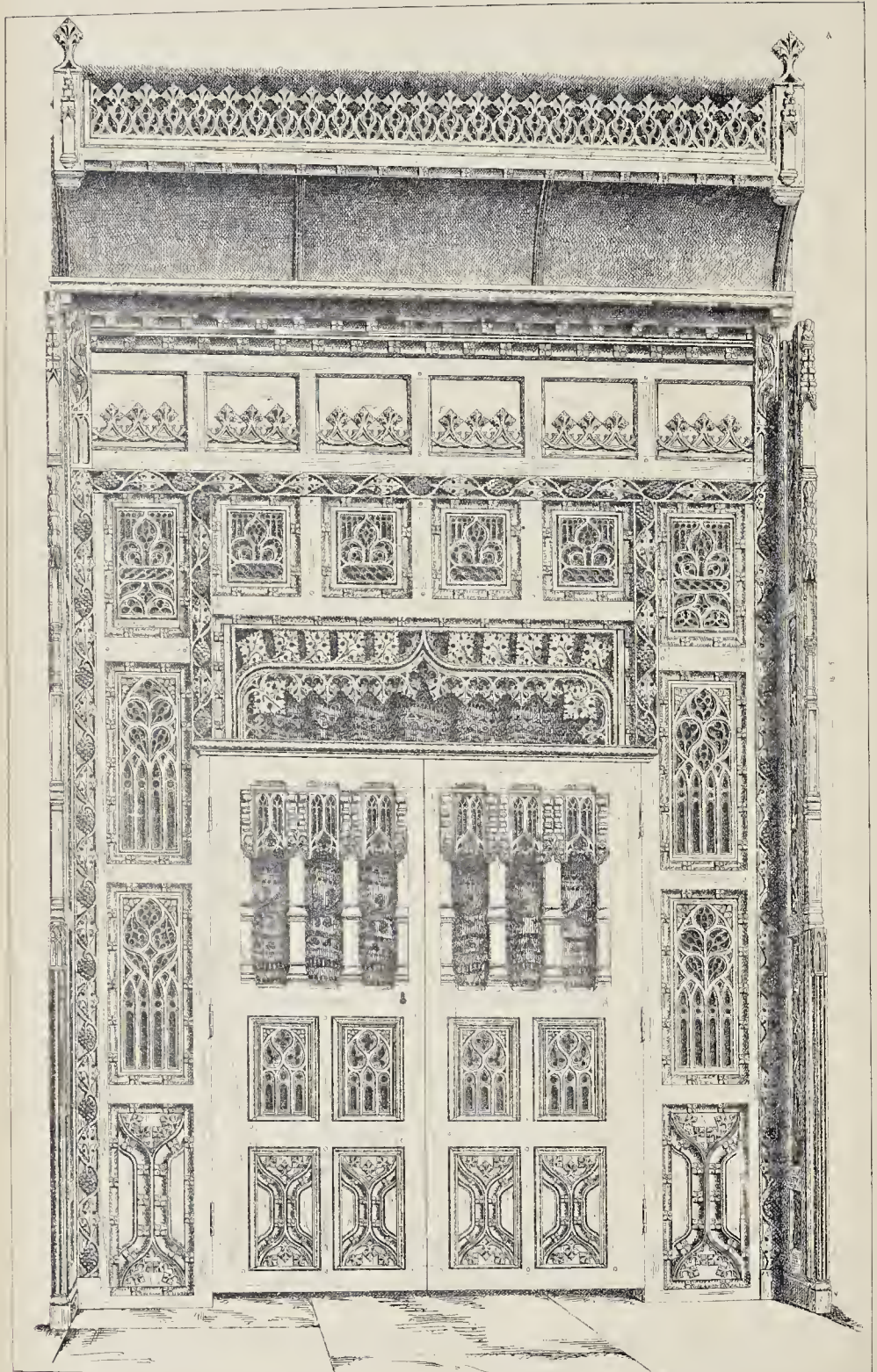
PLAN at A.



WEST ELEVATION.

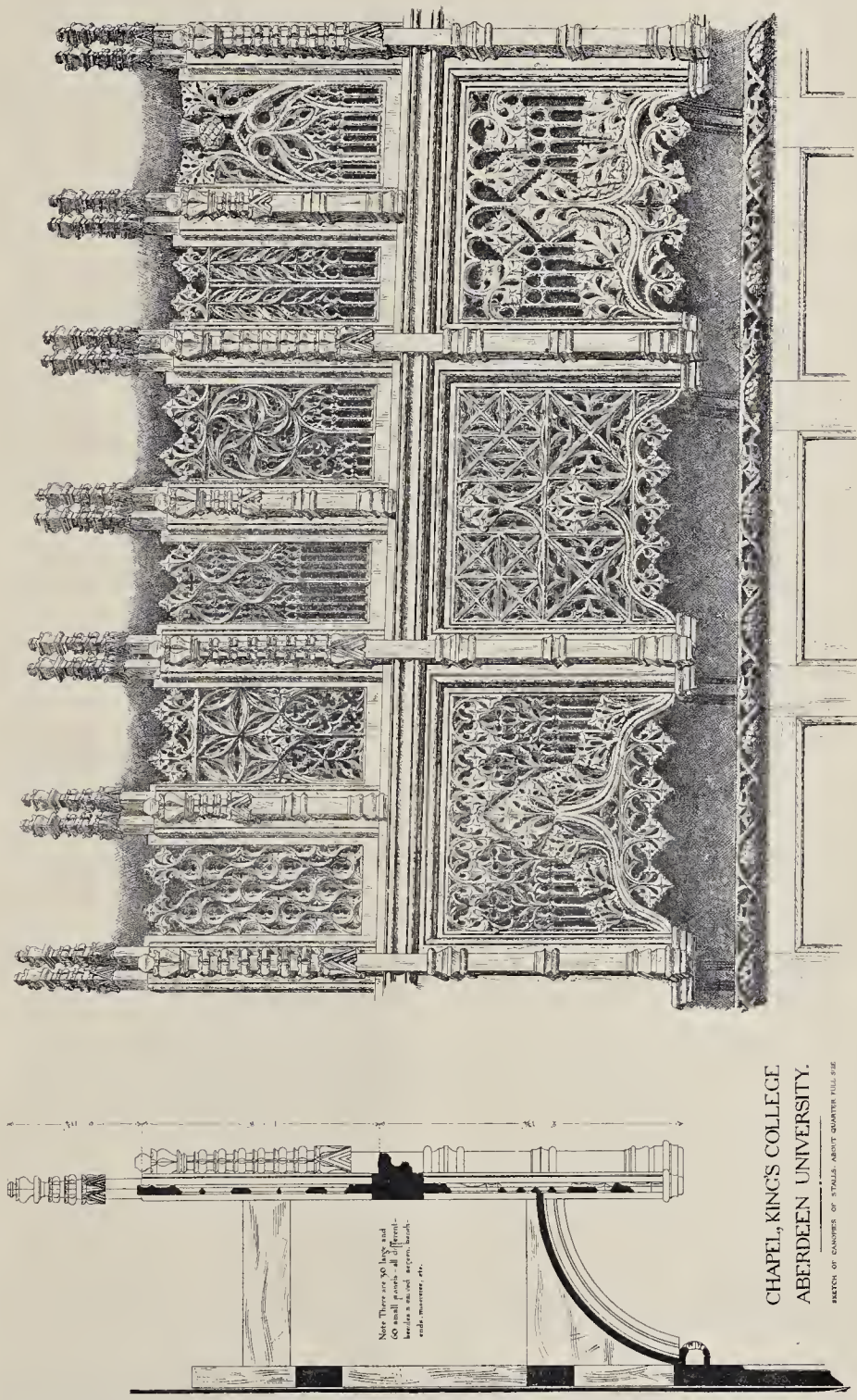
Scale of Feet.





R.I.B.A. SILVER MEDAL COMPETITION, 1885. CHAPEL, KING'S COLLEGE,
MEDAL OF MERIT AND PREMIUM AWARDED. ABERDEEN UNIVERSITY.
DOOR IN SCREEN.

C. P. Kell, Photo-Lith. & Printer, 8, Castle St., Holborn, London, E.C.
MEASURED AND DRAWN BY
MR. JAMES C. WATT.



Note: There are 90 lamps and 60 small points, all of brass, besides a steel screen, hand-ride, mosaic, &c.

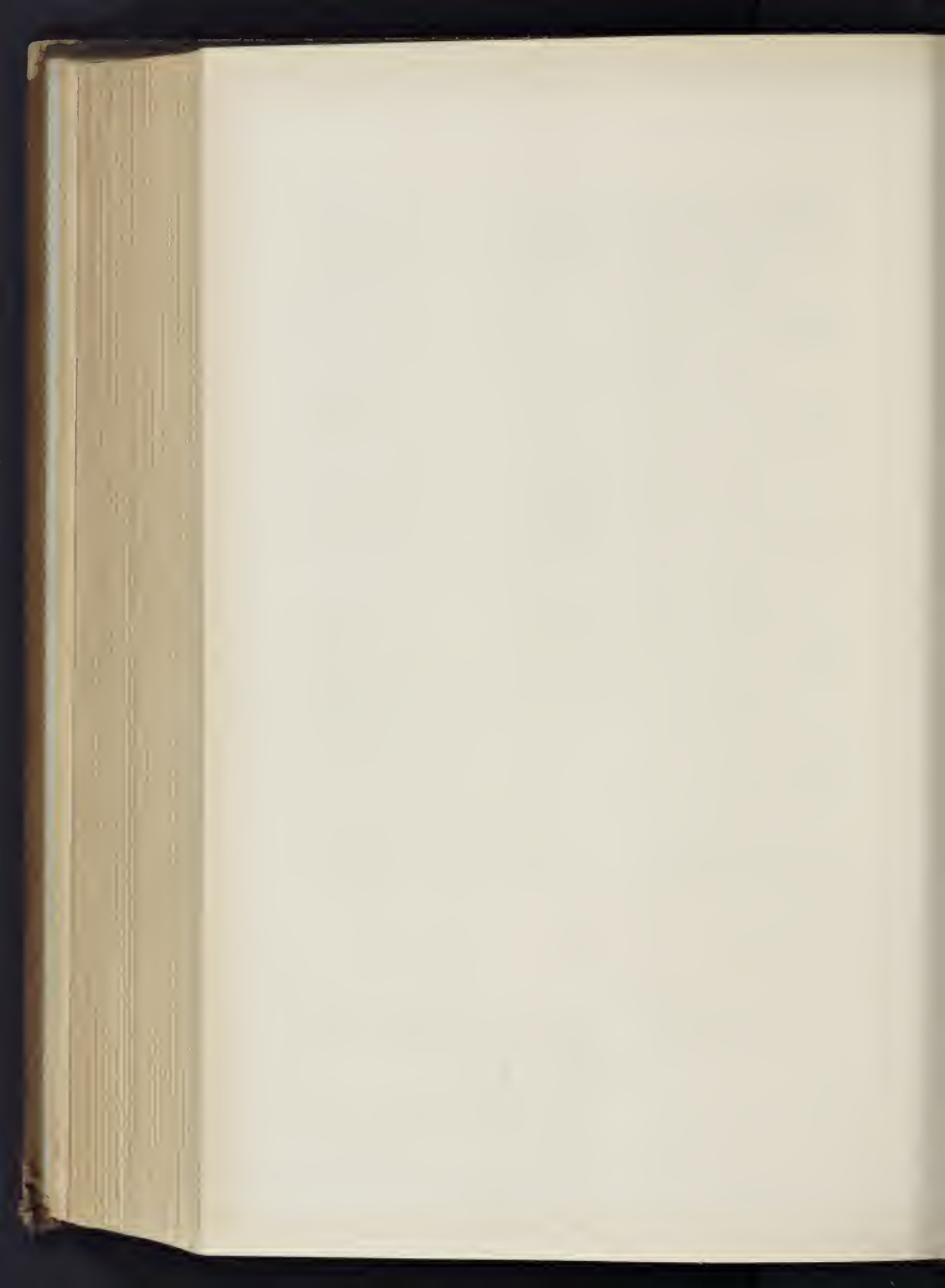
CHAPEL, KING'S COLLEGE
ABERDEEN UNIVERSITY.

SECTION OF CANOPY OF STALLS, ABOUT QUARTER FULL SIZE.

R.I.B.A. SILVER MEDAL COMPETITION, 1885.
MEDAL OF MERIT AND PREMIUM AWARDED.

MEASURED AND DRAWN BY MR. JAMES C. WATT.

2, South Street, Edinburgh, Scotland.

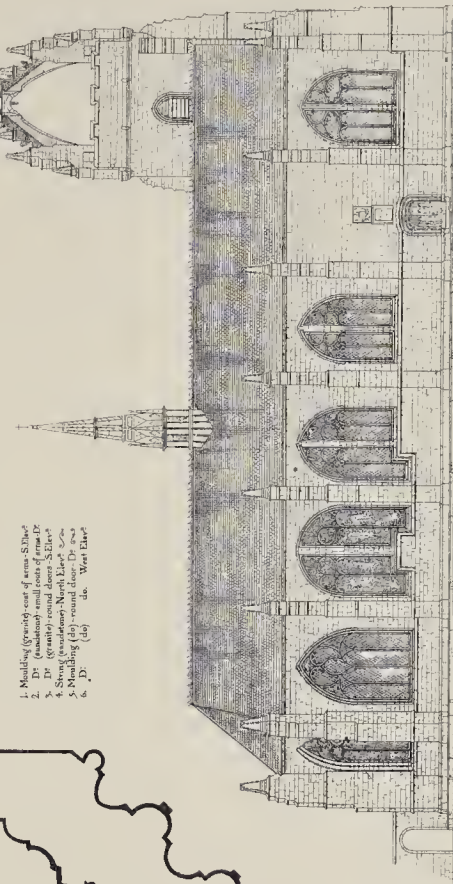


CHAPEL AND TOWER, KING'S COLLEGE ABERDEEN UNIVERSITY.

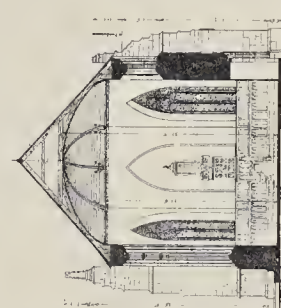
1. Main body (front) part of tower S.W. side
2. Dr. (quadrate) small tower of main Dr.
3. Dr. (square) round tower S.E. side
4. Small (quadrate) North East tower
5. Small (square) round tower West East
6. Dr. (ob) round tower West East



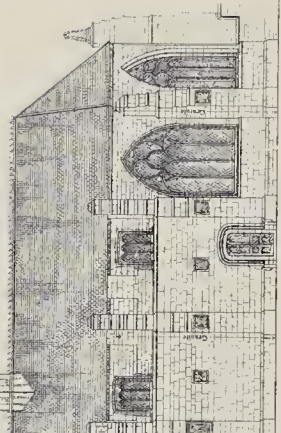
From the North.



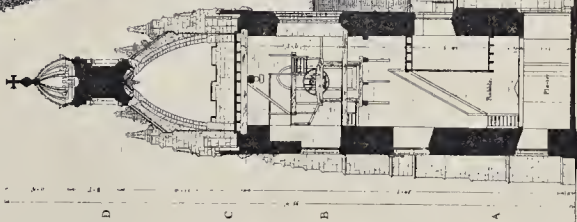
NORTH ELEVATION. (Scale 1/100)



SECTION.



SOUTH ELEVATION.

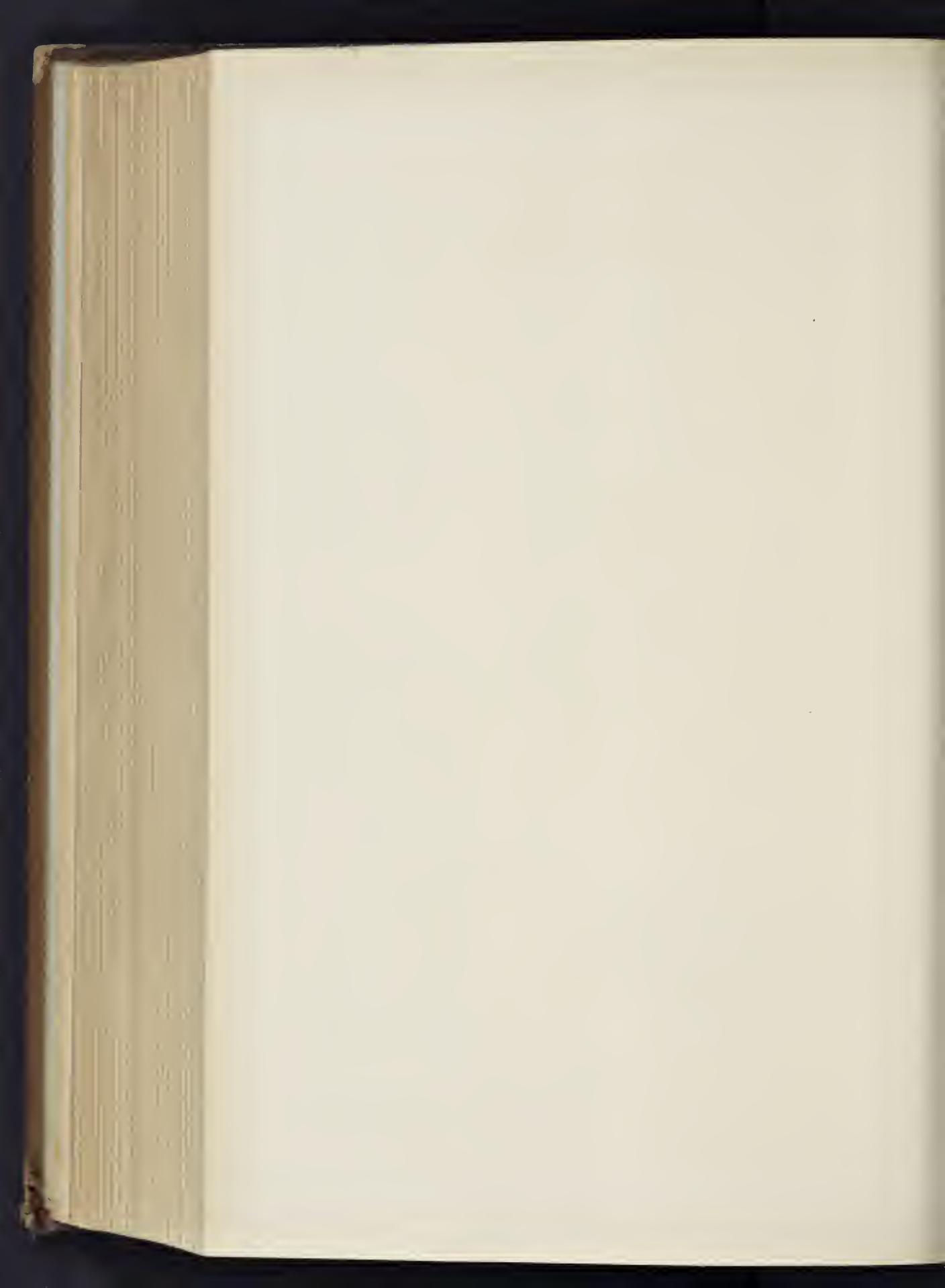


SECTION.

R.I.B.A. SILVER MEDAL COMPETITION, 1885
MEDAL OF MERIT AND PREMIUM AWARDED

MEASURED AND DRAWN BY MR. JAMES C. WATT.

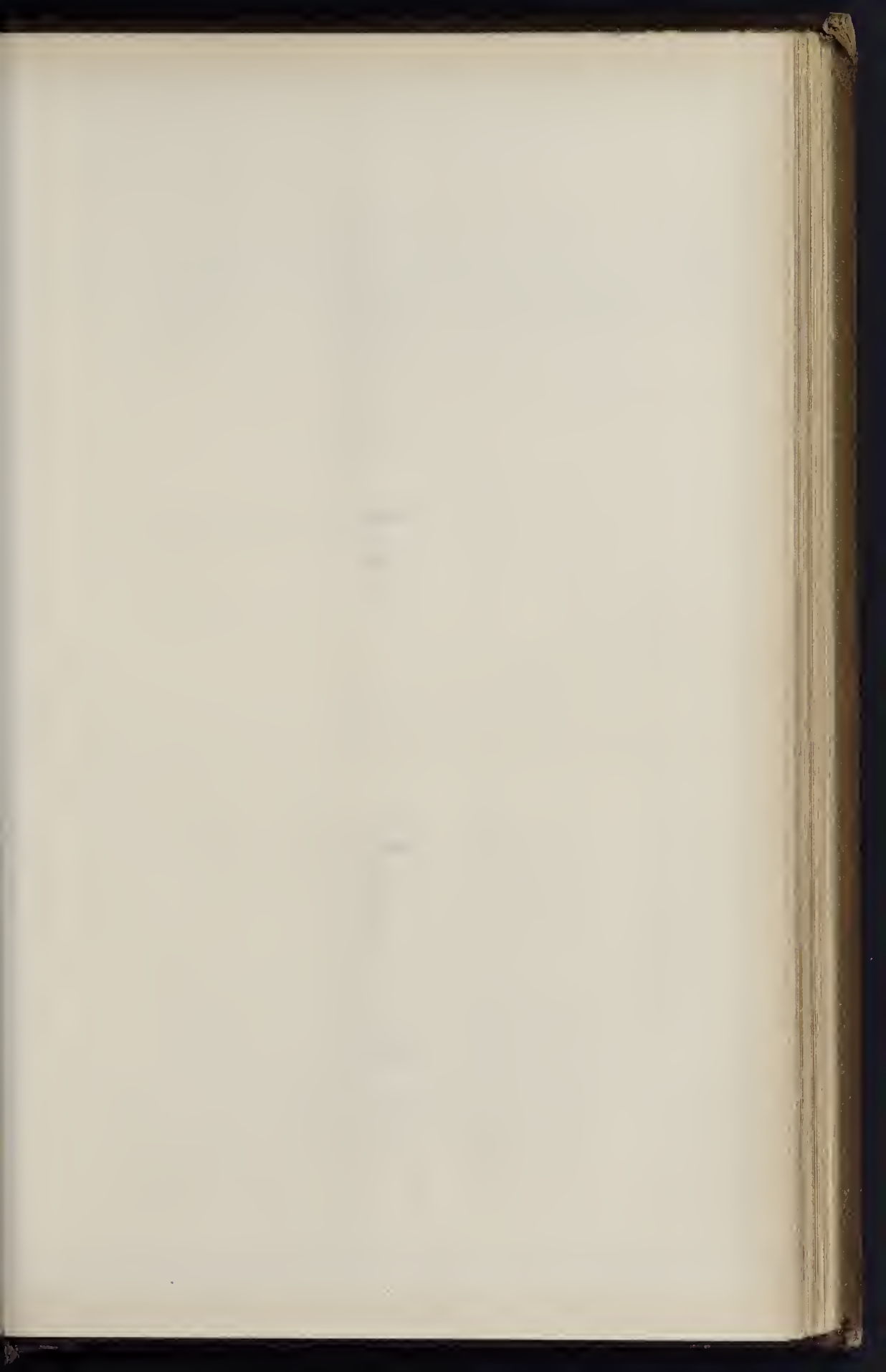
F. Bell, Glasgow, Litho. Co.

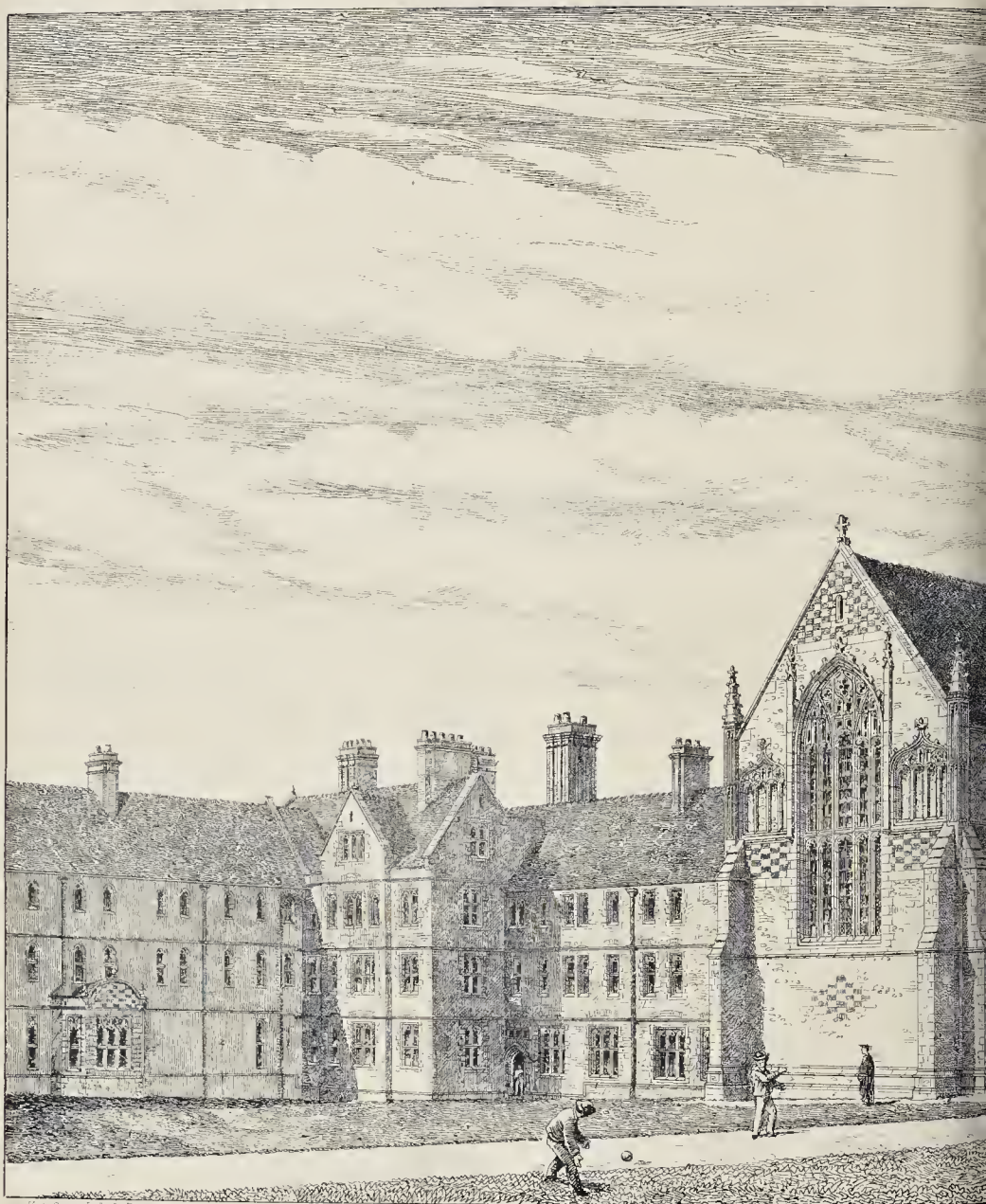




GROTESQUES AT NOTRE DAME, PARIS.

Drawn by Mr. REGINALD T. BLOMFIELD.





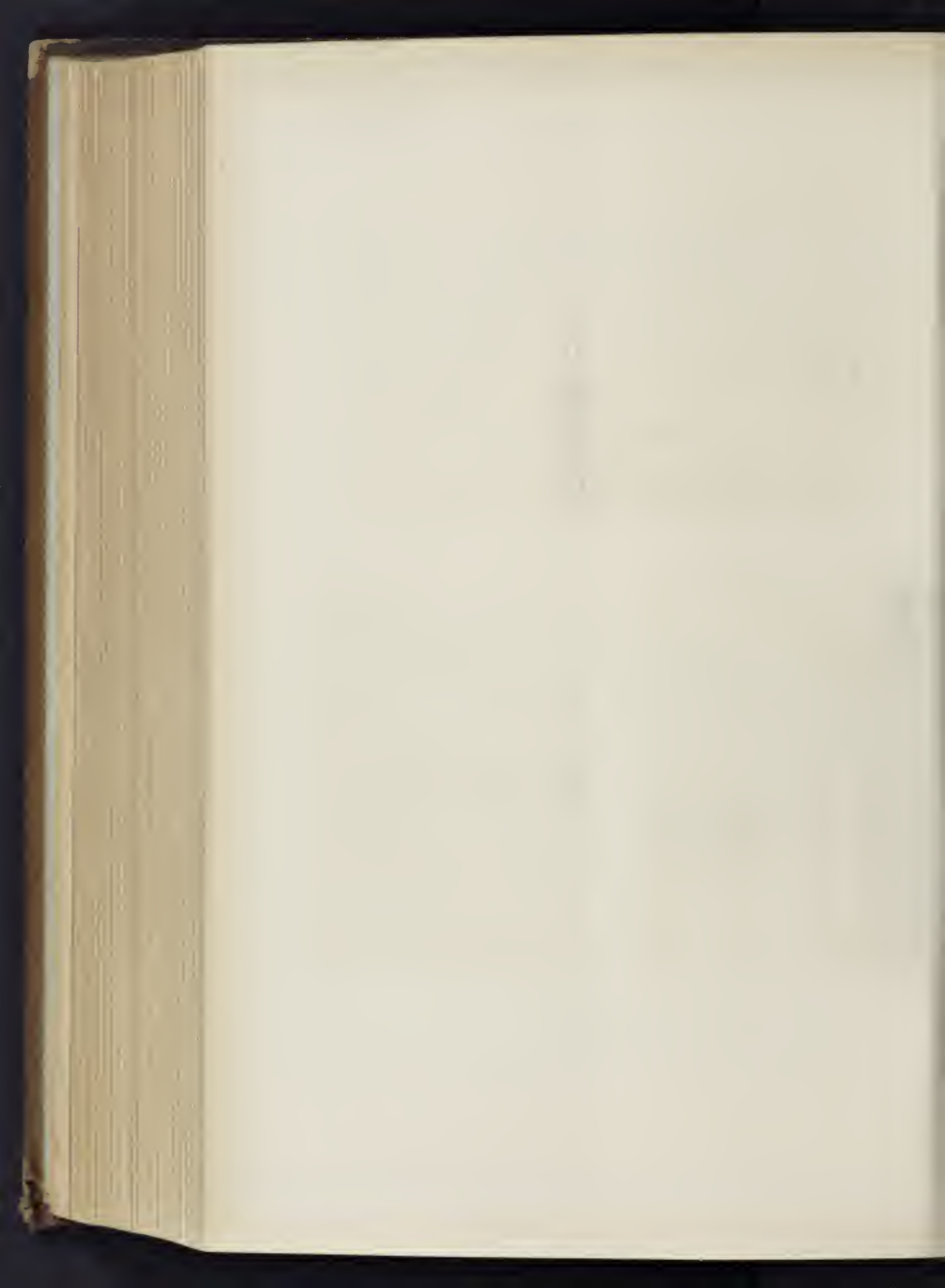
C. F. Ash Photo Lith & Printer

NEW BUILDINGS, BRIGHTON



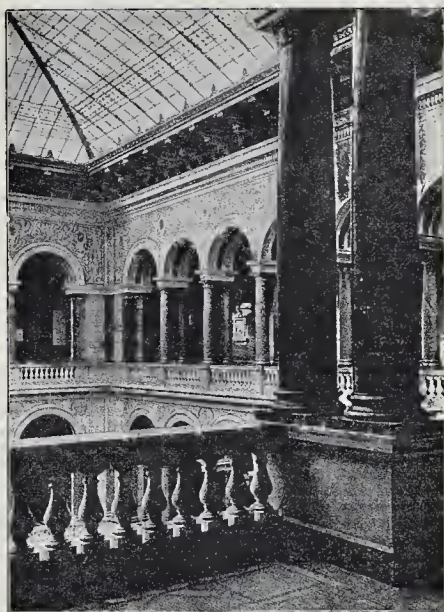
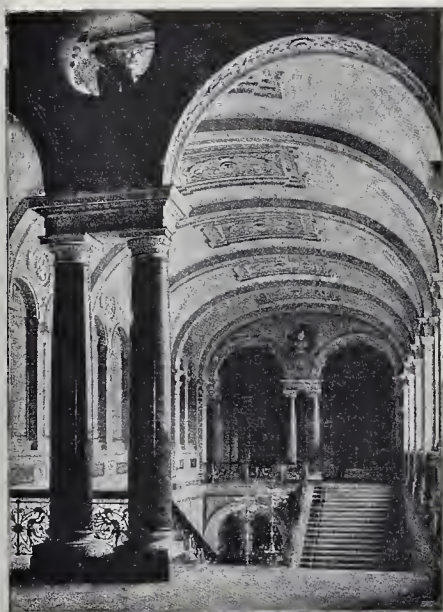
B. Castle St. Holborn London. E.C.

MR. T. G. JACKSON, ARCHITECT.





Polytechnic School, Charlottenburg: Portion of Exterior.



Polytechnic School, Charlottenburg: Views in Principal Staircase.

THE NEW POLYTECHNIC SCHOOL AT CHARLOTTENBURG, NEAR BERLIN.

The new home of the technical high-school Berlin, in the creation of which three prominent architects, Messrs. R. Lucae, F. Hitzig, and C. Raschdorff, were one after another engaged, was inaugurated in the early days of November last. Neither the lately-opened University of Strassburg, nor that of Vienna, can compare in impressiveness with the mighty building which the professors of technique have

erected in the German capital. It is quite the largest building in Berlin,—much greater in its dimensions than the palace,—and is erected on a part of the site, near the boundaries of the city, destined by Schinkel as that of the Charlottenburg-road racecourse. It lies, therefore, at the westernmost point of the Berlin Zoological Gardens.

Owing to the size of the building, as well as to its situation, no point is to be found from which the eye can grasp the façade as a whole. We print a small view which, taken from the left wing of the building itself, gives some idea

of its length. We give also a couple of illustrations of the interior.

Both the principal front and the interior are richly decorated with sculpture. Thus, in the centre block are life-size statues of Schlüter and Leonardo da Vinci, and at the sides those of Watt, Stevenson, Bramante, and Erwin von Steinbach. In the great hall of the central building stand the five busts of Gauss, Schinkel, Liebig, Eytelwein, and Redtenbacher, and round the attic are eighteen life-size figures which represent the building trades, as, for instance, the joiner, the mason, and the carpenter.

ARCHITECTURAL ASSOCIATION.
EXCURSION TO CRAWLEY.

CRAWLEY, in Sussex, was, last Saturday afternoon, May 30th, the scene of the ninth and last visit of this Association for the present year.

Crawley, which is thirty miles from London on the Brighton road, consists of one good wide street. According to Horsfield's "Sussex," it belonged, in the time of King John, to the Poyning's family, and from them passed to the Percys, of Northumberland. The church, which is dedicated to St. John, is of the Decorated Period, but was enlarged and restored in 1880 with a new aisle, and was re-opened July 1st that year, after enlargement, including the restoration of the chancel to its original length, giving accommodation for 140 additional sittings.

Buchan Hill Mansion, which was the chief object of the visit, is between two and three miles from Crawley on the Brighton road, and to this the members walked. The house is being built on the site of an old one now removed, for Mr. P. Saillard, of London, from designs by and under the superintendence of Messrs. Ernest George & Peto.

The works were commenced July 7th, 1882, when the original contract was entered into with Mr. Mark Manley, the builder, for 45,000*l.*, but it is estimated that the mansion will cost about 55,000*l.* when finished, exclusive of coach-houses and stables. The members were received by Mr. J. G. Farrow, clerk of the works, and Mr. M. Manley, the contractor, and first escorted by them round the building. Externally the walls are faced with Lawrence's Bracknell red bricks, with Ham Hill stone dressings. The facing bricks were all specially made by Messrs. Lawrence & Son 2½ in. thick. The same firm also supplied all the rubbers used here.

The roofs are mostly covered with Gloucester stone slabs, and a small portion with Yorkshire stone. Having viewed the exterior, the members entered a large forecourt, one side of which is bounded by a tall wrought-iron enclosure and gates, manufactured by Messrs. Ellis & Rice, who have also supplied all the iron locks and wrought-iron hinges throughout the house. The mansion is entered from a carriage porch, and a lobby leads into the hall, which is 40 ft. by 28 ft. The entrance porches and vestibules are paved with mosaic, by Burke & Co., the conservatory being also paved with mosaic, by the same firm. The steps of the principal entrance are mosaic, and the risers are of vein marble. The large hall is oak-panelled to about 9 ft. high, the upper part being faced with the local Baronsap stone; it occupies the height of the two stories. The corridors are also faced with oak dado, 9 ft. high, and local stone above. In the entrance-hall is a large hooded chimney (between lofty windows) of red Mansfield stone. The ceiling is hand-painted, by Mr. Malins, who has also executed all the hand-painted tiles in the bedrooms, &c. On one side of the hall are the drawing-room, morning-room, &c.

All the dados, doors, seats, &c., in the drawing-room are of solid rosewood, the two rosewood chimney-pieces in the same room being executed by Messrs. Christie. The morning-room is panelled with deal, 9 ft. high, painted ivory-white, the chimney-piece executed in carved deal to match. The ceiling of the dining-room is of oak, the carved beams being of solid oak, as likewise the dados and window-fittings. The tile hearths are by Messrs. Craven, Dunnill, & Co. The floors of all the principal rooms have oak flooring on 1-in. deal sub-flooring. Adjoining the offices, by the garden entrance, are a schoolroom, lavatory, &c.; also Mr. Saillard's private room, which is wainscoted in oak. The principal staircase is in the tower, and is entirely constructed of oak, the treads and risers are cut out of solid oak, with moulded nosings and moulded soffits; carved oak open panelling being used as halustrading. All the stained and tinted glass is by Messrs. Lavers, Barraud, & Westlake.

The kitchen is spacious and lofty, and has an open roof with domed lantern-light for ventilation. The offices, ranged round a kitchen court, are all lined with white glazed bricks. The basement contains extensive cellars, and here arrangements are planned for all chimneys being swept from below.

All the first-floor corridors have oak dados and doors, and the rooms have deal panelled dados and doors; the door brass furniture is by Farady & Co.

The lavatories and other sanitary fittings are

by G. Jennings, of Lambeth. There is a lift to the top of the house by R. Waygood & Co., of London. There are five bath-rooms fitted with porcelain baths from Paris. All the water-closet fittings are by Messrs. Doulton, who have also supplied the terra-cotta chimney-pieces to the bedrooms in the south-east wing. The whole of the plumbing work has been done by the contractor, under his foreman Mr. Parrett. Altogether there are about thirty-two bedrooms. The housemaids' sink and apparatus have been specially made by Messrs. Doulton. The tower above the main staircase has large water-tanks to supply the house. Mr. W. Chard has acted as general foreman to Mr. Manley, and Mr. A. Burton is foreman of masons; and Mr. Adams has officiated as time clerk. The stone carving has been executed by Mr. Christopher Smith and Mr. Walter Smith. Mr. Smith and Mr. Knox executed the modelling of ceilings.

The whole of the wood-carving throughout, of oak and otherwise, is by Mr. Knox. The electric bells are by Strode & Co. The heating-apparatus and all the stoves are supplied by Longdon. The house is to be lighted by gas and electric light, both by Messrs. Strode. The kitcheners and hot-plates are supplied by Messrs. Benham & Sons, London. The butler's pantry is fitted with a strong-room, by Milner. "Tohn's" system of ventilation is used throughout. The mortise and other locks, not mentioned, are by Milner. The paper-hangings have been mostly supplied by Messrs. Woollams and Messrs. Jeffrey. The iron casements are by Messrs. Pearce & Co. The mansion is to have a terrace to the garden front, which is now in course of construction. The stables and coach-house, &c., were erected by Mr. James Longley, builder, of Crawley, from designs by the same architects, and cost about 8,000*l.* They consist of stalls for twelve horses, and eight loose and sick boxes, with harness-rooms, lofts, &c. The fittings were made and supplied by Messrs. Musgrave & Co.

ARCHÆOLOGICAL SOCIETIES.

London and Middlesex Archæological Society. A general meeting will be held at Tallow Chandlers' Hall, Dowgate-hill, on Tuesday next, June 9th, at 1.30 precisely. Mr. Edwin Knight, Master, has consented to preside. A description of the hall, records, and other matters of interest connected with the history of the company, will be given by Mr. M. F. Monier-Williams, clerk. The meeting will subsequently adjourn to the Church of St. Lawrence, Jewry, where an account of the building and the interesting series of parochial records will be contributed by Mr. Louis Stokes. A visit will next be made to Guildhall, for the purpose of inspecting the library and museum; likewise the New Council Chamber, and other recent alterations, also the crypt, some observations upon which will be made by Mr. Alfred White, F.S.A.

St. Paul's Ecclesiastical Society.—This Saturday, June 6th, the members of this Society will visit Chaldon and Merstham. Papers will be read by Mr. J. G. Waller, F.S.A., on the Wall Painting at Chaldon; and by Major Heales, F.S.A., and Mr. W. Bolton.

British Archæological Association.—Under the presidency of the Duke of Norfolk, E.M., the forty-second annual congress of the British Archæological Association has been fixed to take place at Brighton on the 17th of August next, and following days to the 24th inclusive. By the kindness of the Mayor and Corporation of Brighton some of the principal rooms of the Royal Pavilion have been placed at the disposal of the association during the week's proceedings, and there will be excursions to Arundel, Chichester, Goodwood, Cowdray, Bognor, Boxgrove, Worthing, Bosham, Wiston, Steyning, Bramber Castle, Amherly Castle, Hollingbury Copse, and other places of interest in South Essex. There will be extra days arranged for the following week, and which will probably include excursions to Lewes, Seaford, East-honrne, for Hurstmonceaux Castle, Pevensey Castle, and Hastings; a visit, it is also expected, will be made from Newhaven to Dieppe, under the auspices of the Leland Club.

Oxford Archæological and Historical Society.—A deputation from this Society visited Guildford on the 30th ult. to inspect the places and objects of interest. They were met by the mayor (Mr. Conncillor Mason) and other gentlemen, and proceeded to the Town-hall and inspected the

corporation plate. A paper was read by Mr. D. M. Stevens at the Town-hall, and the party afterwards visited Archbishop Abbott's Hospital, St. Mary's Church, the Castle, and other places.

Somersetshire Archæological and Natural History Society.—The annual meeting will be held in August, at Weston-super-Mare, under the presidency of Mr. E. H. Llewellyn.

PORTLAND CEMENT.
SOCIETY OF ENGINEERS.

At a meeting of the Society of Engineers, held on Monday evening, June 1st, at the Town-hall, Caxton-street, Westminster, Mr. Charles Gandon, President, in the chair, a paper was read by Mr. Henry Faija, on "Portland Cement."

The author said that, though much had been written on the subject, little was generally known, and contradictory conditions were often specified. He considered that the weight test is of little or no value to the purchaser, though it has a use for the manufacturer.

Specifications should be as simple as possible, and the author advised the adoption of the ordinary quality of cement, obtaining the different strengths required by varying the proportion of sand or aggregate, in preference to specifying unusual qualities.

The only points which need to be tested are,—fineness, tensile strength, soundness. After defining the degree of fineness which he considered most desirable, having regard on the one hand to strength, and on the other to economy, the author treated in detail the subject of testing. Experience showed that cements which set rapidly attain their full strength in a few months, and have then a tendency to fall off, while a slow-setting cement continues to increase in strength for an indefinite period. The best practice is to test the briquettes at three days after moulding, and again at seven days. At the former period they should not break under 175 lb. strain, or at the latter under 350 lb.

The author exhibited and described a machine that he devised some years ago, and had successfully used since, for gauging cement; also a testing machine, specially arranged to give the most advantageous rate of speed in applying the pressure, which he found to be 100 lb. per 15 seconds.

It was by no means safe to assume that, because a cement bore the required tensile tests, it was necessarily sound, and some cements were long in showing unsoundness, or "blowing." Means were, therefore, described by which this quality could be ascertained at as early a period as possible, by being artificially developed in an apparatus designed for that purpose.

A form of specification, founded on experience in these several respects, was then given, and the paper concluded with some reference to the chemical tests for purity, introduced in German practice by Dr. Fresenius, and with the author's testimony to the freedom of English cements from the adulteration against which these tests were intended to guard.

MAGNETO-INDUCTOR AND BRIDGE FOR TESTING LIGHTNING CONDUCTORS.

As the efficiency of a lightning-conductor depends chiefly on its electrical resistance being low, a good conductor should not have more than 10 ohms from the apex of the rod to the earth-connection, inclusive of the resistance of the latter; and exceptionally good conductors have only one-half of this resistance.

A high resistance is due either to flaws and breaks in the conductor, or to a had and faulty earth-connection. Defects of this kind cause a conductor to become a positive danger to a building, because discharges of atmospheric electricity frequently find a path to earth through some part of the building itself, of less electrical resistance than that of the faulty conductor.

The testing of lightning-conductors from time to time is therefore of paramount importance, as it is only by this means that any increase in their electrical resistance can be ascertained. When the tests show that the resistance becomes greater, it is evident that there is a fault in some part of the conductor; this fault must be found at once and removed.

Messrs. Siemens Bros. & Co., of 12, Queen Anne's Gate, Westminster, have designed a testing apparatus which admits of its being manipulated by workmen of ordinary intelligence; in fact, the instrument itself and the connexions to be made with the conductor are of such a simple kind that no special electrical knowledge is required for the work.

A perspective view of the apparatus is shown in fig. 1. The galvanometer is represented as

ring of German silver wire (forming the A and B branches of a resistance bridge), a contact-lever, P, which can be moved over the ring and used as a battery-key; a small horizontal galvanometer, G, four terminals, b, b', f, and c, and R the comparison resistance of the bridge. A small key, K, is fixed to terminal l, and the resistance, R, is underneath the bridge-board. A leather bag at the side of the wooden case (see fig. 1) is for holding the double conductor



Fig. 1.

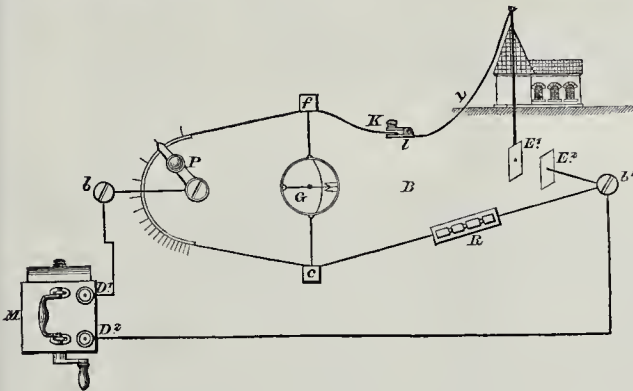


Fig. 2.

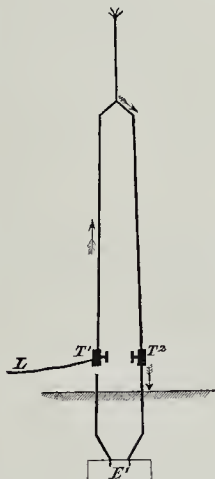


Fig. 3.

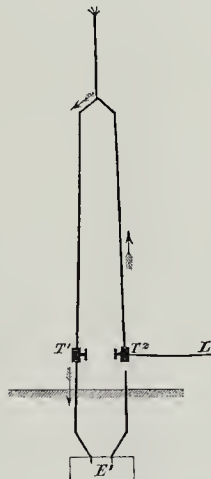


Fig. 4.

removed from the compartment provided for it in the bottom of the case containing the magneto-inductor, and is in connexion with the terminals of the latter. Fig. 2 is a general plan, showing the connexions between the inductor, bridge-board, two earth-connexions, and the lightning-rod. The apparatus consists of a magneto-inductor, M, enclosed in a wooden case, and a bridge-board, on which are fixed a

leading-wire, which is used for connecting the magneto-inductor terminals with the bridge-board. The weight of the complete apparatus is 9 lb., and the dimensions are about 6 in. by 6 in. by 9 in.

By means of this testing-instrument, the electrical resistance of lightning-conductors and earth-connexions can be measured, the range of the instrument being from 0.01 ohm

to 500 ohms. The measurement of a resistance is read off direct without the trouble of making any calculation.

The connexions for testing are made as follows:—

Terminal l (see fig. 2) is joined to the apex of the lightning-conductor by means of a length of leading-wire, which may be either bare or insulated.

Terminal b' is put to earth, that is, a connexion is made by means of a stout piece of copper wire between this terminal and a gas or water pipe, or, should these not be at hand, any metallic body in intimate contact with wet earth may be used in place of the pipes. When no such earth-connexion is available a special copper plate (E') must be employed and put underground at such a depth as will insure all parts of the plate being in good contact with moist earth.

Terminals b, b' are joined to D', D' of the inductor by means of the double-conductor leading-wire. The bridge-board must stand as far away from the inductor M as the leading-wire will permit, so that the galvanometer G may remain as much as possible out of range of the magnetic and inductive influence of the permanent magnets and revolving armature of the inductor.

After the galvanometer needle has been set free, the bridge-board must be so placed that the needle plays freely over the scale, and finally points to zero when at rest. All connexions must be firmly made, and the attachments of the earth wires to a water-pipe, gas-pipe, &c., should be well soldered.

The tests are taken by two persons; one at the inductor and the other at the bridge-board. Whilst the handle of the inductor is turned, the key, K, of the bridge-board is depressed with one hand, and the pointer, P, with the other. The current from the inductor then traverses the bridge, and a deflection of the galvanometer-needle is produced; the key, K, still held down, and the pointer, P, kept depressed and moved a little to the right and left, observing, at the same time, which of these movements causes a decrease of the deflection. As soon as this is ascertained the pointer is kept moving slowly around the German silver ring until a point is found which brings the galvanometer-needle back to zero. The figure over which the pointer, P, now rests gives in ohms the total electrical resistance of the lightning-conductor and its earth-connexion, leading-wire between the apex of conductor and terminal l, and earth-plate E'.

The resistance of the leading-wire and earth-plate E' is so low that it may be neglected; the tests, therefore, can be taken as showing the actual resistance of the lightning-conductor and its earth-connexion E'. A resistance of more than 20 ohms shows the conductor to be in such a state as to have become a positive danger to the building to which it is fixed.

At the time a lightning-conductor is erected one end of a length of copper wire should be firmly soldered to the apex of the conductor. This wire is carried down loosely by the side of the conductor, and remains permanently in position so as to be available for connexion with the testing-instrument whenever the entire length of the conductor has to be tested. By this means the trouble and expense of attaching a fresh leading wire for every test are avoided.

A fault in a lightning-conductor is usually due to a bad earth-connexion arising from partial or entire fracture of the conductor just above or below the ground-line. In some cases, the lower end of the conductor is in dry ground and in others the earth-plate is either too small or is oxidised and broken. The earth-connexion should, therefore, be tested first of all, and for this purpose a strong brass clamp with a terminal screw should be secured to the conductor just above the ground-line and well soldered. A separate short length of leading-wire is then used for connecting terminal l of the bridge-board with the terminal screw on the lightning-conductor.

Double rod conductors, as shown on figs. 3 and 4, of the same, or a greater sectional area, a single one, can be erected, and the testing of conductors of this kind is very readily carried out. The upper end of each rod is well soldered to a joint common to both rods, and at the base the two ends terminate just above the ground-line. To the earth-plate E' are soldered two rods, which terminate close to the upper ones, and are joined thereto by means of connexion-screws T' and T''. Either of these screws can

be connected to the testing instrument by a leading-wire.

To test such a twin-conductor one rod at T' (see fig. 3) is disconnected and joined to one end of the leading-wire, the other end being connected to terminal I of bridge-board (see fig. 2). The test is then made, as described in the case of single conductors, and the continuity of the right-hand rod tried. The left-hand rod is tested in the same way, after the connections have been made, as shown in fig. 4. In erecting a double conductor the two rods must be kept some distance apart throughout their entire length, and not touch any piece of metal forming part of the building, so as to obviate all risk of the two rods being short-circuited. After the tests have been taken, the connections must, of course, be re-made, so that the continuity of the rods is uninterrupted.

The testing of lightning-conductors should be carried out in dry weather, as better and more concordant results are obtained than in a damp state of the atmosphere, when buildings are covered with moisture.

There can be no doubt that a considerable number of lightning-rods, which are supposed to protect their buildings against destruction from lightning, are in a very unsatisfactory state with regard to electrical continuity, and many are doubtless rather a source of danger than a protection, as, while they attract discharges of atmospheric electricity they are unable to conduct the same harmlessly to the earth as they are supposed to do, and the building is therefore endangered. Lightning-rods can only be considered as safeguards if their electrical resistance is kept low, and in order to be sure of this it becomes necessary to have them tested from time to time.

CHEAP, IF NOT EXPEDITIOUS, BUILDING.

CORDERY V. BOTTING.

THIS was a case recently heard in the Windsor County Court before Judge Wigham. According to the report in the *Windsor and Eton Express*, from which we quote, the plaintiff claimed 300l. penalty under a building contract. Mr. G. H. Charsley appeared for the plaintiff, and Mr. C. F. Dean for the defendant.

The plaintiff, Jonathan Cordery, lives at Stoke Poges. Botting is a carpenter at Slough, and he entered into a contract on the 8th of July, 1884, to build three cottages at Stoke for the plaintiff. The amount was to be 217l., and it was agreed the work should be commenced from the date of the signing of the contract and completed within twelve weeks, the defendant to forfeit 2l. a week for every week they were unfinished after that date. It was further agreed that Mr. H. Sargeant, of Slough, should act as umpire, and that his decision should be final in case of dispute. The plaintiff now claimed 2l. a week for fifteen weeks during which the cottages were unfinished, and said that he had to get some one else to finish them.

Mr. Dean contended that this dispute ought to have been referred to Mr. Sargeant, in pursuance of the terms of the agreement; but his Honour thought that the question of penalty was separate and independent. He, however, asked Mr. Sargeant's opinion on the matter, and Mr. Sargeant thought the time allowed for the completion of the work was a reasonable one, but considering the low price at which the contract was undertaken, he did not think the full penalty ought to be exacted. He thought 300l. would have been a fairer estimate for the work.

Mr. Dean submitted that the damages, if any, should be put at the amount of the rent which the cottages would have produced if they had been completed at the proper time. The rent of each cottage was 3s. per week. That was 3s. a week for fifteen weeks, 45l. He contended that the penalty was reducible according to the actual damage. This contract, he said, had ruined Botting, and he was now offering his creditors half his weekly earnings to save the expenses of bankruptcy.

His Honour gave judgment for the plaintiff for 10l.

The Hotel Metropole.—It should have been mentioned, in the account of this building which we published last week, that the wrought-iron wine-hins and the cellar fittings, &c., were supplied by the well-known firm of Farrow & Jackson, of Great Tower-street, who, as will be known to many of our readers, have for a great many years given special attention to such details.—Messrs. R. S. Newall & Co., of the Strand, write to say that their system of copper-plate lightning conductors was adopted, and the work of fixing carried out, by them.

COMPENSATION CASE.

UNIVERSAL MARINE INSURANCE COMPANY V. THE CITY COMMISSIONERS OF SEWERS.

A HEAVY claim for compensation for City property came before Sir James Stanger, G.C., M.P., Recorder, and a special jury, at the Guildhall, on Monday last, the Universal Marine Insurance Company claiming from the Commissioners of Sewers of the City of London upwards of 50,000l. for freehold premises, Nos. 72 and 72A, Old Broad-street, of which they were the owners. Mr. E. Clarke, Q.C., M.P., and Mr. Bremner appeared for the claimants; and Mr. Webster, Q.C., and Mr. Rose-Innes represented the Commissioners.

The property was purchased by the Insurance Company in 1867 for 13,000l., with the intention of occupying it as offices, but it was let on lease at 250l. a year until 1884, and they could not obtain earlier possession. In the meantime they were compelled to move to other premises, and they placed their Broad-street property in the market and gave the Commissioners of Sewers intimation of the facts.

The witnesses called on behalf of the claimants were Mr. Perry St. Quintin, of the firm of St. Quintin & Son, auctioneers and surveyors, 37, Threadneedle-street, who estimated rental value of 2,000l., fixed the capital value at 45,000l., including 10 per cent. for compulsory sale; Mr. Bousfield, of the firm of Fox & Bousfield, who agreed as to the capitalised value, but placed the rental at 2,250l.; and Mr. Farmer, of the firm of Debenham, Tewson, Farmer, & Bridgewater, whose valuation was 47,500l.

The evidence on behalf of the Commissioners of Sewers was that of Mr. E. N. Clifton, architect and surveyor, East India-avenue, who put the value of the property at 33,000l., inclusive of 10 per cent.; Mr. C. J. Shoppee, who made it 33,900l.; and Mr. G. Barnes Williams, who considered it to be worth 35,500l.

The jury returned a verdict for 41,911l. 13s. 4d.

THE ARCHITECTURAL ASSOCIATION.

SIR,—The adjournment of the debate upon the question of doubling the amount of the subscription to the Association gives me the chance of writing what I meant to say had I been present at the meeting.

If the resolution he passed, I hope it may effect all the good its authors anticipate. If, however, the criterion he the greatest good to the greatest number, I fear that the contemplated change will diminish rather than extend the usefulness of the Association. Double the subscription, and you at once weed out of its ranks the poorer students, who must need study proportion in money matters, though they may rarely find it in the architectural designs they spend their days in tracing. That the honours of this useful society should be thus narrowed by the exclusion of the poorer students would be a matter for sincere regret; and the change would appear the more significant and regrettable coming at a time when, in another realm of art, the College of Music is opening wide its doors to the poorest lad or girl in the land who has musical genius. It is well, I think, that this side of the question should receive consideration even if great gains are expected from the proposed change in other ways.

If, indeed, the sum of 3000l. (which I understand is the amount it is hoped to raise by means of the increased annual subscription) be so necessary to the effectual working of the Association classes, why not get the Institute to make a yearly grant of this sum and leave the funds of the Institute as at present figured? The ample funds of the Institute are at present expended in guarding the rights and decencies of the profession; but this scarcely fulfils his Britannic Majesty's intention when he granted its charter expressly for the advancement of art. Here, then, is a way in which the Institute can advance the study of architecture, and, at the same time, do something to redeem its name from the deserved contempt of honest men.

And it seems to me the bondden duty of the Institute to help this school of young architects in some such practical way as I have indicated. Is it not written in the articles which bind the pupil to the service of the F.R.B.A. that the indulgent master shall allow the pupil "all reasonable facilities" for attending classes at the Architectural Association or other kindred institutions? Why, then, should not the Fellows of the Institute contribute (at least indirectly) to the maintenance of a needy educational society which gives to their pupils that knowledge of architecture which they themselves are continually paid a good round sum to teach?

JOHN D. SEDDING.

CURVES OF CONTRARY-FLEXURE.

SIR,—In an article in the *Builder* for May 30, p. 752, Mr. Cave Thomas describes what he is pleased to term "Curves of Contrary-Flexure," made by joining two arcs of circles or ellipses together. These, however, do not form the true curve of contrary-flexure as understood by mathematicians, in which the curvature gradually decreases, or the length of the radius of curvature increases as the point of flexure is approached, the length of the radius becoming infinite at the point of contrary-flexure. In my treatise on "Practical Geometry for the Architect, &c.," I have shown how such curves can be drawn, and applied to the purposes of architecture, as in forming the ogival arch or the mouldings called ogee. By using the true mathematical curve of contrary-flexure a more pleasing contour is obtained than in the attempt to imitate it, by putting together two parts of circles or ellipses, as in the former the change of curvature is gradual, while in the latter it is sudden and abrupt. E. WYNDHAM TARR.

ITALIAN SILVER-GRAY SLATES.

SIR,—Accident has made me acquainted with efforts which are being made by enterprising Englishmen to develop some of the industrial resources and the natural products of Italy. I think it may interest some of your readers to hear, in outline, an account of one such effort which came to my knowledge as a stranger travelling in this favoured country. I write, however, as a traveller only, and not as a man of business; and I may premise that I have no interest in the undertaking, though I heartily wish it success. In the interests alone of Italy, I think that what I propose to say should be more widely known than at present the matter would seem to be known in England; for there are those acquainted with the conditions of the slate trade who think, that the Italian importation will seriously affect the English slate market of the future.

Inland from, and far up in the hills above Chiavari, on the shores of the Eastern Riviera, are situated certain rich slate quarries now being worked by an English firm. The products are carted to that town, whence they are transferred to the small, but deep and safe, harbour of Santa Margherita, Liguria, some eighteen or twenty miles from Genoa, by means of local boats. The slates are shipped abroad from the last-named port, which is the centre of the slate trade of this part of Italy. Owing to vessels requiring ballast for England, on their return voyage from Mediterranean ports, the slates can be loaded at almost nominal rates of freight, viz., from 3s. to 4s. a ton to Cardiff, and from 10s. to 12s. a ton to Liverpool or London. The actual prices of the different sizes and thicknesses of the slates, it is impossible to give in brief; but this is of the less moment as I desire to direct attention in general terms, rather than with mercantile exactness to the subject matter of this letter. It may be said, however, that these Italian slates can be delivered in England at a cost some 20 per cent. cheaper than the price of similar slates of the best quality, at the quarries in Wales; whilst the cost of carriage from the quarries in Wales makes the difference in the percentage still greater. As to the respective qualities of the Welsh and Italian slates, I am unable to speak from knowledge, but this can be easily tested; and I gather on the spot that the Italian are, at the least, equally good with the Welsh slates, and in some particulars they are even superior. They certainly gained the first prize in the Turin Exhibition last year; but I know not if Wales competed at Turin. Any way, the following are some of the virtues of the Italian slates. They can be obtained, I am told, of far larger dimensions than the Welsh. They harden, until they become like stone; and, twenty-four hours after quarrying, they cannot be split, and can hardly be broken. Of a blue colour at first, they become, on exposure, a silvery-grey colour or white, and they turn to a uniform hue. They are non-conductors of heat and cold, and thus are specially suitable for roofing purposes, the houses for which they are used being cooler in summer and warmer in winter. Lastly, the cleavage of the slates is said to be nearly perfect, the percentage of breakage being far less than that of English slates; and in use their wear is very durable. Besides

being suitable for roofing purposes, smaller sizes make excellent slates for schools, and larger ones are widely employed as "black boards" for classes; and both these have already acquired a reputation in England. Slates are also cut for making chimney-pieces, tops of washing-stands and chests of drawers. For mural decoration, in a damp climate, they will (I imagine) prove of value for decorative purposes, when enamelled and painted; and for the heads of billiard-tables in one slab, dressers in kitchens, counters in certain shops, and other uses, they will be invaluable. They would also seem to be serviceable for railway stations, docks, warehouses, sheds, outhouses, and houses of a single story. I will only add, that the quarries above Chiavari are now being worked by Messrs. Bnh & Co., of Santa Margherita, Liguria; and that machinery for developing the resources of these quarries more speedily and effectively, which will be worked by steam power, is now on its way from England.

AN ENGLISH TRAVELLER IN ITALY.

THE PARAGON THEATRE, MILE END ROAD.

Sir,—In the description of the above in your issue of the 23rd ult. [p. 745] I see it stated that the whole of the decorative plastering was executed by the Framemakers and Gilders' Association. This is not correct, as, with the exception of the auditorium, the plastering was executed by me.

T. HIBBS.

150, Hertford-road, Dalston, N.

PROVINCIAL NEWS.

Newcastle.—The Newcastle-on-Tyne local newspapers record that at an adjourned meeting of their City Council, held on May 15th, it was reported to the council that the Justices of the City Lunatic Asylum at Cologde, near Newcastle; and that they had accepted the tender of Mr. Walter Scott, contractor, Newcastle, the amount being 22,041l. Mr. Arthur B. Plimmer, A.R.I.B.A., of Newcastle, is the architect for the work. The matter was referred to the finance committee of the corporation to consider the best means of procuring the funds for the execution of the work, and to report thereon to the council.

Loughborough.—The Loughborough Local Board have elected Mr. George Hodson, C.E., as their chairman. Mr. Hodson was formerly their Surveyor and Waterworks Manager.

Stoke-sub-Hamdon (Somersetshire).—A new post-office has been opened in this village. The new building, which has been erected from plans and specifications prepared by Mr. H. Hall, F.R.I.B.A., London, is of Ham Hill stone. The interior of the office is semi-octagonal in form. The windows are partially fitted with thick crystal glass, and impart a good light to the office. The floor is paved with encaustic tiles, which were laid by Messrs. Wehh & Co., Euston-road, London. The contractor was Mr. F. Fane, of Stoke.

Southport.—On Saturday last, May 30, the Mayores of Southport (Mrs. Pilkington) laid the memorial-stone of a new children's ward now in course of erection in connexion with the local infirmary and dispensary. The new building, which will be known as the Pilkington Ward, and which is being constructed by Messrs. Fairbridge & Hatch, of Birkdale, from the designs and under the superintendence of Messrs. Mellor & Sutton, architects, Southport, will accommodate nine cots, allowing each a cubical air space of about 1,045 ft. The cost of the building will be about 700l.

Exeter.—At a meeting of the Exeter Town Council, acting as the Urban Sanitary Authority, on the 27th ult., it was resolved to purchase premises in North-street, formerly known as the George Inn, at a cost of 2,700l. with a view to further carrying out the street-line which was some time ago adopted by the Council. It was also decided to offer Mr. Faulkner White the sum of 2,500l. for the Phenix Inn and adjoining property in Goldsmith-street. Upon the report of the City Surveyor (Mr. Donald Cameron) the Council decided upon the construction of a new sewer in the place of that now known as the Larkbeare Sewer, owing to the defective condition of the latter. The estimated cost of this undertaking is about 1,400l.

Standon.—The ceremony of placing the

memorial stone of the Farming Home for Waifs and Strays, now being built in the parish of Standon, Staffordshire, took place on the 27th ult. The institution is in connexion with the Church of England Central Society for Providing Homes for Waifs and Strays. This Staffordshire home owes almost everything to the generosity of Miss Anderson, sister-in-law of Mr. Thomas Salt, M.P. for Stafford. Miss Anderson has given the site and 2,000l. for the building, and 50 acres of land, about equally divided between arable and pasture, has been leased on easy terms from Mr. Salt. The intention is to train outcast boys in farm-work, and afterwards send them to the colonies. Accommodation will be provided for fifty boys. Mr. E. Hoole, 104, Russell-street, W.C., is the architect, and the building is being carried out by Mr. W. T. Moss, of Stafford.

Sandown (I.V.).—A new Oddfellows' Hall, erected by the "Loyal Culver" Lodge, M.U., has just been opened at Sandown Isle of Wight. Mr. S. G. Tomkins was the architect, and Mr. C. Bennett the builder.

Chelmsford.—The Chelmsford Board of Health, having recently purchased six acres of land for a new cemetery, have resolved to lay out half of it first, and to erect the necessary buildings, &c., at a cost of about 2,000l. from plans prepared by the Surveyor to the Board, Mr. C. Pertwee.

Blackburn.—Messrs. Neill & Sons, contractors, of Manchester, have just begun the work of erecting a new passenger station at Blackburn, for the Lancashire and Yorkshire Railway Company, who are spending 100,000l. on the station and the site, in addition to erecting a new bridge of 150 ft. span, and doubling the width of the railway for a distance of two miles.

CHURCH-BUILDING NEWS.

Edale.—On the 22nd ult. Lord Edward Cavendish, M.P., laid the foundation-stone of a new church at Edale, Derbyshire. The old Edale Chapel was originally erected in 1633, and was rebuilt in 1812. This had become too small and antiquated for the present requirements of the parish. The new building is to be Early English in style, and is to consist of nave, 54 ft. by 24 ft. 6 in. wide, with porch, chancel, and vestry, a tower and spire, 88 ft. in height, the lower part of the tower serving as the organ-chamber. The church will be fitted up with open benches, to accommodate 200 persons, and is being built of stone from the neighbouring quarries, with open-timber roofs of pitch pine. Mr. W. Dawes, of Manchester, is the architect, and the contract has been let to Mr. Thomas Beck, of Matlock Bridge, for 1,314l. Other works bring the total cost up to about 2,858l.

Gedding.—The parish church here has just been re-opened, after restoration under the supervision of Mr. Bisshopp, architect, Ipswich. A few months ago the nave was a melancholy ruin. The tiles had been mostly stripped off the roof, leaving the exposed timbers to decay. Mortar from the walls, and rubbish from the plastered ceiling, lay in heaps among the ancient low oak benches and the modern high lead pews. The roof, a good specimen of fourteenth-century work, is of oak, and every available bit of the old timber has been worked up in its restoration. It is covered with red tiles, ancient and modern, intermixed. The removal of the patchwork stucco from the outside walls disclosed excellent flint work on every face, with two Norman loopholes in the nave, and a curious lepers' grating in the chancel, which carry back the date of the foundation to the twelfth century. These have been glazed in the antique style, and the walls properly pointed, to display the original flint facing throughout. A new buttress on the north side of the nave, with new doors both north and south, complete the external renovation, and make the building structurally sound, dry, and warm, a result to which an open brick drain all round will contribute very materially in the future. Internally the walls have been smoothly refaced, and the stonework cleared of green mould and whitewash. The huge "three-decker" was of necessity removed, together with the large parlour pews that harried the poor from rich, choked up the nave, and greatly limited the accommodation. The floor is laid with solid wood blocks on a concrete bed, leaving a 4-ft. central passage paved with red tiles, flanked by white brick. The whole of the work has been carried out by Mr. Robert Tooley, contractor.

Nottingham.—St. Mary's Church has just been enriched by the completion of a reredos and chancel screen, the gift of Mr. T. Hill, J.P., in memory of his wife. The works are from designs by Messrs. Bodley & Garner, architects, Gray's Inn-square, London. The screen, which stands at the entrance to the chancel, is of English oak, and in the Perpendicular style. The work has been done by Messrs. Rattee & Kett, of Cambridge. The reredos is of wood, carved by Mr. McEnloche, of Kennington-road, London, and is entirely covered with gilding and colour, the work of Mr. Powell, of Lincoln. It is over 20 ft. high, and contains eleven pictures from the studio of Messrs. Burlison & Grylls, of Newman-street, London. The coverings for the altar have been worked by Mrs. Henry Gee, from the designs of the architects, and have been made up, along with the rich side hangings, under the supervision of Messrs. Watts & Co., London.

Wolverhampton.—St. Paul's Church, Wolverhampton, was re-opened on Whit Sunday, considerable alterations and improvements having been made to commemorate the fiftieth anniversary of its foundation. The old high-framed pews have been removed, and replaced with handsome open seats in pitch-pine, with panelled hench ends and moulded cappings. The wood flooring of seats and the stone paving of aisles, &c., have been taken up and re-laid with new. At the east end of the chancel is erected a reredos of Late Decorated design, in Painswick stone and Derbyshire alabaster, and on the north and south walls of the chancel are fixed the tablets of Commandments, Creed, and Lord's Prayer. The whole of the interior has been painted and re-decorated. The ventilation and lighting are re-arranged, and a new hot-water apparatus provided. The reredos, the re-seating, and other builder's works, were contracted for by Messrs. J. & W. Cockerill, and the painting and decorating by Mr. M. Tatlow, both of Wolverhampton. The hot-water apparatus was supplied by Messrs. Jones & Atwood, of Stourbridge. The cost of the renovation is about 1,400l., and the whole has been carried out from designs and under the superintendence of Mr. J. R. Veal, architect, of Wolverhampton.

Downe.—A new oak porch has been added to Downe Church, Kent, at a cost of about 100l., by Mr. Balding, builder, of Bromley, from the designs and under the superintendence of Mr. St. Pierre Harris, architect, of 1, Basinghall-street, London.

The Incorporated Church Building Society.—The report of this Society for the year 1884 shows that the number of applications received for grants from the general fund was 105. Of these, 93 were granted, namely—30 towards building additional churches, 10 towards rebuilding existing churches, and 53 towards enlarging or increasing accommodation in existing churches by extension of walls, rearrangement of seats, and other improvements. The number of applications received for grants from the Mission Buildings Fund was 33. Grants were voted towards 28 mission churches, temporary churches, school churches, or hamlet chapels. The population of the 93 parishes and districts assisted is 312,706; the number of churches existing therein is 95, to which will now be added 30. The present provision of church room is 31,566, of which there are seats for the free use of the parishioners 24,954. To this provision of church room sittings will be added for 21,475; while the addition to the seats for the free use of the parishioners is 20,381. The general summary of the operations of the Society since its formation in 1818 shows that the total number of applications for aid was 8,959. The grants made were 7,393, namely, in aid of the erection of 1,963 additional churches and chapels, and of building, enlarging, or otherwise improving the accommodation of 5,430 existing churches and chapels.

New Board School.—On Monday Mr. Benjamin S. Olding, a member of the School Board for London, presided at the ceremony of opening a new Board School in Scawfell-street, Great Cambridge-street, Haggerston, the centre of a densely-populated district. The new schools are built from designs by Mr. E. R. Robson, to accommodate 1,193 children, and a large number of local interests had to be bought up to procure the site, which, with legal expenses, cost 13,490l. The buildings cost 11,464l., being an expenditure of 9l. 12s. 3d. per head per scholar.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

Classification of Surfaces.

ANY surfaces belong to no category whatever; others to two or three categories at once.

In the same category are placed the surfaces which have one mode of generation in common; such are, for instance, right cones, right cylinders, and surfaces of revolution.

The following are some of the principal categories of surfaces to be dealt with:—

Ruled surfaces are all surfaces engendered by the motion of a straight line; they are divided in developable and skew surfaces.

Developable surfaces are those which can be spread out on a plane after being cut along a generator; such are, for instance, cones and cylinders. The series of tangents to a helix,—that is, the thread of a screw,—are contained in a developable surface; it is called the developable helicoid. It can be shown that the planes tangent to all developable surfaces are tangent along a generator just as in cylinders and cones.

Skew surfaces are not developable. The distinction lies therein that, in developable surfaces, two generators infinitely near are in the same plane, whereas in skew surfaces they are not.

The principal skew surfaces are:

The **hyperboloid** engendered by a straight line as generator hound to meet in its motion three fixed straight lines as directors not contained in the same plane.

The **paraboloid** is engendered as the hyperboloid with the only difference that the three directors are parallel to a given plane.

The **hyperboloid of revolution** is engendered by a straight line as generator revolving round an axis which is not in the same plane as itself.

Enveloping surfaces are engendered by the motion of a surface, such as S in fig. 93 called an enveloped surface.

If we consider two of these surfaces infinitely near to one another, we find an intersection, G; the surface is, therefore, formed by an infinite number of curves, G, as generators. In the case the enveloped surface is a sphere, the generator is a main circumference thereof. (See fig. 93.)

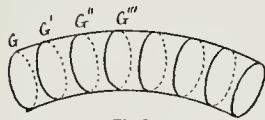
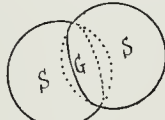


Fig. 93.

Surfaces of the second degree, so named because their algebraical representation involves equations of the second degree or quadratics, comprise the five following surfaces:—

1°. Ellipsoïds.

Let us make two ellipses a, b, c, d, and e, f, g, h, with their planes at right angles; if we

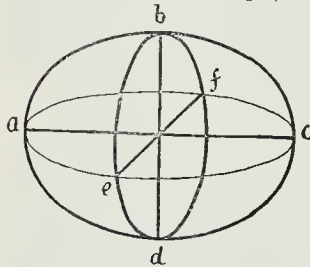


Fig. 94.

imagine a series of horizontal ellipses bound to have the extremities of their axes touching the

fixed ellipses drawn, an ellipsoïd will have been generated. (See fig. 94.)

2°. Hyperboloid of two sheets.

If we replace the two vertical directing ellipses by two hyperbolas, with their axes in common and their planes at right angles, the generating ellipses hound as before to have the extremities of their axes touching the directing hyperbola will generate the hyperboloid of two sheets. (See fig. 95.)

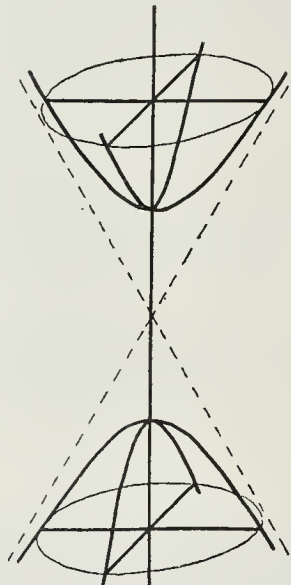


Fig. 95.

Note.—For persons unacquainted with conic sections we point out that an hyperbola is formed of two branches of infinite extent and of opposed directions.

3°. Hyperboloid of one sheet.

If, on the other hand, the directing hyperbolas have their axes parallel to that of the generating ellipses, we get the hyperboloid of one sheet. (See fig. 96.)

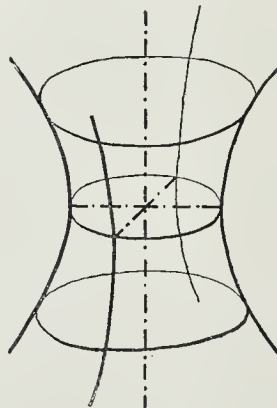


Fig. 96.

4°. Paraboloid.

If the two directing lines be parabolas with the same axis, and their planes at right angles, then the generating ellipses will produce the paraboloid. (See fig. 97.)

In the four surfaces above described, if the directing lines are equal, the generating ellipses becomes a circle, and the surfaces will be surfaces of revolution. The hyperboloid of one

sheet in this case can also be described by a right line revolving round an axis.

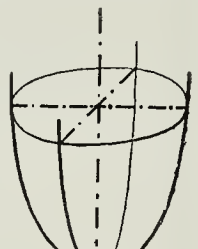


Fig. 97.

5°. Hyperbolic Paraboloid.

This surface is generated by two parabolas having their axes parallel and opposed in direction, their surfaces at right angles. One of the parabolas is fixed, the other moves along its outline with its plane always parallel. (See fig. 98.)

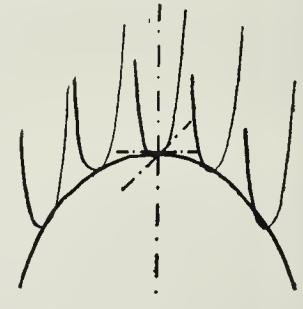


Fig. 98.

Of these surfaces, the second is never used for any practical purpose; the fourth is employed for reflecting mirrors. In building, the first surface has been employed for vaulting, but very rarely; the third and the fifth are the same as those we have called skew, and often occur in masonry.

Students who are not acquainted with conic sections may be puzzled by those definitions, but need not thereby be deterred from passing on to the practical applications, for they will find them quite within the grasp of any person accustomed to making working drawings.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,588. Locking Catch for Bolts, Window-fasteners, &c. J. Hummerston.

When the bolt is shot out it cannot be withdrawn until a small catch, actuated by a spring, be removed. The small bolt is inside, and independent of the main one, and by moving back the knob the small bolt is alone moved: this depresses the catch, and the knob then acting on the main bolt is able to withdraw it. In all cases the ordinary motion of the bolt or lever, although continuous, is in two parts, first removing the catch and then withdrawing the bolt or lever.

3,036. Chimney-pots. T. Anwyll.

The chimney-pot is formed with louvres and vertical radial partitions, arranged so as to form a number of equal flues. Currents of air striking against the louvres on one side are directed upwards, and are deflected laterally outward through the louvres by the partitions. This action is assisted by the closed top. The flues on the other side are meanwhile free for the egress of smoke.

3,927. Bench Hold-fast. W. Hayhurst.

The ordinary bent rod has a lever pivoted at its end. One end of the lever is provided with a hinged foot which presses on the work to be held, and the other with a cam or eccentric connected with a handle. The work is held or released by moving the handle.

14,482. Wood Planing Machine. J. Peirce.

In this machine the tables on each side of the cutter are on their lower surfaces provided with four inclined planes, which rest on four similar surfaces on a frame or slide. As the slide is movable by a

rew, the tables can be adjusted relatively to the extent so as to regulate the depth of cut. The knives blades of the cutter have two cutting edges, and are well bevelled off at the ends to fit into corresponding grooves in two collars, one of which is fixed on the spindle, the other is loose and held up by a nut. Each blade is also held by a screw passing through its centre into a boss on the spindle, and the cutter is driven by a pulley situated between the two collars above. The bearings of the spindle are lubricated by being connected with oil passages in the supports. These oil recesses are fitted with caps screwed on so that the oil is under pressure.

APPLICATIONS FOR LETTERS PATENT.

May 22.—G. 260, G. Barnard, Combination T. Square, Set Square, and Improved Clamp.—6,273, K. Boothroyd, Apparatus for Ventilating Sewers and Drains.—6,291, W. Taylor, Improvements in School Desks and Seats.—6,294, M. Shearer and J. Smith, Brick Pressing and Moulding Machine. May 23.—6,313, C. Clark and H. Coates, Apparatus for Lighting Gas by Electricity, applicable to the gas cutters. T. 15, Improved Improved Spindle for Door-knobs, and Method of Attaching Knob to same.—6,319, J. T. and S. Skinner, Bolts for Doors and other Fastenings.—6,326, B. Saunders, Safety Window Checks.—6,327, D. Rogers and D. Rogers, jun., Fire Grates for Domestic Purposes.—6,337, J. Harrower, an Improved Valve. May 26.—6,378, H. Buchan, Improvements in Water-closets.—6,407, T. Sutton, Portable Heating Apparatus.—6,412, H. Whiteley, Weather Guards, or Draught preventers for Doors and Casement Windows, also applicable for Preventing the Slamming of same.—6,421, J. Small, Improvement in Exhaling Apparatus.—6,422, H. Whiteley, Weather Indicators, or Weather-cocks.—6,439, J. Ellis, Improved Construction of Metal Rib for Bridge Floorings, Columns, and other Constructive purposes. May 27.—6,441, C. Foster, Improvements in Street Paving, and Manufacture of Blocks for same.—6,455, G. Haywood and G. Williams, Improvements in Ventilating Apparatus. May 28.—6,507, A. Fongadoiro, Improved Safety Door Bolt.—6,510, J. Johnson, Improvements in the Manufacture of Decorated Glass.

PROVISIONAL SPECIFICATIONS ACCEPTED.

3,754, D. Faulds, Improved Coupling or Joint for Pipes, &c.—4,269, W. J. & W. F. Rowe, Improvements in Waste preventing Cisterns.—4,520, R. Roberts, Apparatus for Opening Doors from the Inside.—4,939, T. Smith, Lighting Houses and other Structures by Electricity.—5,030, J. Simpson, Improvements in the Mechanism of Venetian Blinds.—5,060, H. Pearce, Opening and Closing Sashes, Fanlights, Skylights, &c.—5,278, B. Verity, Improved Warm-air Stove.—5,305, G. Maxstedt, Door Closing or Check Apparatus.—5,437, A. Link, Preventing the Formation of Ice and other Atmospheric Precipitations upon Windows.—5,555, J. Jones, Folding and Adjustable Bench or Seat.—5,556, A. Clark, Improvements in Window Frames and Sashes.—5,635, M. Wallace, Combined Ventilating and Flap-Valve or Ghimney Door for Kitchens, &c.—5,627, J. Woodward, Reversing the Latch Bolts of Locks and Latches that the same may be used either handed.—5,774, S. Booth, Water-slide Gas Chandeliers or Gas Fencings.—5,812, P. Brown, Improvements in Wire Fencing.—5,855, A. Clark, Machines for Sawing-off and Boring Wheel Felloes.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,564, E. Brown, Improvements in Spring Door Locks.—10,824, W. Burke, Machines for Cutting and Dressing Marble, Stone, &c.—11,549, W. Kent and J. Sutton, Improvements in Gasellers and Apparatus connected therewith.—13,033, L. Dattis, Improvements in Bakers' Ovens.—13,991, H. Fajia, Apparatus for Testing the Strength of Cement and other Substances.—14,611, J. Howard, Apparatus for Automatically Regulating the Closing of Doors, or for Preventing Noise or Slamming when closing.—4,801, R. Sayer, Improvements in Scavengers' Carts.—5,059, H. Haddon, Window Fastener or Stay.—5,112, J. Bonny, Connecting Fire Grates to the Flues of Chimneys.—10,876, J. Wilkinson, Improvements in Ball Castors.—19,412, F. West, Improved Adjustable Frame ascending and descending a Vertical Post, and specially applicable to Concrete Building.—15,816, A. Bickmore, Improvements in the Construction of Panelled Furniture, Doors, and similar Joinery.—5,193, H. Lake, Improvements in Sash-borders.—5,293, J. Adams, Semaphore Indicator for Electric Belts.

A New Temperance Hall for Kennington.—Mr. Arthur Pease, M.P., has promised to lay the foundation-stone of the new Temperance Mission Hall in Royal-road, Kennington Park, on this Saturday, June 6, at 4 p.m. Lady Brassey and Mrs. W. J. Armitage will also lay two tablet-stones on the same day. The architect of the building is Mr. Banister Fletcher.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

Table listing estate sales with columns for property description, agent, and price. Includes entries like 'Portman Estate—Improved ground-rent of 65l. 10s., term 10 years' and 'Bethnal-green—10 and 11, Parliament-street, 25 years, ground-rent 9l.'.

MEETINGS.

Table listing meetings with columns for date, organization, and time. Includes 'SATURDAY, JUNE 6' with 'Association of Public Sanitary Inspectors' and 'Monday, June 8' with 'Royal Institute of British Architects'.

Notes of Excavation and Discoveries in the Trenches of Boyam, on Bestrove, Island of Yell, Shetland, in 1833-35, &c.: By Mr. J. T. Irvine, F.S.A. Scot. 3 p.m.

London and Middlesex Archaeological Society.—General Meeting at Tallow Chandlers' Hall, 1.30 p.m. Birmingham Architectural Association.—Ordinary Meeting: Election of Officers. 7.30 p.m.

Society for the Encouragement of the Fine Arts.—Third conversation in the Galleries of the Institute of Painters in Water-Colour. 8 p.m. Society of Antiquaries.—8.30 p.m.

Miscellaneous.

Useful Timbers of New South Wales.—According to the Immigration Agent for New South Wales, that colony abounds in useful timber. He says that for constructive purposes in dockyards, piers, bridges, horse carpentry, coachmakers' and wheelwrights' work, railway building, fencing, and piles, nearly the whole of the Myrtaceae, of which New South Wales possesses something like fifty varieties, are extremely valuable, and certain of them incomparably so. For the uses of the cabinet-maker and the house decorator, the timber familiarly known as the black-apple, the Moreton Bay pine, the red cedar, coach-wood, Glarence light yellow wood, turnip-wood, rose-wood, Illawarra mountain-ash, tulip-wood, myrtle, cypress-pine, and others, is capable of being worked up into furniture and panelling, beautiful in grain, rich in colour, and susceptible of a high polish. The timber of the prickly-leaved tree (Melaleuca styphelioides) is said to be incapable of decay; that of the white tree (Melaleuca leucadendron) is said to be imperishable underground; that of the turpentine-tree (Syncarpia laurifolia) resists the attacks of the teredo navalis in salt water; and that of the brush-bastard or white box (Tristania conferta) has been known to preserve its soundness, when employed in building the ribs of a ship, for a period of thirty years. To the carver and wood-engraver the cork-wood (Duboisia myoporoides), the rose-wood (Diosydon Fraxinum), and the pittosporum (undulatum) commend themselves as a serviceable substitute for European box; while the cooper finds in the native ash (Elaeodora Australis), the silky oak (Grevillea robusta), the stave-wood (Tarricella actinodendron), the green and silver wattle (Acacia decurrens and Acacia dealbata), and the swamp-oak (Casuarina quadrivalvis) excellent material for staves. Other kinds of timber are specially adapted for oars, spokes and naves, tool-bundles, telegraph poles, and turners' work.

Continental School - Architecture.—Professor Vittanovich has recently contributed to the Politecnico di Milan some interesting details regarding the new elementary schools at Padua, built in 1880 by Signor Camillo Boito. He takes the opportunity of advocating the value of artistic excellence in the construction and furnishing of schools, maintaining that these points are of real importance as aids in education. This principle, it is remarked, has found acceptance in Switzerland, where school-architecture is regarded as being a subject of considerable moment, towns of 4,000 to 5,000 inhabitants spending on this object sums out of proportion to their geographical importance.

The Association of Public Sanitary Inspectors.—The second annual dinner of this Association will take place this Saturday, June 6th. The President, Mr. Edwin Chadwick, C.B., will preside. The following amongst other gentlemen have promised to attend, viz.—Earl Fortescue, Dr. Alfred Garperter, Dr. B. W. Richardson, F.R.S., Mr. James Seal, Mr. C. T. Kingzett, Mr. E. J. Watherston, and Mr. E. C. Robins.

Steel Cooking Utensils.—These, which are made of steel, and coated with pure tin, by Messrs. Perkins & Son, are said to be especially "sanitary" in character, and are in use, we understand, at the National School of Cookery. They obtained a medal at the Health Exhibition.

Society of Arts.—The Council of the Society of Arts have (with the approval of the President, H.R.H. the Prince of Wales) awarded the Albert Medal to Mr. Henry Doulton, "in recognition of the impulse given by him to artistic pottery in this country."

Wood Mantel-pieces.—Messrs. G. Hindley & Sons, of Oxford-street, send us an illustrated catalogue of their work in this class, showing a considerable variety of suitable and apparently by no means costly designs.

"The Future of the Working Classes."

This was the title of a paper read at the recent Co-Operative Congress at Manchester, by Mr. E. O. Greening, of London. In the course of it he said:—"We say to a capitalist employer who earnestly desires to raise his workers, 'Copy the example of Godin of Guisay; make your hired labourers into members of a co-operative republic of which you can become the proud and happy first president.' All competitive industry has been confessedly almost profitless for several years past; yet our established co-operative workshops have been steadily showing an average profit upon the capital they employ of nearly 20 per cent. per annum. The future of the worker, we believe, will be to work in societies which will practically be free states, of which they will be the citizens, owning their shares in the common property, voting for the Parliaments which will govern, and receiving a due proportion of the common results. These labour associations will be linked together in productive federations as our stores are linked together in distributive federations, and we hope that one common union will bind all to work together in reasonable harmony. How easily truly enlightened employers may convert their workshops into such social republics, and with what blessed results to themselves and all concerned, may be seen from the examples of Leclaire at Paris and Godin at Guisay. The summary of the results at Guisay of five years' working reads like a romance. Yet it is social reality. If co-operators, trade unionists, and enlightened employers agree to will the social emancipation of the worker, the great work can be accomplished in our own time and the wasteful strife between employer and employed ended like a dream upon awakening. The prospect even now is full of hope and encouragement." Mr. Odgers (Manchester), Mr. Dockery (Leeds), and Mr. Miller (Glasgow) criticised the paper; Mr. Dockery stating that the future of the working classes would be what they choose to make it.

An Electrical Railway for San Francisco.—There will shortly be in operation in San Francisco an electrical railway, running from the Southern Pacific Depot to the Union Ironworks at the Protrero. Experiments in this direction have been made for some time past by the Pacific Coast Electric Construction Company, which is now constructing the line. The road is similar to the San Francisco cable road, only instead of a cable underneath the track, there will be a negative and a positive wire. These, when brought together by the grip of the dummy, will complete the circuit and provide the motive power. When the car stops, the wires will be released; thus the power necessary to drive the car will be saved while it is at rest. The generating machines are also so arranged that, as soon as a car stops, they will cease to generate the amount of electricity to propel the car. Should the line become blocked from any cause, great saving will result. There is said to be no limit to the pace at which cars can be run by electricity, and experiments on the electric roads at present existing show that to propel a car conveying forty-four passengers costs only from 2d. to 2½d. for each mile run. It is stated that, should the experimental line prove a success, electricity as a motive power will be adopted on many of the tramways of San Francisco.—*Iron.*

Memorial to the Late Sir Henry Moncreiff.—A memorial mural tablet, erected by the congregation of Free St. Cuthbert's Church, Edinburgh, to the late Sir Henry Moncreiff, in the vestibule of the church, was unveiled by the Rev. Principal Brown, Moderator of the Free Church Assembly, on Saturday last. The tablet, which faces the front door, measures 5 ft. by 3 ft., and is of plain Sicilian marble. The design is Gothic. In an indented circle in the centre of the tablet a bust of stately marble by Mr. Hippolyte J. Blanc, architect, the Sicilian marble work was executed by Messrs. Johnston & Davidson, architectural sculptors; and the bust, which is a copy of one which stood in the Academy last session, was entrusted to Mr. John Hutchison, R.S.A., the general design being by Mr. Blanc. The total cost of the monument was about 100l.

Hospitals Association.—We are asked to mention that Mr. J. L. Clifford-Smith has resigned the office of Hon. Secretary of this Association.

More Archaeological Discoveries at Roche Abbey.

The explorations of the ruins of Roche Abbey, which form part of the Scarborough estate, are still being pursued. The unearthing of a large quantity of pieces of coloured glass, supposed to have been parts of the large chancel window, has already been recorded. These pieces, together with a white glass cross, have been made into a window 3 ft. by 18 in. The cross forms the centre of the window, and is approached by a number of small steps formed in glass. The border is made of various colours, and is of irregular pattern. This was executed by a York firm, under the direction of the Hon. W. T. Orde-Powlett, who also takes great interest in the explorations. At the beginning of the present year he presented the window to Lady Scarborough, and it has since been fixed in the lobby of the chapel at Sandbeck. Through the advice of Mr. W. St. John Hope, of Derby, who visited the abbey at Easter, the base of the dining-room of the monastery has been discovered. This was found only a few inches below the surface adjoining the chapter-house. Several parts of the interior in both the north and the south chapels have been restored. Outside the east of the church two more layers of sarcophagi have been found, and it is proposed to further excavate the north corner of the ruins. Three of the large columns of the nave are exposed to view, and altogether the explorations are of a highly interesting character.—*Leeds Mercury, May 30.*

Proposed Indo-China Railway.—On the 27th ult. an address was delivered by Mr. Holt S. Hallett, to the Glasgow Chamber of Commerce, upon "Railway Extension to South-West China." After describing the country through which the railway would pass, Mr. Hallett proceeded:—"The length of the railway from Bangkok to Kiang-Hsen, allowing fully for the necessary windings and turnings through the passes, would not be more than 510 miles. The cost of its construction on the metre-gauge, including rolling stock, &c., could not exceed \$4,000,000. The branch line, which will join the main line at Raheng, will be about 160 miles long, half of the distance being in British territory, and the other half in Siam proper. The cost of the branch will not be more than 2,000,000 sterling, one half of which would have to be guaranteed by the British Government, and the other half by the Siamese. Before leaving Bangkok I was assured by our Minister, Mr. Ernest Satow, that the construction of the railway wholly depended upon our Government, for he felt certain that if our Government would consent to guarantee the construction of the portion of the branch line from Maulmain to our frontier, the King of

Siam would have the main line completed as far as Raheng, as well as the portion of the branch line connecting it with our frontier. The section from Raheng to Kiang-Hsen could be put in hand after the completion of the two lines which would form its base, and connect it with the seaports of Maulmain and Bangkok."

Fire at a Builder's.—During a great part of Sunday last a large contingent of the Metropolitan Fire Brigade was engaged in endeavouring to subdue a very serious fire which broke out between eight and nine o'clock in the morning at the Crown Works, South Lambeth-road. The premises, occupied by Messrs. Higgs & Hill, builders, adjoined the Crown Swimming Baths in Kennington Oval, and comprised, amongst several timber-sheds used as stores, many large stacks of timber. The following is the official report:—"Called to Crown Works, South Lambeth-road, S.W., to the premises of Messrs. Higgs & Hill, builders; cause unknown; contents and building insured in the North British and Mercantile, Commercial, Union, Royal, Westminster, Phoenix, and others; damage,—several stacks of timber and building material, covering an area of about 130 ft. by 130 ft., severely damaged by fire and water; and two timber-shed buildings used as store, one about 115 ft. by 12 ft. and the other about 55 ft. by 10 ft., and contents completely burnt out and fallen down."

Essex-street Chapel, Strand.—It is stated that Essex-street Chapel, the metropolitan headquarters of the Unitarian body, is to be converted into "Essex Hall," at a cost of 22,300l. Sir J. C. Lawrence, Alderman W. Lawrence, and Mr. Edwin Lawrence, have contributed 6,000l. of the amount required. The building will be used in the same manner as the Memorial Hall is used by the Congregationalists.

A Church Burned Down.—St. Paul's Church, an ivy-clad structure, situated on a hill in the picturesque neighbourhood of Woodford Bridge, Essex, was on Monday totally destroyed by fire. No cause is assigned for the calamity, which seems to have originated in the Gallery.

Pinxton.—On Whit Monday two memorial-stones of a new Sunday school in connexion with the United Methodist Free Church were laid. The estimated cost of the building is 300l. The contractor for the brickwork is Mr. G. Goodall, of Pinxton, and for the woodwork the contract has been let to Mr. R. Dennis.

Macclesfield.—Another three-light window, by Mayer & Co., of Munich, has just been erected in Prestbury parish church, Macclesfield. It represents the Good Samaritan, and is the third already executed by the same firm for this church.

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.					
Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.	
Dwellings for Labouring Classes	Liverpool Corporation	50l. and 25l.	August 1st	ii.	
CONTRACTS.					
Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.	
Disinfecting Station	Chelsea Vestry	G. R. Strachan	June 9th	xiii.	
Erection of a Wooden Building	Church Congress Missn	G. Rake	June 10th	xiv.	
Painting and Whitewashing	Met. Asylums Board	Official	do.	ii.	
Painting	War Department	do.	do.	ii.	
Granite and Gravel	St. Olave's Union	H. Saxon Snell & Son	June 11th	ii.	
Ornamental Fence to Sea-Wall	Hendon Union R.S.A.	do.	do.	ii.	
Cleaning, Painting, Works, and Repairs	Home Commissioners	do.	do.	ii.	
Addition to Urinal, Lochbury	Met. Asylums Board	do.	June 12th	ii.	
Artisan Dwellings, Dover	Commissioners of Sewers	do.	do.	ii.	
Alterations and Additions to Premises, Wella	Wilts and Dorset	Street & Scholefield	June 13th	xiv.	
Somerset	Banking Co. Lim.	G. M. Silley	do.	xiii.	
Three Cottages, Peckham Rye	R. Martin	do.	June 15th	xiv.	
Wrought-Iron Fencing, &c.	London Local Board	T. De Courey Meade	do.	xiii.	
Asphalt Pavement	Paddington Vestry	Official	do.	ii.	
Boilers	Brentford Union	E. Monson, jun.	June 16th	xv.	
New Passenger Station, Bishop Auckland	North Eastern Railway	W. Bell	June 17th	ii.	
Well-Pumps, and Additions to Tank	West Ham Union	Official	do.	ii.	
Infirmary, Aberystwith	Trustees	Official	do.	xiv.	
Erection of Lull Shed, &c.	Admiralty	Official	June 18th	ii.	
Granite, Kentish Rag, &c.	Folkestone Corporation	A. W. Conquest	June 20th	ii.	
Furniture and Fittings	London School Board	Official	do.	ii.	
Cast-Iron Socket, &c., Pipes	East Cowes Local Bd.	Official	June 22nd	ii.	
Shelter Roof	Met. Asylums Board	A. & C. Harston	do.	ii.	
Erection of Shops	Met. Asylums Board	E. Monson, jun.	June 23rd	do.	
Engineer's Tools	Lewisham Union	Official	do.	xiv.	
Enlarging Newport (Mon.) Post-office	Com. of H.M. Works	Official	June 24th	xiv.	
Making-up Roads	Finchley Local Board	do.	June 26th	ii.	
Floating Swimming-Bath	do.	do.	June 27th	xiii.	
Sunday-School Buildings, Northampton	Reading Corporation	A. W. Parry	June 30th	xiv.	
		S. J. Newman	Not stated	ii.	

TENDERS.

For mansion, stabling, &c., at Trosley Towers, Wrotham, for Sir Sydney Waterlow, bart., M.P. Mr. E. R. Robson, F.S.A., architect—

Table with 4 columns: Name, Building, Add for Red Bricks, Add for Chimneys. Includes entries for Holland & Henzen, Pannett & Sons, E. Conder, Higgs & Hill, G. Shaw, T. Boyer, H. Lovatt, Wall Bros., Mansfield & Sons, Lawrence & Sons, W. Oldrey, Shephard.

For new cattle-market at Nottingham, for the Corporation. Mr. Arthur Brown, Assoc. M. Inst. C.E., Borough Engineer—

Table with 2 columns: Name, Amount. Includes entries for Contract No. 1: Abutments, Approaches to Bridge, General Formation, and General Laying of Market.

Contract No. 2: Entrance Lodges, Offices, and Refreshment Rooms, Unloading Platform, Cattle-locks, Pig-sheds, Cattle-lairs, &c.

Table with 2 columns: Name, Amount. Includes entries for F. W. Parbury, J. Hutchinson, Hodson & Sons, Foster & Barry, E. Hind, H. Vickers, J. J. Adams, E. B. Vickers & Sons, Bott & Wright, Wheatley & Maule, T. Guy.

Contract No. 3: Framework to Bridge, Rafts, Pens, Stalls, Railings, Hardie, &c.

Table with 2 columns: Name, Amount. Includes entries for Handyside & Co., White & Son, E. B. Vickers & Sons, T. Marshall & Co., G. R. Cowen & Co., Butterley Co., J. T. Hildesley, Goddard & Massey, Abbott & Co., G. Fletcher, Newton Chambers & Co., E. C. & J. Keay, Brooke & Co., Haynes & Co.

[The amount of the three accepted tenders is 22,688. The Borough Engineer's estimate was 25,425.]

For intercepting sewer, penstocks, ventilating-shaft, &c., at Brighton and Hove—

Table with 2 columns: Name, Amount. Includes entries for Hudson, Lockyer, Cheeseman, Bottery, Harrison, Brooker, Peters, Longley.

For the erection of a Board School at Clive Vale, Hastings, including boundary-walls, desks, and all other fittings, for the infants, for the Hastings School Board. Quantities by the architects, Messrs. Elworthy & Son, St. Leonard's-on-Sea—

Table with 2 columns: Name, Amount. Includes entries for D. C. Jones, Tanner, Phillips Bros., Jenkins, St. Leonard's, Bridgeland, St. Leonard's, C. E. & H. Harman, Eldridge & Cruttenden, Snow, Cosens, Hedges, Eldridge & Son, H. Cruttenden, Roddy, St. Leonard's, Timewell, T. Taylor, Small, Cooper.

For alterations to Thornycroft, Christchurch-road, Bournemouth. Mr. H. Hardwicke Langston, architect, Great Jones-street, Bedford-row, London E.C. C. A. D. George, 2233 0 0 A. H. Stroud (accepted) 200 0

Accepted for repairs to walls of nave, and new roof to nave of the Church of St. Andrew, at Althorne, Essex. Mr. H. Hardwicke Langston, architect. First contract—C. Read 4337 10 0

Accepted for improvements and alterations to the chancel of the Church of St. Andrew, at Althorne, Essex. C. Read 2346 10 0

For repairs to Sixty Villas, Upton Park, Essex. Mr. H. Hardwicke Langston, architect—W. Jones 2100 14 6

Accepted for memorial stained-glass east window, in chancel of St. Andrew's Church, at Compton Dundon, Somerset. Mr. H. Hardwicke Langston, architect—G. W. Luxford 2100 0 0

For the erection of the Sailors' Home, adjoining the Custom-house, Gravesend, for the Directors of the Sailors' Home, Well-street and Dock-street, London. Mr. John Hudson, architect, 80, Leman-street, E. Quantities by Messrs. Franklin & Andrews 27,044 0 0

Table with 2 columns: Name, Amount. Includes entries for G. E. Weston, W. H. Archer, T. Blake, Gravesend, T. Little, Hillesham, W. Tufte, Gravesend, S. Belham & Co., Buckingham, Palace-road, Staines & Son, Woolsea-square, Grooms, Rowland & Co., 17, Finsbury-pavement, Dove Bros., Islington, A. Doughty, J. Southwark Bridge-road, J. H. Tarrant & Son, Sayer-street, New Kent-road, J. A. Wood, Stroud-green, N., Kirk & Randall, Woolwich, J. Bentley, Waltham Abbey, Essex, Council Bros., Bethnal-green, E. Procter, Woodstock, G. Parker, 124, Summer-rd, Peckham, B. C. Howell, Palace-road, Lambeth, Priestley & Curry, Hammersmith, J. & H. Cocha, Mile End-road, N., Kirk Bros., Adelstone, Surrey, W. Nightingale, Gravesend, 5,370 10 0

For section 1 of alterations and additions to Headquarters of the First Sussex Artillery Volunteers, Brighton. Mr. W. Purdie, architect, Brighton Reynolds, jun. 4339 15 0 Longley 374 0 0 Cheesman & Co. 365 0 0 Newham 348 0 0 Cox & Sons 349 0 0 Carpenter 325 0 0 Wright (accepted) 314 0 0 [Architect's estimate, 363 0 0]

For making-up Mount View-road, Strand-green, for the Horsely Local Board. Mr. T. de Courcy Meade, engineer and surveyor. E. Heard, Hoxton 21,800 0 0 Marshall, Brighton 1,796 0 0 F. A. Jackson & Sons, Stroud-green 1,465 0 0 Aspinall & Sons, Hoxton 1,460 0 0 Dunmore, Crouch End 1,433 0 0 Williamson, Green Lanes, N. 1,374 0 0 Adams, Moorgate-street, 1,359 14 11 E. Zizzy, Wood-green, 1,300 0 0 Mowlem & Co., Westminster 1,295 0 0 Nicholls, Wood-green, 1,283 0 0 Alf. Walker, Upper Holloway 1,127 3 0 * Accepted.

For alterations to the Nell Gwynne, King's-road, Chelsea, for Mr. W. Purdie, architect, H. I. Newton, architect, Queen Anne's gate, Westminster—Gibbs & Flett 2,355 0 0 Steel Bros., Victoria Works, Dalston 285 0 0 * Accepted.

For the Puncheon Memorial Wesleyan Chapel, Bournemouth. Mr. Robt. Curwen, architect. Quantities by Mr. J. S. Alder—

Table with 2 columns: Name, Amount. Includes entries for Lawson & Donkin, J. McWilliam & Son, G. Perkins, H. W. Jenkins & Son, Newton Chambers & Co., S. Minny (accepted), [All of Bournemouth], For Building the whole, Edward Smith, C. A. D. George, S. Minny (error), Lawson & Donkin, Geo. James, Hyatt Gosden & Co., Wm. White, G. Bevan, J. McWilliam & Son, D. C. Jones & Co., Lucas & Cosser, Hoare Bros. & Walden, H. W. Jenkins & Sons, Harris & Wardrop, John Crook, E. Abley & Co., E. C. Howell & Son.

For the construction of gas-works at the Schools and Workhouse at Mitcham, for the Guardians of the Poor of the Holborn Union. Messrs. H. Saxen Snel & Son, architects, 22, Southampton-buildings, London, W.C.—J. & F. May 25,827 0 0 Willey & Co. 5,379 0 0 J. T. B. Foster & Co. 5,129 6 0 S. Cutler & Son 4,965 0 0 W. J. Fraser & Co. 4,978 0 0 T. Pigott & Co. 4,750 0 0 R. Dempster & Co., architect, Salisbury 4,530 0 0 W. C. Holmet & Co. 4,400 0 0 East Surrey Ironworks Co. 4,125 0 0 Ashmore, Benson, Pease, & Co. 4,049 0 0 R. J. Dempster 3,100 0 0

For alterations and additions to Highfield, Fording-bridge, Hants; for the executors of the late Mr. J. R. Neave, Mr. Fred. Bath, architect, Salisbury—Gilbert Harris, Salisbury 22,435 0 0 W. J. & C. S. Young, Salisbury 2,325 0 0 * Accepted.

For house and end shop, in Beresford-square, Woolwich, for Mr. G. Lawrence. Mr. H. H. Church, architect, Willem-street, Woolwich—Cecil Wood & Sons 2,805 0 0 Brown, Plumstead 855 0 0 Coombs, Plumstead 850 0 0 Fenn, Woolwich 850 0 0 Procter, Woolwich 740 0 0 Lonergan Bros., Plumstead 683 0 0 Walker, Limehouse 658 0 0

For sundry works at Brown's Wharf, Poplar; building examination-rooms for patients, erecting high fences and gates, altering pavings, laying on gas and water services, &c., for the Managers of the Metropolitan Asylums District. Messrs. A. & C. Harston, architects, 15, Leaden-hall-street. Quantities not supplied—Ward & Lambie 2,595 0 0 S. Chafetz 650 0 0 J. Holland 527 0 0 G. Lima 511 0 0 J. H. Johnson 498 0 0 E. Procter, Wellington-street, Woolwich (accepted) 380 0 0

For three houses in Newman-street, Kettering, for Messrs. W. & X. Newman. Mr. H. A. Cooper, architect, Kettering. Quantities supplied by the architect—S. Bamford 4,677 0 0 Dickens & Mutton 634 0 0 C. Sharman 609 0 0 S. Mauley 685 0 0 T. Farey 678 0 0 A. Barlow 671 10 0 H. F. Benson 670 0 0 Henson Bros. 669 10 0 G. Henson 655 0 0 J. Bellamy (accepted) 453 0 0

For two houses in the Broadway, Kettering, for Mr. W. C. Cooke. Mr. H. A. Cooper, architect. Quantities supplied by the architect—Margaret & Neale 2,680 0 0 C. Sharman 670 0 0 G. Henson 630 0 0 H. F. Benson 643 0 0 Dickens & Mutton 643 15 0 C. & F. Henson 629 10 0 T. Farey 623 0 0 S. Mauley 623 0 0 S. Hulks 620 0 0 S. Bamford 610 0 0 F. Barlow (accepted) 610 0 0

For house in Milton-street, Kettering, for Mr. Wm. Ford. Mr. H. A. Cooper, architect. Quantities supplied by the architect—S. Bamford 4,300 0 0 H. F. Henson 290 0 0 S. Mauley 270 0 0 C. Sharman 270 0 0 Dickens & Mutton 270 0 0 A. Barlow 260 0 0 S. Hulks (accepted) 240 0 0

For two houses in Mill-road, Kettering, for Mr. Jno. Munn. Mr. H. A. Cooper, architect. Quantities supplied by the architect—S. Hulks 2,523 0 0 C. Sharman 470 0 0 A. Barlow 470 0 0 H. F. Henson 411 0 0 C. & F. Henson 410 10 0 S. Mauley 365 0 0 T. Farey 354 10 0 Dickens & Mutton (accepted) 352 0 0

For house in Hawthorn-road, Kettering, for Mr. Seaml. Durrant. Mr. H. A. Cooper, architect. Quantities supplied by the architect—S. Hulks 2,333 0 0 H. F. Henson 328 0 0 C. & F. Henson 318 10 0 C. Sharman 305 0 0 T. Farey 298 10 0 A. Barlow (accepted) 286 10 0

For additions, alterations, and repairs to No. 21, Bromley-common. Mr. St. Pierre Harris, architect and surveyor, Basinhill-street—Sykes & Son 4,336 0 0 Taylor & Son (accepted) 295 0 0

For hotel at Bush Hill Park, Hadley Wood, for Mr. Charles Jack. Mr. Edwin T. Hall, F.R.I.B.A., architect, 57, Moorgate-street, E.C. Quantities by Messrs. Evans & Deacon, 1 Adelaide-street, S.W.—Marriott Bros. 22,370 0 0 Longmire & Budge 2,300 0 0 E. Lawrence & Sons 2,195 0 0 F. Horaceman & Co. 2,149 0 0 Turtle & Appletton 2,149 0 0 E. Toms 2,067 0 0 Foster & Dicksee (accepted) 2,055 0 0

For shops at Bush Hill Park, Hadley Wood, for Mr. Charles Jack. Mr. Edwin T. Hall, architect—Foster & Dicksee, Rugby (accepted) 21,318 0 0

For stables and lodge at Ivy Hatch, Kent, for Mr. Charles G. Hale. Mr. Edwin T. Hall, architect—Pannett & Sons, Tonbridge (accepted) 21,700 0 0

For roads and sewers, Bradbury Estate, Gosse-green, S.E., for Mr. W. F. Morgan. Mr. Edwin T. Hall, surveyor to the estate—Blomfield 2,814 0 0 Lloyd 2,667 0 0 Harris 2,623 0 0 C. Pearce (accepted) 507 0 0

For completion of three carcases, Bradbury Estate, Gosse-green, for Mr. Morgan. Mr. Edwin T. Hall, architect to the estate—Bansy 2,880 0 0 F. Dawes 260 0 0 Robinson 200 0 0 C. Pearce (accepted) 763 0 0

For alterations and additions at Villiers-street, Strand, for Messrs. Chaplin & Co. Mr. Thos. W. Mills, architect, 34, Ely-place, Holborn. Quantities by Mr. C. Stenger, surveyor, 21, Finsbury-pavement, E.C.—A. 22,811 0 0 2,202 Totten & Son 2,860 0 100 Lating 2,296 0 282 Patman & Rotheringham 2,263 0 425 King & Son 2,187 0 344 Williams & Co. 2,147 0 239 Ashby & Horner 2,137 0 249 Colls & Son 2,095 0 335 Patrick & Son 2,092 0 223 Jas. A. Taylor 2,020 0 185

A. Extra, if partitions in mahogany instead of deal.

For alterations at 21, Baker-street, W., for Messrs. Amery & Sons. Messrs. New & Son, architects:—

Thomas & Butland	.....	£162	0	0
F. Mark	.....	147	0	0
Drew & Cadman	.....	98	0	0

For the erection of a six-roomed house, Prince's-road, Bermondsey, and repairs and alterations to the house adjoining, for Mr. W. Wilkins. Mr. E. Crosse, architect, Bermondsey-square:—

New House. Repairs. Total.					
B. Wells	.....	£362	477	10
G. Patton	.....	333	45	0
J. Wheeler	—	—	380	0
J. Almond	.....	318	39	0
R. Russell	—	—	357	0
J. Bullers	—	—	336	0
A. White & Co.*	.....	247	46	0
				283	0

* Accepted.

For the erection of new stabling, coach-houses, and vanshed, at Liss, Hants, for Messrs. J. Meils & Son. Mr. B. Crosse, architect:—

W. Jenkins, Liss	.....	£345	0	0
Finch Bros., Liss	.....	293	0	0
S. Woodbourn, Liss (accepted)	.....	251	18	0

For the erection of additional rooms, and alterations and repairs to Heath Villa, Hill-brow, East Liss, Hants, for Mr. W. S. Drayton. Mr. E. Crosse, architect:—

E. Carpenter, Liss	.....	£349	14	6
Finch Bros., Liss	.....	475	0	0
W. Jenkins, Liss	.....	340	0	0

* Accepted, with slight modification.

For alterations and additions to National Schools, Moulsham, Mr. C. Pertwee, architect:—

Potter & Lucius	.....	£1,123	10	0
W. Roper	.....	1,047	0	0
Chest & Son	.....	1,030	0	0
J. Baker	.....	1,030	0	0
W. Fincham	.....	1,024	0	0
Henry Gozzett	.....	933	0	0
G. Saltmarsh	.....	878	10	0
J. Moss	.....	876	10	0
W. Wood	.....	867	0	0
Compton & Fawkes (accepted)	.....	864	0	0

For alterations and additions to Bushey Rectory, Herts, for the Rev. F. W. Rymaston. Mr. G. M. Hills, architect:—

Belham, Pimlico	.....	£1,418	0	0
Hunt, Chiswick	.....	1,082	0	0
Brown & Son, Harefield	.....	1,020	0	0

For alterations and repairs to No. 182, Essex-road, Islington, for Mr. Merry:—

Heath	.....	£124	0	0
Clinch & Patten	.....	120	0	0
Stephens	.....	117	0	0
Dearing & Sons (accepted)	.....	112	10	0
Bayley	.....	98	10	0

For erecting shops and houses on the New Write-street Estate, Chelmsford, Essex, for Count Hoerner. Mr. Edgar Earman, architect:—

Henry Gozzett, Maldon	.....	£8,150	0	0
Good Bros., Witham-stow	.....	5,700	0	0
George Saltmarsh, Chelmsford	.....	5,138	0	0
W. Roper, jun., Chelmsford	.....	4,570	0	0
A. Moss, Chelmsford	.....	4,467	0	0
W. Wood, Chelmsford	.....	4,479	0	0

For rebuilding Nos. 7 and 8, Bury-court, E.C. Messrs. W. E. & F. Brown, architects, 9, Foultry, E.C.:—

F. Mark	.....	£5,317	0	0
T. Boyce	.....	5,316	0	0
J. H. Adamson & Son (too late)	.....	5,213	0	0
Brown, Son, & Hornfield	.....	5,072	0	0
F. & J. F. Wood	.....	4,863	0	0
S. C. Parmenter	.....	4,808	0	0
Lawsance & Sons	.....	4,844	0	0
Colls & Son	.....	4,750	0	0
Brass & Son	.....	4,666	0	0
J. Woodward	.....	4,600	0	0
Killy & Oayford	.....	4,570	0	0
Stimpson & Co.	.....	4,540	0	0

For kerbing, channelling, and tar-paving Brookshot-road, Brentford, for the Local Board. Mr. F. W. Lacey, A.M.I.C.E., surveyor:—

H. Spicer, Brentford	.....	£491	18	0
S. H. Watkins & Co., Brentford	.....	467	0	0
Thos. Brunsden & Co., Brentford	.....	348	0	0
Nowell & Bobson, Kensington	.....	368	0	0
Mowlam & Co., Westminster	.....	377	0	0

[Surveyor's estimate, 3904.]
* Accepted.

For rebuilding The Huts, Wisley, Surrey, for Mr. James Moscrop. Mr. R. T. Elam, architect, Hampton Wick, Middlesex. Quantities by the architect:—

Batchelor, Leatherhead	.....	£2,799	0	0
J. H. Jarvis, Surbiton-Hill	.....	2,795	0	0
C. Bonell, Teddington	.....	2,795	0	0
Watkins, Wisley	.....	2,775	0	0
T. Hardy, Cowley	.....	2,743	0	0
Oldridge & Sons, Northon	.....	2,717	0	0
B. Wood, Cobham	.....	2,621	15	0
T. Hiscock, Hounslow	.....	2,600	0	0
J. Piller, Teddington	.....	2,468	0	0
A. Newland, Cobham (accepted)	.....	2,150	0	0

For alterations and additions to 63, Upper Gloucester-place, for Mr. J. F. Norton. Mr. F. H. Collins, architect:—

Stokes	.....	£150	0	0
Head	.....	130	10	0
Wetherill, Lee, & Martin	.....	114	17	0
Flowers	.....	108	10	0

For the erection of a pair of houses at Tytherton-road, Holloway, for Mr. Thos. Lloyd. Mr. Geo. Waymouth, architect, 23, Moorgate-street:—

Thos. Hogben	.....	£1,238	0	0
Taylor & Grist	.....	1,215	0	0
Howe & White	.....	1,250	0	0
Davis Bros. (accepted)	.....	1,075	0	0

Hampstead Arms Public-house, Gray's Inn-road.—By a Printer's error in our last (p. 713), the tender submitted for building the above house by Messrs. Mattock Bros. was put at 2,283, instead of 3,283.

Shops and Stabling at Kilburn.—Messrs. John Allen & Sons, of Palmerston-road, Kilburn, write to say that their tender for this work should have been marked "with-drawn," as an item for shop-fronts had been omitted, value 100l., making their tender 583l., instead of 483l. The list was printed as sent.

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The Builder.

Vol. XLVIII. No. 2310.

SATURDAY, JUNE 13, 1885.

ILLUSTRATIONS.

Westgate, Surrey.—Mr. Halsey Ricardo, Architect	832-833
Foreign Brasses: of Martin de Visch, Bruges Cathedral (A.D. 1452); of Sidonia, Daughter of King Podiebrad of Bohemia, at Meissen (A.D. 1510)	836-837, 840
The Colozletzer Thor, Rothenburg.—Sketched by Mr. A. B. Pitt	841
Sculpture at the Paris Salon: "Protection," M. Demaille, Sculptor; "Baptême Gaulois," M. Ogé, Sculptor	844, 845

CONTENTS.

The Glasgow Corporation Waterworks	821	Ancient Brasses	830	A Suggestion as to the Widening of City Streets (Illustrated)	850
Foreign Brasses	825	"Westgate," Surrey	830	"Wapscott Essays"	850
Notes	825	The Colozletzer Thor, Rothenburg	830	Domestic Water-Supply	850
Architecture at the Inventions Exhibition	824	Sculpture at the Paris Salon	830	Italian Silver-grey Slates	850
Royal Institute of British Architects: Presentation of the Royal Gold Medal to Dr. Schlemm	827	Model Plans for Infectious Hospitals (Illustrated)	848	Stained Glass	850
The Congress of French Architects	825	Association of Public Sanitary Inspectors: Annual Dinner	848	The Student's Column: Descriptive Geometry.—Part II.	850
Gas at the Parkes Museum	829	Archaeological Societies	848	Recent Sales of Property	852
The Old "Cheshire Cheese" Inn, Walsley	828	"A Day in the Country"	849	Meetings	852
Society of Arts Prize Essays	830	Building over the Dead: Gibbons and Others s. Chambers	849	The Sanitary Institute of Great Britain	852
Proposed New Exchange, Amsterdam	830	The Reform of the Institute	849	Miscellaneous	852
		Curves of Contrary Flexure	849		

The Glasgow Corporation Waterworks.



On the 14th of October, 1859, a day of most inclement weather as it proved, Her Majesty, accompanied by the Prince Consort and retinue, arrived at Loch Katrine from Edinburgh,

and there formally opened the new water supply for the City of Glasgow. The Loch Katrine-Glasgow aqueduct, as designed by Mr. J. F. Bateman, C.E., was from the first recognised, and justly so, as one of the most stupendous works of the kind of any age; and the confident calculation was that the city, though admitted to be a manifestly growing community, had been endowed with a water supply which would certainly suffice in overflowing abundance for the better part of a century to come. The loch, which is from eight to nine miles in length, with a surface area of about 3,000 acres, in order to adapt it fully for the purpose designed had its level raised permanently by 4 ft., the new mark standing 362 ft. above the datum line of spring-tide high-water at Glasgow. The water thus additionally dammed was tapped at a point 3 ft. below the line of the old natural surface, in this way affording an available storage of 7 ft. depth very nearly over the whole of the 3,000 acres of loch area. The daily outflow stood, in the original estimate, at 50,000,000 gallons, but the impending friction within the many miles of roughly-blasted rock tunnelling had been considerably underrated, and it proved that a daily flow of 38,000,000 gallons, only, formed about the utmost stretch of the new works' capacity. Ample in every existing sense this supply was indeed found for a period of years; but Glasgow was all the while maintaining a growth-rate of quite unexpected vigour. Including its fringe of circumjacent burghs, which are now virtually portions of the city though nominally independent municipalities, Glasgow may be said to have very nearly trebled itself in size and population since the Loch Katrine water scheme was first practically taken in hand as a possible and likely project. The intramural house-clad elevations of which a considerable part of the area is composed first began to experience an intermittent absence of water, the gravitation pressure in certain instances proving insufficient for forcing the pipe-currents to their summit reaches, except at those seasons when the consumption over the city generally was at its lowest. By reason also of the wet closet system being universal and the presence of

built-in baths very general (small houses of only two apartments are occasionally found fitted with these) Glasgow possesses a singularly powerful capacity for a wholesale, not to say wanton, consumption of water, and this the Corporation officers have found it quite impossible to keep within anything like strictly economic compass. A large and still increasing volume of but slightly utilised water pours incessantly into the Clyde; the population, over all, borders upon a total of 800,000, while the Loch Katrine supply, magnificent as it no doubt has been and is, has all along remained inelastic. The authorities have thus been gradually forced onwards, until now they are brought face to face with the necessity of furnishing with as little further delay as possible a largely-increased supply.

Accordingly, a Bill passed before Lord Redesdale as an unopposed measure on the 18th of May of the present year, authorising the Corporation of Glasgow to extend their works in connexion with the supply of water to the city from Loch Katrine. Before entering upon the details of its powers, it will be interesting to briefly notice a few of the leading features of the existing works. In the first place, it was thought that the present tunnels could be widened, and so admit of a larger flow of water into the reservoirs at Mugdock and the new reservoir at Craigmaddie at present constructing, an Act for which was obtained in 1882. It may here be remarked that the immediate object of the Act of 1882 was to secure for Glasgow fourteen additional days' supply in the event of an accident to any part of the aqueduct. It had long been observed that the rough rock sides of the tunnels had a serious retarding effect upon the velocity of the water passing through them. Another suggestion was made to line them with concrete. Both ideas, however, were ultimately discarded as absolutely impracticable, as the consumption of water by the city is now so great that a very small margin of time can be allowed for the examination of the aqueduct and its maintenance in a state of repair. For this purpose five stoppages in the flow of water are made in the year for five days upon each occasion, and it is found that the twenty-five days thus gained are entirely taken up in the ordinary way of examination and repair. To give an adequate idea of the force of this remark, it will only be necessary to observe that the geological formations met with in a large portion of the aqueduct are mica-schist and clay-slate, and another long tunnel passes through compact sandstone conglomerate. The time consumed in the operations in the former hard material was simply enormous. When the tunnels were being formed the work was carried on night and day, and yet the amount

done was often less than three lineal yards per month at each face. Hand labour was preferred to perforating-machines for the drilling of the holes for blasting purposes, and very slow progress was consequently made, a bore-hole of 1½ in. diameter and the ordinary depth of 20 in. being driven on an average at the rate of one-fifth of an inch in one minute of time. A gang of men taking down with them at night 60 drills to an 8 ft. space, frequently returned in the morning with every one of their drills dulled. The tunnel passes through ten miles of this description of rock. It will be obvious, then, that the idea of enlarging the existing tunnels, and in that way providing for a larger flow of water, was preposterous. The consumption of water by the city is at the rate of 42 million gallons per day, and the present aqueduct only admits of the passage of that volume of water. The actual limit having thus been reached the situation at once becomes serious, and two possibilities force themselves upon the mind: first, the failure of any part of the works; second, a considerable increase in the demand upon the supply. In view of these contingencies a temporary alternative has been found in the use of Deacon's system of District Meters throughout the city, by means of which any undue waste of water can be detected and means taken to prevent its continuance. The system has worked so well that it is being rapidly extended. Our space will not admit of our enlarging upon this point. It may, however, with advantage be here observed that the waste of water from the use of improper fittings is often less serious than that due to the bursting or other injury done to main or service pipes, where the water, escaping into a sewer, passes off undetected. By the use of Deacon's Waste-water Meters such an accident is easily discovered. The saving of water in this way has averaged 13 gallons per head; hut, taking it at 10 gallons, the saving over the whole city would be 7½ million gallons per day, or about one-fifth of the water supply, and at an expenditure of one-third of the capital represented by this saving.

The existing Loch Katrine-Glasgow aqueduct, it should be noted, is thirty-four miles in total length; twenty-six miles between the loch and Mugdock service reservoir, and eight miles thence to Glasgow itself. After clearing the mountain girdle encircling the loch, its course pursues, in irregular form, a south and by east direction, passing Loch Chon and Loch Ard at close quarters, and shortly afterwards crossing the Duchray streamlet, which is part of the head waters of the river Forth, and, of course, flows eastwards. The valley of the Eudrick, whose course is westward into Loch

Lomond, is next crossed, passage thence being taken by way of Killearn village and Blane valley on to the small town of Milngavie, in the neighbourhood of which it discharges its freight into Mugdock reservoir, situated 311 ft. above Clyde high-water level, and possessing a capacity of 550,000,000 gallons. The distribution begins at this point by means of branching cast-iron mains 36 in. in diameter. The engineering interest, however, is confined exclusively to the other and much larger section. Leaving the loch, 2 miles below the "Roh Roy" landing-place at Stronachlacher Inn, and about four or five miles above the romantic gorge of the Trossachs, the aqueduct at once begins the piercing of a spur-flank of lofty Ben Venue at a crossing possessing a summit height of 600 ft. This is done by a rock-hasted tunnel 2,325 yards in length, cut through beds of gneiss and mica slate, and with a bore of 8 ft. diameter. The fall here and all along to Mugdock, except where syphon-piping is used in crossing valleys, is the uniform one of 10 in. to the mile. Where the surface is followed the conduit is composed of arched masonry of 8 ft. inside diameter, this alternating with tunnel-cutting and syphon-pipes where necessary, the 26 miles from Katrine to Mugdock being made up of 13 miles of tunnelled work; $9\frac{1}{2}$ of arched masonry, and $3\frac{1}{2}$ of iron piping. The works as here briefly described, inclusive of compensation awards, cost one million and a half sterling.

The reservoir in course of construction will hold 700 million gallons, or fourteen days' supply in addition to the ten days' supply already provided by the existing reservoir. It is not intended to proceed with the whole of the new works at once, but in the first place to duplicate some of the tunnels, especially those parts where it is known that the water is most retarded. This being done, an entirely new aqueduct is only a matter of time. This, however, will be delayed after the necessary duplicate tunnels have been made, till the storage at the lochs is increased, Loch Katrine being raised in level. The raising of the level of Loch Katrine will necessitate the construction of a new road on the north shore, a new hotel at Stronachlacher, and new landing-piers for the convenience of the steamboats plying upon the loch. The other items necessary for the completion of the aqueduct will be proceeded with as additional water is wanted.

When the proposed works are carried out, a continuous supply of 75 million gallons of water will have been provided. The limits of the present Bill are there reached, but the whole system will not then be complete. The intended aqueduct is designed on a sufficiently large scale to allow ultimately of the passage of 70 million gallons, while the existing one passes 40 million gallons. Allowing 10 per cent. for stoppages in the flow for examination and repairs, the supply will have been increased to 100 million gallons. The additional powers requisite are, however, an after consideration.

The new aqueduct will consist of 12 $\frac{1}{2}$ miles of tunnelling, 9 miles of open cutting arched over with masonry and bridges, and $3\frac{1}{2}$ miles of syphon pipes. It will follow the same line as the existing one at a distance of 22 yards from it, and will be upon the same level. The difference in the cost of constructing an aqueduct of the proposed dimensions and one of the existing dimensions is estimated at about 150,000l.

With regard to the sources of supply, water can be drawn from Loch Katrine and the other lochs in the immediate vicinity without injury to any interest whatever. Loch Katrine itself is so situated as to level that it forms a convenient centre into which water may be drawn from all the other lochs in the locality. During the winter months there is a very large overflow of water from Loch Katrine. In order to make it available for supply purposes it is intended to increase its storage capacity. It may here be remarked that the loch derives the full benefit of any rainfall that takes place, as it flows rapidly down the steep mountain-sides, thus admitting of very little possible evaporation or absorption. Calculations derived from carefully gauging the discharge of

water from the loch by the streams give the result that in very dry years, such, for instance, as 1869 (which was the driest year since 1850), when the present works were completed, a supply of 75 million gallons may be depended upon by raising Loch Katrine 5 ft. above its present high-water level, and converting Loch Arklet into a reservoir, by raising it 25 ft. in level. Loch Arklet is a small loch, situated between Loch Katrine and Loch Lomond, and has an area of 200 acres, which would be increased by the proposed alterations to 400 acres. Objection as to any possible difference in the water of the two lochs has been anticipated by the proposal to convey it, not directly into Loch Katrine, but to within a short distance of its outlet, where a portion of it will pass directly down the river into Loch Vennachar, and the portion remaining will be thoroughly mixed with Loch Katrine water, and exposed to air, before it can reach the inlet to the aqueduct five miles higher up.

The supply which the proposed works will render available for the city, calculating upon the most reliable data, will only serve the city for about thirty-six years from the present time. This is considered a sufficiently long period to anticipate. It means, however, less than double the present supply, while the works about to be undertaken for the supply of Manchester from Thirlmere will yield 2 $\frac{1}{2}$ times the present requirements of that city.

It remains to be said that the whole cost of the new works is estimated at 1,000,000l. sterling. The revenue of the Commission has gone on increasing so rapidly for many years past that it is not intended that the rates be increased even for a short time. Very little doubt is entertained by those in a position to judge, as to the possibility of completing the whole of these new works without the slightest further demand upon the pockets of the ratepayers of the city of Glasgow.

The passing of the Bill through Parliament has been throughout in charge of Dr. Marwick, Town Clerk, and Mr. James Gale, the Corporation Engineer. The construction of the works will be under the immediate direction of Mr. Gale, a gentleman long and worthily associated with Glasgow in the capacity of Water Engineer.

FOREIGN BRASSES.



THE publication of a series of facsimiles of foreign brasses by the Rev. W. F. Creeny fulfils a great want in the history of these Mediaeval monuments.* And the mode in which it has been accomplished, by making photo-lithographic reductions of well-executed rubbings, is the only one which had the slightest chance of ever being successful. The expense of accurate engravings would have been enormous, and the time during which such a work would run would have tired out every subscriber. Whatever deficiencies, therefore, the mode of operation involves, we must accept the result on account of the advantages and the truth of the general impression. No engravings in Gough's "Sepulchral Monuments," nor among those published by Cotman, are to be depended on; indeed, they are very inaccurate; but here we have real facsimiles, though in delicate details they necessarily sometimes fail. By means of this important work we can now enter into a general history of the monumental brass.

There is no doubt whatever that the incised slab was the forerunner of the brass, and there are examples of a very rude character, which must be dated very much before the brass recorded as once existing at St. Paul's, Bedford, viz., 1208. They continued in use, as well as the brass, until the end of the sixteenth century in a more or less degree. To what country we owe the beginning of the incised work on metal, as a more enduring and handsome material, is an unsolved problem, and although in this work we have the earliest example known, viz., that to Bishop Ysowilpe, 1231, at Verden, it does not help us in our difficulty. It accords

* "A Book of Facsimiles of Monumental Brasses of the Continent of Europe." By the Rev. W. F. Creeny, M.A., vicar of St. Michael-at-Thorn, Norwich. (To be had of the author.)

with no known type; conventional representations of features, in general so good a test, are here too rudely given to enable us to speak with certainty: the execution is by thin lines keeping to the same diameter, and the figure is not cut out to the outline as in English examples, but has for its background the plain metal,—the inscription being on the verge. Both arms of the figure are raised, supporting two models, one in each hand,—in the right a church, which is said to represent that of St. Andrew, in Verden, where the brass now lies, the tower of which he rebuilt; in the left the same tower appears within a fortified enclosure, as he is said to have put a ring wall about the city. It is worthy of remark, that there is yet in France a church within a fortified wall of the thirteenth century at Sentein, in the department of Arriège. The costume of the figure consists of a plain alb, with, as we consider, loose sleeves, those closer fitting to the wrist belonging to the cassock. There is chasuble, with dalmatic and a pallium, but as he was not an archbishop we can hardly, perhaps, apply that name to it. There is neither stole, maniple, nor amice. The mitre is of a very low, simple form.

Figures holding models are not very common in brasses. It is singular, therefore, that the two earliest of the foreign examples should show this feature; for that of Bishop Otto of Brunswick, 1279, at Hildesheim, given in the same page as the former, holds a model of the Castle of Woloebergh, of which he was the builder. Now, it must be remembered that our earliest English brass is that of Sir John Dauhernoun, 1277, at Stoke Dahernon, Surrey; it is useful, therefore, to make a comparison of the execution of the two, as far as possible. One can trace an analogy in the treatment of the drapery, as also in parts of the features. It is slight, but worth noting, as it tends to point to a common origin for this kind of monument, although one cannot fix upon that country which first set the example, and political boundaries go for little in the matter. In general treatment, having blank metal for background, it is in accord with the last-named.

Before we proceed further it is well to glance at the three divisions of the monumental brass, those of England, Flanders, and Germany; for France, having lost hers, is of little account; but if we judge by what evidence we possess in the character of her incised slabs, they would come as intermediate between those of the two first-named. The only example now in France is at the Cathedral of Amiens, and is given in this work, and its character is distinctly Flemish. The English brass is marked by being cut to its outline, whether of figure or architecture. The Flemish is generally known by its presenting a large oblong surface of metal, on which the figures are engraved, and surrounded by either the most elaborate architectural details or rich diaper-work. In general the German follows the Flemish principle, but differs in details, and it developed into a distinct type. But we have examples of the Flemish following the English habit, and some late English examples the Flemish. There is a separation between them in the mode of execution: the English use the graver or burin, properly so called, viz., a lozenge-shaped tool; the Flemings made more, indeed an excessive, use of the *scorper*, a chisel-cutting tool, which tended to confine them to lines of equal thickness, or nearly so, thus possessing less grace than our English examples. This defect may be seen in all those magnificent works which, now, for the first time, we have an opportunity of comparing one with another, as well as in those of St. Alban's, Lynn, and Newark, which belong to the same school, if not to the same hand. Before, however, we take this group, we must note that to Bernard de Lippe, 1340, at Paderborn, for this is treated exactly after the English fashion, and in general character might easily be taken to be of English workmanship, except for the disproportionate size of the two shields at the head, and their being placed diagonally.

The series of Flemish brasses of the fourteenth century here given comprises that of

King Eric Menved and Ingeborg his queen, 1319, at Ringstead, Denmark; two at Schwerin, 1347 and 1375; one at Lübeck, 1350; one at Stralsund, 1357; and one at Thorn, 1361. Those already noted, as in England, belong to this same time, and thus we have nine of the most elaborate specimens of Mediaeval engraving extant. All these show the figures set under canopies of the richest tabernacle work, which finds no parallel in our English architecture of the same epoch. The abundance of small figures introduced, the exuberance of the ornament and diaper work, the fancy everywhere displayed, commands our admiration; and we cannot wonder that Gough, speaking of those at Lynn, pronounced them to be the work of a Cellini of the fourteenth century. The plan observed in all these compositions is very much the same; the shafts of the canopies have their niches filled with small figures of the Prophets and Apostles, ranged together, the former distinguished by their holding scrolls, the latter by their emblems. The upper part above the heads of the figures exemplifies the redemption of the soul, which is sometimes given as being borne by angels in a winding-sheet to Paradise; sometimes as in the bosom of Father Abraham; and it is necessary to note that this figure is never distinguished by the crossed nimbus, as in the three persons or symbols of the Trinity. There are also instances of the combination of the two ideas. The first is seen in that at Ringstead; the second in the two at Schwerin, and that of Stralsund, whilst the combination is found in those of Lübeck and Thorn. Mr. Creeny states that, in this latter there is a distinction of sex in the symbol of the soul, and, if he be correct, as doubtless he is, it is a singular idiosyncrasy on the part of the artist, no such distinction having been usually recognised. There is a small brass to the memory of Walter Beauchamp, doubtless a child, at Chekendon Church, Oxfordshire, which simply consists of the sexless symbol of the soul, borne in a winding-sheet by two angels: date about 1430. In the brass at Ringstead, the figure of the soul is partially clothed in its winding-sheet, but this is not always observed, and only when in Abraham's bosom.

As a memorial to a king and queen, this brass fitly takes precedence in the group to which it belongs, as we have no other royal brass. The king is in a long tunic, richly emblazoned with three lions passant guardant in a field semée of hearts; and it is fastened on the breast by a small ring brooch, such as are occasionally met with, having amatory posies. And it is worthy of remark that the general outline of this is very much in harmony with one found near Scarborough, formerly in Lord Londesborough's collection, but probably of the seventh or eighth century. The figure of the queen has also one, but of simpler outline. Both have the usual mantles of estate, and are crowned,—the king, in right hand, holding up a drawn sword, that of Justice; in his left a sceptre. The queen holds a sceptre in her right hand and a hook in her left. This is an early instance of the introduction of the latter in monuments, especially when not to one of the clerical order. The richness of the detail can only be understood by a close examination of the fac-simile. The faces of the figures are not in brass, but are insertions, that of the king being of marble, the queen of alabaster. These are also restorations, and do not too closely accord with the conventional style of the time. It must be also remarked that the date, 1319, is much too early for the character of the execution, which is fully thirty years later.

Of the two at Schwerin, to the four bishops of the Bulowe family, that of Ludolph and Heinrich is the grandest, full of the pomp of heraldry and worldly display, and one of the finest brasses in existence, though yielding to that of Lübeck to Bishops Burchard de Serken and John de Müll. But the other, to Bishops Godfrey and Frederic de Bulowe, is the more interesting from its details, reminding us of the two at Lynn. At the foot of one figure is a haquet to a hairy king, served by hairy men, who cook before him. Beneath the other

is seen a wild man on horseback carrying off a damsel; he is pursued by a knight on horseback issuing from a castle. The hairy king is sitting in a tent; a wild man has apparently left it to receive the abducted damsel. It doubtless illustrates an old romance of similar import to Valentine and Orson. The inscription goes all round in a wavy fillet, making a Jesse tree with royal figures playing upon a variety of musical instruments. At the feet of the bishops of the Lübeck brass are the stories of St. Nicholas and St. Eloy or Eligius. The brass at Stralsund to Albert Hovener, 1357, has hunting scenes at the feet, and some details are so close to those at Lynn that it is almost inevitable to pronounce it by the same hand. It is to be regretted that these small subjects could not have been given in a larger size; as with the banquet on the brass of Robert Braunch, as well as the other subjects on that of Adam de Walsokne, at St. Margaret's, Lynn, we have a very remarkable series, which deserve great attention for their design and execution. Neither of the latter fine brasses is accurately given by Cotman, although boldly etched. The example at Brussels to John and Gerard de Heere, 1398, is a very inferior work, though belonging in date to our group.

When we get into the fifteenth century, the Flemish brass changes its character to some extent, rejecting architectural arrangements which it before rejoiced in. This new departure was larger in character, consisting of admirably-designed diapered backgrounds, often intermingled with heraldic devices. Two fine specimens at Bruges illustrate this new phase. One to Joris de Munter and wife, 1439, consists of figures in winding-sheets or shrouds, loosely arranged and in well-folded drapery; figures of angels with scrolls above and below. But we do not consider, with Mr. Creeny, that there is any idea of ascension intended to be conveyed, but that the figures lie, as in death, on the diapered ground. The diaper in this case is said by Mr. Weale to be similar in design to a specimen preserved, as he thinks, in Stettin Museum. One of the most effective of this class is that which forms our larger illustration. It is in the Cathedral of Bruges, and is to the memory of Martin de Visch, 1452, who is represented as a knight in armour with hands conjoined in prayer, and wearing a tabard of his arms, the sleeves terminating closely at the wrist. His head is bare, and beneath it is his shield emblazoned, the sole instance of one so placed; and above this his helmet and crest, seemingly consisting of a fish disporting betwixt two tails of a bird, encircled by a coronet. The mantling is finely arranged, and altogether it is one of the most remarkable of heraldic displays in the volume, and in no way excelled. The diaper of the background consists of the device of a talbot dog, with collar of bells, couchant, beneath which is the word "Moy," which Mr. Weale interprets "Gentillement," and all is interwoven with conventional floriated work, constituting one of the best examples of Flemish design. The inscription incloses this, having the symbols of evangelists at the corners and the centre, on each side, broken by the armorial hearings. An outside rim made up of a series of horses' bits, another device, completes this interesting and fine brass.

There is another at Lübeck, which belongs to this type, but, in this case, it is to a civilian, who is represented in a long richly-embroidered tunic, with furled cuffs, collar, and hounce, the execution of the fur being remarkably fine. This brass commemorates two of the same name,—John Lüneborch, 1461, and another John in 1474. Mr. Creeny is doubtless right in assigning the figure to the first, who was mayor of this city. The head has all the characteristics of portraiture, being full of individuality, and is an early instance of such. The background is composed of Flamboyant architecture and diaper, which, with the root of Jesse worked outside the inscription, has much that is earlier in character, resembling some of the examples previously alluded to. Before one passes from the Flemish brass, it is necessary, at least, to call to mind that which is on the title of the work, forming

merely an oblong border with a wavy fillet for the inscription, between which are disposed subjects illustrating the ages of man's life. It would be long to describe this fully, which is well done in the volume, and refer to an article on the general subject in the Proceedings of the London and Middlesex Archaeological Society, 1875. We must here, however, point out that the main divisions are six, each having three subjects, viz., Childhood, Boyhood, Youth, Manhood, Age, Decrepitude. It is exceedingly interesting in its details, calling to mind many incidents familiar to us as "household words" out of the play of our great poet. It is preserved at St. Mary's, Ypres, the date being 1489.

We now turn to the German series, and of these the earliest seem to emulate, and sometimes copy, the character of the Flemish, but at a distance, introducing variations of their own. There are the same oblong surfaces with elaborate architecture, but no embroidered backgrounds. The metal is often so cut away as to give a semi-relief to the work, which, therefore, cannot be quite satisfactorily rendered by a rubbing. Those most worthy of attention are from Erfurt, Breslau, and Posen. But the special character which distinguishes itself, as a type, not having any analogy with either Flemish or English examples, has more interest in our inquiry. One remarkable feature is that portraiture becomes the rule rather than the exception. In England this is not generally developed until the sixteenth century. There is also another peculiarity, the great heraldic display, with largely-proportioned escutcheons, crests, and mantling placed at the feet of the figures, and reaching a full third, and sometimes half up in front. An importance is also given to the figures by the rejection of all redundant accessories. That to Canon Georitus de Lewenstein at Bamberg, 1464, illustrates this phase of design; the head turns a little on one side, showing a three-quarter face, and holds a book, which is now frequent with ecclesiastics. The figure fills an arched recess, which has a diapered background. It is to be noted also that the characters of the inscription are Roman, showing the growing classic influences. But we find this alternates often with the Mediaeval types. There is another at Bamberg, evidently by the same hand, to Canon John de Limburg, 1478, but here the inscription is Mediaeval in its character. At Meissen there are nine examples of great interest, as they are all of one general type of the oblong plate, varying only in details, sometimes showing a clinging to Mediaeval forms, in others mingling them up with cinque-cento ideas. This is especially shown in the border of that to Frederick, Duke of Saxony, 1517. Many of them also rejoice in a great display of heraldry. One of these is selected for our smaller illustration, viz., that of Sidonia, the daughter of George Podiehrad, king of Bohemia, and wife of Albert, Duke of Saxony. She died in 1510. This brass has been ascribed to Albrecht Dürer; but, without attempting to decide such a question, it is impossible not to see that a refined hand has here been at work. The simplicity of the treatment, good drawing, well-arranged drapery, and, above all, the expression put into the face, declare the mind of a master. We seem to look through an arch into an oratory, the windows showing behind. There is a diapered curtain behind the figure, which holds a rosary and seems as if in prayer, and two coats of arms are at the feet. It is to be remarked that the inscription, arranged all round in two rows, is Mediaeval in its characters, which, in the brass of her husband, are Roman, though it is earlier in date. A very interesting account of this pious lady is given in the text. The later brasses at Meissen show a rapid degeneracy, but have some interest nevertheless. But to follow up decline is never a pleasant task. After the culmination of art in the sixteenth century, there were many causes,—social, political, and religious,—which hastened its decadence. When a tradition is broken, the dis severed links are not easily united.

This notice would be imperfect if it did not

glance a little hack to our English school, and make some comparison. Our brasses are in much greater numbers than those abroad, notwithstanding a large amount of destruction. In richness or exuberant fancy we can in no way compare with the Flemish type. But we have a speciality of our own, which is very interesting, as it declares the distinctness of the school from its foreign neighbours. Nor need we in any way lower our sails. If we consider such examples as that of Prior Nelond at Cowfold, Sussex, with its precision of execution, the light elegant treatment of its canopy; those of Cobham, Kent, to the memory of Sir Reginald Braybrook, and to Sir Nicholas Hawberk; that to Sir Thomas Beauchamp, Earl of Warwick, with its delicate *opus ponsatum* at St. Mary's, Warwick; that to Sir Nicholas Carew at Beddington, Surrey, and to Sir John Leventhorp, Sawbridgeworth, Herts; besides many others of the first quarter of the fifteenth century, we shall find, for simplicity, grace of execution, and qualities of drawing, there is no equal amongst the foreign brasses. This quality of drawing is finely shown in the hounds at the feet of Sir Nicholas Carew and Sir John Leventhorp, and these are but types of excellence found in many others of the period, of very varied design. It is most satisfactory, therefore, in making this comparison, that we can vindicate the claims of our English type; not only is it distinct from the foreign, but, as regards the period to which we have alluded, it is superior in those qualities which are demanded in the higher walks of art.

Something may be said on the process in making these fac-similes. It is a new idea, and Mr. Creeny demands our best thanks. But the heel-hall process, although showy, is liable, on account of the waxy nature of the material, to obliterate details of fine work, and also to take away from some of the precision of the larger parts. The finest rubbings we have ever seen from brasses have been executed on highly-glazed tissue-paper, with black lead mixed with linseed-oil, and applied by a rubber of wash-leather. Even when badly done, it gives more exactness, and is the *only* process where reductions are required for engraving. A rendering by the photo-litho process, here adopted, from rubbings done in this manner, would, especially in delicate details, make a very complete and satisfactory result, and it may suggest itself to others for the publication of such fac-similes as are here presented, many of the fine examples of Flemish and other brasses in England as yet unrecorded, or so imperfectly as to be behind the requirements of our time. The text of Mr. Creeny's book is full of interesting matter, very carefully put together, and showing a good deal of research, and the work commends itself as the only one on the subject.

NOTES.

IF any doubt prevailed as to the existence of a depression or uncertainty, such as has not been known in this generation, it would be at once dispelled by the enormously long list of country houses and properties to be disposed of, as shown in the columns of a recent issue of the *Times*. Look at it how we will, it is a most unsatisfactory testimony to the stagnation of trade, the decline of agriculture, and the loss of confidence that have so peculiarly characterised the last two or three years; and if, Asmodeus like, we could peep into the interiors of the various mansions, a pitiful tale of ruined fortunes would be disclosed. A noteworthy feature at the present time is the unusually large number of estates and houses of antiquarian or historic interest, though it is to be feared that the old associations will not add much to the sale price. Scotland figures rather prominently in the catalogue, the principal estate being that of Fyvie Castle, Aberdeenshire, in which Edward I. is said to have spent a night in 1296. It is built in the form of an L with three towers, of different dates, and called respectively the Preston, Meldrum, and Gordon Towers, the ancient

entrance being between the two first, flanked by round bastions. The Preston tower was built in 1390, when the estate came from the Lindsays to the Prestons, and on its summit is a statue of the Trumpeter of Fyvie, which is the subject of a well-known Scotch ballad. The Meldrum tower was added by Alexander Seton, who was made Earl of Dunfermline by Charles I. in 1596, and the Gordons subsequently erected the third tower in 1726. Like more than one Scotch castle, Fyvie possesses a chamber of horrors, which is walled up, from a tradition that indefinite trouble will ensue to the family whenever it is opened. Dunecht Castle, in the same county, is also for sale. It is a fine baronial structure, but with no traditional interest, although in the grounds is the most perfect ancient fortress in Scotland, with ramparts as regular as masonry. A third place is Mingary Castle in Argyllshire, which belonged to the M'Fians, Lords of the Isles, and where, in 1493, James IV. held his court to receive the submission of the island chiefs. The castle is not habitable, but the property around is valuable for its minerals. Kelbe Castle, near Arbroath, is also in the market, —but it is modern, and has no traditional interest.

IN Kent, Hall-place, near Bexley, and on the Cray River, is advertised. For many generations it was the residence of the Halls, the last of whom died in Edward III.'s reign, after which it became the property of Lords de Despances, who devised it to Francis Dashwood in 1781. The house has some fine architectural features, in the shape of a banqueting-hall and picture-gallery. Bower Hall, near Steeple Bausstead, in Essex, is a fine old house of Queen Anne style, which was restored in 1710 by the late Sir Henry Bendyshe, bart. Llantarnam Abbey, in Monmouthshire, is a beautiful Tudor building, erected by Wyatt in 1837, on the site of the ancient Cistercian monastery founded in the twelfth century by Ap Iorwerth, and rebuilt after the Reformation. In Surrey the picturesque ruins of Guildford Castle are open to a purchaser, together with the surrounding estate. As a specimen of a Norman keep, Guildford is one of the most interesting remains in England, but of the outer walls very little remains. The keep tower is about 70 ft. in height, and the walls are 10 ft. thick, cased with chalk, flint, sandstone, and ragstone, the centre being filled with rough unwrought stones, cemented by a strong grouting. The keep is divided into three stories, and one of the chambers in the interior, probably the chapel, has some interesting wall-carvings. For all its strength, it is singular that no stirring scenes of siege or battle are associated with Guildford. Tonge Castle, near Shiffnall, is a curious erection in the Brighton Pavilion style, which, however, does not look so *bizarre* as it might do, owing to the pleasantly warm tint of the new sandstone of which it is built. This architectural creation is due to George Durant, Paymaster of the Forces in 1761, who is said to have made a very good thing of his appointment, and amassed a large fortune. There was, however, a really ancient castle on its site, which was said to be the palace of Hengist the Saxon, —and a minute representation of this old mansion is the subject of a carving over the entrance-gate.

THE election last week of Mr. Burne-Jones as an A.R.A. seems to have caused all the surprise in artistic and amateur circles which it well might cause. The primary surprise is that the Academy should elect Mr. Burne-Jones, who has never, we believe, exhibited at Burlington House, and whose ways certainly are not as their ways, either in his faults or his excellencies. The secondary and larger surprise is that Mr. Burne-Jones should have consented to be elected. His art is sentimental, it is true, and has its full share of the shortcomings incident to sentimentality in art; but it is poetic and imaginative, and what place is there for it among those rows of unimaginative and matter-of-fact works which line the Academy walls every year? Is his election a sign that a

different tone is coming over the Academy exhibition? It is not too soon, though we by no means wish the prevalent tone to be that of Burne-Jones art. We sigh, however, for the poetry of art in some shape, and in one shape at least he can give it us. The election of Mr. Henry Moore, the powerful and learned sea-painter, requires no excuse, save that it is rather late in the day; but why is Mr. Alfred Hunt persistently passed over? Mr. J. W. Waterhouse has certainly good claim to recognition, but by no means so good or of so long standing as Mr. Hunt's. The election of Mr. A. Waterhouse to the full rank of R.A., which has now been accorded him, was, of course, only a question of time.

WE have received authoritative information that the reports which have been circulated (alluded to in our last) as to the possible or intended pulling down of "six, eight, or ten churches in York," are, as we supposed, absurd exaggerations. The scheme set on foot, under the authority of the Archbishop, is one for consolidating and re-arranging parishes with a view to the better working of them, and the utmost that was likely to follow might have been the removal of two churches. At present there is no likelihood of any more than one church being affected; and this from accidental circumstances. The church of St. Crux has been for some time in a dangerous condition, and the question of its removal was under discussion more than two years ago. The Society for the Protection of Ancient Buildings addressed the Archbishop, through their secretary, on the subject at that time; and the Archbishop pointed out to the Secretary that if the Society would set on foot a subscription for some pecuniary help, it would be quite possible to preserve the church. This appeal of the Archbishop's closed the correspondence. Without their aid, however, a considerable sum was raised towards the restoration; plans, &c., were prepared; and the roof of the church was removed. By this time, however, an influential committee of the clergy and principal laity had recommended, with a remarkable amount of agreement, the scheme for the re-arrangement of parishes. Upon this, the Building Committee of St. Crux, finding that under the proposed scheme St. Crux's parish was likely to be united to another parish with a large and sufficient church, whilst they had still a large sum to raise for the restoration, arrived at the opinion that they would not be able to complete their labours. They felt sure that many of the donors would rather not give their subscriptions to the restoration of a church that might not be wanted. Under these circumstances the Archbishop called a meeting of the parishioners of St. Crux, which was attended by a somewhat small number. That meeting came to a resolution that instead of restoring the old Church of St. Crux a smaller church should be erected at a moderate cost on the same site, and the Building Committee were directed to ascertain how far the promised subscriptions would be extended towards this new proposal. The Building Committee met and considered the subject, and it is understood that they resolved that they could not proceed with the undertaking, and that they would have to return the subscriptions. With this one exception, we are informed that there is no case in which a church will be removed. Only two other cases are likely to be dealt with at present, viz. the two St. Mary Bishop-hill Parishes and the Union of St. Mary's, Castlegate, with St. Michael's, Spurriergate. In both these cases the churches will be preserved and kept open. The most effectual mode of keeping a church open, it has been suggested by the ecclesiastical authorities, is in the hands of the parishioners. As long as they attend it in considerable numbers it is sure not to be closed.

THE statue in marble of Darwin, seated, and somewhat over life-size, which was, on Tuesday, formally accepted by the Prince of Wales on behalf of the Trustees of the British Museum, is a fine example of portrait-sculpture, and does credit to the powers of the sculptor,

Mr. Boehm. The overhanging of the brow is somewhat exaggerated as far as actual modelling is concerned, but it does not produce the effect of exaggeration in the actual result, and in the light in which the figure is placed the expression of the head is grand and powerful, perhaps more so than in the original; for artists, stirred by Darwin's fame and greatness, have on several occasions shown their desire to read into his countenance all the expression of power and genius which they think ought to have been there; and certainly, to convey the mind in the face, even more clearly than nature's realistic treatment sometimes conveys it, is a legitimate object of portrait art, whether in sculpture or painting. But the remainder of the figure raises again the question, so often raised by portrait-sculpture, whether a modern man in his habit as he lived (even with the assistance of a great-coat thrown over his knees for sculptural effect) can ever be a satisfactory object of sculptural treatment, and whether a bust with decorative architectural surroundings is not preferable. Here are the shoes in the Darwin statue, for instance; apparently old and ill-fitting shoes (for new boots would not be picturesque), with all their wrinkles and creases cut in the fine marble. Is that what marble sculpture was meant for?

PERILS of fire, as is but too well known, beset the toil of the coal-miner. The last week has shown how he is exposed to the opposite danger,—to peril by water. Not that this is by any means without precedent. The flooding of coal-mines has usually occurred from the same cause that produced the calamity at Houghton-le-Spring on the 3rd current. Water may accumulate in the empty spaces from which coal has been removed; and at times forms vast underground lakes. It often is but too probable that no accurate surveys of these workings exist, and in that case the new works may be carried on in close proximity to an unseen source of terrible danger. The reaction of a shot, or the chance blow of a miner's pick, may give passage to a jet of water which will enlarge its course with portentous velocity, and with no warning whatever. In the present case the first indication of what had taken place was a rush of gas, leading the men below to the conclusion that the shaft was on fire. This was followed by an inpour of water, which rushed through the galleries like a river. In such cases the men are at times swept before the current. In the case of one of the inbursts of the Thames into the Rotherhithe tunnel while in course of construction, Mr. Brunel was thus washed to the bottom of the shaft, narrowly saving one of the most important lives among the "makers" of modern England. In the present case, most of the men and boys underground, numbering some 120, were saved, many of them by the aid of the force of the current; but it is feared that some thirteen have been either drowned or cut off from all hope of escape by the rise of the water. As our coal-fields are rapidly being exhausted, the danger of accumulation of water is on the increase, and the importance of accurate surveys of all old workings, and of their careful study, increases daily.

AT the meeting of the Royal Institute of British Architects on Monday evening last, the large gas-burner, which usually makes the room almost unbearable, was removed, and a ring of thirty-six Swan incandescent lamps was arranged round the base of the dome. These lamps were worked from the engines and plant at the Grosvenor Gallery, from which as a centre Sir Coutts Lindsay expects in a short time to be able to distribute the electric current over a considerable area. The Gouland-Gibbs system of distribution is adopted, and two of their secondary generators were placed in a cupboard on one of the upper floors at the Institute, and the wires thence taken through the dome to the lamps, which were supplied and fixed by Mr. Verity, of Regent-street. The effect was very pleasing, and the difference of temperature from that which ordinarily prevails was most marked, but unfortunately just before the meeting commenced the driving-

belt of the steam-engine broke, so that the light could not be brought into action till nearly nine o'clock, and recourse was had to oil lamps. After the belt had been repaired, the electric lamps were turned on, but as the repairs were very hurriedly executed, the speed of the engine could not be kept uniform, and the lights consequently were not steady. The accident is much to be regretted, as it must necessarily make the Council hesitate before deciding to adopt the electric light permanently; but we should hope the recurrence of such an accident could be sufficiently guarded against.

THE case of Percival v. Dunn, which has been recently reported, is not without interest to those who are concerned with building contracts. A, we will say, lets land to B, to build upon, and in the lease he agrees "to make advances to the lessee for enabling him to roof in the messuages . . . in such sums and at such times as the said A shall certify in writing." B finds that he owes various accounts. Among others, he owes C some money for goods supplied, and accordingly he gives him the following note:—"Dear sir, please pay Mr. C. the amount of his account, 42l. 14s. 6d., for goods delivered at Park, and oblige.—B. To Mr. A." When A receives this note from C he refuses to pay the account, and C accordingly sues him for it on the ground that the note constitutes an equitable assignment of a part of the advances which he agreed to make to B. But the Court held that this note was no more than a "mere civil note by the writer, asking some one else to pay his creditor, and conferring no manner of right" against A, not constituting an equitable assignment, since it did not assign, in so many words, any fund, or any part of a particular fund. It is therefore necessary that persons who take such notes should be careful to see that they are worded accurately and clearly. If a moral is to be drawn from this case, we should say, spend 6s. 8d. on a lawyer, who will draft a note for the debtor to sign, and then you will have the money you require safely assigned to you.

IT is not improbable that an attempt will be made to place the whole of the theatres and places of public amusement in the metropolis under one jurisdiction. The Lord Chamberlain has intimated to the Metropolitan Board of Works that he will not be indisposed to relinquish his jurisdiction over theatres provided the Board will take powers to include in their supervision the music halls and other places of entertainment within the metropolitan area. This appears to be a step in the right direction. The Metropolitan Board has been for some time past the inspecting authority with regard to theatres, the Lord Chamberlain referring all matters of construction to the decision of the Board, and it seems desirable that the inspecting and licensing power should be vested in the same authority. At the present time the only means at the disposal of the Board to enforce compliance with their requirements is by summoning the offender before a magistrate,—a cumbrous and generally unsatisfactory procedure, which would be rendered unnecessary if the licensing were in the hands of the Board. The Lord Chamberlain proposes to retain the censorship of stage-plays, out of which his control of theatre buildings has arisen, and the public will probably not be disposed to grudge him the continued exercise of this "little brief authority."

THE Pergamene marbles have recently received an important addition, in the shape of a slab with the figure of a wounded giant, of very sensational appearance. The Turks seem to have been struck with the value of the slab, for they made great efforts to secure it for the Constantinople Museum,—efforts happily frustrated, though with much difficulty, by Berlin. The slab represents a giant falling towards the right, his mouth wide open, his face distorted with pain, his hair wildly dishevelled. Instead of fingers and toes, his feet and hands end in powerful eagles' claws, a new feature in the fantastic composition of giant figures. He

is winged, and ends in snake-coils, like so many of his brothers. The slab acquires additional interest from the fact that it joins on to the so-called Latona slab. In the garment of Latona two deep indentations have long been observed. Into these indentations the claw of the giant accurately fits. Undoubtedly he was the opponent of Latona.

FROM Rome we hear that an interesting monumental tomb has been discovered on the left of the Via Salara, a short distance outside the gate. The top of the tomb was struck 7 ft. 6 in. below the surface; it is a large circular monument 117 ft. in diameter; and, judging from the remains of the decorations, it must have been a striking object on the roadside. Fortunately the inscription is preserved; it is in beautifully-cut letters, once filled in with red colour, on a block of white marble 17 ft. long by 3 ft. 6 in. high, and reads as follows:—

V. M. LYCLIVS. V. M. F. SCA. PAETVS
TRIB. MILIT. PRAEF. FABR. PRAEF. EQVIT
LYCLIA. M. F. POLLIA. SOROR.

The marble cornice above the inscription has disappeared. The tomb is faced with travertine stone, with grooved joints, like the tombs of Cecilia Metella and the Plantii; and although a great portion of the travertine cornice has been taken away previous to the tomb being buried, fortunately enough remains on either side of the inscription to show what it was like. At present only as far as the base of the inscription has been cleared, but the proprietor is digging, and intends excavating the whole of the tomb.

FROM the *Philologische Wochenschrift* we learn that at Akraiphia, in the district of Thebes, a fine statue of Apollo has been discovered, which, according to present report, belongs to the best period of Greek sculpture.

THE works required to be done to the Sir Paul Pindar Public-house, 169, Bishopsgate-street Without, which had been reported to the City Commissioners of Sewers as a dangerous structure by Mr. E. Woodthorpe, the District Surveyor, were reported to have been completed at the fortnightly meeting of the Commissioners held on the 3rd inst., and there would appear to be a chance that this picturesque building may remain for some short time longer.

WE commented before on the injustice that would be done to Mr. Seddon if the completion of his remarkable building at Aberystwith were entrusted to other hands than his own, as was at one time intended. We are glad to learn that this matter has been reconsidered, and that the Council of the College have graciously made up their minds to appoint Mr. Seddon architect for the completion of his own building.

AT Messrs. Dowdeswell's, in New Bond-street, is at present to be seen a very interesting collection of the work of M. Rajon, the eminent etcher. This includes not only a considerable number of his etchings from well-known paintings, but also examples of his work in oil painting and crayon, mostly portraiture, exhibiting a remarkable versatility of talent in the handling of various methods and materials.

FROM a local monthly magazine, published at Windsor, we learn that there is prospect, at an early date, of some much-needed sanitary improvements being carried out in one or two of the worst lanes of the town, especially Bier-lane, which is described as "a dark blot upon a Royal borough, such as Windsor." Attention was drawn to the unsanitary and discreditable state of portions of Windsor in the *Builder* a good many years ago, and we believe the Rev. A. Robins, the Rector of Holy Trinity, Windsor, has been constantly agitating on the subject, and it appears that at last something is to be done.

THE eighth annual report of the Society for the Protection of Ancient Buildings is an amusing, though somewhat melancholy, record of childish and captious criticisms against everything that everybody proposes to do to any old building anywhere, intermingled with amusingly naive confessions of the indifference with which their remonstrances were received, and the occasional pretty direct snub they encountered. What state of things is dear to the mind of the "Anti-scrapes" is indicated in a doleful wall addressed to them by a sympathiser at Packwood, Warwickshire, and printed with obvious approval, in which the writer feelingly laments the loss of the old church, "its broken floor, stained walls, old mural tablets . . . the pews grey with age, the windows mended with glass of every tint," &c. It seems nearly incredible that any set of people should actually and seriously consider it a sacrilege to build a new church when the old one had come to that state; but that is the state of the "anti-scrape" intellect, apparently.

ARCHITECTURE AT THE INVENTIONS EXHIBITION.

ALTHOUGH Group III. of the Exhibition is described in the official catalogue as consisting of "Engineering Construction and Architecture," it can scarcely be said that architecture is adequately represented. The real architectural department is the Old London which Mr. Birch's skill has called into being, and which proves more attractive and charming than ever.

Lord Templetown contributes (226) a "Plan and Model of Labourers' Cottages," showing careful study of a difficult problem and a real desire to ameliorate the condition of his poorer brethren. These cottages have been erected singly, in pairs, and in rows, upon his lordship's Irish estates, and possess many noteworthy features. The ground plan comprises an entrance-porch, a good-sized living-room, two sleeping-rooms, a scullery, and outbuildings for fuel, dust, and other necessary uses. The living-room is carried up to the roof; but above the ground-floor sleeping-rooms an additional sleeping-loft is provided open to the upper part of the living-room and warmed in part by its fire. It is evident that this apartment would receive with the warmth from below much impure air, and the arrangement is one which calls for special means of ventilation, which are not shown to be provided. It would undoubtedly be an airy sleeping-place, and with a little care it could be made a fresh-air one,—that is, if the labourers on Lord Templetown's estate are unlike all other labourers and set store by that commodity. Adjacent to the living-room fireplace is a closet contrived for drying the labourer's clothes when he returns wet from his work, the steam therefrom being taken off by a fine specially provided for the purpose. This would be a real advantage not only to the labourer but to his family, and shows a carefulness as to their welfare which calls for gratitude. If, as the farmer said at the rent dinner, "All landlords 'ud do as this one do they wouldn't so many on 'em do as they do do"! We heartily appreciate the efforts which this considerate landlord is making in behalf of his dependents, and would suggest that a second window in the living-room would make it both more cheerful and more wholesome, and that the assistance of a professional architect would, with the same expenditure, lead to a desirable improvement in the somewhat cold exterior aspect of these otherwise excellent dwellings.

Mr. Arthur Baker exhibits (291) what is described as "Model of Church, showing method of carrying Central Tower," though no model is to be seen. There is a series of very interesting drawings,—four plans, four perspective views, and two small sections. The object is to provide for the support of a central tower, while dispensing with the customary angle piers, which obstruct the view, and by the undue attenuation to which they are subjected on this account frequently prove too weak for their burden. Mr. Baker's plan consists in hocking up with a solid wall one bay of the nave arcade on each side, and turning longitudinal arches of wide span from these solid bays to companion shutments afforded by the chancel walls.*

* This is only carrying a 14-ft. span, in fact, the expedient adopted by the Normans at Tewkesbury and elsewhere.

From the haunches of such arches the tower walls would rise. The section suggests a somewhat slippery pose for so heavy a mass; but criticism is disarmed in presence of the fact that the arrangement advocated has been carried out by the inventor in his church at Llanberis with complete success. A table shows the relative obstruction to a view of the pulpit by the new and the old method to be respectively '02 and '25, and that without a central tower the ordinary church plan obstructs the view to an extent represented by '17. The designs by which Mr. Baker illustrates his proposals are in excellent taste, and the only fault we have to find with his scheme is the interruption of the series of nave arches, which cannot, we think, be pleasing or artistically satisfactory.

Mr. Ingress Bell shows, by a well-executed model in plaster (392) one pavilion of a proposed military hospital for a hot climate, which he has worked out upon a principal devised and advocated by Major-General Sir Andrew Clarke, R.E. The drawings of this building are being exhibited at the Royal Academy*; but a general plan is appended to the model, and shows an important and elaborate scheme. The point of the whole is the adoption of the circular form ward, the complete isolation of the accessory services, and the defence of the roof and enclosing walls from the direct rays of the sun. The circular form of hospital ward is growing in public favour, and examples of its use may be seen at Greenwich, Hampstead, Burnley, Seaford, Graveyard, Antwerp, and will soon be seen in evidence at Hastings, where Messrs. Keith, Young, & Hall have, we are informed, a hospital on this system in contemplation.

These three exhibits may be said to exhaust the list of those which come under the head of architecture. Of building materials,—constructive, decorative, and otherwise,—there is no lack. Concrete building is copiously represented, and it is evident that this form of construction is exercising the ingenuity of many minds.

Mr. G. H. T. Beamish, A.M.I.C.E. (238), shows an improved method of construction with concrete or other blocks, arranged in such a manner as to admit of vertical settlement without lateral derangement. The blocks are cast in I and T sections and are arranged to interlock. There is no longitudinal bond, but the resistance to cross strain is considerable. It is not stated whether the plan has been tested in practice, but there seems to be no reason why, with certain precautions, it should not be effectual under particular conditions.

Another form of concrete construction for ordinary occasions is shown by Messrs. Frank & James P. West (275), who construct thin slabs of fine concrete, which, when set edgewise on the outer and inner faces of the wall, and keyed to its body, take the place of the movable wooden boarding used by Mr. Tall in his original system of concrete building. The slabs in question are about 1 ft. 6 in. long, 1 ft. high, and 1½ in. thick, the inner one would be roughened for plaster, or left smooth and painted. The cost of the slabs would be about 1s. 6d. per square yard. The chief recommendation urged in favour of concrete building is its reduced cost, but it is doubtful whether in walls of 1 ft. 2 in. and less thickness, the saving would be at all considerable. Messrs. West's plan would make a good wall, quite impervious to moisture, and very durable; and as the facing slabs may be self-coloured in various tints, the possibilities of a pleasant arrangement of coloured surfaces might, in skilful hands, be turned to good account.

The Croft Adamant Co. (272) send specimens of enriched mouldings, friezes, and plaques, of good character and design. Granite chip-pings are the basis of the material, which is said to be hard enough for paving, and yet may be sawn and cut with a chisel; non-absorbent; capable of being made in any size and shape; and cheaper than York paving.

Homan's "Simplex" fire-proof flooring (277) is a variation of the ordinary concrete floor with rolled joists imbedded therein, the peculiarity of which is the possibility of nailing the floorboards directly upon the concrete. This would certainly give a damp-proof and firm flooring, and would no doubt possess many advantages over the common hollow and unsatisfactory construction. The under surface would be roughened as a key for the plaster; lathing and rendering

* Some illustrations (including plans) of the proposed building were given in the *Builder* for May 9 last.

would be saved; and, from the absence of resilience, the ceiling would be less likely to crack or fall than is now unfortunately the case. Inventors are, as a rule, not sufficiently explicit on the question of cost. In this case it is said to be "about" the same as the ordinary construction; but it is probable that the excess of cost would, in fact, be sufficient to render its adoption in ordinary cases impossible.

The patent Myconian Marble Company (271) have an attractive exhibit of a sort of improved scagliola, in which various marbles are imitated with varying success. The prospectus is as florid as the "exhibit," and neither is in the very best taste. A neat little compliment to "modern architects" who are said to be "not less artistic than those of the time of Pericles" is judicious, perhaps, if not strictly true. Every virtue is claimed for the patent Myconian marble. It would answer for music-halls and restaurants, and certainly has some advantages over the fashionable wall tiling used for such purposes.

Of inventing sash-fasteners there is apparently no end. A great variety is here presented for the perplexity of the curious visitor. They are all very good, and it is hard to say which most perfectly fulfils its object. Gardner's patent, No. 298, is certainly amongst the best. The scientific burglar, as he walks the show and listens to the artless tales of the inventors of these articles, must smile at the confidence which they profess as to the certainty with which gentlemen's endeavours will in future be frustrated. He is generally credited with no ideas beyond the slipping of a knife between the meeting-rails, and if this manoeuvre can be foiled, the inventor is satisfied that his victory is complete. With what a bland expression of face would the late Mr. Peace have listened to these simple souls, and how gratefully would he have congratulated them on their successful ingenuity!

Various also are the devices for hanging the modern gullotine sash and for removing the same for cleaning it from the inside. Mr. John Carter's patent (290) balances the one sash against the other, and so dispenses with our old friend the "deal-cased frames." By removing the inside head, which is screwed to the frame, the sash can be removed, as the inventor deftly illustrates to all who will oblige him with their attention. Many incidental advantages are claimed, and if they do not all of them strike an outsider so forcibly as they appear to strike the inventor, they are, nevertheless, numerous enough to encourage architects and holders to a trial of his sash.

Messrs. W. B. Simpson have a tasteful little stall (276) showing the applicability of their decorated enamelled plates to ceilings and walls, and very pretty, very cheap, and very clean they are.

One of the most interesting exhibits is that of Mr. George Bower, of St. Neots, who shows a variety of metal articles (198), both useful and ornamental, treated by the Bower-Barff process for preventing rust, a treatment which has proved entirely successful and ought to become universal. The castings are well designed and of excellent quality.

Before closing our remarks, we would observe that a diligent examination of the various prospectuses which it has been our duty to peruse leads us to the conclusion that there is an opening for young gentlemen of literary talent and aspirations in the compilation of these very useful documents. An invention may be recommended to notice or made ridiculous by the terms in which it is brought before the public. The statement about it should be short and clear,—should not be ahead of the facts,—and, above all things, should not "verge on the poetical." We have, however, noticed that these pretty leaflets sometimes fall in almost every essential: they are diffuse, vague, outrageous in the claims they prefer, and sometimes unintelligible. A sanitary building block is said to "possess artistic features of the nicest exactitude and truth," that it "combats the ravages of the elements," and, moreover, that its durability is greater than that of stone, "having less weather-resisting properties!"

Another glowing eulogium awakes in the reader slumbering memories of "English as she is spoke," claiming for a certain decorative material "all the hygienic qualities previously referred to for themselves." We abstain from illustrating this matter further, merely suggesting that a Saturday Reviewer might find in a chance collection of these little pamphlets matter for an amusing article. But, seriously,

the inventor who spends a hundred pounds or so on a patent, and who is not necessarily as skilful with his pen as he is ingenious in contrivance, might do worse than lay out a guinea in the employment of a scholar to set down with as much modesty as cunning the real advantages of the inventor's achievement.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

PRESENTATION OF THE ROYAL GOLD MEDAL TO DR. SCHLIEMANN.

The last ordinary meeting of the session was held on Monday evening, Mr. Ewan Christian, President, in the chair.

The decease was announced of M. Théodore Ballu, of Paris, Hon. Corresponding Member. M. Ballu was one of the eight Architect Académiciens, and won the Grande Prix de Rome in 1840. He was known to have restored several Mediaeval churches, but would be best remembered as the architect of the Trinity in the Place de Chausseé d'Antin, and as joint architect with M. Deperthes of the Hôtel de Ville, Paris.

Several donations of books, together with money donations, to the library were announced.

Professor Kerr submitted a proposal for conducting the higher operations of the Institute by means of four standing committees, taking charge respectively of four departments,—of Art, Science, Literature, and Practice,—and asked the Council to appoint a special committee to consider the question during the recess. He said,—In the stately language of our Charter of Incorporation, there is assigned to us as a primary duty "the advancement of civil architecture" as "an art esteemed and encouraged in all enlightened nations"; every thing short of this supreme purpose is but the inconceivable commonplace of daily maintenance, the narrow things of the house. I submit that we are chargeable with having forgotten this duty. True to an instinctive feeling, the profession, both within and without, has of late years manifested a certain uneasiness in consequence. Hostile critics have gone so far as to tell us, if with sarcasm, not without sincerity, that we have permitted ourselves to degenerate into a trade union. This, at any rate, we have had sufficient spirit to deny; but certainly it has to be acknowledged that we are at this moment contemplating, under pressure, material reforms in our constitution. The recommendation I beg leave to offer is in direct harmony with this accepted movement. I presume to think that it will not be enough to introduce, in accordance with the spirit of the age, a more liberal or more popular administration for our corporate service; but that we ought to seek to discover also some broader basis for our organisation at large, whereby to facilitate the performance of those public functions which attach to the imposing name we bear, and to the glorious traditions of historical art and science which we therefore represent in this great nation and this great age. The academical work of the Institute to which I refer may be classified, of course, in various ways; but I think one of the most convenient forms of departmental division may be this:—(1) *Architectural Art*, the province of Taste; (2) *Architectural Science*, the natural philosophy of Building; (3) *Architectural Literature*, past and present; and (4) that miscellaneous field of private business which is commonly designated by the phrase, *Architectural Practice*. My proposal goes far enough if it goes no farther than this,—that these four departments of the higher work of a Royal Institute of British Architects should be carried on systematically by means of special machinery. For the sake of a little more completeness, but without going into detail, I will suppose that the Department of *Art* might accommodate archaeology also; that the Department of *Science* would be concerned not with construction only, but with all scientific problems which affect building operations; that the Department of *Literature* might deal with the Library, and perhaps conduct with advantage a certain portion of our foreign intercourse; and that the Department of *Practice* would not exclude the important and somewhat neglected province of professional etiquette and *esprit de corps*. Perhaps it might be matter for debate if I were to rely upon the principle in the abstract, that the most effectual mode of dealing with such great

public aims as I have indicated is to enlist the energies of the many rather than the few; but I may at any rate claim special consideration for such a policy in our own case, when I ask you to bear in mind that in the everyday exercise of our profession we are all so habitually engaged in the transactions of important affairs that no class amongst us, and, indeed, no individual, can be supposed incompetent to participate in the public service of the guild. For, indeed, there is no other profession whose practitioners, as I have often ventured to say, so efficiently combine the qualifications,—sometimes antagonistic in their essence,—which spring from the cultivation of the graceful accomplishments of art, the severe logic of science, and the worldly wisdom of business. Permit me to suggest further, if only as the conclusion drawn from my own experience within these walls, that it is to the great mass of the members that I would entrust the cause of progress, and not to those alone in whose riper years repose has taken the place of enterprise. I beg leave to suggest, therefore, that it would be expedient to appoint, through the Council, on a comprehensive and representative basis, a special committee of inquiry, to consider during the coming recess the general question of the organisation of the Institute for its higher work in what our charter calls the *Advancement of Architecture*. Personally I am of opinion that the best organisation may be found in the judicious employment of departmental committees for art, science, literature, and practice respectively, each having its own honorary officers and its own departmental action, and each, being under the necessity therefore of accounting for its stewardship. Whether such an organisation should be established upon the simple principles of the existing by-laws, or upon any improved system to be introduced into the proposed supplementary charter, it is not now necessary to inquire. Neither is it worth while at present to discuss the scheme of departmental classification which I have tentatively suggested. Nor would it, indeed, be desirable to lay down beforehand any precise line of investigation. All I propose is that the investigation should be entered upon; and I am bold enough to believe that the conclusions which would be arrived at, applying directly, as they necessarily would, to the question how to exercise the more elevated functions of a national architectural guild with dignity and efficiency, might at the present moment do more than anything else to enable the Institute to command the confidence of the profession and of the public.

The President promised that this should have the consideration of the Council.

The President then rose to present the Royal Gold Medal to Dr. Henry Schliemann, F.S.A., Hon. Corresponding Member, who attended for the purpose of receiving it. The President said:—Dr. Schliemann, the medal which I am to have the honour of presenting to you this evening is the highest distinction in the power of the Royal Institute of British Architects to bestow. It is given by our Patron, the Queen, but her Majesty entrusts to us the task, sometimes a very difficult one, of deciding, subject to the Queen's final approval, on the man most worthy to receive it. I say that it is sometimes a difficult task, not from paucity of men, but rather the contrary, because this Institute, having always taken, as I think wisely, a catholic view of its responsibility, has included within its scope of vision not only architects, archaeologists, and men of science at home, of whom there is no lack, but has also looked widely abroad, and invited to share with their brethren here of like pursuits with themselves the noblest and best amongst the learned men on the Continent of Europe. In the roll of Gold Medalists will be found the honoured names of men of Italy, of France, and of Germany,—great architects, learned writers, and archaeologists; and this Institute is proud to associate with that of the great Assyrian explorer, Austen Henry Layard, the now world-renowned name of Henry Schliemann. In you, sir, this Institute recognises not only the indomitable explorer, but the earnest student of the arts of past ages,—one whose youthful imagination, having been fired by the grand story of the great poet of antiquity, has shown so powerfully that noble enthusiasm which "scorns delight and lives laborious days," that dogged pertinacity so delightful to all true Englishmen, which, having once fixed the mind on the performance of an arduous

task, never wearies until it has been finally accomplished. Few things that I have read of late years have interested me more keenly than the simple tale of early struggles in the pursuit of knowledge under difficulties which you, sir, have given so freely to the world; a history of obstacles met only to be vanquished,—of determination to learn, under all circumstances, however disadvantageous, everything that could aid you in attaining what you have made the object of your life, the solution of the long-veiled question as to the existence and position of ancient Troy. It is a story such as in these days of luxury and self-indulgence deserves, for the admonition of our youth, to be written in letters of gold,—one that would teach them, if anything would, that success, to be real, must be the product of resolute hard work, and that nothing is denied to well-directed labour. That indefatigable industry such as yours, employed in the pursuit of commercial enterprise, should result in the acquisition of wealth is no uncommon thing; but that that wealth, so laboriously and honorably obtained, should without stint be freely expended on the realisation of the early aspirations of enthusiastic youth is a very rare and noble thing, and a most valuable lesson to all who are wise enough to ponder, or have the generosity to practise it. I will not venture to detain you, sir, or this meeting, by speaking in detail of the great work you have been able to accomplish towards settling the controversy to which I have already alluded, which has so long occupied the minds of many learned men like yourself Homeric enthusiasts; a controversy resulting in conflicts almost as dire as those we read of between the Greeks and Trojans of old. Your labours in this direction, and in the discovery of the Homeric tombs at Mycenae, with the wealth of gold and bronze ornaments which were then brought to light, and your exploration of the remains of the Treasury of Orchomenos, have added a new chapter to the artistic history of Greece, the full value of which has perhaps not even yet been realised by archaeologists, but the importance of which can hardly be over-rated. Of your labours at Tiryns, and the discovery, within the circuit of its well-known and long-celebrated Cyclopean walls, of the pre-historic palace, possibly older than anything at Mycenae or Troy, but still retaining its wall-paintings and decoration, we know enough to make us look forward with lively interest to the publication of your forthcoming work, which we cannot but believe will add to the fame you have already acquired, as one of the most liberal, undaunted, and successful labourers in the investigation of the un-revealed history of the past which this century has produced. Sir, I congratulate you very truly and heartily on the success you have attained, and with all humility, and yet with pride, rejoice to be the medium of presenting you with this medal, the well-earned acknowledgment of the distinction you have so honorably acquired by your disinterested labours. (The President's remarks were received with much applause.)

Dr. Schliemann, in reply, said:—Mr. President and gentlemen, I receive with profound gratitude the Royal Gold Medal, and am exceedingly proud of it; the more so as it is conferred upon me by her Majesty the Queen, at the solicitation of the Royal Institute of British Architects, and because this most distinguished body more than eight years ago elected me a Corresponding Member. I feared at the time that this high distinction was quite undeserved, but nevertheless I felt very much honored by it, and have done ever since everything in my power to show myself worthy of the office. Not being able to accomplish this by new inventions in modern architecture, which British genius has brought to the highest pitch of perfection and excellence, I thought I could not do better than to use my pickaxe and my spade to make some new discoveries in the architecture of the Homeric age, and to solve the architectural problems which had puzzled the wisest architects of all ages. In fact, our knowledge of the prehistoric architecture was very deficient, our sole informant being Homer, whose scanty information regarding the construction and the internal arrangement of the Heroic palace, was open to question. But I venture to hope that my discoveries and excavations of the great prehistoric palace of the ancient kings of Tiryns, the galleries in the walls with their eleven large ogee-like chambers, and the three chambers we have lately discovered in the

towers, will contribute greatly to explain to us the Homeric description. Mr. President and gentlemen, I beg you once more to receive the expression of my profound gratitude. (Dr. Schlie-mann resumed his seat amidst loud and continued applause.)

The President then presented the various prizes to the students and others who had won them.

The Pugin Travelling Student, Mr. William Henry Billake, B.A., received his Medal, together with the sum of 50*l.*, at the completion of his tour, and only after depositing his sketches, &c., made during the tour. A similar rule applies to the holder of the Godwin Barsary, Mr. Bradshaw Gass, Associate.

Two medals of merit, in connexion with the Pugin Travelling Studentship, were awarded, the recipients being Mr. Herbert Oshorn Creswell and Mr. Thomas Maclaren.

The Soane Medallion, with 50*l.*, to be afterwards paid under the usual conditions, was awarded to Mr. Arnold Bidlake Mitchell. In presenting the medal the President said that the work done by Mr. Mitchell had been of the most creditable kind, being a design for the best description of municipal mansion. The plan was a most excellent one. There had been a good deal of heresy lately as to the desirability of one man designing the plan and another the elevation of a building, but unless a man, when designing his plan, could see the elevation he was going to produce by the combination of his arrangements, he was only half an architect.

In the competition for the Soane medallion, two medals of merit were awarded, the first to Mr. Alfred Arthur Cox, and the second to Mr. John Thomson.

The Tite prize of 30*l.* and a certificate were awarded to Mr. John Archibald Campbell.

The Institute silver medal with ten guineas, for measured drawings, was taken by Mr. Ernest Albert Coxhead. It is usual only to present two medals in this competition, but such excellent drawings had been submitted that the Council had decided on this occasion to present four medals and one certificate of honour. To Mr. James Cromar Watt a medal of merit and ten guineas were therefore awarded, while Mr. John Holmes Greaves and Mr. Arthur George Adams took medals of merit, and Mr. Thomas Locke Worthington a certificate of honour.

Mr. Charles Barry then formally asked the acceptance by the Institute of a portrait of Mr. Horace Jones, painted by Mr. Frank Holl. Mr. Jones, he said, was one of their oldest as well as most honoured members, and was, he believed, one of the original few who really founded the Institute. He went abroad in 1841, accompanied by men of his own age, and whose names, like his own, had since become famous. His early career was a successful one, one of his first known efforts gaining the competition for the Town-hall and Law Courts at Cardiff, followed by a great many works of varied character.* In 1864 Mr. Jones was appointed to the honourable office of Architect to the Corporation of the City of London, which office he had served with distinction and credit, leaving his mark on several very important buildings. The present handsome roof of the Guildhall was due to Mr. Jones, replacing a flat and unornamental ceiling by a work of great merit. The same might be said of the new library at Guildhall. Mr. Horace Jones would also be known to posterity by the long line of markets, which were thoroughly well conceived, and had become models for markets all over the world. One of his most recent works was the great Council Chamber of the City of London, which was of very distinguished merit. Mr. Barry also touched upon Mr. Jones's large and successful experience of compensation and valuation cases, and his connexion with the acquisition of Epping Forest. The number of subscribers to the portrait fund was 124; the list was still open, and would afford the opportunity for making a more tangible present to Mr. Jones. Mr. Barry added that Mr. Holl had expressed his interest in the work of the Institute, and he would ask them to enrol that gentleman amongst their Hon. Associates.

The President, in accepting the portrait, referred to the fact that Professor Hayter Lewis, Mr. Horace Jones, and he were the only survivors of a party of friends who, forty years ago,

* Among his principal early works may be named the Surrey Music Hall (afterwards destroyed by fire); Mansion, Caterham Park, near Reading; the Telegraph Office, Threadneedle-street; and the Sovereign Life Office, corner of Piccadilly and St. James's-street.

trudged across the Campagna, and studied together the great works of Rome. The portrait did not exactly portray the young figure which he remembered then, but it gave the same face, though with the body of the substantial City magnate, which had accompanied him through life as his very good friend.

Mr. Atchison, A.R.A., next proposed a vote of thanks to Mr. Holl, which was carried by acclamation, and responded to by the recipient.

Mr. Thomas M. Rickman, F.S.A., Associate, then read a paper entitled "Professional Lessons from a Boulder: a Plea for Geology as Part of an Architect's Education," of which the following is an abstract:—The author described a particular boulder on the beach of Cardigan Bay, near the old Castle of Criccieth. This boulder, besides having been split, had been roughly shaped by Nature, had been weathered, coloured by the salt and spray, the lichen, the moss, and the sea-birds. It was there to tell many things; for all form and all colour, too, were history, if we would but read it. Should it be said that the mere outline of a stone could but give results, whilst the outline of a building reveals a purpose, the objector might be reminded of the form of every shell found in stone as adapted to the continuation of the species of animal once inhabiting that shell. The series of outlines, all to scale, parallel to the hinge-joint of a hivalve mollusc, and not less the continuous lines radiating from the hinge, the same in infancy and through later stages of growth, every one of them was the development of the meaning of the form, like the delicate mouldings of a mullion curving through tracery.

Let any architect study for awhile the serried outline of such a shell, with every change of form and size in its life's history marked in the clearest manner, and he would learn a lesson in the adaptability of curves and shapes which would bring him back to the design proper for his mouldings, should he ever have been tempted to go astray. So, again, should he compare the devolution of allied genera, in the matter of form, according to climate and life environment, he will come back, not un instructed, to the use of his timber, brick, sandstone, limestone, marble, iron or granite, but with the feeling that he has picked up ideas which will be his business to turn to good account. By studying the forms of orthoceras, ammonites, and such newer births of geological time as the nautilus; by taking note of their mode of growing straight or curved, or in coil, open, close, or involved, the outward form always corresponding with the position of the internal air-channel, the early year's growth of the individual still seen in the eye of the perfect and full-grown volute, the nodule shown in which the internal coil bursts into the wide outer rim, the last formed aperture appearing in the natural termination of the antecedent convolutions, the professional aspirant would come back to his task of designing any curved architectural form with his eye refreshed by the sight of outlines full of meaning for him, and would not dare draw for the purpose of execution in stone, in wood, or in plaster any unmeaning shape. Let the architect contrast the elements of form to be seen in the bivalve shell and its hinge with those exemplified in the nautilus on the one hand, and with those to be found in the multicellular shell on the other, and he will not fail to recognise distinctions of principle as great as can be traced in Classic architecture of the most trite style, or in Gothic, the most arcuated. Nature's mode of working, said Mr. Rickman, was not like the plasterer's zinc mould horsed upon a straight-edge. The mould which shaped the shells was the soft pulp of the living animal in its perfect state, and repeated ever with more and more significance, and with a set of different sections, but all fitting the mould. And from such studies of nature the architectural instinct would come back to the examination of an antique building, and would penetrate the purpose of the designer. That purpose would be divined from the privacy of the dwelling, the indispensableness of the castle's inviolability, the worship celebrated in the church. The problem would be studied in the light of the proved political condition of the country, the cleanliness or filthy habits of the population, the current modes of offence and defence, the depth of the people's devotion. All these helped to clear up the architect's aims. The history of a country was more to us than dates and names, and so the metamorphosis of an orthoceras into a nautilus conveyed

to the mind ideas far greater than those of mere changes in stratification. To an architect the study of these changes revealed the growth of motive and the history of form. Such researches made him an engraver of the annals of his race. By seizing on the clues thus furnished by Nature the course of architectural style would follow in the footsteps of political and race history, and architectural forms would tell of the religion which had influenced the lives of the profession and its clients. Progress or retrogression in our buildings would be the test of the education of the time. Whereas stones were mostly shaped by forces which it is the architect's business to control, the history of a boulder might help architects, not only in the criticism of old buildings, but of their own works also, and so help in the formation of a really original style. The essayist urged that natural sciences, and especially geology, might fill the place for an architectural curriculum of the study of a dead language. Geology and language were each to be valued as a phase in the delineation of thought, of purpose, and of mind,—language for the man of the day, geology for the architect, whose works were to tell to later eyes their own stone history.

In the discussion which followed,

Mr. P. Anson proposed a vote of thanks to Mr. Rickman. To the geologist whose mind was full of his subject, every stone was fraught with a wonderful history, and the lecturer had applied some of the lessons he had learned to the science of architecture. He would like to call attention to one piece of architecture which illustrated the history of past times, viz., the Temple of Serapis at Pozzuoli. Those who saw its stately columns could read the history of the extraordinary geological and volcanic changes which had taken place in the neighbourhood. These columns had evidently been from 15 ft. to 20 ft. below the sea, as the shells were embedded in them. The stones had been raised and sunk several times, and a history of these changes would be found in Sir Charles Lyell's works.

Professor T. Roger Smith, in seconding the vote of thanks, drew attention to the literary quality of the paper, which had struck him as being of a very high order. He had had the opportunity of reading the paper and of trying its methods, and he would like to recommend to those who sometimes attempted to analyse ancient or modern buildings, some of the suggestions which had been made as to the questions to put to a building with the view of getting such answers as might reveal a little of the mind of the designer and the skill of the constructor. He had lately tried some of these upon a famous London building, with results which, if there were time, he would put before the Institute. At that late hour, however, he would confine himself to seconding the vote of thanks.

The President said that the paper had reminded him of the old story of "Eyes, and no eyes." Mr. Rickman was clearly one of those who made use of his eyes, and, while wandering on the shore in search of health, found "Sermons in stones, and,"—no doubt,—"good in everything." He concluded by quoting an eloquent passage on stones, from Mr. Ruskin's works.

The resolution was then put, and was cordially received.

Mr. Rickman replied, and referred to the pleasure he had experienced in studying builders since his first introduction to one by Professor Roger Smith, in front of the hotel at Keswick.

The meeting then proceeded to elect the following members:—

As Fellows.—Mr. William Salway, Associate, of Melbourne; Mr. Horace Cheston, Associate, of Great Winchester-street; Mr. Keith Downes Young, Associate, of Southampton-street, Bloomsbury; Mr. Samuel Flint Clarkson, Associate, of Great Ormond-street; and Mr. Samuel Musgrave, Associate, of Hnll.

As Associates.—Mr. James Ledingham, of Bradford; Mr. Edgar Wood, of Middleton, Manchester; Mr. Norman Spencer, of Wiltshire, Cheshire; Mr. Paul Ogden, of Manchester; Mr. Harry Anderson Pacey, of Lancaster; Mr. George Benson, of York; Mr. George Penrose Kennedy Young, of Perth; Mr. Archibald Taylor Ellison, of Queen Victoria-street; Mr. Robert William England, of Christchurch, New Zealand; Mr. Samuel Perkins Pick, of Leicester; Mr. Thomas Charles Yates, of John-street, Bedford-row; Mr. John Eaglesham, of Ayr;

Mr. Henry Bernay, of Croydon; Mr. Norman Clayton Hadlow Nisbett, of Euston-square; Mr. John Watt, of Upper Norwood; Mr. Alfred Arthur Cox, of Queen's Gate, S.W.; and Mr. William Edward Willink, M.A., Cantab., of Liverpool.*

THE CONGRESS OF FRENCH ARCHITECTS.

WHEN these lines appear, the Congress of French Architects will have completed its thirteenth session, under the presidency of M. Questel, member of the Institute. We are obliged to defer to the next number the account of the main portion of the proceedings, and confine ourselves now to noting briefly the work accomplished during the earlier portion of the week.

It was on Monday, the 8th, that the Congress held its first sitting in the Hémicycle des Beaux Arts. This meeting was devoted to the election of the council and of the committees entrusted with the examination of certain questions of professional interest: public competitions, the code of professional charges, artistic copyright, responsibility in relation to public works, road construction, and sanitation were the subjects of these reports, to which we shall return. After this preliminary business, M. Hardy read an interesting paper on "The Architecture of the Salon of 1855," a subject which we need not follow up here, as it was treated of at some length in the *Builder* a few weeks back. The same day the Congress betook itself to 20, Rue Bergère, to the "Imprimerie Centrale des Chemins de Fer," founded, in 1840, by M. Napoleon Chaix, and the working of which occupies the hôtel built by the former-general, Lenormand de Mezières, under Madame de Pompadour. These well-organised printing-works employ 700 persons, and fifty printing and lithographic machines, among them a special press for the printing of posters, the largest which exists in France. To the printing-house is annexed a professional school for the instruction of apprentices who are afterwards to become workers in the establishment.

The next day the Congress was invited to visit the archaeological excavations in the Louvre, undertaken beneath the Salle des Caryatides, that of the Venus de Milo, and that of the Melpomene. It is to the late M. Lefuel that we must credit the initiation of that interesting piece of work, which was not, however, interrupted at his death, but has been continued for the last three years under the able direction of his successor, M. Guillaume. It forms a kind of completion to the excavations undertaken by the Municipality of Paris in 1866, and which allowed of the indication, by means of a line drawn on the ground surface of the Cour du Louvre, of the perimeter of the ancient substructures. Thus, one can now follow in their successive stages the transformation of the parts constructed by Philippe Auguste, St. Louis, and Charles V.

It is exceedingly difficult to give any account in detail of this long subterranean peregrination, in the course of which M. Guillaume successively showed the old walls and glacis where the Jardin d'Infantes now extends and which the river water formerly washed; the columns, with their fine lines, discovered in the alterations of the surface; the portions of the vault ornamented with grotesque heads; a vast piscina excavated not far from the sewer leading to the Seine, where one may still see a figure of a warrior curiously carved in stone; and, lastly, the fragments of paving, in terracotta, of the XVth century, with ornaments and figures identical with those which were found, in 1876, in the Hôtel de Jean sans Peur.

We cannot now reproduce the lecture given, as a sequel to that excursion, by M. Ledrain, custodian of the Assyrian Antiquities at the Louvre. The subject was "Les Monuments Sumériens et les Rois Architectes de la primitive Chaldée," especially Gonda, of whom there are seven statues in the Louvre. These statues which, according to the inscriptions translated by M. Ledrain, date from 3,900 years B.C., are of high interest in regard to the origin of architecture, for one can see, very well engraved, the plan of a palace which is almost identical with some actual designs, and one of

which bears a scale, the dimensions of which approach extraordinarily near to our metric linear measures. With much learning and spirit, the lecturer revived before our eyes the constructions built by Tello on the banks of the Euphrates, and the remains discovered by M. de Sarzoc, French Consul at Bassorab.

Two other lectures terminated the second day; one of M. Marcel Deslinières on "Céramique," the other by M. Coquet, architect, of Lyons, who led his hearers through the Moorish archaeology of Spain.

On Wednesday morning the Congress met at La Villette, to visit the abattoirs constructed in 1865-67, by the late M. Baltard, whose work was worthily completed by M. Janvier, who himself died in 1879. The abattoirs at La Villette, which have replaced the analogous establishments scattered throughout Paris, cover an irregular surface of nearly fifty acres, and the buildings cover about 58,000 square metres. The general aspect is rather imposing. The façade towards the Rue de Flandres shows a grille about 20 metres interrupted by pilasters intended for allegorical groups. From the principal front six large avenues radiate, intercepted by smaller cross ones. All the buildings have Cromij stone dressings with filling of rough-dressed masonry or of brickwork. The partition-walls are in hard brick covered with Portland cement. The floors are of iron, covered with plaster and bitumen, the roof entirely of tiles.

To give some idea of the importance of the abattoirs and of the service they render, we may add that the work of the establishment occupies 150 slaughter-houses contained in eight groups of buildings; that the dwellings for butchers and shepherds, &c., occupy ten blocks of buildings, and that the stalls can allow space for 2,000 oxen, 7,000 sheep, 2,700 pigs, and 2,000 calves. Each year there is some new improvement in the general arrangement. Now it is a special railway to be made around the line of enclosure, communicating with all the other railways radiating from Paris to the provinces; now another suspension railway is constructed for the quicker circulation of the meat, &c. Further on, three large pavilions are occupied in roasting pigs by gas; not to speak of other structures for the cleansing of offal, the triperies, the blood store, the extraction of alumen and animal oil, the preparation of calves' heads and sheep's feet, &c. For the purpose of having everywhere the indispensable element of cleansing, water from the Marne and from the Ourcy is received into sixty iron reservoirs which project into the establishment at all points.

This is not all, for when the buildings are completely finished they will cover a space of 87,000 metres, and contain 311 slaughter-houses, of which 179 only are at present in work. The works have cost up to this moment about 16 millions (frances); about 7 millions more will be required to complete them. The cattle market, which forms the complement to the abattoirs, and opens on the Rue d'Allemagne, was commenced in 1867, and has cost about 19 millions. We are indebted to M. Moreau, the present architect for the abattoirs, for the information furnished on the occasion of this visit.

In another article we will speak of the lecture given the same day by M. Perrot, member of the Institute, on the "Temple of Jerusalem."

GAS AT THE PARKES MUSEUM.

THE Exhibition of Domestic Gas Appliances at the Parkes Museum, for an inspection of which invitations were issued for Saturday, is in reality an exhibition solely of the exceedingly useful inventions of Mr. Fletcher, of Warrington. The exhibition has not, therefore, the wider interest attaching to a general display of the works of many minds, and it presents none of the critical aspects of comparison. But it has the one advantage of being a unique collection of goods of highest repute, crowned by gold medals and other awards by many international and other exhibitions, and of classes of articles of extensive and wide-spread use.

The star-burners, the concentric burners, the radial burners, are familiar objects in shop windows, and are universally accepted as exceedingly handy and useful; and the various less familiar modifications, such as those adapted for soldering irons, hatters' irons, laundry irons, and the drip-proof burner for

glue-pots and liquids liable to boil over are in great demand for their special purposes and applications.

There is another purpose to which gas heating is extensively applied, that of boiling water, and for this service many ingenious devices are shown. Of these, the most noticeable from its small size and its efficiency is the small instantaneous water-heater, formed by a cylindrical perforated burner, surrounded by a coil of twenty or more volutions, through which the cold water flows, under the influence of the gas flame, for the whole length of the coil. Thus, say, that the length of the burner is 12 in., and the diameter of the coil 3 in., the length of the pipe in which the water is beating in its passage past the flame will be, roughly, about 9 ft. It is easy, therefore, to see how water may enter at one end of the coil and go out at the other end hot. A very simple and perfect little instrument of this kind is shown, formed of a straight horizontal burner of about the above dimensions, for attaching to the walls of lavatories and other places where small quantities of hot water are frequently or occasionally required. The like principle of a coil is applied to the interior of the larger boilers for restaurants and hotels, around which in those cases the flame or hot air circulates freely amongst the volutions of the coil. There are also large hot-water vessels heated by the star and radial burners from below. The small coil articles, however, have a most attractive appearance, and are designed with that forethought and intimate knowledge of requirements which characterise all Mr. Fletcher's inventions.

Another very useful article remains to be noticed amongst the smaller goods,—the coffee-roaster. The atrocious manner in which coffee is commonly prepared needs an almost universal remedy, and the hope cannot be suppressed that these little instruments may have a very wide employment. In sizes they are made from that equal to roasting from 2 oz. to ½ lb. up to a large size for hotels for roasting from ¼ lb. to ½ lb. A quarter of a pound may be roasted thus in four minutes, and a pound in eight minutes, and we were assured by the attendant who showed the goods that a saving of 4d. per pound would be effected by the apparatus,—a strong recommendation to housekeepers.

Two other different applications of gas to its natural purpose of heating,—for cooking apparatus and for stoves for heating rooms,—are represented by many well-considered productions. The cooking-stoves are of excellent design, and the lecturer on cookery at the Parkes Museum speaks most approvingly of their practical application. Gas for cooking, however, is not popular with domestic servants, and gas stoves in the kitchen are even strongly disliked. But the objection to them is in the largest degree that there is no fire to be seen. The watching of the flames and glowings of a coal fire has universal attraction—even dogs enjoy basking in the warmth of its rays and in its wavering light. For them, no more than for servants, does the gas fire seem to complete the appearance and the comfort of home. It is the same in all classes of society. The open grate and the coal or wood fire is the symbol as well as the reality of home. And although Mr. Fletcher produces excellent stoves with asbestos fibre squares of unexceptionable quality, it is only for temporary purposes that such stoves have as yet in the world any actual occupation. They are very convenient in reception or other rooms, where visitors are intermittent, or occupation exceptional. They are also very handy at particular seasons, as late spring, or in autumn, when cold days interpose with warmer weather; but the gas fire for sitting-rooms and for bedrooms, in the present circumstances of the gas itself, is distinctly not a sanitary arrangement. That fault, however, is not separable from the gas companies. Nor can Mr. Fletcher do better until he can get gas, or, more correctly, pure hydrogen. For it is the pure hydrogen that is required for heating, and not the mongrel compound carburated hydrogen supplied for lighting purposes. The carbon deteriorates the gas for all heating purposes. It is the source of smoke and of fumes, and neither cooking nor domestic heating can be properly effected when such impurities arise. To avoid them requires under present circumstances very careful manipulation. For cooking, gas should indeed be the most perfect fuel. Its quantity can be perfectly regulated; its combustion equally perfectly assured, and consequently the exact temperature can be applied with

* All the gentlemen elected Associates have passed the Obligatory Architectural Examination.

unvarying certainty for any period of time, or the temperature can be raised or lowered in any way desirable. There is no waste of fuel. There is no time occupied getting up a fire, as with coals, nor any further time taken in letting down a fire once got up. There is no fire to be maintained whilst none is wanted against some future period when the fire will be wanted. The ingenious devices Mr. Fletcher puts forward in the shape of cooking-stoves are everything seemingly required for the application of gas, and they ought to tempt cooks to trials of them. The burners can be used singly or in multiple; they revolve so that by turning the flame downwards grilling may be performed by the radiation from them downwards, whilst boiling may be performed by the hot-air rising upwards from the flames beneath. Large square central chambers, clean whitewashed on the sides, and with gravy trays at bottom, afford admirable spaces for the cooking of joints or poultry. Double iron doors with silicate packing between the thin outer and inner sides stop all outward radiation of heat. The handiness, cleanliness, and convenience seem unexceptionable, but we doubt whether, whilst the companies carburet their hydrogen, gas-cooking will take extensive hold in general domestic service. The admirable way in which gas stoves can be used even now in large establishments by trained experts is indicative of what their application might become if the gas supplied were more suitable for the purpose.

The Parkes Museum authorities are doing well in submitting such an excellent series of special class goods to the public view, and which are so worthy of being selected as specially illustrating the sanitary conditions attainable even now by common gas in its present state.

THE OLD "CHESHIRE CHEESE" INN, WALLASEY.

This village of Wallasey in Domesday is called "Walea" in a charter of 1081, and was afterwards changed to Waleyseigh. After 1487 it is written Walesey and Wallsea.

Ormerod's "History of Chester" states that "in the reign of Elizabeth Wallasey had a little port to which there belonged three 'barks' and fourteen men, a very inconsiderable quantity, but nevertheless nearly one-fourth of the number of 'barks' and mariners which then were employed at the infant port of Liverpool on the opposite shore, as in the same year, 1565, a consents extant in the town records states the entire number to consist of only twelve 'barks,' navigated by seventy-five sailors."

The old Cheshire Cheese Inn is a quaint, squat, long, one-story building, thatched, divided into two rooms with a cook-loft over the kitchen. It is stated that King Charles II. slept in this old bed-chamber. The gable of the kitchen is built with freestone in regular coarsed work, having an angle fireplace and a two-light mullion window, now built up, with a modern window at one side. The entertaining-room has a large hooded chimney corner, used in the days of log fires, with two old-fashioned squab seats. The roof is framed with arched jaw principals in oak; the feet rest upon the floor for support, and the rafters are tied across here and there. The beer-cellar is opposite the entrance, which is direct into the room; here is a very pretty "Queen Anne" door and casings in panels and lattice work, and a cupboard of the same date is fixed in the chimney corner.

The road into the village at this point being narrow, the commissioners have purchased the land upon which the inn now stands from the proprietor of the Vale Brewery for the purpose of making the road wider, which will be a great improvement, and in a few weeks this ancient hostelry will be cleared away. The licence dates back 220 years. Mortimer's "History of the Hundred of Wirral" says:—"In 1690 the troops of William III. were encamped in the village and neighbourhood previously to their embarkation for Ireland in the year 1696, accompanied by his Majesty in person, and a brilliant staff, including the Duke of Monmouth, the Marquis of Ormonde, the Earls of Manchester, Oxford, Portland, and Scarborough, and many others. The host of the Cheshire Cheese takes pleasure in showing the kitchen, which is traditionally reported to have been selected for the royal dormitory. The Wallasey Leasowe was probably the oldest gentlemen's racecourse in the kingdom, being noticed by

Webb as existing in the early part of the seventeenth century. In 1633 the Duke of Monmouth rode as jockey a race which he won, and presented the plate to the daughter of the Mayor of Chester. Races discontinued 1750."

"Wallasey was once an island, its original name being 'Kirkby in Walley,' which means the church in the woody island, the parish being separated from the rest of the hundred by a small brook called the Birkin. Tree stumps and peat are still to be seen, the remains of a dense forest towards the sea." (Hume's "Ancient Meols.")

A new hostelry is now being built in the garden belonging to the old inn, in the Queen Anne style. The old wood, and other fittings will be refixed here, and the old oak timbers made into furniture, so that any architectural features the old house may be considered to possess will be preserved. The new building has been designed by Mr. T. C. Ebdy, architect, of Birkenhead, the contractors being Messrs. W. & J. Varty, of New Brighton.

SOCIETY OF ARTS PRIZE ESSAYS.

SOME time since, the Council of the Society of Arts undertook to award in prizes for essays on "London Reconstruction" and the "Housing of the London Poor" a sum of 1,200*l.* placed at their disposal by Mr. W. Westgarth.

The committee appointed to consider the essays sent in have reported to the effect that in their opinion none of the essays realise the requirements of the offer in such a manner as to justify them in recommending that the full amount of the prizes offered should be awarded. They recommended, however, that prizes amounting in all to 600*l.* should be awarded as under:—

Three prizes of 100*l.* each, to H. H. Bridgman, 42, Foultry, E.C. 1; J. Corbett, 24, Barton-arcade, Manchester; W. Woodward, 7, Duke-street, Adelphi, W.C.

Three prizes of 50*l.* each, to A. Wynter Blyth, Court-house, St. Marylebone, W., and R. Greene, Berry Wood, Northampton; Clement Dunscombe, City Engineer, Liverpool; C. Scott, Town Hall, Belfast, and J. W. E. Tilley, Royal-avenue, Belfast.

Six prizes of 25*l.* each, to A. H. Do Wind, Comber, County Down; J. S. Fairfax, 3, St. Paul's-road, Camden-square, N.W.; Victor Jetley, 8, North Audley-street, W.; T. E. Julian, 22, Palace-road, Roupell Park, S.W.; W. A. Newell, M.D., 201, Palisade-avenue, Jersey City, N.J., United States of America; G. W. Usill, Haldon Lodge, Southfields, Wandsworth, S.W.

The Council, after consultation with Mr. Westgarth, have accepted the report of the Committee, and awarded the prizes as recommended. It has been determined that the three essays to which prizes of 100*l.* were awarded shall be published on behalf of the Society.

PROPOSED NEW EXCHANGE, AMSTERDAM.

THE final award in this competition took place last week, the following members of the jury being present:—

Herr D. Cordes, President of Chamber of Commerce, Amsterdam; Herr P. J. H. Cuyper, Architect, Amsterdam; Herr L. H. Ebersson, Architect to the King of Holland; Herr S. Hepner, President of the Corn Exchange, Amsterdam; Herr J. R. de Kruijff, Director of the Art Schools, Amsterdam; Kgl. Baurath J. C. Raschdorff, architect, of Berlin; Oberhanrath Fr. Von Schmidt, architect, of Vienna; M. Paul Sédille, architect, Secretary of the Society of Architects, Paris; Mr. R. Phéné Spiers, F.S.A., architect, London; Herr A. L. Wurfhain, President of Stockbrokers' Society, Amsterdam; and Herr J. J. Van Ijssendijk, architect, Brussels.

The first prize of 10,000 gulden was awarded to the design bearing the motto Y, No. 175, its author being Monsieur Cordonnier, of Lille.

The second prize of 6,000 gulden to the author of "In hoc signo fioresco," No. 150. M. Groll, of London and Vienna.

The third prize of 5,000 gulden to "La bourse ou la vie," No. 20, M. Volkmar, of Berlin.

The fourth prize of 4,000 gulden to "Mercatura," No. 73, Messrs. Sanders & Berlage, of Amsterdam.

The fifth prize of 3,000 gulden to "Ammerack," No. 91, the name of the author not having transpired.

Illustrations.

ANCIENT BRASSES.

FOR information as to the two fine examples of ancient brasses, of which illustrations are given in this number, see the article on "Foreign Brasses" in another column.

"WESTGATES," SURREY.

THE house of which a view is given here is built from the designs of Mr. Halsey Ricardo, on some high ground on the road from Charlwood to Newdigate. The house faces westward, to command the view of Leith Hill and Holmwood. It is built of Bolney stone with Box-ground stone dressings, with a red tile roof. The drawing from which the illustration is taken is in the Royal Academy Exhibition.

THE COBOLZETTER THOR, ROTHENBURG.

THESE sketches, by Mr. A. B. Pite, taken from the interior and exterior of the gateway, give views of a very picturesque though simple bit of old German building.

SCULPTURE AT THE PARIS SALON.

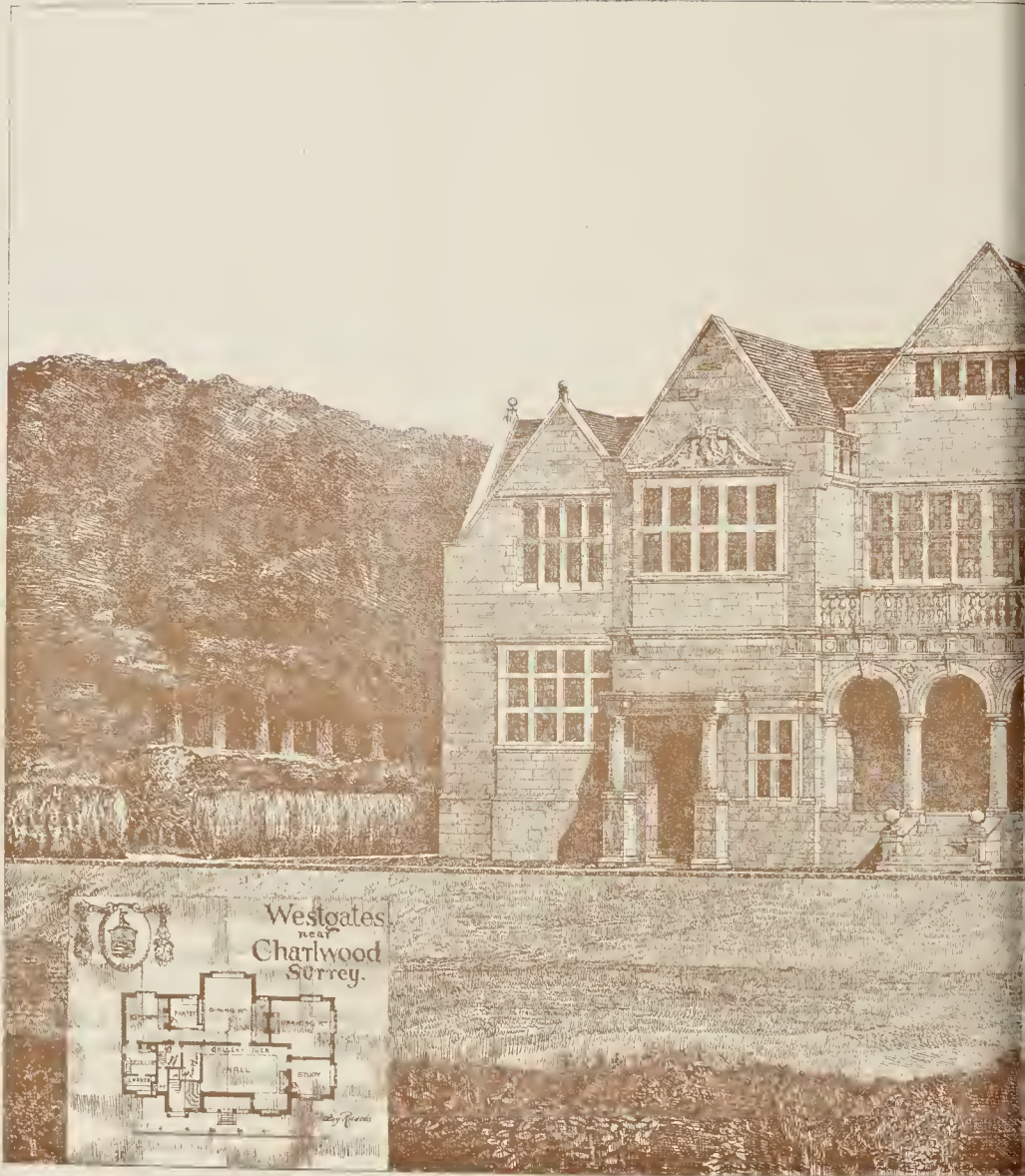
WE give this week illustrations of two of the works which were mentioned with commendation in the recent articles in our columns, by "B. B. Fenwick" on painting and sculpture at the Salon Exhibition. The first, "Protection," is by M. Demaille, and was described in the article referred to (p. 757, ante). The second, "Baptême Gaulois," by M. Oge, is an example of the tendency of French artists at present to go back to early Gallic history and life for their subjects. This is an illustration of the warlike infancy of France, when it is supposed that the father's sword should be the most sacred object in the eyes of his children. The idea is perhaps too modern in feeling for the supposed period, but the work itself is a fine and robust one. "Protection," however, is the more intellectual work of the two, representing the highest use of sculpture for the representation of a purely abstract ideal.

MODEL PLANS FOR INFECTIOUS HOSPITALS.

THE Local Government Board have recently issued model plans for buildings for the isolation and treatment of persons suffering from infectious diseases. These plans, which are intended to serve as a guide to sanitary authorities in making the provision so necessary for the defence of their districts from invasion of epidemic diseases, have been prepared under the advice of the Board's medical officer and architect, and appear to have been very carefully designed, with the view to afford the greatest facility for the safe treatment of different diseases while involving the smallest outlay for building.

The group of plans at the top of p. 847 is for a complete hospital of the smallest kind, viz., for four patients, and shows a ward-block divided into two distinct portions each of which contains a ward-room for two beds, with a nurse's room adjoining. The rooms in one half of the building are arranged to open into an unenclosed verandah in front, while those in the other half open into a similar verandah at the rear, thereby tending to the more complete separation of the patients in one half from those in the other half of the building, while a railing across the verandah in each instance serves to hinder communication between the occupants of the two sets of rooms. The beds are arranged so that each patient will have the full benefit of the prescribed amount of space, namely, 2,000 cubic feet, 12 ft. lineal of wall-space, and some 150 square feet of floor space; the angles of the wards, both vertical and horizontal, are rounded in order to facilitate cleansing, and to prevent the deposit of infected dust; none of the four rooms in the building have any direct aerial communication with any other room, but a fixed window is provided in the wall separating the nurse's room from the adjacent ward-room. It is contemplated that, in so small a hospital, movable baths and dry-earth commodes would be used, with screens, in the ward-rooms; hence

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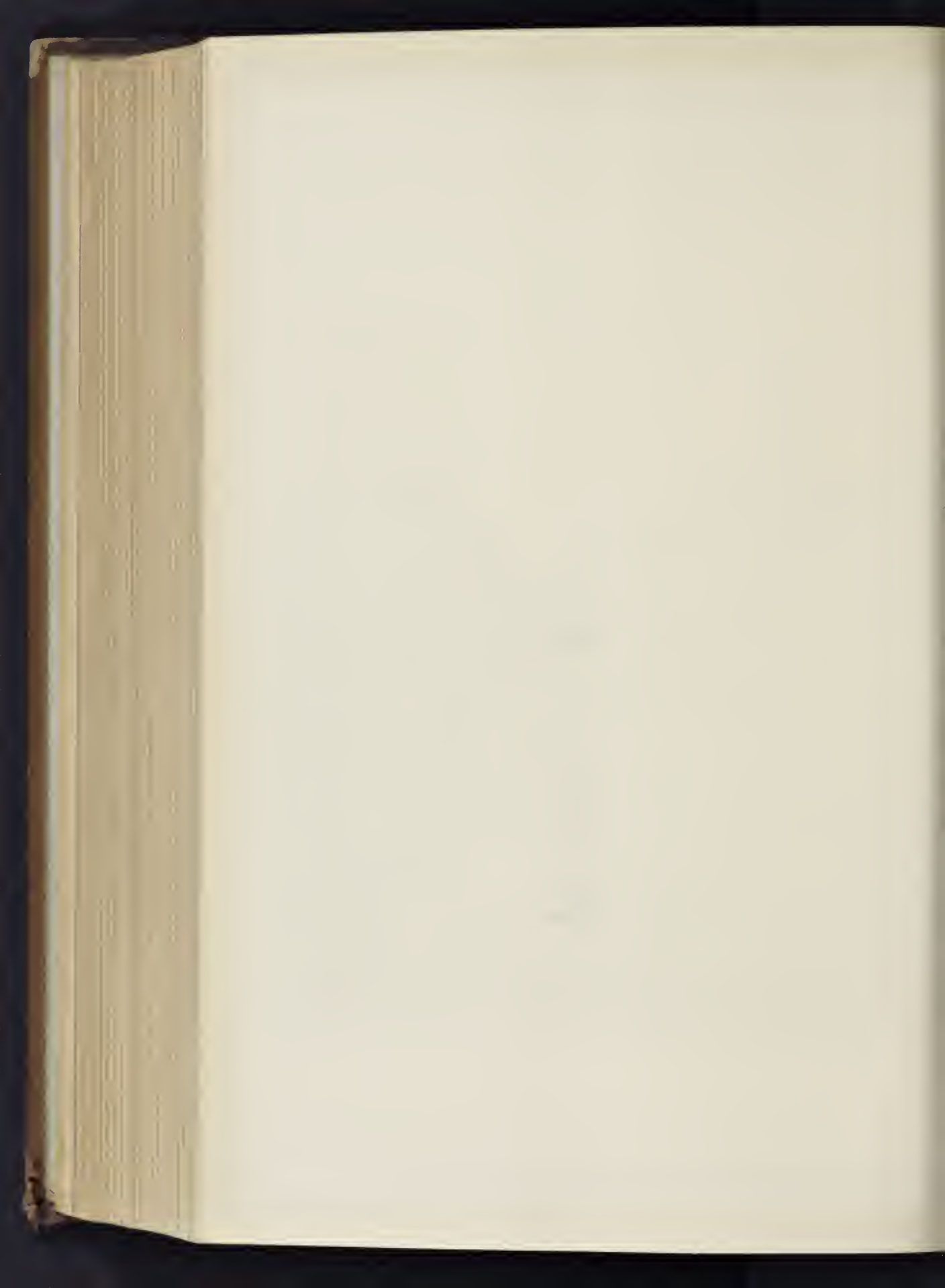
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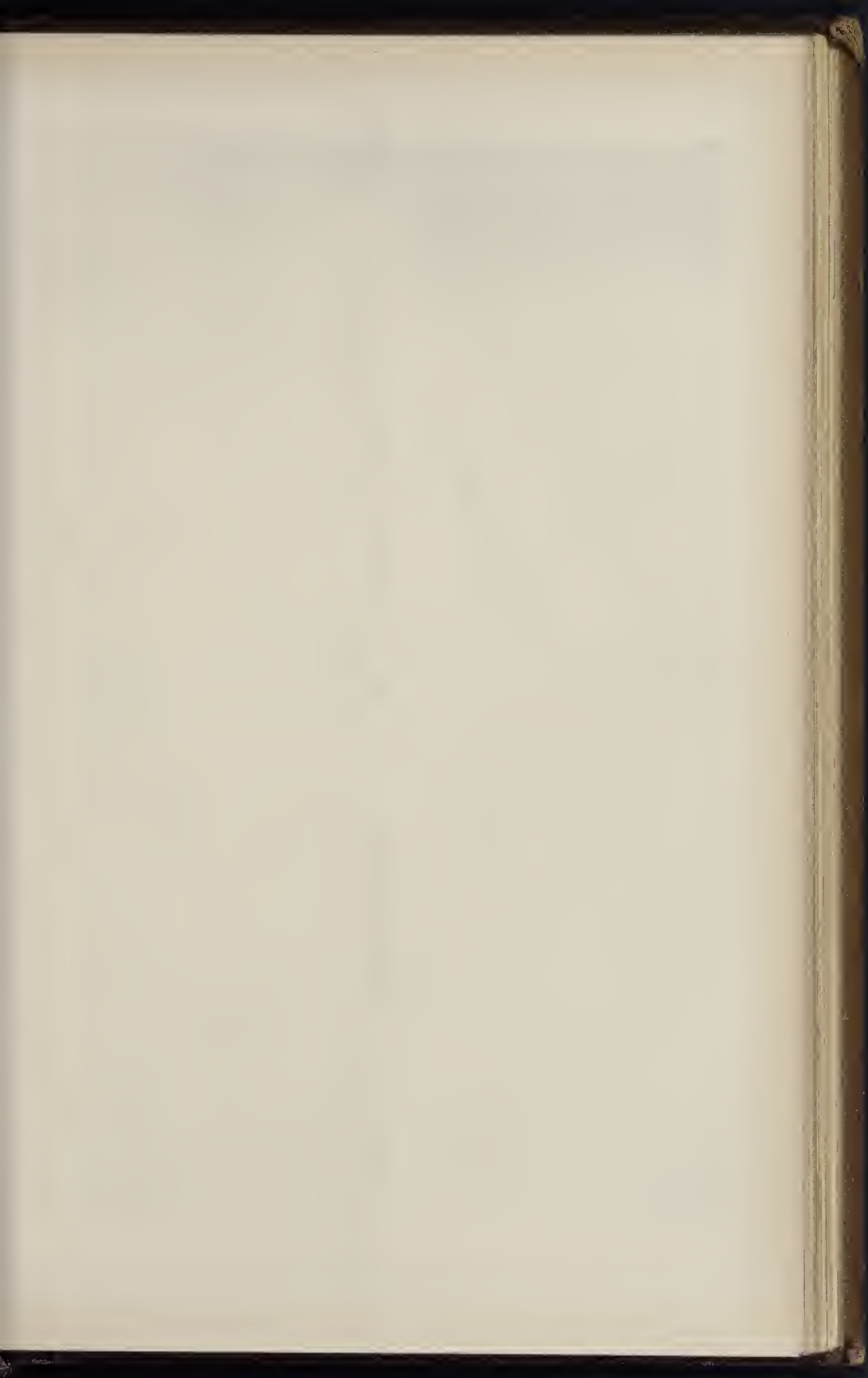
WESTGATES, SURREY



ALFRED WATSON, ARCHITECT.

8 Castle St' Holborn London





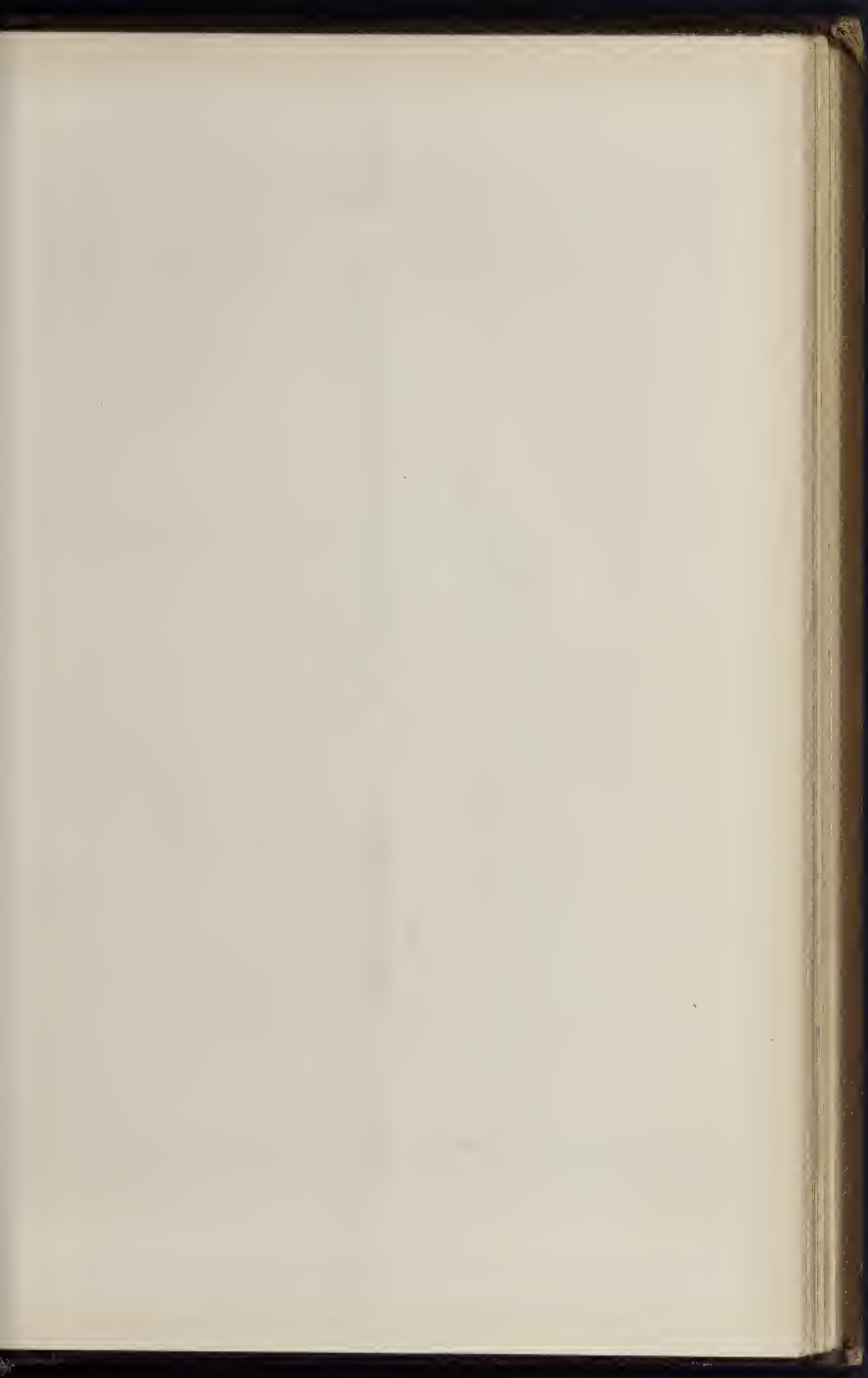


INK PHOTO, SPRAGUE & CO. LONDON

SCULPTURE AT THE PARIS Salon.

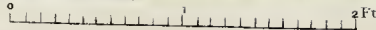
"PROTECTION,"

M. DEMAILLE, SCULPTOR.



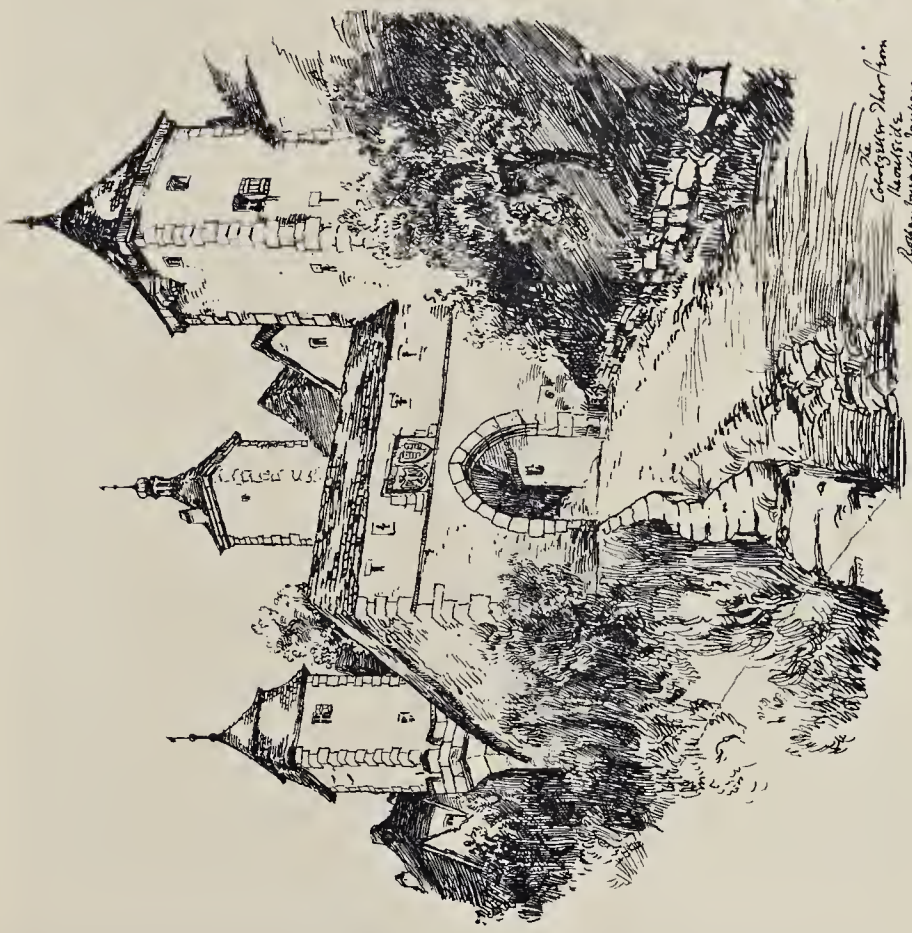


C.F. Keil Photo-Lith & Printer, 8 Castle St. Holborn, London E.C.



FOREIGN BRASSES.

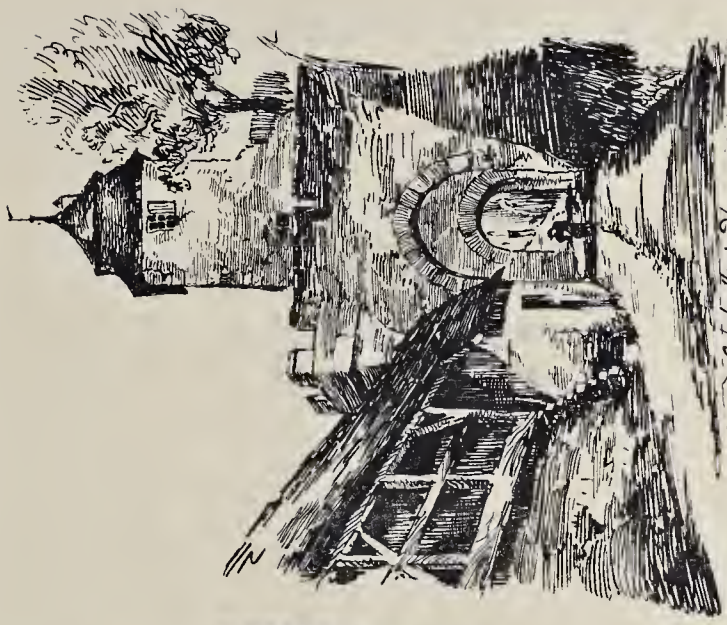
BRASS OF SIDONIA, DAUGHTER OF KING PODIEBRAD OF BOHEMIA: AT MEISSEN (A.D. 1510).



*The
Cobolletter Thor from
Hessels's
Rodenburg in Nassau.*

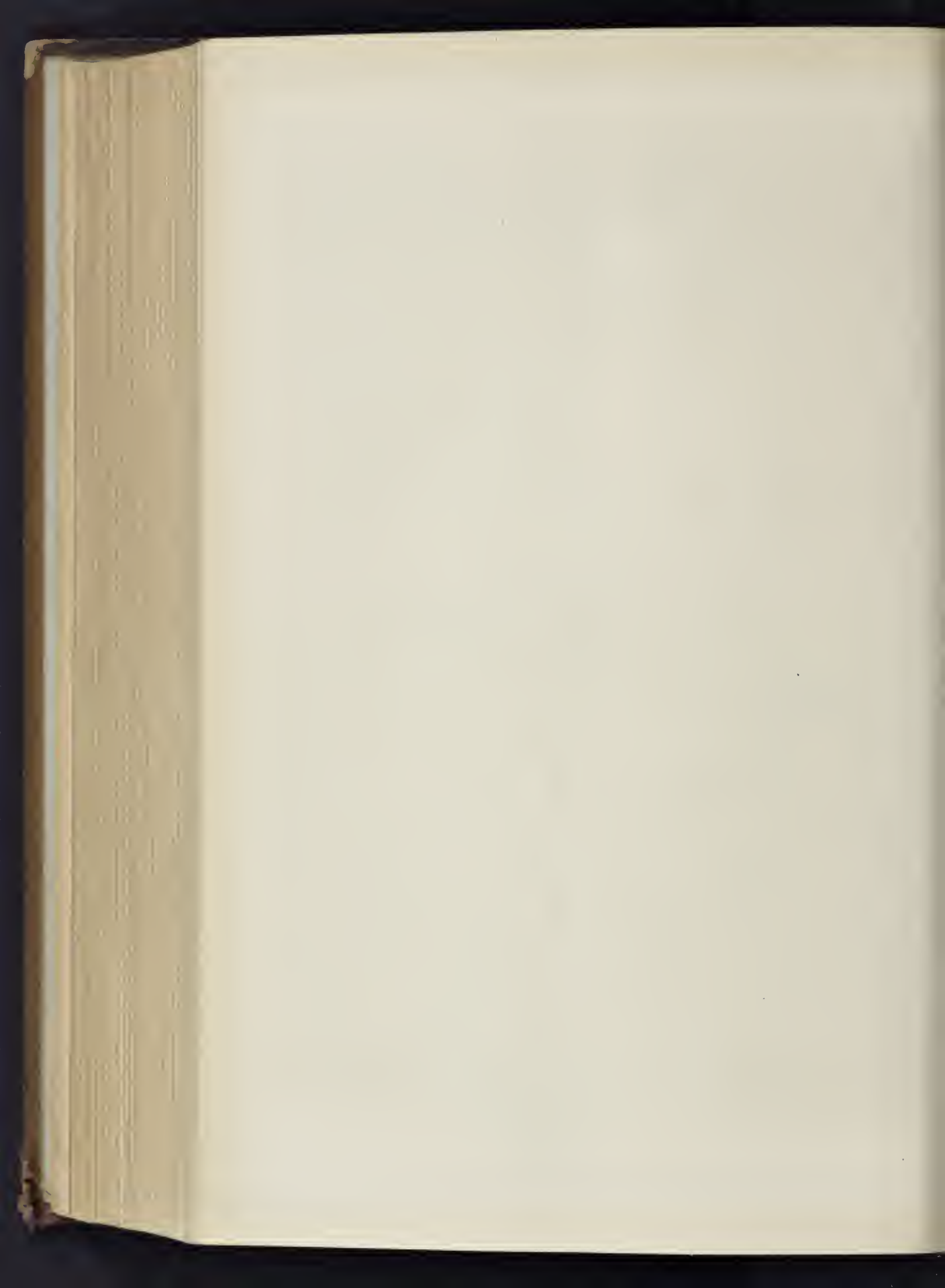
THE COBOLZETTER THOR, ROTHENBURG.

SKETCHED BY MR. A. B. PTE.



*The
Cobolletter Thor, Nassau
Rodenburg in Nassau.*

C. F. Bell, Photo-Litho & Print. 7, 8, Castle St., Holborn, London, E. C.



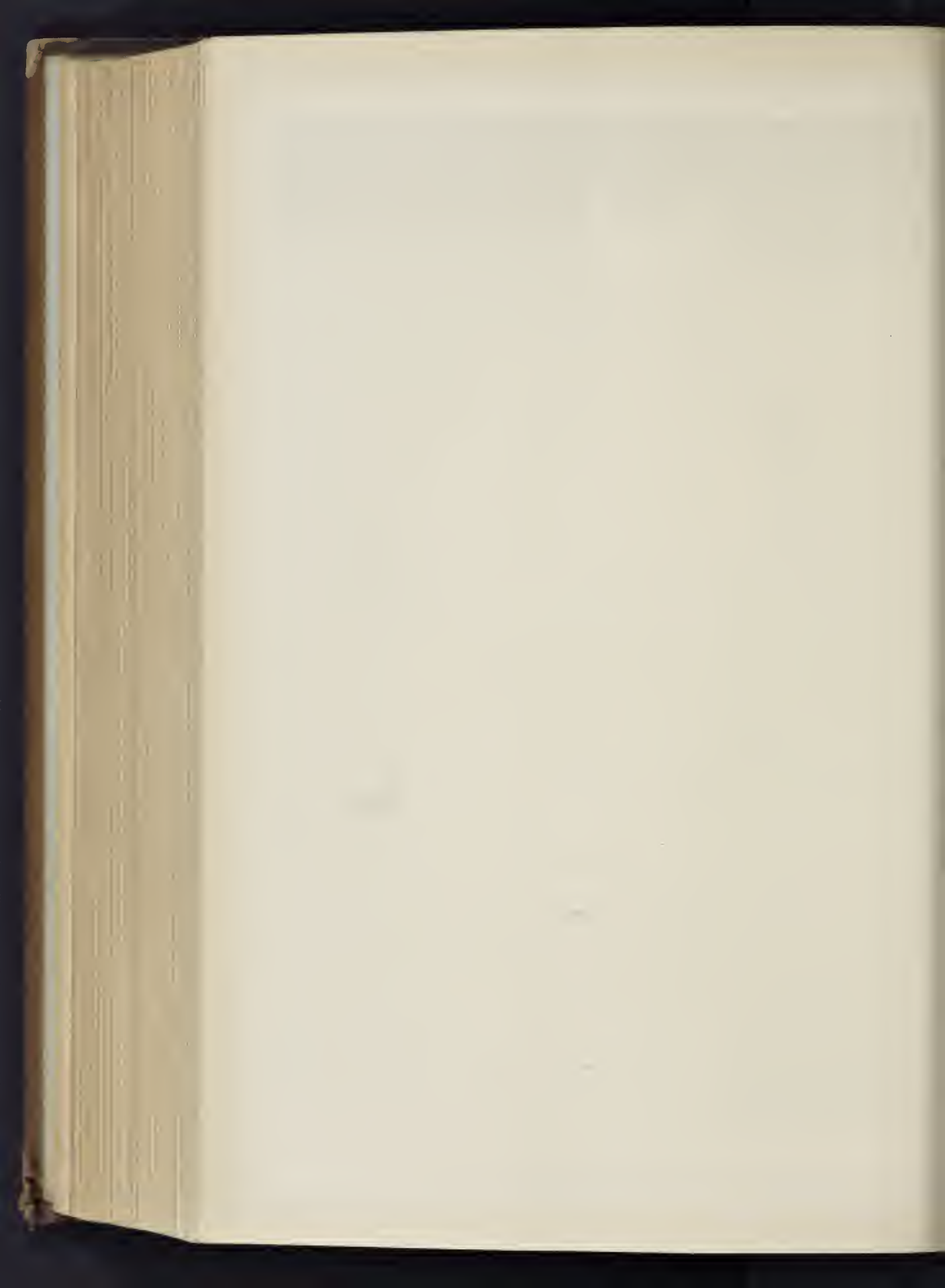


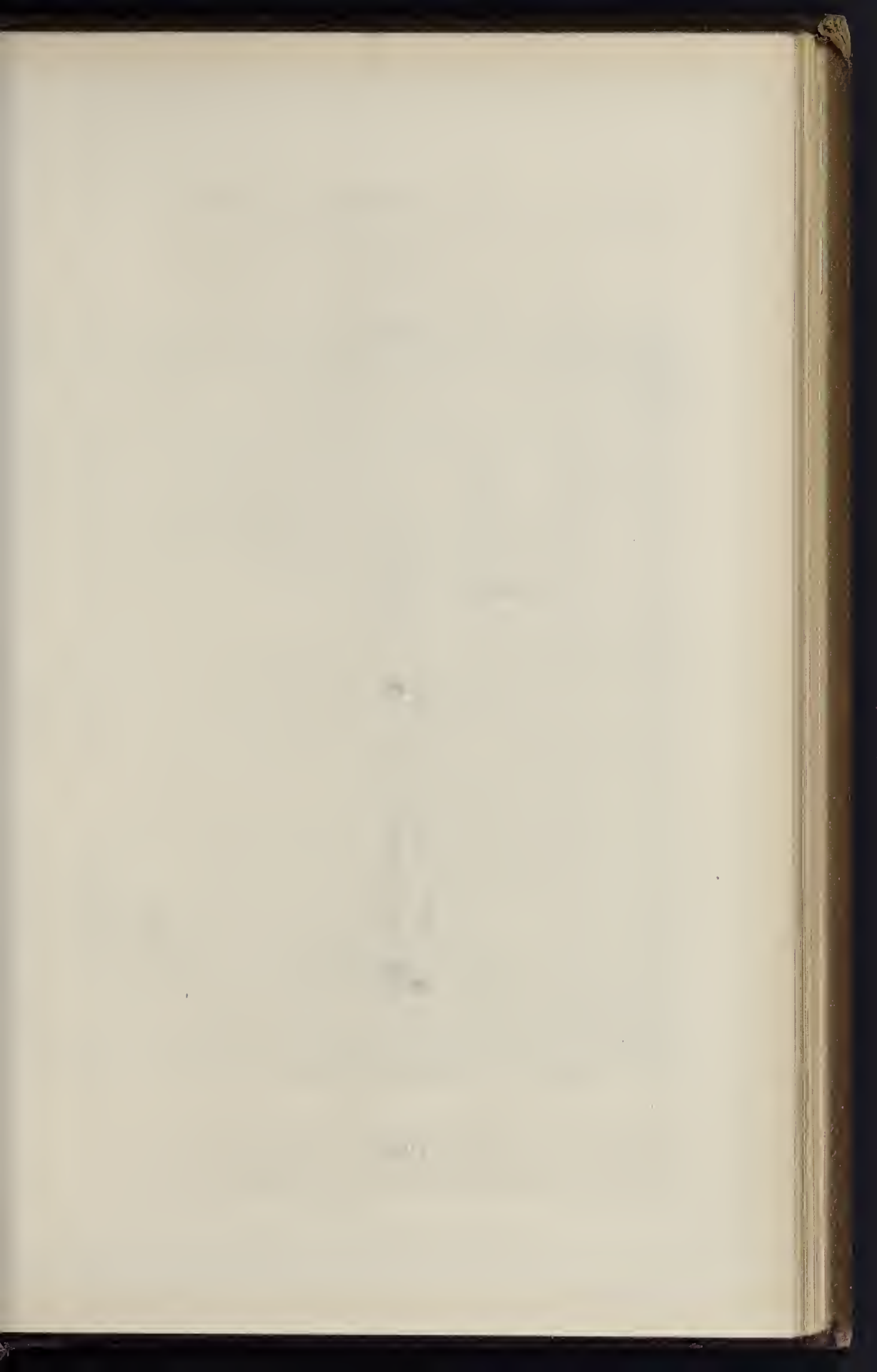
INK PHOTO SPRAGUE & CO. LONDON

SCULPTURE AT THE PARIS Salon.

"BAPTÊME GAULOIS"

M. OGÉ, SCULPTOR.



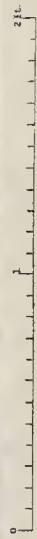


THE BUILDER, JUNE 13, 1886





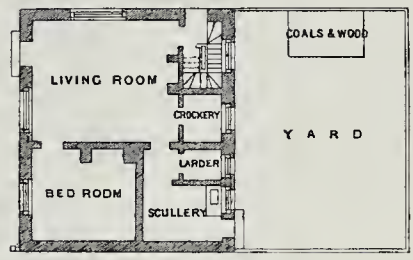
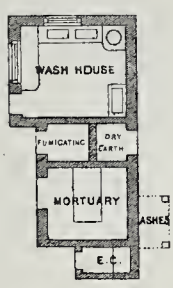
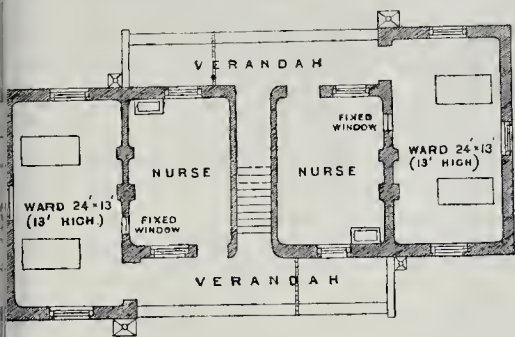
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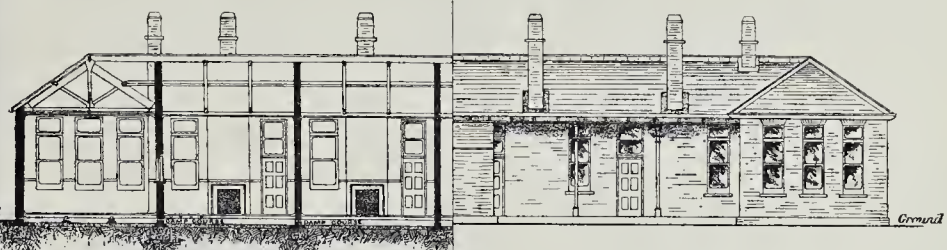
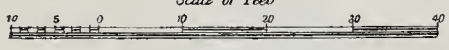
FOREIGN BRASSES.
BRASS OF MARTIN DE VESCH, BRUGES CATHEDRAL (A.D. 1452).

C. F. Keil Photo Lith & Printer



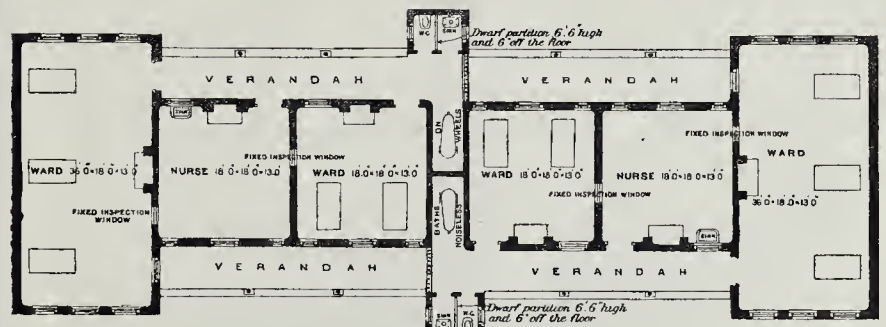


PLAN.
Scale of Feet.



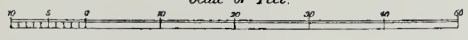
SECTION.

ELEVATION.



PLAN.

Scale of Feet.



bath-rooms and water-closets have been dispensed with.

This plan shows also a small block of offices (wash-house, mortuary, &c.), which, like the ward-block has to be kept at a distance of at least 40 ft. from the boundary-fence of the site. An administrative block, or caretaker's cottage, is provided at the entrance, but if, from motives of economy or otherwise, this should not be built, accommodation is provided for the staff in an upper story of the ward-block approached by a flight of stairs from one of the verandahs.

The larger plan on p. 847 is designed on principles similar to those of the small ward block in the first plan, but the building is on a larger scale. Indeed, it may form the ward accommodation for a district of some magnitude, seeing that it contains ten beds in four distinct wards, or it may form one block of a hospital, where the rest of the accommodation is provided in larger wards. In either case such a ward block would be found most useful, as it affords facilities for the safe isolation of cases of different infectious fevers, for the isolation of any individual case sent to the hospital in so early a stage that the precise character of the disease may not have definitely shown itself, and which therefore it may be desired to keep separate for a while, or for any patient desiring, and willing to pay for, more privacy than is afforded in the general wards.

In this plan no administrative offices are shown as it has been assumed that the staff, &c., necessary to the supervision and care of so large a number of patients as might occupy the building either by itself or in conjunction with other ward-blocks, would involve the provision of more extensive indispensable buildings.

ASSOCIATION OF PUBLIC SANITARY INSPECTORS. ANNUAL DINNER.

THE second annual dinner of the members of this useful and growing Association took place on Saturday evening last, at the Holborn Restaurant, Mr. Edwin Chadwick, C.B., President, in the chair.

Dr. Cameron, M.P., in proposing "Success to the Association of Public Sanitary Inspectors," said he regarded sanitary inspectors as the regimental officers of the army of preventive medicine. Without the intelligent co-operation of sanitary inspectors no good result could be achieved. In the discharge of their duties they required great firmness and courage, and to be prepared to fight against both prejudice and ignorance, and still more against sordid interests. Under these circumstances it was important they should weld themselves into an association to maintain their views and to indicate to politicians unnumbered reforms of detail, which, without them, would be ignored. He supposed they would like to see the portals of their profession guarded in such a way that a man who entered it should be a credit to their body. He would couple the toast with the name of their president, to whom he paid a high tribute. Throughout the sanitary literature of the last half-century no name occupied a more honoured place than that of their president, who had been associated with everything done during the last half-century to improve the health of the nation and to lower the national death-rate. In conclusion, the hon. member expressed his hope that the Prime Minister in the next distribution of honours would do some justice to such men as their president.

The Chairman, in responding, observed that the perception of the power of sanitation, and demands for its application, are extending afar as well as near. But the great hopes of sanitary legislation are stopped by the delays of administrative organisation. To the devising heads of sanitation, the preventive engineer, or the preventive health officer, the sanitary inspector is the direct executive hand. After referring to Mr. Chadwick referred to the recent Sanitary Congress at Rome, and to the insatiable condition of many of the Italian cities. He continued:—"The well-intentioned French politicians of the last century promised to the most depressed of the population the attainment of the greatest good when they had attained for them 'liberty, equality, and fraternity.'" I forbear investigation as to what political or mental or metaphysical benefits

may have been gained by them under those terms. But as the object of my study and experiences, I cannot fail to note and lament the dire physical conditions under which a large proportion of the population of Paris and of France suffer. With a finer climate and site the death-rate of Paris is 27 against 20 in London, and throughout France the depression is even greater than that we complain of in England. Of the working classes in Paris, the excess of their special death-rate partakes of that of the general death-rates, and their physical condition, instead of being one of liberty is one of slavery, of slavery to disease, of the scourging of painful diseases, of fever, of rheumatism, and of phthisis, by which their working ability and their wages are reduced, and their lives shortened by from one-third to one-half. By examples achieved they may be shown that by effective sanitation true liberty may be achieved for them, the liberty of health and strength, freedom from the excess of preventable diseases, and an augmentation of at least ten years more of life. As to equality, its deplorable violation is shown in this; that, whilst death now trends once at the chateau, it trends at least three times at the cottage, and the mother there has to bewail the loss of half the children born to her before they attain the age of maturity. Sanitation, and sanitation alone, will effect a real equality in this respect. As to fraternity, what practical evidences of it are visible other than in admission to hospitals, where the working disability from sickness is augmented by one-half, and the chances of recovery greatly reduced? For fraternity I may claim having, with my colleagues of the Commission of Inquiry into the condition of young persons engaged in our factories, initiated a measure of centralisation for the people, in place of the centralisation really against the people (chiefly for the levy of military force and war taxes), our centralisation "for the people" presenting the elements of real fraternity of protection by inspection of the places of work, protection against accidents by machinery, and protection for children by the half-time principle against exclusion from education. This last protection is now proposed to be extended to the sanitary inspectors of schools to detect and deal with the premonitory symptoms of disease, a protection by sanitary inspection which it is now proposed to have extended to a large proportion of the houses of the wage classes from experience of the sanitary benefits conferred by such inspection on the inmates of the common lodging-houses. It was objected that the restriction of the excess of the hours of labour, chiefly by my former colleague, the Earl of Shaftesbury, must reduce productive power and reduce profits and wages. But greater force has been given to production in the reduced time, and wages and profits have been augmented. Such is the centralisation for the people comprising the elements of a real fraternity, of which the most heavily death-rated of the wage classes of Paris and of France are greatly in need. I must not now transgress further than to submit that our object should be to impress the new constituencies with their paramount interest in this subject; with the wastefulness of ignorance, of which the metropolis has presented so great an example; with economy of true science, and with the need of legislative securities, for its application in administration. To this end it will be requisite to bring together the sanitary functions, now scattered and weakened and wasted in different departments under distracted and divided attentions, and to consolidate them under the undivided attention of a Board of Specialists, presided over by a Cabinet Minister of Health. By such an arrangement the training for the specialities of the preventive service may be ensured for the colonies as well as for home. The need of the consolidation of the educational functions, now scattered and weakened and wasted in independent departments, is at length recognised, and it is proposed to bring them under the undivided attention of a Minister of Education, but the scheme at present displays imperfect conceptions of administrative organisation, in the omission of fundamental provisions for physical training, such as have been the greatest successes of our times, and also in the need of preventive sanitary inspection. I regret that we cannot have the presence to-night of our distinguished honorary member, Lord Shaftesbury, who served for five years as the most efficient

member of our first general Board of Health. If he had been here, I would have recalled to him the text he gave to us from St. Paul, at a parting dinner, a text of prophetic import:—"We are troubled on every side, yet not distressed; we are perplexed, but not in despair; persecuted, but not forsaken; cast down, but not destroyed." This is still true, but sanitation is yet living, is recognised, is advancing; and in desiring, as I do, with all my heart, "Success to the Association of Sanitary Inspectors," I am desiring for sanitation a further advancement for the foremost benefit of humanity.

Mr. William Rains proposed "The Houses of Parliament," and in doing so expressed a hope that the next Parliament would consolidate the laws relating to sanitary inspection.

Dr. Cameron briefly responded. Dr. Lory Marsh proposed "Unity of Administration in the Metropolis." To the division of local authority in the metropolis they were indebted, he said, for many of the abuses and had sanitation that existed in it.

Mr. James Beal, in responding to the toast, referred to an agitation got up many years ago against the gas companies, which resulted in a saving to the consumers of a million a year; and said the saving would have been much greater if there had been a municipality, and the same observation applied to the water companies, whose undertakings a municipality would have purchased for the sum they had cost.

Dr. Alfred Carpenter, in proposing "The Executive," said there was a general feeling that some means should be adopted to test the fitness of applicants for the office of sanitary inspector, and the subject was now under consideration. It was hoped before long to establish an Institute of Hygiene which should unite for common action all the societies concerned in sanitary work.

Mr. Jerram, the chairman of the executive, and Mr. Samuel C. Legg, the honorary secretary, spoke in acknowledgement of the toast.

Dr. B. W. Richardson proposed "Local Government."

Dr. T. Orme Duffield, in acknowledging the toast, said he believed the complaints that the vestries neglected to carry out sanitary legislation were unfounded. In Kensington, where he was an officer of health, he was not interfered with in the least; and he believed that it had been known how much sanitary work had been done in London during the last few years, the agitation against the vestries would cease.

ARCHÆOLOGICAL SOCIETIES.

British Archaeological Association.—The closing meeting of the session was held on Wednesday, June 3rd, the Rev. S. M. Mayhew in the chair. It was announced that the intended works of repair about to be undertaken at Waltham Cross had been considered and approved by the Council. It is contemplated to improve the position of the cross by removing and setting back the buildings which at present join it. The Rev. Prebendary Scarth rendered a report by Mr. Herbert Reid of some excavations near Newbury, where two circles of flints have been found, 3 ft. below the surface, with the remains of wood fires. They were evidently beacons used in Roman times. Mr. Greenhields sent a beautiful silver fibula, and the Rev. Canon Routledge reported the discovery of a hagiocope in the west wall of St. Martin's, Canterbury, partly built over by the thirteenth-century tower. The west wall proves to be ancient Roman work, similar to what has been traced on the south. The Rev. Dr. Hooppell described some remarkable interments of early date found within the ancient earthwork called Dane's Camp, Northampton, now being removed for iron ore. Mr. Loftus Brock, F.S.A., exhibited a Roman vase found at Colchester. The first paper was by Mr. T. G. Pinches, of the British Museum, on Babylonian Cylinders. He reviewed the whole history of these remarkable objects, illustrating his remarks by the exhibition of many specimens of great beauty and interest, several being of great antiquity, some being 2,700 years B.C., of very good workmanship. Dr. Hayes Ward, in the discussion which ensued, suggested that correct information should be obtained as to the actual localities where such cylinders were found. The second paper was by Mr. Romilly Allen, F.S.A. Scott, on some recent discoveries of Saxon sculptures

of interlaced patterns on stone, found at Rock- and Colsterworth, in Lincolnshire, and Bekhill, Sussex. At the latter church, a fine small Saxon tomb has been found, covered with patterns of very great beauty. A third paper was then partly read, on the Saxon tower of Barnack Church, by Mr. J. T. Irvine. A good deal of sculptured work here was illustrated, particularly a window filled in with a slab of stone pierced with an open-work pattern.

London and Middlesex Archaeological Society. A general meeting of the members and friends of this Society took place at the Tallow Chandlers' Hall, Dowgate-hill, on Tuesday last, the 9th inst., by permission of the wardens and court of assistants. Mr. Edwin Knight, the master, occupied the chair, and briefly welcomed the visitors, and introduced Mr. M. F. Monier-Williams, clerk and solicitor to the company, who read an interesting descriptive history of the charters, hall, and other matters of interest connected with the company. The earliest reference to it was in 1426, when letters patent were granted by Henry VI. empowering the Tallow Chandlers of the City to search for and destroy all had and adulterated oils. Their first charter of incorporation was obtained in 1432 from Edward IV. The original grant of armorial bearings is in excellent preservation. The minutes of the company did not state who was the architect of the hall. Some thought it was Sir Christopher Wren, but this was doubtful. The two oil portraits of William III. and Queen Mary were by Sir Godfrey Kneller. There are some handsome Chippendale chairs. The table was saved from the Great Fire, from which the Company suffered severely; but, owing to the energy of the then Master, the archives were removed from the Hall before the fire reached it, and it is recorded that he took them in his coach to Hampstead. Mr. Monier-Williams concluded by referring to the recent Underground Railway works, and regretted that the panelling of the hall and other rooms had been much damaged of late by the railway, which ran almost immediately beneath the building. Mr. Alfred White, F.S.A., proposed a vote of thanks to Mr. Monier-Williams. After inspecting the different rooms, plate, charters, and other chief objects of interest, the members and visitors adjourned to the Church of St. Lawrence, Jewry. Mr. Louis Stokes said this was one of Sir Christopher Wren's churches, and was generally thought to be one of his best, as regards the richness of decoration, stability of structure, and the wonderful manner in which the architect adapted himself to the peculiar wants of the place. There was very little known about the church before the Fire beyond what Stow said, that it was a large and fair building; he (Mr. Stokes) made special mention of the very great repairs which were executed in 1618, and said that in the old building there were two private chapels. Directly after the Great Fire a committee was appointed, and the church was commenced in 1671. One curious matter was that the Moorfields morass extended as far back as the church, and the architect was obliged to drive piles 12 ft. long to the depth of 7 ft. to get a foundation for the church on the north side. It was one of the most expensive of the City churches built, at that time costing over 15,000*l.* It took nine years to build, and the congregation meanwhile used the Chapel of St. Mary Magdalene, or the Lord Mayor's Chapel, which was on the eastern side of Guildhall-yard. When this was demolished many monuments were removed to St. Lawrence, Jewry. In the books Mr. Pearse was mentioned as the carver of the organ and other woodwork in the church. The building was wonderfully well adapted for hearing, one of the great points which Sir Christopher Wren always had in view. The windows were all modern, as also was the mosaic over the altar. There is a monument to Gresham, father of the celebrated Sir Thomas Gresham. Among the rectors were Tillotson, afterwards archbishop. After inspecting the ancient plate, &c., the visitors proceeded to the Guildhall, where they first inspected the Library and Museum, and then the new Council-chamber. Mr. Gannon, keeper of Guildhall, conducted them through these buildings and the old Council-chamber. Mr. E. C. Robins expressed his pleasure at inspecting the new Council-chamber, and said he was at the Royal Institute of British Architects on the previous evening, when a portrait which had been painted by Mr. Holl was presented to Mr.

Horace Jones. He thought the building was a great honour to the architect as well as to the Corporation. The visitors having descended to the crypt, Mr. Alfred White, F.S.A., said that the crypt or undercroft of most buildings was one of the most interesting parts, for many reasons. It told the history of the building above it better than any other part, and this was particularly the case with this one. This was a very small portion of the Guildhall, and extended under a small part of the east end of the hall, whether the rest of the Guildhall had an arched crypt of this kind there were no means of determining. On the south side of the Guildhall stood, as he could just remember, the chapel of the Guildhall. That was a building of very ancient foundation,—certainly as early as before 1300. The present hall did not commence till the year 1411, therefore there was a chapel there long before the Guildhall was built. But there were indications of a more ancient hall. There was a great peculiarity in the crypt. The crypts of domestic buildings had always a line of columns in the centre, as at the great hall of South Wingfield, in Derbyshire, which was of gigantic size. But he found the crypts of all ecclesiastical buildings there were two rows of columns down the centre, dividing them into three bays, and this was the case with the crypt of the Guildhall. This was the original crypt of the chapel of the Guildhall. In pulling down the old chapel of the Guildhall some interesting monuments were found, among them a slab which was now in the Guildhall Museum, to the memory of Geoffrey le Trompeur. Everything went to show that this was the site of the ancient chapel of St. Mary Magdalene, and that this was the crypt of the chapel itself. After inspecting the crypt, the members and friends adjourned to the Holborn Restaurant to dine, under the presidency of Major Alfred Heales, F.S.A. Mr. H. S. Milman, F.S.A., responded to the toast of the "Society of Antiquaries"; Mr. R. S. Fergusson, F.S.A. (ex-Mayor of Carlisle), for the Camberland and Westmoreland Archaeological Society; and Mr. Thomas Milbourn for the Surrey Archaeological Society.

"A DAY IN THE COUNTRY"

We have received the following circular from the Committee of the East London Mission, to which we gladly give publicity:—

"The Managers of the East London Mission, 263, Cable-street, Shadwell, E., earnestly solicit help to enable them to take 600 of the very poorest children from the courts and alleys of East London for a day in Kipping Forest. This annual treat, already eagerly anticipated by the little ones, includes dinner, tea, amusements, &c.

Contributions from benevolent and Christian friends are earnestly solicited, and should be sent to Mr. G. Hopkins, Superintendent, Mission Hall, 263, Cable-street, Shadwell, E., by whom they will be gratefully acknowledged."

BUILDING OVER THE DEAD.

GIBBONS AND OTHERS v. CHAMBERS.

THIS case, tried in the Queen's Bench Division on Wednesday last, before Mr. Justice Day, involved a legal issue of a very singular kind. The action was brought to recover two quarters' rent, amounting to 70*l.*, of a piece of land at Bethnal Green, known as the Peel Grove Burial Ground, the facts in connection with which were last year before the public and the courts of law. The action was brought under an agreement dated the 9th of February, 1883, between the plaintiffs and defendant, by which the defendant agreed to erect certain buildings on the land in question before the 25th of March, 1884; the plaintiffs agreed to grant to the defendant, when such buildings were erected a lease or leases of the said land and buildings; the defendant agreed to accept such lease or leases, and the defendant further agreed to pay rent to the plaintiffs at the rate of 140*l.* per year until such lease or leases should be granted. The present action was to recover such last-mentioned rent, the buildings not having been erected by the defendant under the agreement. The defence was that an Act of Parliament passed last session (47 & 48 Vict., c. 72) made it illegal to erect any building on a disused burial-ground, and that by virtue of this Act the agreement was illegal, and failed. On this ground the defendant denied his liability to pay any rent under the agreement, but at the same time paid into Court a sum representing an apportionment of the rent to the date in August last, when the Act received the Royal assent. One or two surveyors were then called to prove that it was impossible to build over the ground without removing the bodies, in consequence of the

certainty of subsidence of the soil, and that no local authority would assent to such building.

Mr. Justice Day gave judgment for the defendant. His lordship was of opinion that in this case the freeholder and the builder entered into a contract which necessarily involved a violation of the rights of those who had paid money on the faith that their friends and relations should lie in this ground undisturbed, and that this amounted to a conspiracy, which would in itself render the contract illegal.

Judgment was accordingly given for the defendant, but without costs, the learned Judge remarking that there were no merits in the case, and that it was an unholy proceeding altogether.

[We condense the foregoing from the *Times* report. Mr. Justice Day's decision will be gratifying to all those sanitarians who, with us, protested from the first against the proposal to build over this burial-ground. It is satisfactory to find that the day of retribution has come.]

THE REFORM OF THE INSTITUTE.

At the meeting of the Institute on Monday a short paper was read by Professor Kerr, in which he recommended that the work of the Institute should be divided and directed by several committees. To this proposition the Council, I believe, agree. To one of such committees I would suggest should be deputed the office of communicating with each Architectural Association in the land that their co-operation may be obtained with a view to federation. At present these associations have no power. They are so many scattered atoms, and when the proposed new charter goes up for confirmation by the Queen in Council the question will be asked, Why should the Institute ask an extension of its powers? Is there not a large number of mutual admiration associations in the country, and beyond mere chit-chat coteries, of what value are they to the State and the public? If the Institute wishes to widen its base, should it not be required to give in return to the public through its members increased efficiency and protection in case of malversation, so that the fear of a black mark against the name of any wrong doer may keep men straight, as in the case of the Law Society? At present the public are not protected, and the remark of the late Prince Consort to Sir Gilbert Scott that any one could set up as an architect expressed both truth and satire.

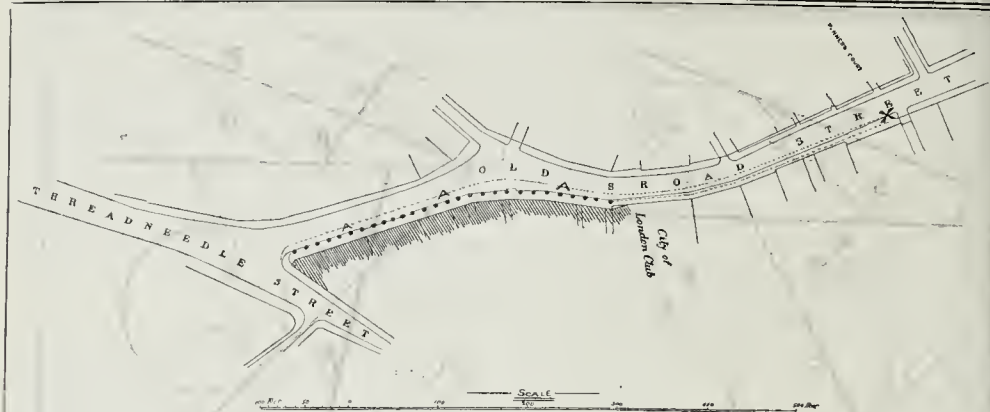
THOMAS E. KNIGHTLEY.

CURVES OF CONTRARY-FLEXURE.

SIR,—My paper, on the above subject (*Builder* May 30, p. 752), does not exclude any curve of contrary-flexure from consideration. It is designed to afford a clue to the rationale of the mental evolution or conception of a line of beauty, to those aesthetic conditions to which any curve of contrary-flexure, to be beautiful, must conform. In the wider mathematics all curves are mathematical curves. Many persons imagine that every geometrically or mechanically described curve must necessarily be beautiful. This is a very venerable and a very fallacious supposition. But that I stand alone in composing ogee curves of segments of circles, &c., as your correspondent intimates in the *Builder* of the 6th inst. [p. 814], is utterly refuted by Mr. Penrose's interesting Royal Academy lecture, only a few pages off [pp. 334, 371, ante], from that he might have learned that it was the practice of the Grecian and Roman architects to combine curves to form the cymatium as I have done, and that Mr. Penrose also denominates such curves, curves of contrary-flexure. The cymatium above the frieze of the Parthenon,—of the Parthenon!—was composed of segments of circles, a practice common in Roman architecture, but unusual in Grecian, in which segments of other curves were used. It would be interesting, however, to learn whether there be an instance of the use of that particular curve of contrary flexure, championed by Mr. Tarn, in either Classical or any other architecture.

W. CAVE THOMAS.

The Hotel Metropole.—We are asked by Mr. Edgar P. Jones, of the Melincourt Brickworks, Resolven, Briton Ferry, to state that he supplied a large quantity of enamelled glazed bricks for this building.—Messrs. Alfred Goslett & Co., of Soho-square, write to say that they executed the glazing.—Mr. John Smeaton, of Ludgate-circus, says he supplied his patent dust-shoots for this hotel, as well as for the First Avenue Hotel.



Messrs. Copland & Gilmour's Suggestion for the Widening of Old Broad Street.

A SUGGESTION AS TO THE WIDENING OF CITY STREETS.

SIR,—Our attention having been directed to the rapid increase of traffic along Old Broad-street to the neighbourhood of the Royal Exchange, which has been created principally by the erection of the new railway stations in Liverpool-street, and the consequent frequent blocks of vehicular traffic and crowded state of the footways,—particularly at the commencement and close of the ordinary business hours,—also to the fact that during wet weather no one can pass along the street without being much splashed by passing vehicles, we trust that as it is a matter of public interest, you will pardon us for intruding on your space by suggesting the cause of such inconvenience, together with a suitable and comparatively inexpensive means of remedying the same.

The obvious cause of the above state of things is the narrowness of the street, particularly at the south end, where at one part, by the Ocean Marine Insurance Company's offices, the footways are respectively 7 ft. and 5 ft. in width, and the roadway about 16 ft., thus only allowing of one vehicle to pass another, whereas a street with such an amount of traffic should provide for four, or at least three lines. It is well known that the City authorities are ever anxious to improve the facilities for street traffic, even when involving a large expenditure in the purchase and compensation for removal of valuable property. This item would form a considerable part of the expense of widening Old Broad-street, and if effected in the ordinary way would be likely to prove an almost insurmountable obstacle. We would therefore suggest that the existing buildings should be retained as a whole, the curb line at the east side being set back from its present position, as shown on the dotted line A, A, A (see above sketch plan), to the face line of the buildings commencing from the junction with Threadneedle-street to the City of London Club, a colonnade being substituted for the ground-floor frontages, a footpath of from 8 ft. to 10 ft. in width carried behind the same, and the offices and shops in the rear being lighted by continuous glazed fronts. Thus no serious diminution of light or rental value would be caused, except so far as related to the diminished area of the ground-floors. From this point northwards, the improvement would consist in throwing the spaces occupied by the areas into the footway, and lighting the basements by means of prismatic lights; the existing curb, as shown by the dotted line, being set back to the firm line in continuation of the proposed colonnade, and running into the present curb at the point marked X, opposite Pinner's-court.

By the above means, a minimum width of roadway would be secured, sufficient for three lines of traffic, besides obtaining more commodious footways. We also notice that, notwithstanding the congested state of the traffic, a pillar letter-box is so placed opposite Gresham House as to leave only sufficient space for two people to pass almost. We should have thought a wall-box behind the railings would have answered every requirement.

COPLAND & GILMOUR, Civil Engineers.
42, Old Broad-street, E.C.
May 28th, 1885.

P.S.—The above principle is not only applicable to Old Broad-street, but to several other crowded City thoroughfares.—C. & G.

The Conversazione of the Institution of Civil Engineers, on the 12th inst., was very largely attended, and the enjoyment by the visitors of the varied programme set before them was facilitated by the favourable weather.

"WESTGARTH ESSAYS."

SIR,—Every competitor, whether in receipt of a prize or not, should enter a strong protest against the action of the Council of the Society of Arts in their award of only half the sum offered by Mr. Westgarth.

The committee's report, "that, in their opinion, none of the essays realise the requirements of the offer," should bear some explanation. The offers as issued by the Society were for the best practical essays on the subjects, and although the Council reserved the right to withhold or deal with the prizes as seemed to them desirable, it is none the less a breach of trust to arrogate to themselves a standard of merit, and to deprive competitors of the full value of the liberal offer made by Mr. Westgarth. NEMO.

DOMESTIC WATER-SUPPLY.

SIR,—Permit me to occupy a small space in your paper to draw attention to the necessity for the inspection and cleansing of cisterns at this period of the year. It is a matter of urgent necessity that all cisterns should be examined and thoroughly cleansed. The trouble and cost are no moment as compared with the consequences which may ensue. Household holders will be astonished in many instances, at the amount and character of cistern mud deposits, and if these are neglected at this season water drawn from these sources may be expected to be more or less offensive. It is quite true that in most instances the cistern is used only for supply of water-closet; but it is equally the fact that in many cases the domestic supply from hot-water pipes for scullery use and of cold water for cooking purposes are drawn from cistern supplies, whilst in some few cases, perhaps, the domestic supply altogether is from this source. At any rate, I strongly advise householders to look to the cistern as a possible source of mischief and of family sickness of a dangerous or fatal character.

JOSEPH BRIERLEY, C.E.

ITALIAN SILVER-GRAY SLATES.

SIR,—We have been much interested by the perusal of the letter in your columns [p. 814, ante] descriptive of the above, and should like to know if the slates referred to are from the same "rock" which supplied this business with a cargo some years ago? If this should prove to be the case, we cannot agree with your correspondent in thinking supererogatory this "silver grey" rival.

Attracted by the moderate price noted by "An English Traveller," our predecessor speculated in the cargo above mentioned; but this sample lot was more than sufficient. The breakage was terrible. Instead of "hardening and becoming like stone," and presenting a substance which "can hardly be broken," the slates crumbled at the touch of the slaters' tools, and split in half when nailed on the roof. Indeed, so far from becoming harder, and excelling in durability, the process of decay set in rapidly, until the surface of the slate could be scraped like chalk.

We may mention that in some cases, for his business reputation's sake, our predecessor supplied other slates by his own expense.

Your correspondent refers to the habit which the slates he describes have of changing colour upon exposure, as a *virtue*. If giving the roof the appearance of being whitewashed be a *virtue* (from an architectural point of view), then the slates were certainly commendable; but, somehow, our customers were unable to appreciate this characteristic. We join most heartily with your correspondent in

wishing every success to the enterprise for developing the natural resources of Italy, but we cannot refrain from expressing a hope that the effort will result in something better and more useful than the sample of roofing-slates which that sunny land supplied to Alfred Braly, to whom have succeeded, yours faithfully,
E. & C. BRABY.

** We have received other letters to the same effect.

STAINED GLASS.

Ventnor.—On Ascension Day a painted three-light window, representing Faith, Hope, and Charity, was unveiled in St. Luke's Chapel of the Royal National Hospital for Consumption, Ventnor, being the gift of Mr. Stafford Henry Northcote and family, in memory of the late Mrs. Northcote, who was a warm friend and benefactress of the hospital. The work was executed by Messrs. Heaton, Butler, & Bayne, of London.

Kington (Herefordshire).—A four-light Munich window has lately been presented to the parish church of Kington, Herefordshire, in memory of the late Dr. G. Footo. The work has been designed and carried out by Messrs. Mayer & Co.

Felsted.—Mr. H. W. Stock and other members of his family have offered to put a stained-glass window in the apse of the chancel of Felsted School chapel, in memory of their relative, Cecil H. Stock, architect, who was at the school from September, 1870, to June, 1877, and who died prematurely in 1883, as we mentioned at the time. Mr. C. H. Stock will be remembered as the author of a useful book on "Shoring."

Burrington.—A stained-glass window has just been completed at the north-west end of this recently-restored church. It is a three-light window, and represents the appearance of Our Lord to Mary Magdalene in the garden. The window, which is by Messrs. Heaton, Butler, & Bayne, of London, is in memory of the wife of Prebendary de Moleyns, vicar of the parish.

Gibbs & Flew (Limited).—An extraordinary general meeting of the shareholders of this company was held at the Cedars Estate Office, on Monday, the 8th inst., when several special resolutions, which were passed at the general meeting held on the 21st of May, were confirmed. The report of the directors, which was duly adopted, after recommending a dividend at the rate of 7 per cent. per annum, proceeded to point out that the constitution of a Limited Company was not suited to the effective and economical carrying on of an active building business, it being impossible to avoid very heavy charges, legal and otherwise, which would not be incurred by a private firm. After some little discussion, it was determined that the Limited Company should resolve itself into a House Property Company, under the name of "The West Kensington Estates Company," and that the whole of the plant, machinery, and building business, and portion of the estates be purchased from the company by Mr. Gibbs and Mr. Flew, for the sum of 70,000l. Messrs. Gibbs & Flew will carry on the business of builders privately, as before.

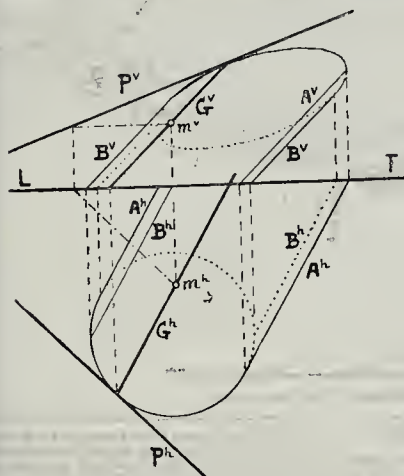


Fig. 99.

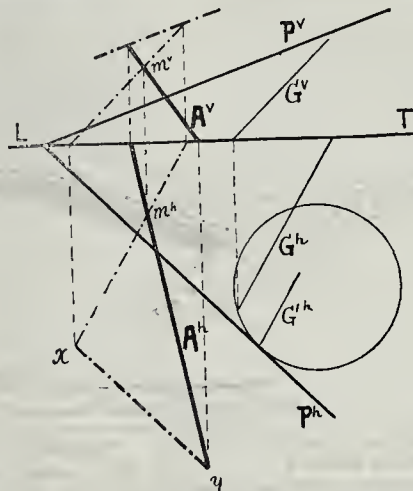


Fig. 101.

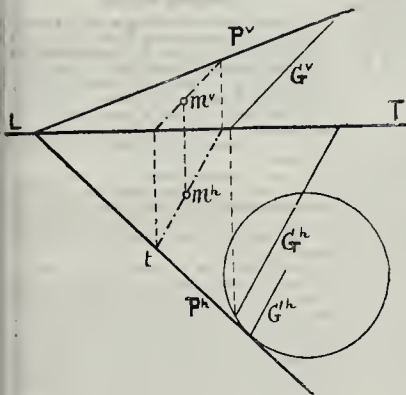


Fig. 100.

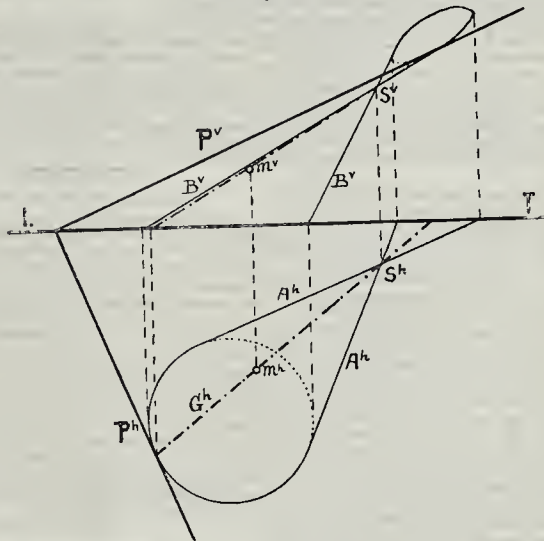


Fig. 102.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

III.

CONES AND CYLINDERS.

Representation of a cylinder and of a plane tangent to it.

THE cylinder is given by its basis on the plan and the direction of its generators. Every generator will have its projections, G^h, G^v , parallel to the projections of the direction given, therefore they can be readily drawn and, by marking the points where the generators enter the elevation plane, we get the vertical trace of the cylinder.

The plane P tangent to the cylinder along any generator G will be tangent to the base of the cylinder in the point g foot of G , and hereby we get P^h . If P^h meets $L T$ we get hereby a point of P^v and the vertical trace of P is another. If P^v meets $L T$ outside our paper, as in fig. 99, we take a horizontal line of the plane P through a point m of the generator G , and its trace will be a point of P^v . The outline of the cylinder, either in plan or

elevation, are the extreme projections of the generators, such as A^h, A^v on the plan, B^v, B^v on the elevation. (See fig. 99.)

Find a plane, P , tangent to a cylinder, and passing through a point, m , outside the cylinder.

We take through the point m a line parallel to the generators of the cylinder, and find its foot, t , on the plan; P^h goes through t , and is tangent to the base of the cylinder. It will be seen that through t two lines, P^h , could be drawn tangent to the cylinder, and we conclude that through the point m there are two planes tangent to the cylinder. This problem is identical with find the shade of a cylinder lighted by a candle; the limits of the shade would be the generators, G^h , along which the planes, P , are tangent. (See fig. 100.)

Find a plane, P , tangent to a cylinder and parallel to a line, A , given.

Through a point, m , of the line A we produce $m x$, a parallel to the generators of the cylinder; we connect the foot, x and y , of the lines A and $m x$, the trace, P^h , of the plane will be parallel to the line $x y$. Here, again, there are two planes that satisfy equally the question.

This problem is also identical with find the shade of a cylinder lighted by the sun's rays; the limits of the shade would be the generators, G^h , along which the planes, P , are tangent. (See fig. 101.)

Representation of a cone and planes tangent to it.

The cone is given by its basis on the plan, and by its apex, s , any line, G , which connects a point of the basis with the apex is a generator of the cone. The lines A^h are the extreme positions of the plans of the generators G , and, therefore, form the outline of the plan of the cone, and so do the lines B^v form the outline of the elevation of the cone. Given the plan of any point, m , of the cone, we find its elevation by drawing through that point a generator, on the elevation of which we will find the elevation of the point m . (See fig. 102.)

Find a plane, P , tangent to the cone on a point, m , of its surface.

We find the generator G , on which the point m is situated; P^h will be tangent to the base of the cone at the foot of G , and P^v will pass through the vertical trace of G . (See fig. 102.)

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

827, Locks and Bolts. W. C. Jones. The main bolt, which is of peculiar shape, is centred so that it always has a tendency to shoot in virtue of its own weight. It is drawn back by a follower on the knob spindle, and may be locked when shot by a small auxiliary lock.

2,315, Sash Fastening. W. Macvittie. The lever is pivoted on the meeting-bar of the upper sash, a coiled spring on the pivot tends to make it assume a position parallel to that bar. A hollow pillar fixed to a plate is secured on the meeting bar of the lower sash. A catch on a spring riveted to the plate of the fastener engages with a hollow arm when it is drawn across. By pressing the thumb-piece the catch is disengaged and the lever may then be pushed back.

2,777, Wall Ties. W. Monnery. The ties are intended for binding together double walls, between which a space is required, and are made with shoulders to prevent the walls collapsing. The branches within the walls are serrated.

5,396, Flooring Cramp. T. Thornton. The boards are clamped by a sliding-bar driven forward by a lever, which is an end piece falling below the bar. The tongue of the cramp is longer than the ordinary pattern, and when the boards are cramped up, a wedge is driven in allowing the tongue to return to its normal position and releasing the cramp.

6,014, Wall Ventilators. W. Cowell. The ventilator is of a boxlike form, and is provided on the outside with flaps or louvres, with air-spaces between. The bottom louver overlaps the bottom of the box, and each of the others overlaps the top of the one immediately beneath it, so that while permitting the passage of the air from within or without, the rain and moisture are excluded.

10,221, Window Frames and Sashes. R. Mason. The upper sash is pivoted at its centre to the window-frame, the lower one is hinged or pivoted at its bottom edge to the lower bar of the frame of the window. The sashes may be opened by cords for ventilation, &c. A strip of wood or other material is fixed by springs to the joints of sashes and frames to keep them tight.

The moulded articles are partially dried, and coated with white enamel. They are then fired in biscuit kilns, and afterwards coated with glaze, and fired in the glazing kiln.

APPLICATIONS FOR LETTERS PATENT. May 29.—6,521, T. Street, Construction of Lock Bricks and Apparatus for making same. May 30.—6,579, J. D. Denny, Double Lock Tiles for Walls, Ceilings, Partitions, &c., with Box, Plates, &c., for manufacturing same.—6,581, J. Billingham, Steam Excavators.—6,601, H. Lake, Improvements in Pipe and other Wrenches.—6,629, H. Lake, Electric Indicator.—6,639, F. Lyto, Manufacture of Refractory Bricks, Furnaces, Converters, and other Refractory Apparatus and Cement.—6,643, R. Hunter and J. Turnbull, Improvements in Kitchen Ranges.

June 2.—6,583, T. Bradford, Improved Disinfecting Apparatus.—6,675, W. Todd and A. Spedman, Improvements in Window Sashes and Frames.—6,683, P. Davies, Improvements in Fire-plugs and Boxes for Water Mains, &c.—6,693, H. Allison, Link, Mounting Circular Saws for Cutting Piles and analogous operations.—6,704, E. Beech and T. Wigley, Construction of Shutters or Guards for Shop Windows, Doors, &c.—6,705, H. and W. Schooling, Joints for Metallic Windows and Other Frames.—6,712, J. Budd, Ornamental Glass for Decorating Walls and Ceilings.

June 3.—6,734, T. Howie, Appliances for the Guidance of Visitors in Buildings, Grounds, &c.—6,745, V. Schneider, Controlling Apparatus for Preventing Waste of Water.—6,753, J. Lorrain, Apparatus for Heating, Cooling, and Ventilating.—6,769, W. Parry, Improved Scaffold Fastener.—6,769, J. Gilmore and W. Clarke, Improved Pipe Union or Joint.

June 4.—6,783, R. Bateman, Ventilation of Public Offices, Rooms, &c.—6,813, C. Kingsford, Apparatus for the Manufacture or Treatment of Cement.—8,329, F. Nell, Improved Method of Laying Wood, Stone, or other Blocks for Paving Roads, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED. 3,283, R. Pearce, Opening and Closing Fanlights and Casements.—3,284, R. Pearce, Opening and Closing Fanlights and Casements through an Outer Wall.—3,493, J. Anderson, Automatic Saw Setting and Sharpening Machines.—4,463, A. Oakden and W. Sharpe, Improvements in Cooking Ranges.—4,968, C. Crestman and A. Lloyd, Combination Writing and Work Table.—5,129, H. Strachan and J. Henshaw, Parallel Vices, Clamps, &c.—5,412, F. Ransome, Manufacture of Cement.—5,533, N. Harrison and J. Coughtrey, Indicating Mechanism for

Door Bolts.—5,636, S. Coombs, Mechanical Door Check.—5,639, R. Hodges and F. Lilley, Adjusting Door Knobs on attaching them to Spindles.—5,763, T. Walker, Improvements in Ventilators.—5,801, C. Brotherhood, Electric Bell Pushes, Contact-makers, and Indicators.—5,868, A. Davis and J. Langley, Combined Gas Pliers and Pipe Cutter.—2,000, K. Perrott, Boiler for Circulating Hot Water suitable for Kitchen Ranges, &c.—3,612, R. Hale, Joint Connexion of Sanitary Drain and other Pipes.—5,506, R. Heap, Improvements in Water-closet Seats.—5,767, G. Campbell, Improvements in Fire Grates.—5,778, H. Yull and J. Thompson, Water-waste Preventer.—5,971, H. Hadden, A Collapsible Wardrobe.—6,077, G. Thynne, Sanitary and other Pipe Joints.—6,337, J. Harrower, Improved Table.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

13,148, W. Lindsay, Improvements in Bridges.—2,573, S. Kirby, Construction of Gully Traps.—5,316, P. Lovatt, Improvements in Hydraulic Coments.—5,377, C. Garrett, Machinery for Sharpening Circular Saws.—5,434, L. Hourtaise, Improvements in Hydraulic Elevators.—11,455, R. Evans, Improvements in Connexions for Metal Pipes for Roofs, &c.—11,533, J. Parker, Improvements in Automatic and other Sash Fasteners.—13,656, E. Booth and F. Dyer, An Improved Sanitary Appliance.—4,875 and 4,878, W. Lake, Manufacture of Nails.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MAY 28. By FLICE & SOY. Hoddesdon, Herts.—Eighteen plots of freehold land £1,040

By R. J. COLLIER. Bermondsey—33 to 39 even, Stanworth-street, freehold 1,100

By MERRILL & SCOBELL. West Croydon—Buckinch House, freehold 1,100 Hackney-road—Improved ground-rent of 100 lb. a year, 31 years 235

By WATTHEALL & GREEN. Whitechapel—83, Grenold-street, freehold 610

By W. & F. HOGGTON. Walthamstow—1 and 2, Warwick Villas, freehold. A plot of freehold land adjoining 405

By LYMAN & CO. Islington—365 and 367, Liverpool-road, 24 years, ground-rent 12l. 710

By E. E. COUCHER & CO. Fulham—43 and 44, Haldane-road, 74 years, ground-rent 8l. 5s. 560

By W. MORER & CO. Honor Oak—15, Herne Villas, 83 years, ground-rent 6l. 327

By WALPOLE & WILKIN. Anerley—34, Station-road, 79 years, ground-rent 5l. 5s. 315

By H. W. SAPPPELL. Balham High-road—House and shop, 41 years, 14, 2, 3, 4, 5, 6, 7, and 8, Balham High-road, and a plot of land, 41 years, ground-rent, 3l. 765

Balham Hill—Holly Cottage, 41 years, ground-rent 2l. 4s. 1,170

Chelsea—47, Smith-street, 10 years, ground-rent 4l. 10s. 100

By J. HOLCOMBE. Bayswater—Improved ground-rent of 11l. a year, with reversion for 74 years 770

Improved ground-rent of 7l. a year, with reversion for 8 years 335

Improved ground-rent of 8l. a year, with reversion for 84 years 310

Improved ground-rent of 14l. 10s. a year, with reversion for 6 years 985

By P. D. FURBERT. Enfield—Plumbridge Farm, and 28a, 3r. 27p., leasehold 5,000

By R. PERKINS. Lee—12 and 14, Edingham-road, 88 years, ground-rent 11l. 600

By J. REVELL. Deptford—79, Adolphus-street, freehold 820

Caledonian-road—19, Balmoral-grove, 77 years, ground-rent, 3l. 490

Lambeth—25, Paradise-street, 63 years, ground-rent 100l. 250

By J. A. SMITH. Chiswick High-road—The "Bicklayers' Arms," freehold, and five cottages, 2,250

Barnes—1 and 2, Liffan-road, freehold, 700

6 and 7, Liffan-road, freehold, 500

8, Castellan-gardens, 24 years, ground-rent 8l. 16s. 7d. 750

By FARRINGTON, ELLIS & CO. Fitzroy-square—12, Pitt-street, copyhold 680

Upper Norwood—1, Hillside Terrace, 73 years, ground-rent 6l. 6s. 375

Wadhurst, Sussex—Snape Farm, and 174 acres, copyhold 4,000

Hurley, Berks.—The "Seven Stars" Inn, and 155a, 6r. 3p., freehold 5,100

Freehold enclosures of land, 165a, 2r. 23p., 1,500

Freehold cottage, and 1a. 2r. 31p., 350

Grounds, and part Scotland Farms, 161a, 3r. 13p., freehold 7,200

Freehold orchard and woodland, &c., 1a. 1r. 19p., 450

By RICH BOS. St. John's Wood—Ground-rents of 30l. a year, term 35 years 5,000

Ground-rents of 64l. a year, term 35 years 1,090

By COOPER & GOLDING. Battersea—25, Church-road, freehold 310

By G. WOODS. St. John's Wood—17 and 18, Queen's-road, 35 years, ground-rent 14l.

By NEWSON & HARRING. Clerkenwell—31, Myddleton-square, 37 years, ground-rent 9l. 7s. 6d.

Islington—78, Shepperton-road, 23 years, ground-rent 5l.

55, Rotherfield-street, 51 years, ground-rent 4s.

Stoke Newington—23 to 29 odd, Allen-road, 80 years, ground-rent 26l.

By W. A. BOWLER. Lawford, near Manningtree—Freehold marsh land 9a. 3r. 23p.

By MASTR, MULNER, & LANGTON. Fitzroy-square—167, Cleveland-street, 5 years, ground-rent 6l. 6s.

9, Polygon-mews South, 37 years, ground-rent 4l.

Hayward's-heath, near The "Bent Arms," and a cottage, freehold

Freehold cottage in High-street

The Manor House, with grounds

Three enclosures of freehold land, 7a. 2r. 27p.

Two enclosures of freehold land, 5a. 3r. 7p.

Hampton—Four freehold cottages, and grounds,

The residence, Florence Grove, and grounds,

JUNE 5. By BEAN, BURNETT, & ELDINGES. Beiford Park—1 and 19, The Avenue, 89 years, ground-rent 12l.

4, 9, 7, and 9, The Avenue, 89 years, ground-rent 39l.

Life interest in 282l. 9s. a year, secured upon shares in limited companies also a policy for 600l., life aged 54.

MEETINGS.

MONDAY, JUNE 15. Liverpool Architectural Society Junior Debating Club. Mr. T. J. Dalsiel will open a discussion on "Early Gothic Vaulting."

Investors' Institute.—8 p.m.

WEDNESDAY, JUNE 17. Royal Meteorological Society.—15 papers to be read 7 p.m.

Builders' Foremen and Clerks of Works' Institution. Ordinary meeting, 8.30 p.m.

Manchester Society of Architects.—General Meeting 3 p.m.

Society of Engineers.—Visit to the Tilbury Docks.

THURSDAY, JUNE 18. Society of Antiquaries.—8 p.m.

Dundee Institute of Architecture.—Business meeting and Election of Officers, &c.

Miscellaneous.

Sewer Accidents.—A serious accident happened at Kingsland, whereby two workmen named George Pimm and George Cobb, in the employ of Mr. W. Rigby, contractor for the Holloway and Northern High Level Sewer relief lines, have lost their lives.—Another serious accident, though fortunately not attended by loss of life, occurred on Monday evening near the Sloane-square Station of the District Railway, where a new sewer has for some time been in course of construction by the Metropolitan Board of Works. It is an iron one, and runs parallel with the old brickwork sewer which it is designed to replace. Shortly after three o'clock in the afternoon, the old sewer, which though still in use, appears to have been in a very unsatisfactory state of repair, suddenly burst, and discharged its contents through a cavity in the railway tunnel, which had been made to admit of the necessary operations in the construction of the new sewer. The station at Sloane-square soon became flooded with the matter which poured into the tunnel, and all traffic was necessarily brought to a standstill.

The Sanitary Institute of Great Britain will hold its Autumn Congress at Leicester from September 22 to 26 inclusive. The President of the Congress is Professor de Chaumont, the Sectional Presidents will be, in the department of "Sanitary Science and Preventive Medicine," Mr. Arthur Ransome; in the section of "Engineering and Architecture," Mr. Percival Gordon Smith; and in that of "Chemistry, Meteorology, and Geology," Mr. William Marcell, M.D., F.R.C.P., F.C.S., F.R.S. Papers are limited to twenty minutes in reading, and the discussion upon them to ten minutes each speaker. Each author should prepare an abstract of his paper and send it, together with the original manuscript, by hook-post, on or before August 26th, addressed to the Secretary, Sanitary Institute of Great Britain, 71a, Margaret-street, W.

The Albert Palace, Battersea Park, was opened on Saturday last, under very depressing circumstances so far as the weather was concerned. Nevertheless, the proceedings of the day argued well for the future of the Palace, which has already been described at some length in our columns.

Annual Dinner of the Architectural Association.—The retiring President, Mr. ole A. Adams, presided at the dinner on Wednesday last. There were not so many members present as usual, but the Duke's alou at the Holborn Restaurant was com- rately filled. The toast of the "Army and y, &c." was proposed by the President and sponded to by Mr. Henry Lovegrove, who rferred to the work of the Association, with hich he had been so long connected. Mr. ashill proposed the toast of the "Royal Insti- te of British Architects," and Mr. James ooks responded in a most able and energetic ay. Mr. Robinson proposed the "Visitors," nd Mr. W. P. Appleton (brother of the honorary ecretary) responded. Mr. Horace Cheston roposed the "Officers of the Architectural ssociation," and Mr. Douglas Mathews, Mr. rrett, and Mr. Berry responded. Mr. W. P. ppleton gave two capital recitations, and Mr. G. K. Killmister delighted the audience with his ianoforte performance.

The North Sea and the Baltic Canal.—The project for a sea canal across Holstein, nnecting the Baltic with the North Sea, pears at length to be on the point of realisa- on. The details which have just been sub- mitted to the Chancellor, Prince Bismarck, and rferred by him to the Prussian State Council, s well as to the Federal Council, will, it is understood, receive the formal approval of hose bodies at their next meeting. The esti- mated cost of the work is 156 million marks, or 800,000l., of which sum Prussia will find two millions and a half sterling, the remainder eing contributed by the other German States.

Wood Block Flooring.—Messrs. Geary & Walker's patent system of wood block floor- ing has recently been laid at the Royal Eye ospital, Manchester; Post-offices at Leeds, Liverpool, and Doncaster; St. Chad's Church, Ayr, and other places. It is also being aid at Glossop Hall, for Earl Howard; churches t Shilbottle, near Newcastle-on-Tyne; Wednes- day and Stoneford, near Accrington; also at several schools, hospitals, &c. We have drawn tention to Messrs. Geary & Walker's system of flooring previously, but may add that they how samples at the Inventions Exhibition.

New River Bridge betwixt Sunderland and Durham.—As an important district public improvement the erection of a new bridge over the river Wear at Low Coken has lately been commenced. The contract for masonry and piling has been let to Mr. R. Allison, builder, Sunderland, and the wrought-iron lattice girders, of 120 ft. span, with Lindsay's patent trough steel flooring, to Messrs. Head, Wrightson, & Co., Stockton-on-Tees. The works are being carried out from the plans and superintendence of Mr. D. Balfour, Assoc. M. Inst. C.E., Houghton-le-Spring, Sunderland.

New Mission Hall, Lavender Hill.—A new Mission Hall, in connexion with the Church of the Ascension, was commenced on Monday last. It is to be built in two portions, each to accommodate 500 adults, at a total cost of 2,667l. Mr. Charles Ansell, of York-street, Lambeth, is the builder. The architects are Messrs. Romaine-Walker & Tanner.

Female School of Art.—By command of the Queen, a fan has been designed and painted on silk by Alice Elfrida Manly, which is intended as a gift from Her Majesty to the Princess Beatrice on Her Royal Highness's approaching marriage.

Wilberforce Mission House, Newington Butts.—On Monday last the new works to the above were started by the Bishop of Rochester and Trustees of the Wilberforce Memorial Fund. In August last the Rev. C. H. Grundy entered the new house as first Wilberforce Missionary. The work has increased to such an extent as to demand the addition of a large reception-room for meetings of associations and persons engaged or interested in Church work in South London. An admirable site has been secured adjoining the Mission House. Messrs. H. Burman & Sons were builders to the work last year. Mr. Frederick Higgs is the builder of the additions. The entire works have been carried out from the designs and under the superintendence of the architects, Messrs. Romaine-Walker & Tanner, of Buckingham-street.

Inventions Exhibition.—We are informed that Messrs. W. H. Lascelles & Co. have supplied the walnut doors and fittings in the Council-room of the International Inventions Exhibitions.

For New Central Stores, Newgate-street, Newcastle-on-Tyne, for the Newcastle-on-Tyne Co-operative Society, Limited. Mr. Edward Sawbros, F.R.I.C.A., architect, Newcastle-upon-Tyne.—

Tyrie & Graham, Gateshead	£11,730 9 7
E. B. Reed & Son, Newcastle	11,376 0 0
Joseph Elliot, Newcastle	10,970 0 0
T. R. Lamb, Gateshead	10,954 0 0
J. Ferguson, Newcastle	10,947 0 0
N. & R. Reed, Newcastle	10,865 0 0
Haswell & Waugh, Gateshead	10,510 0 0
R. Allison, Sunderland	10,409 5 0
H. Atkinson, Blaydon-on-Tyne	10,335 4 0
Middlemiss Bros., Newcastle	10,285 13 9
Brownhead & Kewick, Newcastle	10,100 2 0
J. & W. Lowry, Newcastle	9,981 1 0

* Accepted.

For erecting work premises in Short-street, Hoxton. Mr. R. A. Lewcock, architect and surveyor; Bishopsgate-street Within.—

Marr	£763 0 0
Jackson & Todd	744 0 0
Roome	717 0 0
Shurmut	707 0 0
Anley	705 0 0
Steele Bros.	674 0 0
Pringle	658 0 0
Goodall	610 0 0

For performing sundry external repairs to thirty houses in Aske-street and Fanshawe-street, Hoxton. Mr. R. A. Lewcock, architect and surveyor.—

Anley	£420 0 0
Marr	315 0 0
Jackson & Todd	294 0 0
Pringle	285 0 0
Roome	280 0 0
Shurmut	172 0 0
Steele Bros.	165 0 0

For erection of jam factory, for Messrs. Geo. Pickard & Sons. Mr. R. Frank Vallance, architect, Mansfield. Quantities by the architect.—

Bradley & Baker, Nottingham	£1,939 0 0
Chas. Vallance, Mansfield	1,853 0 0
S. & G. Frisby, Mansfield	1,778 0 0
Fisher Bros., Mansfield	1,749 0 0
J. Greenwood, Mansfield	1,670 9 0
H. Alsop, Mansfield (accepted)	1,632 9 0

For erection of boundary-walls, forming footpaths, &c., Crow-hill, Mansfield, for Mr. R. Barringer. Mr. R. Frank Vallance, architect. Quantities by the architect.—

Wm. Sills	£150 0 0
Thos. Millott	135 18 8
J. Greenwood	130 0 0
Fisher Bros.	114 11 4
W. A. Vallance	98 16 3

[All of Mansfield.]

For making new streets, Crow-hill, Mansfield. Mr. R. Frank Vallance, architect. Quantities by the architect.—

Thos. Millott, Mansfield	£335 4 4
Fisher Bros., Mansfield	291 17 8
W. A. Vallance, Mansfield	193 9 0
John Lane, Skegby	270 4 0
J. Greenwood, Mansfield (accepted)	271 0 0

Accepted for erection of new Sunday-schools in connexion with the Unitarian Chapel, Mansfield. Mr. R. Frank Vallance, architect. Quantities by the architect.—

Chas. Vallance, Mansfield	£224 0 0
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For new Wesleyan Chapel at Brailes, Warwickshire. Mr. W. Ranger, architect, London.—

King	£384 7 6
Adkins	384 0 0
W. Pickering	334 10 0
J. Pickering & Sons	324 8 0
Attwood (accepted)	320 0 0
Hoare & Gardner	320 0 0

For additions and improvements to the United Methodist Free Church, Radstock, Somerset, for the Trustees. Plans, specifications, and quantities by Mr. W. F. Bird.—

William Tovey	£498 19 0
Joseph Bird, Frome-Billy, Radstock	481 10 0
Wheeler & Gregory	451 2 6

* Accepted.

For alterations to the "Adelaide," Liverpool-lead, for Mr. Budd. Mr. Arthur W. Saville, architect, 39, Strand. Quantities supplied.—

Buckle	£236 0 0
Clinch & Pattern	270 0 0
Royal	268 0 0
Hawkins	263 0 0
Cook	243 0 0
Walker	235 0 0
Ward & Hamble	235 0 0
Meath (accepted)	198 0 0

For the erection of a Welsh Calvinistic Chapel in the Southern-road, Hammer-smith. Mr. John Owen, architect, John-street, Thornhill-square. Quantities by Messrs. Johnstone & Paine, Bedford-row.—

Chapel, House, Heating, &c.	
J. Grover & Son	£1,524 0 0
L. H. & R. Roberts	1,509 0 0
H. J. Williams	1,460 0 0
E. J. Chan	1,437 0 0
T. Richards, 61, Vincent-square	1,412 33 3

* Accepted.

For building house (exclusive of ground-work, bricks and sand, smiths' and plumbers' work), Leicester-road, New Barnet. Mr. Joseph White, surveyor.—

Daniels	£310 0 0
Prentice	265 0 0
Ellwood (accepted)	253 10 0

Accepted for house and stable (with additional work), at Potter's Dale, Middlesbor', for Mr. G. Salmon. Mr. Joseph White, surveyor.—

Reed, Leytonstone	£610 0 0
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CONTRACTS AND PUBLIC APPOINTMENTS.

Epitomes of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Water-Mains, Pipes, and Fittings	War Department	Official	June 15th	i.
North Eastern Railway	W. Bell	Official	June 17th	xix.
Vell-Pumps, and Additions to Tank	West Ham Union	Official	do.	xix.
aving	Hendon Union	Official	do.	xix.
Villa Residence, Herne Bay	Enfield Local Board	W. Rittingerham	June 18th	ii.
Painting	Westminster Union	Official	June 19th	xix.
ew Infant School	Woodford School Bnd.	E. Tidman	do.	xix.
rection of Drill Shed, &c.	Admiralty	Official	do.	xix.
Furniture and Fixtures	London School Board	Official	June 22nd	xix.
ast-Iron Socket, &c., Pipes	East Cowes Local Bnd.	J. R. Mann	do.	xix.
ew Sunday-Schools, Northampton	War Department	S. J. Newman	do.	ii.
Painting, &c., Caterham	Canterbury Gas Co.	H. E. Jones	do.	xix.
ashholder Tank	Great Western Ry. Co.	Official	June 23rd	xix.
rection of Shops	Beth U. S. A.	Official	do.	ii.
Marriage Timber	Com. of H.M. Works	Official	June 24th	ii.
Renovate Drain-Pipes	Beckenham Local Board	G. B. Carlton	June 25th	xix.
Flushing Tanks and Pipe Sewer	New Windsor U. S. A.	Official	June 26th	ii.
Paving High-street	Cardiff Corporation	J. A. B. Williams	July 1st	xix.
Laying Pipes, &c.	Kent Wesleyan Methodist School Association	Chas. Bell	July 2nd	ii.
ew College, Canterbury	Dartford U. R. S. A.	G. H. Tait	July 3rd	ii.
Sewerage, Farningham and Eynsford	Great Northern Ry. Co.	J. Fraser & Sons	do.	ii.
Construction of the Dewbury Branch Railway	Gr. Nrbth and Manch. Shild., and Lincn. By.	Sir F. Drumwell	July 7th	ii.
ewage Works	Portsmouth U. S. A.	W. Ranger	Not stated	ii.
rection of a New Mission Hall				

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Engineer	Llanfrecch Upper L. B.	Not stated	June 20th	xvi.

TENDERS.

For rebuilding Knighton Workhouse, for the Guardians of Knighton Union, Radnorshire. Messrs. Jones & Parks, architects, Newtown. Quantities not supplied.—

Thomas, Watkins, & Jenkins, Swansea	£8,630 0 0
Price & Davies, Knucklins	7,969 0 0
Wells, Ludlow	7,450 0 0
E. Davies & Son, Newtown	6,751 0 0
Bowers & Co., Hereford	6,659 0 0
J. Williams, Knighton	6,659 0 0

* Accepted, after reductions, at 6,902l.

For the erection of four shops, Russell-street, Strand. Mr. J. Platt Lofthouse, C.E., architect.—

Geo. Drew, Chalford	£2,700 0 0
Bowers & Co., Hereford	2,519 0 0
Jas. Greenleaf, Stroud	2,300 0 0
W. Harper, Stroud	2,143 13 0
English & Son, Stroud (accepted)	1,975 0 0

Accepted for erecting the St. James's Temperance and Mission-hall, Royst-road, Kennington Park. Mr. Banister Fletcher, architect.—

Aldridge & Jenvey	£2,650 0 0
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[No competition.]

For alterations at the "Star," corner of Old-street, City-road. Mr. R. A. Lowcock, architect and surveyor, Bishopsgate-street Within:—

Table with 2 columns: Name and Amount. Includes Battershill, Jackson & Todd, Marr, Anley, Walker, Steele Bros.

For the formation and metalling of new roads, and the laying of 6-inch pipe-sewer, on the Grengre-road Estate, Cambridge, for St. John's College. Mr. J. Carter Jones, surveyor, Cambridge:—

Table with 2 columns: Name and Amount. Includes Wm. Saint, Swann Bros, Geo. Honour, Thoday & Son.

For stabling and lodge, at Kidderminster, for Mr. M. Tomkinson. Mr. J. M. Gething, architect:—

Table with 2 columns: Name and Amount. Includes R. Thompson, Binnian & Son, Howard & Sons, H. Smith.

For office screens and fittings, at Kidderminster, for Messrs. R. Smith & Sons. Mr. J. M. Gething, architect:—

Table with 2 columns: Name and Amount. Includes Howard & Sons, Field, Snowdon, W. Atkins.

For new school for girls at Folkestone, for the Kent Wesleyan Methodist School Association. Messrs. Buck, Sand & Smith, architect, Maidstone. Quantities supplied:—

Table with 2 columns: Name and Amount. Includes C. J. Slade, Hayward & Paramor, H. Clemmuss, Wm. Brooks, H. M. Moody, E. Webster, Geo. Prebble, W. J. Wild, E. C. Howell & Son, J. Bingham, H. Urwin, Walks & Clements.

For alterations to No. 43, Great Russell-street, and No. 33, Duke-street, W.C., for Messrs. Jones & Willis. Mr. A. B. G. Feunig, architect, 10, Lincoln's Inn-fields:—

Table with 2 columns: Name and Amount. Includes T. Rider & Son, J. Hooper.

Accepted for building new board-room and lavatories, and for other alterations, at No. 3, Great College-street, Westminster, for the Lancashire and Yorkshire Railway Company. Plans, specification, and designs by Mr. James Norris, surveyor, Vauxhall Bridge-road, Westminster:—

Table with 2 columns: Name and Amount. Includes Frederick A. Anear, Westminster.

Accepted for the erection of shops and cottages in Bridge-street, Greenwich, for Mr. Blackman. Mr. R. W. Crawley, architect, Trinity-square, Tower-hill:—

Table with 2 columns: Name and Amount. Includes H. L. Holloway.

For painting and repairing works at the Infirmary and Workhouse in the Fulham-road, for the Guardians of the Poor of the St. George's Union. Mr. H. Saxon Snell, architect, Southampton-buildings:—

Table with 2 columns: Name and Amount. Includes W. Bamford, Vigor & Co, C. F. Keadley, Munday Bros, Hindman & Worsley, F. Stevenson, W. Brown, W. G. Lily, Dicksee & Dicksee.

For sewerage, kerbing, channelling, and making roads and paths to east end of South-street, Colchester. Mr. G. H. Page, surveyor, Trinity-chambers, Colchester:—

Table with 2 columns: Name and Amount. Includes G. Leo, C. Cappin, A. Gladwell, G. Bowles.

For external painting at the school, &c., and internal decorative repairs, at the Asylum for the Deaf and Dumb, near Dartford, Kent, for the Metropolitan Asylums Board. Messrs. A. & C. Harston, architects, Leadenhall-street. Quantities not supplied:—

Table with 2 columns: Name and Amount. Includes H. H. Swan, W. Reid, A. W. Derby, M. McCarthy, Dicksee & Dicksee, Gibbin & Son, F. Stevenson, W. G. Lily, R. Proctor, Woolwich (accepted).

Accepted for alterations to the Imperial Hotel, Clacton-on-Sea, for Messrs. T. Daniell & Sons, West Bergholt. Mr. J. W. Start, architect, Colchester:—

Table with 2 columns: Name and Amount. Includes H. Wilkinson.

Making-up Mount View-road, Stroud-green.—Mr. Wm. Nicholls, road and sewer contractor, of Irurro-road, Wood-green, writes:—"Will you be kind enough to correct the list of tenders which appeared in your issue of the 6th [p. 818], for making-up Mount View-road, Stroud-green for the Hornsey Local Board. They evidently should not have been published. My tender having withdrawn, my tender being next lowest has been accepted. The last two items on the list should have appeared as follows:—

Table with 2 columns: Name and Amount. Includes Wm. Nicholls, A. Walker, W. G. Lily.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 36, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

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The Builder.

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SATURDAY, JUNE 20, 1885.

ILLUSTRATIONS.

Design for Admiralty and War Offices: Park Front.—Mr. H. B. Garling, Architect.....	866-867
New Offices of the <i>Daily News</i> , Fleet-street.—Mr. T. Chatsfield Clarke, Architect.....	870-871
Sculpture at the Royal Academy: Subjects from the <i>Æneid</i> of Virgil.—Mr. Harry Bates, Sculptor.....	874-875
House at Wrotham Heath, for the Hon. Lady Carolina Navill.—Mr. H. Hardwicke Langston, Architect.....	878
Canadian Timber Construction: Balloon Framing.....	879
A few Bits of Old Glass.....	884, 881

CONTENTS.

Crowe and Cavalcaselle's Life of Raphael.....	851	Balloon Framing.....	865	Labourers' Dwellings.....	856
Ancient Life from Ancient Monuments.....	856	The Annual Report of the Metropolitan Board of Works.....	852	Central Towers.....	885
Sewage at Aylesbury.....	857	The Architectural Association.....	853	Santa Maria della Grazie, Milan.....	883
Notes.....	858	An Old Fresco at Lincoln's Inn.....	853	Provincial News.....	883
The Congress of French Architects.....	859	The Late Mr. Henry Edward Kendall, Architect.....	862	Dissenting Church Building News.....	885
Inventions Exhibition: Hydraulic Machines.....	861	The "Kestington" Grease and Waste-Water Trap.....	854	Venice.....	885
Notes on a few "Bits" of Old Glass (Illustrated).....	862	Concrete Walling.....	854	The Strand's Column: Descriptive Geography.—Part II.....	838
Design for Admiralty and War Offices.....	863	The "Inventories".....	854	Recent Patents.....	887
New Offices of the <i>Daily News</i>	863	Pumps for Contractors' Purposes.....	854	Recent Sales of Property.....	887
Sculpture at the Royal Academy: Scenes from the <i>Æneid</i> .—By Mr. Harry Bates.....	863	Early Galleys.....	854	Meetings.....	887
Two Larches, Wrotham Heath, Kent.....	863	Gas Fires in Houses.....	854	Death of Mr. S. Buxton Walker, F.R.S.....	888
		Cases under the Metropolitan Building Act.....	855	Miscellaneous.....	888

Crowe and Cavalcaselle's Life of Raphael.



THE second volume of Crowe & Cavalcaselle's "Life of Raphael" has certainly not been expected with very much impatience; nor is the fact at all hard of explanation. The co-ordination of our knowledge of the history of early Italian art was a work never thoroughly attempted, and certainly never approximately accomplished, till the authors of the "New History of Painting in Italy" took it in hand. Their labours were crowned with that highest of all success, which is proved by the fact that students instructed by their history have been enabled to advance beyond it, and to discover and manifest its shortcomings. A new generation of careful students of art history has arisen, furnished (owing to the vast preliminary labours of Crowe & Cavalcaselle themselves) with a critical apparatus of continually increasing complexity and exactness, and the honest and thorough forerunners, to whom we owe so much, are in danger of being thrown into the shade by students who, but for them, could not have attained the knowledge they possess.

The life of Raphael † offers no such vacant field as the early history of Italian art presented a few years ago. Raphael has been the subject for one biographer after another, and since the appearance of Passavant's work the amount of new matter likely to be brought together by a new biographer has always been relatively small. Nevertheless, in the last few years two important lives have appeared,—the German hook upon Raphael and Michelangelo, by Anton Springer, and the French Life of Raphael, by Eugène Müntz. Morelli's "Italian Masters in German Galleries" has likewise thrown a powerful new light upon the course of the great artist's early development. Altogether, there remained little for Messrs. Crowe & Cavalcaselle to discover, or even to re-arrange.

The disappointment caused, not in England only, but amongst all lovers of art in Europe, by the perusal of the first volume, arose, not because the book contained no new facts of importance, but because it neglected to make due use of the work done by Morelli, Müntz, and others. It took, in the opinion of the

majority of competent critics in England and abroad, a false view of the nature of Raphael's early career. It held Timoteo Viti to be Raphael's pupil rather than his teacher, and it accepted the so-called Venice Sketch-book as the product of Raphael's boyish hand. These two false judgments greatly diminished the value of the first volume.

The second volume deals with the last part of Raphael's career, from the time of his arrival in Rome to his death. In this period there are few such burning questions for a biographer to deal with. We know practically everything needful about the course and influences of his life. His pictures and drawings manifest a steady progression in a definite direction, and documentary evidence of various kinds exists in tolerable quantity. The character of the second volume could thus be foretold beforehand. There is little to correct in it, and there is little likely to attract. It is a solid piece of work, full of facts, duly catalogued, co-ordinated, and indexed. Its price is kept moderate by the omission of all illustrations, which the rapid increase in the number, excellence, and accessibility of photographs renders no longer needful. In this connexion, however, it is unfortunate that the authors have not given the names of the photographers and the numbers in their catalogues of the photographs of the pictures and drawings referred to. The example set in their German edition of the "History of Flemish Painting" might have been followed here with great advantage. A chronological list of the genuine pictures and drawings referred to would not have been difficult to construct and would have been useful to all students, besides that it would have given relief to the crowded alphabetical index.

The book is clearly the result of a great deal of work and research, but what is new in it is chiefly conjectural. Page after page presents its crop of suggestions, of possibilities, of probabilities more or less modified. Such a picture may have been suggested by such an event; such a drawing by the work of such and such an artist. Of this kind of thing we can readily have too much. Even the most specious conjectures are poor food. The worst of it is that sometimes, by the mere lapse of a few pages, a conjecture is turned into a fact. This is an old failing of our authors. It is one of their most annoying idiosyncrasies. Unless the reader be careful and critically disposed, he is liable to go away with the impression that a thing actually was the case when in reality it may have been quite otherwise.

This Bramante's connexion with Raphael assumes in this "Life" a more definite form than recorded facts can be quoted to prove. We know that the architect and the painter

were close friends, and that Raphael was on more than one occasion dependent upon Bramante for advice in architectural matters. But the exact nature of their connexion is not so clear as Crowe & Cavalcaselle would lead their readers to imagine.

One of the most interesting portions of the book is that which deals with Raphael's architectural works. When Bramante died in 1514, Raphael was appointed to succeed him as architect of St. Peter's. He immediately prepared a model and estimates, which, however, have not come down to us. Bramante's first idea was to build an edifice upon a plan of the form of a Greek cross, covering an area of about 26,465 square yards. He soon had to abandon these gigantic proportions. When the four great piers of the dome had been raised to a considerable height, their foundations were discovered to be insecure. Other defects in Bramante's scheme likewise made themselves manifest, and corrective measures had to be taken at a very early date. When the building was committed to Raphael he made no less alteration than the substitution of a Latin for a Greek cross in the plan. "The way in which Raphael worked out his design was severely criticised by contemporaries, and condemned by Michelangelo. Antonio Picconi da San Gallo ventured to call Raphael's aisle a lane; he pointed out defects in the ambulatories at the heads of the transept and choir, blamed the distribution of the weights on the pillars of the tribune, and the poverty of the cornices and their projections. But when Michelangelo afterwards came to express an opinion on Picconi's own plans he dealt blows of quite another kind, and called Antonio's model 'food for beasts and oxen, who knew nothing of architecture.'" "There is reason to believe," say Messrs. Crowe & Cavalcaselle, "that Raphael's talent as an architect was more genial than profound"; and in this judgment they are probably right. He could conceive a gracefully-proportioned general design, but he had not training and experience to enable him to follow it out in detail. Instead of being the master over his assistants, he was their slave. As long as Bramante lived, Raphael's lack of thorough knowledge of this branch of art was not perceived. He is said to have gone to Bramante for the designs which he employed in the backgrounds of his frescoes of the "School of Athens" and Heliodorus. He was only acquainted superficially and at second-hand with the writings of Vitruvius, until he got Mario Fabio Calvo to translate them into Tuscan for him. How lacking Raphael was in genuine architectural feeling is shown by his treatment of the two-storeyed *loggia* erected in the Vatican by Bramante. Raphael, without

* "Raphael: his Life and Work." By J. A. Crowe and G. B. Cavalcaselle. Vol. II. London, 1885.
† We adopt the spelling "Raphael," instead of "Raffaello," in accordance with the title of the book.

considering the strength of the structure, built on a third story, and then found himself obliged to close the arches of the lower colonnade to prevent the whole thing from crumbling to pieces.

Fortunately Raphael did not make much impression on St. Peter's during the time it was under his charge. The works went forward in a very leisurely fashion, so that when Michelangelo was placed in command, he was able at once to return to Bramante's scheme and continue that with slight modifications. But it must not be supposed that Raphael was half-hearted in his architectural studies. On the contrary, for a time, he was thoroughly absorbed in them. When he was painting in the Camera della Segnatura and dell' Eliodoro, he devoted much of his attention to the designing and execution of the frescos, but the Camera dell' Incendio was chiefly the work of his pupils; he did little more than generally oversee the work. Besides St. Peter's, Raphael is accredited with a good many architectural works. It is true Vasari's statements are couched in ambiguous form. For the Villa Madama, for instance, Raphael is said to have furnished the design, but the drawings made to scale, now in the Uffizi, are by Antonio da San Gallo. The "designs sketched" for S. Giovanni of the Florentines at Rome, and S. Lorenzo at Florence, were never carried out; whilst the Palazzo Pandolfini, for which also he "sketched" a design, was not begun till after Raphael's death. As for the Chigi chapel at the church of S. M. del Popolo, it is by no means certain that Raphael had anything to do with the structure, whilst his connexion with the Farnesina is involved in much obscurity. Altogether, it is probable that Raphael did little more than give to trained architects suggestions upon the practicability of which they had to decide. If possible, they carried them out, with the useful modifications; if impossible, they simply laid them on one side. In fact, Raphael's connexion with architects was just like Dürer's. Builders, sculptors, amateurs, all came to Dürer for suggestions, and they got what he had to give, and made whatever use of it they could. In this respect there is a great contrast between Raphael and Michelangelo, for Michelangelo was at heart a sculptor and an architect. The monumental structure of things fascinated him, and not their momentary outside appearance.

The second volume of Crowe & Cavalcaselle's "Life" is, of course, mainly devoted to Raphael's work as a painter. Each of his frescos and pictures is very fully investigated and unnecessarily fully described. Unless the reader have some kind of reproduction at hand the descriptive matter is wearisome, and in face of an illustration it is useless. Moreover, the descriptive passages themselves are often far from felicitous. The main virtue of the book, as it seems to us, is the thorough manner in which the authors have worked the history of the time into their discussion of the artist's works. They have made every possible use of contemporary documents and of the labours of others in the same field, and they have thus been enabled to approximate still further towards an accurate chronology. The period in the year 1511 at which Raphael finished the frescos in the Camera della Segnatura has been fixed by them with much probable correctness. They show that in the month of August both the walls of the Camera della Segnatura and the finished portion of the roof of the Sistine Chapel were bared for inspection. Several other such points of minute chronology receive discussion, and in more than one instance a welcome light is thrown upon what was previously obscure. We need not, and we do not, always agree with our authors' conclusions, but we cannot refuse them our thanks for untiring patience expended by them on our behalf.

It is the more annoying, therefore, to be obliged to say that much of the work the authors must have gone through has been wasted when it might have been turned to good service. There is no doubt that they have read the Raphael literature with much care, yet again and again they come to and

pass by controverted points without so much as a hint that the conclusions adopted by them have been already widely disputed. Just as in the first volume they assigned (without a word on the other side) the "Apollo and Marsyas" to Raphael,—a picture now almost universally accepted as by Perugino,—so in this volume they devote some three pages to the so-called "Fornarina" of the Barberini Palace, without so much as hinting that the large majority of students of Raphael consider him to have had no hand in its production.

In discussing particular pictures, they talk very glibly of the share this and the other assistant took in the work. They see here the hand of Giovanni da Udine, there that of Gian Francesco Penni, or Giulio Romano. It is impossible for a reviewer to express a decided opinion off-hand about the correctness of such discriminations, but their mere multitude is startling, and the *ex cathedra* tone in which they are pronounced is far from being reassuring. In one or two instances we know that we disagree with Messrs. Crowe & Cavalcaselle's conclusions, but it is only the experience to be derived by using their book in the face of the pictures themselves that can enable the formation of an authoritative judgment upon its merits in this respect. We have had occasion again and again to disagree with similar discriminations introduced by the same writers into their earlier works, which we have tested line by line in many a church and gallery. In this last hook of theirs the number of such authoritative statements is far increased, and they are just as tyrannically expressed as ever. We cannot but feel more than usual distrust in results so stated.

Our chief objection to the book as a whole is that it is merely a "life" of the same type as those that have gone before it. It is not, and does not attempt to be, final. It goes a step further in preparation of the way; it does something towards removing misconceptions, rectifying dates, and defining the existing productions of Raphael's art. It makes no real attempt to grasp the whole area of the man's work, and wrench forth from the tangle of tale and legend the man himself. If all Raphael's pictures were to be destroyed from the face of the earth, as, in the nature of things they some day will be, this "life" would avail no more than any of its predecessors to give to the memory of Raphael himself an enduring monument. The business of a biographer is not to index and arrange the works of his subject, but to manifest for all time the manner of man that he was. If no painting by Fra Angelico existed the artist-friar would still be a recognisable individual, owing to the vivid sketch of him printed amongst Vasari's "Lives." To all lovers of Raphael's art the painter's personality is well known. We want some biographer to come forward and make it his business to express that personality in writing. We want a psychological study of the man's mind to be made by some one capable of looking below the surface of a picture and seeing something more in it than an historical puzzle. It need not be said that the author who alone can produce such a hook must be himself an artist. Of course he must, but the artistic spirit is by no means rare. It can be traced in every mind, usually in a retrogressive condition. It needs fostering to make it a formative power. Let the historians of art of our day set themselves diligently to manifest not so much the technical as the spiritual development of the artists of the past; let them hear continually in mind that the interest in every picture lies not in the chance circumstances by which its making was surrounded, but in the "pictorial idea" it was produced to express. We shall then have volumes upon art history, whose interest will be lasting, and independent of the immediate proximity of the works referred to. Much of the writing upon art in the present day is mere cataloguing in disguise, and if Messrs. Crowe & Cavalcaselle had thrown two-thirds of their present book into catalogue form it would have been more useful to the student, and the residuum would have been more interesting to the ordinary reader.

ANCIENT LIFE FROM ANCIENT MONUMENTS.

NO works could he in form, manner, and intention more unlike than the two we here place together.* But they have this in common that they both represent the modern classical tendency to seek for knowledge of ancient life, customs, thought, religion, by examination of evidence rather monumental than literary. The archaeologist is much abroad to-day, the verbal scholar can no longer hold his old exclusive monopoly. Each must help the other if both would not perish in an interminable struggle.

We called attention to Dr. Baumeister's "Denkmäler" when the first number appeared and now that fifteen numbers have been issued amounting to six hundred pages of text, six hundred-and-thirty-five letterpress illustrations, and six full-page plates, it is time to ask whether the book fulfils the great expectations roused by the prospectus put forth a year ago. A very difficult task was before the editor: he proposed to lay under contribution the whole field of Greek and Roman art, so far as it could illustrate in any way any department of ancient life, and this was to be in dictionary form. The obvious difficulty of classification at once appears, and we do not think it is always quite happily overcome. For example, under the head "Laokoon," we should naturally expect to find the well-known Vatican group, but, as a matter of fact, we do not; the group appears under the heading "Agessandros," and though the classification is no doubt perfectly just, we doubt whether five out of six of the general educated public would be able to supply the necessary link. It seems, indeed, a general principle throughout the book that the *sculptors' names* should dominate classification. The editor even goes so far as to give us the lives of sculptors (e.g., Agoracritos) of whom no works survive at all. This, in a book entitled "Denkmäler," seems a little odd. Considering the title, we think throughout that the text, admirable though for the most part it is, has somewhat disproportionate space.

Turning to the illustrations, we note that where they are reproduced from original photographs they are done by the new Meissenbach process of "autotype." We are not quite sure whether this differs in any important way from the excellent process employed by Mr. Frætorius for the new British Museum illustrated guides. Both seem to have in common the ingenious factor of a line produced upon a photograph by taking a plate through the medium of some textile fabric, whereby printing is rendered possible. We note in the Meissenbach process that, faithful in the main though they undoubtedly are, and far preferable for archaeological purposes to the old falsifications of engraving, they yet suffer badly from the old light and shade difficulty, which in some cases amounts to positive distortion. The ideal method of illustrations combines the photographic basis with the final touch of the understanding artist; but this, alas! like all good things, is costly. Whether a method of reproduction really good, yet cheap, is possible, we venture to doubt; meanwhile we may well be thankful for "autotype."

Turning to individual articles, that on the "Alphabet" stands pre-eminent for completeness and for what is in this work a rarer quality, brevity. The tabular view of alphabets, Sæmic, Greek, and Latin, is simply delightful. The article on Athens is full and good, but it suffers from Dr. Baumeister's method of classification, for the important Varvakeion statue, the best reproduction of Athene Parthenos is reserved, evidently for the Phœdrias article. We are shocked at the plate representing the Acropolis, but we hope Mr. Freeman will buy a copy of the book at once,

* "Denkmäler des Klassischen Alterthums zur Erläuterung des Lebens der Griechen und Römer, in Religion, Kunst, und Sitten." Letztlich bearbeitet von B. Arnold, H. Blunier, W. Deecke, K. von Jan, L. Julius, A. Milchhöfer, O. Richter, H. von Rohden, R. Weil, B. Wölfflin, und dem Herausgeber A. Baumeister, mit etwa 1,400 Abbildungen, Karten & Farbendruckern. München und Leipzig: Oldenbourg, 1884, &c.

* "Mythologie Figurée de la Grèce." Par Maxime Collignon. Paris: A. Quantin, 7, Rue St. Benoît (Bibliothèque de l'Enseignement des Beaux Arts).

for there, well in view we have the Turkish tower which Pheidias never knew, and which the next generation will never see, and which, however dear to the mind of the comparative historian, can have no place in a book entitled "Denkmäler des Klassischen Alterthums." We do not think that the autotype process is at all successful for landscapes: we seem to see architecture and landscape alike through a piece of intervening muslin. We believe that many of the articles were already written before the first issue, but we think more pains might have been taken to revise them up to date; the article on "Chiton" might have been much improved if the author had read the "De Vestiaris Græcorum" of Dr. Boehlan, a tract which throws new light on the whole subject of Greek dress. Again, in the article on "Aerzte" (Physicians) the whole of the discoveries recently made in connexion with the Asklepeion, and recorded in the *Ἐπιγραφαὶ Ἀρχαῖαι*, are simply ignored: no one is more wishful than we are ourselves that this periodical could be persuaded to appear in any language except its own, but as that is improbable the duty of reading it remains. Dr. Baumeister has drawn such abundant and excellent illustration from vase-paintings that we wonder to see him wholly ignore vase-painters. He gives us, as we said before, an article on Agonismos, of whose works we know nothing: why does he ignore such vase-painters as Brygos, Duris, and Euphrosion, from whose works he is so ready to draw information?

But enough of carping: the book is, in method and completeness, far before anything we have, or are likely to have, in England. Specialists in each subject may grumble that each article is not posted up in the last new theory, but every student, and especially every schoolmaster, ought to rejoice that he has ready to hand the means of *realising* his literary work, of verifying his classical teaching. A first-rate index will simplify many complications, and we may add an English translation would be welcome to many who do not love to labour in the German idiom.

No one need wait for a translation to enjoy M. Collignon's "Mythologie Figurée." The book is just one of those light, delicate bits of popularisation which the first-rate French savant from time to time delights to give us, and which, after laborious acquaintance has been made with a subject, are so pleasant to read. The subject is touched so delicately that we sometimes wonder if due impression can be made on minds not already prepared. Figured mythology, or mythology from the monuments, is a subject of which hitherto we have had no handbook. We have had manuals of mythology illustrated from monuments, but that is not the same thing. What M. Collignon does is to build up the type of the god or goddess out of the representations ancient art has left us, to show us step by step how the formless stone, the *βασιλεύς*, grew by successive developments into the Athens of Pheidias or the Hera of Polycleitos. Before he takes the individual gods in succession he gives us an interesting chapter on the general subject of the "formation of figured types." "A Porigine cæme s'il faut en croire les textes anciens, le culte religieux s'adressait aux objets naturels que la divinité était censée remplir de sa présence. L'Artemis Soteira de Boie était un myrte, et à Orehomène une statue de la déesse, placée dans les branches d'un cèdre, consacrait le souvenir de l'antique dévotion à l'arbre sacré." The why of this worship M. Collignon is happily not called upon to decide. He may hold with Mr. Max Müller that the sight of the tree awakens "the awe-struck thought of powers infinite, invisible, divine, that the tree possesses a kind of life, an unknown and unknowable yet undeniable something," or he may be a reader of Mr. Lang, and have thereby lost his illusions; he may believe that tree-worship arose from the hope of catching a resident "possum," or a desire to tap the trunk for honey, or "probe in the bark for grubs." By the first illustration he gives we think M. Collignon inclines to this base, utilitarian creed. He figures the delightful coin of Myra, in which a rude

image of Kybele, the mother of the gods, is perched, half tree herself, among the branches of the tree. The practical savage, says Mr. Lang, even if he worship the tree for its grotesque form and tremble at the thought of the "boilyas" in its branches, will yet, probably, deal with the problem of its occult life by burning it round the stem, chopping its charred wood with stone axes, and using bark and branches as they came handy. This is just what is happening on the Myra coin, but we regret to say the print is so bad that few could make out the scene unless it was familiar. Two sacrilegious savages with their axes are chopping away at the tree, but the boilya does not gladly suffer their sacrilege. She sends out two rearing snakes to slay the impious ones.

The charm of M. Collignon's book is that he begins always at the beginning. We are introduced to no full-blown gods and goddesses. He understands to the full the charm of the *origines* of things. Though the remoter branches of archeology are freely laid under contribution and much obscure literature has been ransacked, yet we have no heavy pedantry; always the same light hand. Of course here and there we could wish a change. When the type of Athene Parthicos is in question we must, no doubt, have the Varvakeion figure, done to death though it is, but why not add the beautiful Petersburg medalion, with its grave, gracious style, full of the spirit of Phidias, and unique as a close reproduction of ehyselephantine style? M. Collignon is far at his best among archaic types. He flags a little (but who would not?) in Greco-Roman art.

SEWAGE AT AYLESBURY.



THE directors of the Native Guano Company have just published the Report of the experiments recently made on the A B C process by Dr. Tidy and Professor Dewar, the results of which, as recorded in diagrams and tabulated statements, certainly go far to establish the fact of its producing a satisfactory effluent. The experiments were conducted very carefully, precautions having been taken to guard against a possibility of particularly favourable or unfavourable conditions influencing the results, by collecting samples of the raw sewage and effluent every half-hour, and mixing equal portions of four consecutive half-hour samples for chemical examination. By this means, three series of experiments were obtained, differing in the quantity as well as in the strength of the raw sewage to be dealt with. The mode in which the process is carried out appears to be that the B C mixture is first run evenly into the sewage and completely and immediately deodorises it, no escape of offensive odours into the surrounding air taking place. The Alum solution is added afterwards, as it was found that the addition of the precipitating ingredients separately afforded better results.

In the first series of experiments attention was more especially directed to the matters in suspension and solution, both in sewage and effluent, and the relation between the organic and inorganic portions respectively, the quantity of organic matter being determined by the amount of oxygen required to oxidise it, and which was found to average 1.795 grains per gallon in the sewage, and 0.522 grain in the effluent, showing that 74.8 per cent. of the organic matter had been removed. Of the suspended matter, 89.3 per cent. had been intercepted, while the ratio of inorganic to organic matter was in the sewage as 1 to 1.18, and in the effluent as 1 to 6, which showed that the suspended matter left in the latter was principally organic. The matters in solution yielded a mean of 46.3 grains per gallon in the raw sewage, and 57.5 grains in the effluent.

The second series of experiments was devoted to a consideration of the character of the organic matter, both in the sewage and effluent, before and after filtration. The results obtained showed that 83.3 per cent. of the oxidisable organic matter had been removed by

the treatment in the unfiltered state, and 61.4 per cent. from the filtered sewage; also that one-seventh of the organic matter in the sewage, and one-sixth of that in the effluent, was volatile. The suspended matter removed in this series reached as high as 96.8 per cent., while a great improvement in the deposition of the sludge over that observed in the first series was apparent, although the quantity of precipitating material used was only slightly more than one-third of the total weight of sludge produced. This series of experiments was characterised by a very large flow, a greatly increased strength of sewage, and the improved working of the process.

The third series was taken principally on account of the very dry weather which had been prevailing, and the consequent unusual strength of the sewage. The results showed a removal of 86.3 per cent. of oxidisable organic matter, while the removal of the suspended matters, notwithstanding they reached the abnormally large amount of 246.3 grains per gallon, was so complete that the effluent was devoid of turbidity, and contained only 0.98 of a grain. The conclusion arrived at is that the A B C process is capable of producing a uniform effluent under very varying conditions and degrees of concentration of the sewage.

After concluding the experiments with the first part of the process, viz., the purification of sewage, the second process,—that of the drying of the sludge, and its conversion into a saleable manure under the name of Native Guano,—was subjected to examination.

The manure is, in fact, only the partially dried precipitated sludge mixed with some sulphate of magnesia and ground. One curious feature of the process is, it is explained, the large amount of heat developed in the interior of the heaps of the cylinder-dried manure both before and after grinding, which continues for many months in the stacked manure without any apparent diminution, reaching a maximum temperature of 113 deg. Fahr., at which it remains, without emitting steam or any apparent sign of heating on the surface of the heap, until it is turned over. Instead of any loss of ammonia resulting from this action, an examination of the gases showed that they contained only 0.1 per cent. of ammonia, and 5 per cent. of carbonic acid, suggestive of the action being due to oxidation, and not to any fermentative process. But direct experiments for determining the actual loss of ammonia in the preparation and subsequent heating brought out the fact that a manure was obtained containing only 20 per cent. of moisture without its manurial value being sensibly affected, so far as the loss of available ammonia was concerned.

It must be admitted that the experiments carried out by Messrs. Tidy and Dewar prove that the A B C process is unquestionably very effective, as far as the purification of sewage and the production of a sufficiently pure effluent are concerned. Of course the commercial aspect of the question is not one into which they were called upon to enter. How far the expense of the process will admit of its adoption in other localities, or whether any or what proportion of the outlay is recoverable from the sale of the manure, are points which must be determined or explained by the commercial results to the company itself. It has been repeatedly asserted by eminent authorities and experts that sludge, however treated, is not worth its carriage for agricultural purposes except under very exceptional circumstances. Sewage, however, cannot await the determination of its commercial value, but must be got rid of from all great centres of habitation as quickly and effectively as possible, and economically if practicable. Whether the last condition is an accompaniment of the A B C process yet remains to be demonstrated.

The late Mr. E. C. Page.—Mr. Arthur E. Northcote writes to ask us to mention that a painted window in memory of the late Mr. Richard C. Page has been erected at St. Alban's, Hobsorn. The name of the designer of the window is not communicated.

NOTES.

AN important meeting was held at the rooms of the Society of Antiquaries on Friday, the 12th, the Bishop of Durham in the chair, consisting of subscribers and others interested in the excavation of the Temple of Ephesus, from which Mr. Wood has already gained such important results. After an address from the Chairman, Professor Newton moved, and Mr. Beresford Hope seconded, the first resolution: "That the sculptures already found on the site of the Temple at Ephesus, and only forming a small portion of the entire remains, are incontrovertibly of the highest artistic value, while the inscriptions, now being prepared for publication, prove also to be of great value in both a literary and archaeological point of view," which was carried unanimously. The Dean of Llandaff afterwards moved, and Sir Talbot Baker seconded, a resolution to the effect that a new subscription list be at once opened, and a sub-committee formed to take such steps as may be necessary for completing the work: also carried unanimously. Professor Newton spoke eloquently and to the point as to the value and interest of the inscriptions that had been discovered, and urged that a proper and adequate sum should be found to enable Mr. Wood to continue his excavation. "To deal out niggardly grants of 50l. at a time was a reproach to the country." We concur entirely. The Government ought to make a liberal grant in aid of an Englishman who has distinguished himself and his country by such valuable discoveries at the cost of so much toil and perseverance. But there seems to be a hopeless and Philistine indifference to these subjects in official circles.

THE extraordinary solicitude which the members of the Conference on the Suez Canal have suddenly developed as to the sanitary protection of the European ports appears likely to have results which M. de Lesseps will be the first to resent. The blocking of the canal by the sinking of a dredge occurs at a moment when the question of delay is engaging the attention of the owners of vessels that now use the route. Forty-eight hours and thirty-six minutes were passed in the canal, on an average, in 1883, by every vessel that went through, for only nineteen hours and thirty-two minutes of which she was under way. With the speed attained by commercial steamers, which are now built of 24 times the size common in 1870, it requires but a little more delay to make the canal a more costly route than the old course by the Cape. In 1882, out of 923,147 tons of cargo shipped from Calcutta to Great Britain, 440,375 were sent by the Cape route. Thus it is evident that it is no vague threat on the part of shipowners that if the proposed quarantine regulations are imposed, with a view to injure English commerce, that commerce will take care of itself. The value of time is an ascertainable quantity, and the result of the attempt to injure England, if persevered in, may be the ruin of the canal.

THE serious delay occasioned by the sinking of a dredge, when the whole power and goodwill of the persons composing the service of the Canal are strained to the utmost in order to keep open the waterway, may give Englishmen some idea of what is likely to happen if the control of the Canal should pass into unfriendly hands, in the case of any complications involving the despatch of troops to India. With the mercantile navy, the chief object is to secure low freight; and as soon as the heavy charges of the Canal are aggravated by the delay of several days, commerce will seek the open sea-water. But for military service speed is of more importance than saving of expense. The route, once opened, cannot be closed; and the possibility that it might be opened to our enemies and closed to ourselves is one that we cannot afford to neglect. In the Tel el Kehir campaign the Canal was seized by surprise in the most masterly way. A fast steamer was sent up it by Lord Wolsey, which put a guard on each of the dredges, and thus effectually prevented

such a misadventure as has recently occurred. And when M. de Lesseps got up in the morning Port Said was in the possession of the English. The Canal authorities were frantically angry,—for their sympathies were altogether against us. But the affair was properly carried out. And anything that will prevent a defensive action of this nature on the part of Great Britain in the event of war, will be a serious danger to the Empire.

THE pertinacity with which railway companies endeavour to evade the effect of adverse judgments is remarkable. When appeal is out of the question they seem to cast about for other means to render the decisions of the courts of no benefit or advantage to their opponents. This was strikingly exemplified in a case decided before the Railway Commissioners last week. The plaintiffs (Messrs. Girardot, Flynn, & Co., of Derby) are corn factors and maltsters, but the issues involved affect all traders possessing private sidings. This firm obtained a judgment in their favour against the Midland Railway Company, in July of last year, in connexion with alleged preference given to the Burton brewers in freight charges on grain. The company, so far from accepting this judgment, appear to have adopted the course just indicated by "revising" their rates to Derby; and on plaintiffs declining to pay these charges, they refused to deliver their traffic at their private sidings as heretofore. The three Commissioners each delivered judgment on the case, one of them holding (as argued by the counsel for the company) that they had no jurisdiction in the matter. But the result was that the company are to resume delivering plaintiffs' traffic at their sidings, they paying the rates demanded, but reserving the right to object to such charges in a fresh action. Considering the expense involved in the construction and maintenance of private sidings (for which no allowance is made beyond a rebate for collection and delivery) it is satisfactory to find that they cannot be practically closed at the will of the railway companies.

WE are glad to see that the last issue of the *Archäologische Zeitung* (Jahrgang xliii. Erstes Heft Taf. I, 1885) the authorities of the Berlin Museum have at last published a very beautiful Greek terra-cotta relief which has been in their possession some three years. The relief is of the finest period of Greek art, fifth century B.C., of, we think, unique beauty, and, from its subject, of great mythological interest. It represents Charon in his boat just touching the shore; to him Hermes approaches leading a maiden figure. No publication could do justice to the severe decay of the original, but all that mechanical means can do is done in the prototype of the *Archäologische Zeitung*. On the original are faint traces of colour. In consequence of this the authorities of the Museum will not allow a cast to be taken, an added reason for this adequate publication. With it appear in the same number two beautiful Athenian white lekytho; with the same subject slightly modified. In both Charon brings his boat right up to the tomb itself, and seems to grasp at the funeral offerings. A very interesting paper by Professor F. von Duhn of Heidelberg accompanies the publication. He shows that the myth of Charon was of the purely popular sort, foreign to the aristocratic temper of epic literature, rising therefore to importance only in the fifth century, the century of democratic impulse. In the text he publishes also a fourth-century replica of the same motive, and, from the juxtaposition of the two plates, he deduces the whole moral of the contrast between the art and life of the fifth and fourth centuries B.C.

THE terra-cotta fragment to which we referred in a past number (*Builder*, May 6) as bearing the design of "Hermes carrying the child Dionysos" turns out to be, not as was at first supposed, a piece of a painted vase, but a bit of late Roman "terra sigillata." Such fragments have, of course, great archaeological value, because they not infrequently embody types borrowed from works of real artistic merit, and, no doubt, this is the case in the

present instance. The design is clearly Praxitelean; the execution, however, is so rough and blurred that it is quite impossible to say what Hermes holds in the right hand. This much is satisfactory, that the object held is not a bunch of grapes. It is a long shaft of some sort, possibly a thyrsos,—possibly, but less probably, a caduceus. It will be remembered that Dr. Treu, the finder of the Praxitelean statue, desired to restore it with the thyrsos in the right hand, and to this, his original view, he has steadily adhered. The fragment is published in the *Archäologisch-Epigraphische Mittheilungen aus Oesterrich*, Jahrgang viii., Heft 2, Taf. v., and is accompanied by a commentary by the finder, Dr. Rollett, and the editor, Dr. Benndorf.

PERSONS who supply men and plant to corporations will do well to make themselves acquainted with the recently-decided case of Jones v. The Corporation of Liverpool. The Corporation seems to be in the habit of hiring borses and men for purpose of working the carts which water their streets, and the employer of the men is the person by whom they are paid, and not the Corporation. One of these carts injured the plaintiffs' carriage, and Mr. Justice Day decided that the Corporation were liable for the negligence of the driver of the water-cart; but the judges of the Queen's Bench Division have thought differently, and have reversed this judgment, holding the Corporation not to be liable. The principle of the decision seems to be the same as that acted on in an older case, namely, that the person who chooses the servant and has the power of dismissing him is the person who is liable for his misdeeds, and not the person who, so to say, has the right temporarily to order him to do this or that. In the recent case an inspector superintended the watering of the streets, and directed the drivers where to go. This, however, did not seem to the Court to be sufficient to make the Corporation to such an extent their master as to make them liable for their negligence. It is obvious that this principle may have a wide operation.

WE understand that there is a scheme in hand for erecting dwellings for the labouring poor (more especially for women engaged in industrial occupations) in the parish of St. James, Westminster. A trust fund of the amount of 6,000l. has been placed at the disposal of the Vestry of that parish for the purpose, and it is intended to invite four architects, experienced in that class of buildings, to enter into a limited competition, in order to secure the best possible return for the money, in construction, arrangement, and accommodation. The architect whose design is selected will be employed to carry out the work.

CONSIDERABLE excitement has been caused by two fires which have taken place during the last few days,—that at Mr. Whiteley's establishment on Wednesday, and that at the Inventions Exhibition on Friday last week. The fire at Mr. Whiteley's assumed alarming importance in consequence of its rapid progress, which at one time seems to have threatened a more extended and very serious conflagration. The details have been fully made known through the daily papers; the only point for comment here is in regard to the statement made in the *Times* report, that "the iron doors that have been placed in the buildings seem to have had little effect in checking the progress of the fire." We do not suppose such doors ever would have much effect in the case of a large and fierce conflagration which has once made head; they are better than nothing, however, for they at all events assist to isolate a fire in its earlier stage, and give greater chance of checking it. The fire at the "Inventories" was not a large fire as fires go, but it was watched with painful interest owing to the imminent danger to the Indian collection, and also the great risk of an extended conflagration in the Exhibition if the flames had fairly passed the brick barrier of the building in which they originated. The point of junction between

this and the frail structure of the Exhibition entrance buildings was evidently felt to be a critical one, and every effort was made to meet and check the fire at this point. Watching the whole affair, we were rather impressed with the loss of time and apparent want of concerted action in attacking the fire; also with the entire failure of the chemical fire-annihilating bottles to produce any apparent effect. Crates of these were hoisted up to the roof of the Exhibition entrance (with several slips and breakages, owing to the incapacity of some persons to tie a knot that will not slip), and thrown at the fire with more or less dubious aim, and apparently with about as much result as throwing so many ink-bottles in. The bulk of the India Museum articles were got out, but more loss has been sustained in this department than was at first stated. Exhibition-roads was the scene of a complete *tapage* for two hours, in the midst of which was to be seen the artist of an illustrated journal quietly sketching the scene in the midst of the fire-engines and the general excitement. Others found their special interest in the spectacle. "What a colour for a dress!" exclaimed a lady, as the flame and smoke mixed into a ruddy orange; and then, after a moment's more critical consideration,—"at least, for a morning dress!"

WE wish to call attention to an admirable work which has been set on foot by the "Home Arts and Industries Association," a society having for its object to spread a knowledge of decorative arts and hand industries among the people. There are now about sixty classes established for this purpose in England and Ireland, and a few in Wales and Scotland, where instruction is given *gratis* by those who know enough of drawing, designing, and modelling to be able to teach others, or, at least, help them on their way in the work. The head-quarters of the Society are at 1, Langham-chambers, Langham-place, and in July an exhibition will be held at 3, Carlton House-terrace, of work done by the classes of the association.

THE Peel Grove Burial Ground was before the Court of Queen's Bench last week, as reported on p. 849, in connexion with the issue raised by the case of *Gibbons v. Chambers*. Some doubt at first existed as to whether the Act prohibiting the building on disused burial-grounds applied to the Peel Grove Burial Ground, building having been commenced by the defendant before the Act was passed; but we are now informed that the law officers of the Crown have been consulted upon the point, and have advised that in their opinion no buildings can be erected upon disused burial-grounds, and that if the present erections are in any way proceeded with the same come within the scope of the Act, and can be dealt with accordingly. The Metropolitan Board of Works are now applying for power to put the Act into motion, and this, it is to be hoped, will be the termination of what at one time seemed to be likely to prove a great scandal to public morality and decency.

WITH regard to the subject of building upon private areas, we understand the Metropolitan Board of Works have decided not to appeal against the decision of the magistrate in the case of the Chelsea Park Dwellings Company [p. 743, *ante*], but to select two other cases which are now before the Courts, as it is thought that the latter cases better illustrate the point upon which the decision of the High Court is wished as to building on private areas.

ONE of the most ancient of the few remaining old houses in Lambeth will shortly go the way of its more famous neighbour and contemporary,—the Swan. It is close to the waterside, being No. 157 in Lambeth-road, formerly Church-street, and over the wide entrance into Swan (or Palace) Yard: The large room, which occupies nearly all the first floor, has served for a conventicle, and is said to have been used by Bunyan on the occasion of his evangelistic visits to this

quarter from Bedford. Adjoining No. 157 is the cleared site of the Swan, pulled down some three years since, reputedly one of the earliest public-houses established in London.

A CORRESPONDENT writes:—"Signor Giacomo Boni, a Venetian architect, has reprinted from the *Ateneo Veneto* a spirited protest against the proposed demolition of the ancient thirteenth-century fortifications of Bassano, to which we have before referred. Signor Boni writes with a wonderful command of the subject, and quotes from the Greek Anthology, Ovid, Virgil, Shakspeare, Goethe, Heine, Ruskin, W. D. Howells, and others, in support of his propositions, and his citations are made with singular accuracy and propriety. His quotation from the "Tempest," act 1, scene 2, with regard to the injurious action of ivy on buildings:—

"The ivy, which had hid my princely trunk
And suck'd my verdure out,"

draws attention to a danger which was recognised by Pausanias, but which is too often overlooked by the custodians of ruins and ancient buildings, particularly the towers of Mediaeval churches. He also quotes with commendation the words of an Italian lady of the fifteenth century, Margaret, the daughter of Ruberto Acciaiuoli, a worthy daughter of her father, according to Vasari, who relates that she was the means of preventing the furniture belonging to her husband, who during the siege of Florence had retired to Lucca, being carried off to France. When Giovambattista della Palla, with permission of the mayor and Town Council of Florence, offered to purchase the property, she replied:—"So, you vile old-clothes man, you are ready to despoil this city of its most valuable and most honoured objects in order to embellish a foreign country. I do not wonder at you, despicable enemy of your country, but I wonder at the authorities of this city who have urged you to this abominable wickedness." Strong words for the fifteenth century.*

THE committee which has been formed to provide a suitable memorial to the late Sir John Goss, organist of St. Paul's, have adopted a design by Mr. John Belcher for the monument in the cathedral. A panel by Mr. Hamo Thornycroft, A.R.A., representing chorists singing, forms part of the design. Sir Arthur Sullivan is chairman of the committee, and Mr. T. L. Southgate hon. secretary. The monument to Sir John Goss's memory is only a portion of the scheme that the committee have in contemplation.

THE portrait of Gordon, by Mr. Lowes Dickinson, now being exhibited at 57, Pall Mall, is judged by relatives of the deceased here to be a good likeness of him; so we are given to understand. But the painting, representing him standing on the tower at Khartoum on "his last watch," draped in a cloak, and with a lorgnette in his hand, is hard, theatrical, and unreal, and we have no pleasure in seeing this kind of memorial to a man who, in his greatness, was also the simplest and most unpretentious of men. If there is to be any artistic monument to Gordon, the highest art we can command at present is hardly adequate to the occasion, and we have no wish to see him commemorated in second-rate art. We think of Burns's dying request to his brother,—“Don't let the awkward squad fire over me!”

WE have received from our esteemed contemporary the editor of the *Revue Générale de l'Architecture* an advance proof of some remarks in regard to the great ceremony at the obsequies of Victor Hugo in the early part of this month. M. Daly considers that those who directed the ceremonial did not rightly apprehend their task, and made a mistake and missed a fine point in draping the Panthéon in funeral array. He says, the lying in state of the body under the Arc du

Triomphe was the mournful side of the ceremonial; there the mortal remains of the poet were laid in state before reaching their last abode; but in entering the Panthéon he entered into glory and immortality; it was his apotheosis. It was right to drape the Arc de Triomphe with funeral emblems, but "il eût fallu draper de gloire le Panthéon, le temple de l'Apothéose, y faire ruisseler l'éclat de la pourpre et de l'or, comme le firent autrefois les Romains aux obseques de César." This is certainly a fine and suggestive idea, and worth bearing in mind on another such occasion; but, alas! there is not another Victor Hugo. Our contemporary remarks, in conclusion, on the happy idea which occurred to some one of gathering up the crowns and wreaths of natural flowers with which the steps of the Panthéon were strewn, and making them up into memorial bouquets, to be carried away as souvenirs, instead of leaving them to decay where they were laid. He was assured that "the poet" who conceived this idea was an engineer, M. Klein. "Où diable," says M. Daly, "la poésie va-t-elle se nicher aujourd'hui!"

THE CONGRESS OF FRENCH ARCHITECTS.

We left the members of the Congress* at the Auhattoir de La Villette on the morning of Wednesday, the 10th; the afternoon of the same day we find them at the Ecole des Beaux Arts, where M. Perrot, member of the "Académie des Inscriptions et Belles Lettres," and Director of the "Ecole Normale Supérieure," held us under the charm of his finished and fluent discourse.

What a fine theme for an archaeologist, that of the "First Temple of Jerusalem,"† that marvel of which all times have spoken, and the recollection of which has traversed history like a brilliant meteor, and the destruction of which marked the dispersion of a race which, in spite of the miseries of its exodus, its struggles and persecutions for ages, has kept itself so prodigiously tenacious of life and so faithful to its origin; that temple which seems the type of priestly architecture, and which, singularly enough, has been adopted as a mysterious symbol by the most diverse creeds and the most opposed form of religion and free thought; by Judaism, Christianity, and Freemasonry.

It was of this that our lecturer treated with learning, drawn from the best sources, endeavouring especially to defend the topography of the Temple, such as Hebrew tradition and written documents have indicated it, such also as it has appeared to be confirmed by English explorers, to whom M. Perrot rendered full homage, notably to Sir Charles Wilson, whose plans were reproduced photographically, to the great interest of the meeting. M. Chipiez, the architect, who has long been the collaborator of M. Perrot, completed the historic and philosophical exposition by technical explanations. For this last lecturer the Bible has served as a basis for a work of calculation, which has enabled him to re-establish with precision the cost, dimensions, disposition, and internal arrangement of the Temple, and even the decoration as described by the prophet Ezekiel. To use a distinctly Parisian expression, one may say that through his study and manipulation of the prophecies of Ezekiel, M. Chipiez has completely entered "dans le peau de personnage." His restoration is, no doubt, hypothetical, but so ingenious that one is persuaded, almost convinced, more especially when, in support of his demonstration, he brings before our eyes, with the optical illusion of shaded projections, the plan of the Temple with its first enclosure, into which strangers were admitted; the "parvise" of the Levites; then the *naos*, or Holy of Holies, where the high-priest alone could penetrate once a year: and, lastly, in the rear a sort of court, in the form of an Egyptian temple, surrounded by the principal dwellings reserved for the priests.

According to M. Chipiez, who relies in this a good deal on the work done at the close of the last century by the architect Cassas, to whom we owe drawings made in Syria, Phœnicia, and Palestine, which have become very scarce, it is

* See page 829, *ante*.
† And what a transition,—from the Paris abattoirs in the morning to the Temple of Jerusalem in the afternoon! Is there any other profession that is expected to embrace such diverse interests?

* Not at all. It was a time when strong words were in fashion.—Ed.

in Phœnician art that we should find the guide for the construction of the Temple as it must have existed, and it was, in fact, from Phœnician monuments that he derived the plan, elevations, façades, and perspective views which were successively exhibited to the audience.

The order of the day brought us, at the close of this long lecture, an account by M. Chas. Lucas of the ninth annual congress of the learned societies which was held this year at the Sorbonne. As this *compte-rendu* would lead us into too long a digression, we confine ourselves to mentioning only this part of the programme, which brought M. Lucas much applause. For the same reason we merely record that at the sitting of Friday, the 12th (almost entirely devoted to reports of committees), an excellent discourse was given by M. Dally on the necessity of pushing forward more vigorously the study of architecture.

On Thursday, the 11th, the Congress left by the Gare St. Lazare, which unhappily is now no longer the "ville des vieilles rues" celebrated by Victor Hugo, but in its numerous monuments still offers to visitors much matter for study of great interest.

Received at their arrival by the architects of the "Lower Seine," who offered them lunch, with its inevitable accompaniment of toasts, the members proceeded to the Palais de Justice, so well restored and enlarged by M. Lefort, the architect-in-chief to the department, of whose drawings we spoke with appreciation in our article on the *Salon*. After having admired the façade, of which M. Lefort offered each member a photograph, and the Salle de Pas Perdue, restored 1876, and of which the wood-work recalls some of the lost *chefs d'œuvres* of old Rouen, the Congress proceeded, under the guidance of M. Sauvageot, the diocesan architect, to the Church of Saint Patrice, an historic monument of 1533, restored by M. Barthélemy, where there are some admirable sixteenth-century windows. Rouen is besides pre-eminently the city of glass-painters, and the windows of the Church of St. Ouen, which have been restored by M. Bernard, of Rouen, are justly celebrated.

With so experienced a guide as M. Sauvageot, the Congress could see rapidly though in sufficient detail the churches of St. Godard, St. Venient, the cathedral where the wondrous portal rises between the two towers, and which contains that tomb of the Duc Do Brézé, of which the *Builder* gave a view in the number for June 21, 1884; the Church of St. Maclou, and the ancient parochial cemetery known under the name of Aître St. Maclou, where the grim sculptures of the *danse macabre* contrast so curiously with the Cupids, and female figures, and erotic subjects carved in the capitals of the cloister which surrounds it. It is to M. Sauvageot that we owe the museum actually in course of construction, and the new Théâtre des Arts, which replaces the structure burned in 1876.

Among the civil monuments, the Congress particularly remarked the Joan of Arc Tower, the Museum of Antiquities (one of the richest in France), the Fontaine Ste. Marie, the work of M. Deperthes, and decorated with sculpture by M. Falguère; the Lycée Cornille, the Hôtel de Ville, the remains of the Abbey of St. Ouen, the Hôtel Bourgtherould, that beautiful gem of Renaissance art now occupied by a financial establishment; the great clock, the old Hôtel des Finances (another Renaissance *chef d'œuvre*), and lastly, the quays of the Seine, which bring out finely the picturesque perspective of the ancient city and the modern town.

In the course of these peregrinations, M. Lehreton, the curator of the Museum, gave an interesting discourse on the celebrated faience of Rouen; and in the evening, after terminating this very well-occupied day by a banquet, the Congress returned to Paris, carrying away from the old Norman capital admiration of its numerous points of interest, coupled with the recollection of a cordial reception.

For some years the Congress has been in the habit, each session, of visiting one of the workshops for the fabrication of products employed in modern building. Last year they paid a visit to M. Didron, the celebrated glass-painter; the year before to M. Parville, the well-known maker of ceramic ware; the year before that to the model brickmaking yard of MM. Müller & Cie., at Ivry. This time it is again "céramique" which has tempted the French architects, and the visit on Saturday morning, the 13th, to the address of M. Leibnitz, Rue Pierre Levé, was

in some sort the sequel and the justification of the lecture of the Tuesday previously by M. Deslinières, a lecture which, owing to the superabundance of work in 1884, had been postponed to the present year.

M. Leibnitz is an industrial artist, of great ability, and one may say that with M. Deck, he holds the first place at the head of modern ceramic workers. His name is well known in Germany, where his terra cotta and enameled faïences constitute, especially at Berlin, one of the most important elements of the interior decoration of houses.

In 1810 his grandfather, M. Pechinat, invented the faïence panels which have come into such common use now; and it was he who first began to ornament faïence by means of decorations "au petit feu," as in porcelain, and this first attempt in this way figured in the Exhibition of 1844. He began with flowers and birds, then employed a kind of damask design, as in some form of textiles; lastly, he employed flowers and bouquets which an artist recently deceased, M. Julienne, gronped for him with great skill and fancy. The models were afterwards infinitely varied, and we had successively medallions with figures, reproductions of German stones, and panels of bright and clear colour offering means for a cheap decoration of façades. We may mention especially the terra cottas executed after the cartoons of M. Emile Lévy, and treated like fresco with very simple tones and a contour of engraved lines. This kind of decoration adorns the principal façade of the manufactory of M. Leibnitz, and has a very happy effect. It is surmounted by a frieze in faïence designed by M. Sédille.

It is to M. Leibnitz that we owe the execution of the grand gateway, designed by M. Sédille, to the south entry of the Pavillon des Beaux Arts in the Exhibition of 1878. This gateway, made in blocks of terra cotta, and enameled, showed to what a superb artistic effect ceramic art could rise. We came upon the portions of it in the course of this visit, as also on the panels which formed so fine a decoration to the ball-room in Arabic style, of which the ceiling presented large pierced ornaments very difficult of execution, and intended for the reception of coloured glass. But we have not space to enumerate all the varied models and artistic curiosities contained in the atelier, where M. Leibnitz has piously preserved also a collection of designs executed by the hands of the late M. Duban and of Viollet-le-Duc, *souvenirs* of the restoration at the Château de Blois and the Château d'Eu under the hands of those masters.

The conclusion of this last day of the Congress was devoted to the distribution of awards. This solemnity was presided over by M. Alphand, Directeur de Travaux, supported by MM. Questel (President), Hermant (vice-president), Paul Wallon (Secretary), Mr. l'Anson (delegate from the Institute of British Architects), M. Kaempfen (Director des Beaux Arts), M. Doulin (Director of Civil Buildings), and MM. Bailly and Sédille, architects.

M. Alphand gave an address comparing the works of modern architects with those of the engineers, both of whom concurred to assure to French art and industry an important place, and alluded to the social crisis of the moment, urging that we must be the friends of the working classes without flattering their false ideas and jealousies, often embittered and heightened by subversive social theories. M. Daumet followed with an address, unfortunately not always very audible, on the late M. Abadie and his works. Mr. l'Anson, who spoke with complete fluency in French, after referring to the works of MM. Abadie and Ballu, announced, amid much applause, that on the preceding Monday the Royal Institute of British Architects had nominated in their place, as Honorary and Corresponding Members, MM. André and Hermant, to whom he was charged to present the diploma of the Institute. In conclusion, Mr. l'Anson expressed himself warmly as spokesman for his countrymen on the admiration and esteem of the English architects for their comrades in France; a sentiment cordially responded to by M. Alphand, who expressed his belief that the two nations, who were "à la tête de la civilisation" would be always, in spite of passing political divergences which did not disturb the calm of their avocations,* united

* We may say this with the remark of an eminent English landscape-painter the other day, to a friend who was lamenting the littleness of modern politics:—"Well, of course, there always must be politicians; the best thing is to let them go on and take no notice!"

in marching hand in hand in the path of art and progress.

M. Sédille then made his report, in the name of the jury for awards, announcing that this year the honour to architects who had applied the resources of art and science to the amelioration of habitations had been adjudged to MM. Achille Hermant, Nicolas Escahier, and Louis Martenot, to whom were awarded the three silver medals of the Lesonfâché foundation.

M. Escalier, who obtained the second medal at the *Salon*, is both architect and painter. In the house which he has built, 33, Rue Galilée, and the interior of which he has ornamented with large decorative panels, everything, as M. Sédille expressed it, is united in a kind of general harmony. M. Hermant, who in spite of the criticisms formulated by the Conseil Municipal of Paris, will be remembered no less as the constructor of the remarkable *Maison de repression* at Nanterre, merits eulogy also for his buildings in the Rue du Mail; and M. Martenot, architect, of Rennes, is well known in the artistic world by his numerous works. After having announced the honourable mention of the jury as awarded to M. Étienne, M. Sédille bestowed a high eulogium on the Reverend Père de la Croix, member of the Society of Antiquaries of Poitiers. To this indefatigable explorer, who two years ago discovered the ruins of Sauxay, the Honourable Mention in the department of archeology was awarded.

The medals which the Congress awards every year to the pupils of the French schools at Athens and Rome remind one of the intimate union existing between architecture and archeology. In this department the jury had selected M. Pierre Paris, on account of the excavations undertaken by him at Eleata, to find the remains of the Temple of Athena Crania, and M. Laloux, already known to our readers, who will remember the description we gave of his restoration of the Altia at Olympia, for which he received the *médaille d'honneur* of the *Salon* Jury.

We note next the Destors silver medals, adjudged equally to MM. Francis André and Louret, both of whom have entered into residence for the *pris de Rome*; the Chaplain medal, awarded to M. Margotin fils, a decorative sculptor of great talent. The Rolland medal was awarded to M. Thibaron, and the Van der Goyen medal to M. Emmanuel Garnier. The silver medal, founded in 1877 by M. Paul Sédille, for art-industries, was awarded to M. Guilbert Martin, chemist, of St. Denis. In giving this latter award the Congress wished to recognise his labours in regard to mosaic work, which, after a journey in Italy, he introduced into practice in France. The materials for this work are made in his workshop at St. Denis, where he is forming a company of young mosaicists; it was there that the mosaics for the Pantheon, after Hébert's cartoons, were made. M. Guilbert Martin has already obtained the *médaille d'honneur* of the "Union Centrale des Arts Décoratifs," and has been charged by the Government to execute the cupola of the Grand Staircase of the Louvre.

The remainder of the sitting was devoted to the delivery of medals to the boys of the "École Municipal d'Apprentis," to the "Cercle des Maçons," a kind of professional school presided over by M. Daumet, and which has been of great service; and, lastly, to "Veterans du Bâtiment," as the recompense of a life of honourable hard work.

Among these venerable workers whom M. Paul Wallon, in an eloquent report, held up as examples to the young working men, while exhorting them to repudiate the detestable theories of the "déclassés" and the revolutionists, we may name M. Bertrand, joiner, of Paris, MM. Neand and Guibin in the same branch of trade at Lyons, and M. Bellais, foreman of the "Agence des Travaux du Palais Royal," who is seventy-seven years old, and has worked forty-eight years, without cessation, in the same building yard.

The tremendous applause which greeted this part of the report, and hailed the appearance of the venerable workman, formed a pleasant and gracious recompense, of a nature to give rise to some reflections in regard to those who thus seem to have understood so exceedingly well the "social problem." One may be pardoned for a remark on this subject, for, as M. Wallon well observed, in these times of social disturbance and revolution, it is touching to see, in the midst of all the squabbles of politics,

these simple and straightforward natures, going on unhesitatingly in the path of duty, and coming forward humbly at the end of their career, astonished at the applause which greets them, to receive the unexpected testimony of esteem and respect.

Giving then a rapid résumé of the work of the Congress, the President, M. Questel, pronounced the Session of 1885 closed, and in the evening a fraternal banquet noted for the last time at the Hôtel Continental, the Parisian members of the Congress, their colleagues from the provinces, and the visitors who had responded to the invitation of the Société Centrale des Architectes.

INVENTIONS EXHIBITION. HYDRAULIC MACHINES.

DURING recent years the utilisation of water pressure for mechanical purposes has made substantial progress. This has largely been due to the firm of Sir Wiliam Armstrong, whose enterprise in the construction of hydraulic cranes, dock-gates, movable bridges, &c., has fully demonstrated the value of water pressure for a great variety of mechanical operations not hitherto attempted. Workshop processes, too, of various kinds,—such as riveting, forging, stamping, &c.,—can now be carried out by means of hydraulic power with convenience and economy. Although in London and other cities hydraulic power may now be rented for working lifts, engines, and other machinery, there can be but little doubt that hydraulic engineering is still in its infancy, and ample scope remains for development and invention in this direction. Considerable advance has recently been made in the means adopted for obtaining economically the desired water pressure by the aid of steam engines and accumulators, and also in the transmission of the power when so obtained. For working hoists, and for many other commercial purposes, the pressure of water obtainable from the ordinary public, or Hydraulic Company's power mains, is sufficient, but where very considerable power is required separate force-pumps driven by an engine can be worked with advantage. An economy attending this latter plan is the very great saving effected in water, as after being used in the rams it can be returned over and over again to the pump tank. Perhaps the most advanced examples of the development of hydraulic power are the cranes used at Newcastle, Cardiff, and other ports, for loading coal ships, which duty they can perform in an incredibly short space of time with certainty and economy.

Before commencing our notice, we cannot refrain from remarking on the extremely satisfactory arrangement of this group, all kinds of machinery, either directly or indirectly connected with water pressure, being mixed up together, compelling the visitor to pick out the hydraulic exhibits as best he may. Riveting machinery and hoists are the best represented classes,—the latter possessing several novelties both in construction and working. Notwithstanding their increased first cost, and greater cost in fixing, ram-lifts appear to be making greater progress in public favour than suspended lifts. The chief reason for this is probably their increased safety and the absence of ropes, gear, &c., which must from their nature necessarily more or less rapidly deteriorate. There are several excellent samples of both types in the Exhibition, which we shall now briefly notice.

The Hydraulic Engineering Company, of Chester, have an interesting exhibit, amongst which is a hydraulic balance ram-lift on Ellington's system. This is worked from an accumulator, and is so arranged that counter-balance chains and weights are done away with, and there is no mechanism whatever above the cage. It is claimed by the makers that, as in ram-lifts, when the lift is at the bottom of its stroke, the lifting-ram is immersed in water in its cylinder, at the top of its stroke it is out of the water. The ram, therefore, weighs more at the top of its stroke than at the bottom, and to secure economy it is generally necessary that the balance should compensate for this variation in load. This compensation they secure in all low-pressure lifts, and in high-pressure lifts when desirable, by the proportion they adopt between the diameters of the lifting-ram and the balance-ram. The lift is controlled by a single valve, worked by a rope from the inside of the cage. A commendable feature in this lift, and one likely to prevent accidents, is the

fact that it is impossible to work it with the door of the cage open.

We also saw here in motion a Brotherhood's three-cylinder hydraulic engine, arranged with Hastie's patent variable throw, which adapts its piston stroke in proportion to the work done. Thus, the greater the load the longer the piston stroke. This is an improvement, as the same effect as expansion in a steam engine is secured, i.e., the amount of water used is in proportion to the work done. In most hydraulic engines with which we are acquainted, owing to water being non-expansive, the same amount is consumed, as the cylinder must be filled every stroke, whether the engine has a full load or is running empty. This variable throw arrangement seems, however, in a great measure to get over this difficulty, and is, to say the least, ingenious.

A Schmid's patent water-meter is also shown. This is a positive meter of the piston type. It consists of two vertical cylinders, with double-acting pistons, so constructed that the pistons act as valves, controlling the flow of the water to and from the cylinders. The two cylinders are connected by admission and exhaust-ports, and they work the two pistons, which are coupled at 90° on to a horizontal shaft. This meter is of simple construction, and should answer its purpose well. We noticed some samples of pipes for conveying hydraulic power, some of these, with ordinary flanged joints, had been broken under a pressure of 3,500 lb. per square inch, whilst the improved pipes, which are arranged with a modified form of spigot and facet joint, withstood a pressure up to 6,050 lb. We may add that the weight of metal in both pipes is the same, and the improved pipes are similar to those now being laid in London by the Hydraulic Power Company.

A novelty in the shape of hydraulic ram-lifts is exhibited by Messrs. Richmond & Co., of Kirby-street, Hatton-garden, E.C.; it is constructed on the telescopic principle, but the chief feature about it is, that instead of each section rising independently as in ordinary telescopic lifts, the water has to fill only the space underneath the lowest piston when all the sections rise simultaneously. Its action may be briefly described as follows:—Each of the upper sections of the lift when telescoped forms a space between it and the outside of the ram. This space is charged with fluid. Immediately the lowest ram begins to move, the fluid in the upper sections, having no means of escape, flows from the outside of each ram to the inside through an aperture, thus acting on the bottom of all the rams at the same time, and causing them to rise together. In descending the same fluid returns to the outer chamber as before, and as this can be used over and over again instead of water. An important saving is effected by this form of lift in doing away with the necessity of a deep well or bore holes as required by ram-lifts made on the ordinary plan. We congratulate the makers on their invention, which is a clever idea cleverly and practically carried out, and should from its merits secure extensive adoption.

A hydraulic hoist also on the telescopic principle is exhibited by Mr. B. G. Smith, of Halifax. The rams in this hoist are made to slide one into another after the fashion of a telescope, the whole when closed occupying about one-fourth the height to which the hoist rises. It can be worked by force-pumps or by water-pressure from the mains. The general construction of the hoist is simple, and, owing to the telescopic arrangement, deep foundations for the cylinder,—as in ordinary hydraulic safety hoists,—are unnecessary. The maker claims for it amongst other advantages a very low first cost, perfect safety, and ease of erection or removal. The rams are usually made about 10 ft. in length, and the cylinder does not require to be sunk below the basement more than the height of one ram, and, in cases where it is not necessary to lift from the basement, no sinking is required, all overhead gear is dispensed with. Unlike the telescopic hoist which we have just noticed, the lifting power of this hoist depends on the diameter of its smallest ram. For ordinary heights and loads this may not be very material, but for very high or heavy lifts it is a somewhat serious drawback, and we would recommend the inventor to tax his ingenuity to try to remedy this.

A hydraulic balanced passenger-lift is exhibited by Messrs. Waygood & Co., of Falmouth-

road, S.E. This is worked from an accumulator charged by a rotary pump. Without presenting any great feature of novelty, the general working arrangements appear to be simple and good.

Messrs. Archibald Smith & Stevens, of Battersea, show both a hydraulic balance passenger lift and a hydraulic suspended lift, a hydraulic accumulator and pumps, and a hydraulic single-action door-spring. The chief feature claimed for their new hydraulic balanced passenger-lift is the method employed in balancing. This is effected by means of a cylinder arranged with an upper and lower compartment, with a piston or ram moving between them. The lower compartment contains the same amount of water as the long cylinder of the lift, and this volume of water alternates between the lift cylinder and the balance cylinder, through a pipe connexion, so that when the lift-cage and ram are up, and the lift-cylinder full of water, the balance ram is down, and the lower portion of the balance cylinder empty, and when the lift ram returns, displacing the water from its cylinder, driving it through the balance cylinder, the ram of the latter is forced upwards. The counter-balance is made slightly lighter than the lift ram and cage, that the preponderance of the latter may always bring it to the bottom of its travel when the driving-pressure is removed. Suitable valve-controlling gear is fitted, and arrangements are made to prevent accidents should this fail from any cause.

Amongst the recent applications of water-power hydraulic riveting machinery holds a prominent position. A number of these, made under Tredwell's patents, are exhibited by Messrs. Fielding & Platt, of Gloucester. These are constructed of various sizes and types, as may be specially suited to the requirements of ship-builders, boiler-makers, and others. They are connected to an inverted type accumulator, weighted and arranged so that the water-pressure may be varied from 150 lb. to 1,500 lb. to the square inch.

The "Fielding" type-riveter presents several fresh and ingenious points in its construction, the cylinder being bored to a curve struck from the centre of the gudgeon, to which curve the ram also is traced. This obviates the necessity of jointing the ram or the chance of the dies swerving when in work. This machine is attached to a compound patent hanger, which allows of its being moved round whilst under pressure and worked in any desired position.

A double-ended portable riveter is shown fixed for work on a railway carriage under frame. In this machine the levers are made of unequal length, and a hydraulic cylinder is mounted on one of them, and its ram acts by means of tension links on the other. Various other machines and models are here to be seen, and illustrate well the very great development that has taken place during recent years in this branch of hydraulic engineering. The workmanship in the machines shown is all that can be desired.

An extensive show of hydraulic riveting machinery is made by Messrs. Hugh Smith & Co., Fossil Works, Glasgow. This includes machines especially adapted for boiler work, ships' keel riveting, bridge and tank work, &c.; and also an accumulator with direct-acting steam pressure pumps, a hydraulic crane and hoist, &c.

The crane is of the pillar type, but it can be modified to suit the varied requirements of foundries, boiler works, saw-mills, &c., and by mounting it on a centre post they can be made to swivel round in a complete circle. All the motions are worked by hydraulic power, including raising, swelling, and travelling on the job. The raising motion is fitted with Smith's Patent arrangement, which gives three powers of lift and three speeds. The changes to give different powers can be quickly made.

We also noticed a massive hydraulic boiler-flanging machine, especially adapted for flanging boiler-end plates, setting and flanging dome end plates, and other similar work. The main frame of the machine is mounted on trunnions, and when it is used for hending flanges, &c., it can be set over at an angle, so that pressure may be put on both angles of the plate. To prevent the end plate from buckling when the flange is being set, a small hydraulic cylinder with ram is made to bear upon it. The end plate is made to turn on an eccentric pin, with lever for relieving the plate when being turned round. For doing this class of work very great pressure is required, and, in the machine under

notice the hydraulic cylinder is arranged with duplex links, giving a leverage of six to one, a much greater pressure is obtained than with ordinary direct-acting cylinder, and the power required to work is reduced in proportion. For riveting the keels of ships for which a pressure of 100 tons per rivet is often required, Messrs. Smith & Co. make a special form of riveter, which they mount on a travelling carriage arranged with vertical and horizontal adjustments for bringing the centre of the steel snaps in a line with the centre of the rivets. Our space prevents a longer notice of the interesting exhibits at this stand, which we may add combine compactness of design, strength, and freedom from complication in a marked degree.

A considerable display of hydraulic riveting-machines with pumps, especially designed for working the same, is made by Messrs. Anderson & Gallwey, of Chelsea. Amongst the riveters we noticed a well-designed machine of the fixed type. The action of this machine is governed by a foot lever, and the riveting die is arranged with an automatic return stroke, which comes into action immediately the operator's foot is removed from the lever. The length of the stroke of the riveting die is regulated as required by means of tappet gear, which is an improvement, as it obviates the necessity of constantly changing the dies. We believe a riveter of this type has recently been constructed for the heaviest class of boiler work, which gives a pressure of some 120 tons at each stroke.

Several very handy portable riveters are also exhibited; these are modified in power and details to suit the requirements of bridge and boiler makers, &c., and include one of very simple construction for use in difficult positions. The pumps for working the riveters combine strength and simplicity of design with ready accessibility to the working parts, an important point not always sufficiently borne in mind by designers. The frame is cast solid round the upper part of the crank-shaft bearing, and therefore receives the strain of the upward thrust, which is an improvement.

Messrs. John Barker & Sons, Limited, Oldham, exhibit a very useful adjunct in connexion with hoists, in the nature of an automatic self-closing door, which can be fitted to any building, and prevents by its action the possibility of passengers falling down the well. A self-landing and self-delivering hoist is also shown here.

The East Ferry Road Engineering Company, Milwall, exhibit a specimen of Duckham's patent hydrostatic suspended weighing-machine, especially adapted for attachment to cranes. It is fitted with a self-indicating arrangement. Models are also shown of self-counterbalanced movable hydraulic cranes.

A duplex hydraulic lift, with pump and accumulator, are shown by Messrs. Clark, Bunnett, & Co., of Rathbone-place, Oxford-street, W.

NOTES ON A FEW "BITS" OF OLD GLASS.

THE skill and ingenuity of the old craftsmen in designing decorative detail is strikingly manifested in the painted windows of the time, and designers and students will find themselves amply repaid for the time devoted to the study of old glass by the excellence of the work brought under their attention. It is now pretty generally admitted on all hands that the art of glass staining and painting reached a degree of perfection in the fourteenth and fifteenth centuries that was denied the other art crafts of the time. The mural painting, for instance, is not of the same excellence as the hulk of the painted windows of the same date, though there and there may be found an altogether exceptionally good piece of painted work, which only serves to emphasise the comparative poorness of the rest of the painted decoration. The early glass-painters seem from the beginning to have recognised the important fact that glass staining and painting is essentially a "colour art," and that, whatever other excellencies a window should possess, it must, above all other things, be a beautiful "bit" of colour. It was not until the revival of the art, early this century, that this fact was brought home to glass-painters. Sir Joshua Reynolds and the school of glass-painters of the eighteenth century had quite lost sight of this important fact, that glass-painting is a "colour art," as the monuments of their misapplied talent and mistaken zeal attest to this day.

It is singular when we consider the question how the early glass-painters came to be so successful; for those who know anything practically about the craft of glass-painting are aware of the great difficulties that lie in the way of a successful painted window. And in looking at old glass onemust never lose sight of the fact that the early craftsmen had to overcome difficulties which a modern painter would deem insurmountable. The work of the early masters, in whatever way it be, must always be looked at from the standpoint of the artist who wrought it, and not, as we are so fond of doing, from the point of view of the present day. The early masters were our pioneers, and had the exceedingly difficult task of feeling their way in an unknown country. There is little credit due to us, who have centuries of examples to guide us, in succeeding; we have hardly any excuse, save our own incompetency, for failing, and we should be very chary of giving out a thoughtless, superficial opinion about old work, simply because we have not the modesty, taste, or sympathy to appreciate it. I have no doubt that a large number of people who go to the National Gallery to see the *Ansiedi "Madonnas"* by Raffaele will look in vain for their money's worth; for are they not aware that for 70,000, one might purchase the whole contents of some modern art galleries? I am not here finding fault with the conclusions many people arrive at on looking at this latest addition to our National Collection, but at the method whereby they arrive at their conclusions.

The way to appreciate old glass is to see it side by side with had glass. In New College Chapel, Oxford, may be seen a few good old windows, together with some leaded windows of the seventeenth century, about as bad as windows can be, together with that wholly mistaken effort in glass-painting, "the Reynolds" window, as it is termed. In Peterhouse, Cambridge, there is a fine specimen of Dutch glass in the east end window, and some very offensive Munich windows in the nave, said to have taken a medal at the '51 Exhibition! If that is so it only shows what a very "modern art" stained-glass painting is.

Perfection of result may be, and often is, due to limited means, and it was probably owing to the technical difficulties the early craftsmen had to overcome that kept their art so restrained and made their work so entirely successful. It is to be regretted that with increase of technical skill comes the desire of exhibiting one's skill. We see this in the works of many of the rising painters of the day,—this desire of showing the world "what a deuced clever painter I am." The early glass-painters could not do that. The difficulties of their craft restricted them, and imposed the necessary limitations upon them. They went the simplest way to work, contented to arrange large masses of colour effectively and harmoniously, and striving to obtain broad, simple *sculptural* effects. With increase of skill came the desire to exhibit their powers of technique, and with this desire the throwing overboard of all restrictions and limitations imposed upon them by their craft, to result, as time went on, in such deplorable examples of mistaken skill and misapplied ability as such windows as those instanced in New College and elsewhere.

There is such a wealth of material in the old glass that has come down to us, even in this country, that it is difficult, in attempting to give scattered examples of "bits" from old windows, to know where to begin, and still more where to end. The examples here offered are, in the main, taken from English glass, though the three-figure windows are from St. Ouen, Rouen. It will be enough for my present purpose if I append a brief note, with the various examples given. Figs. 1, 2, and 3 are taken from the Church of St. Ouen, Rouen. They illustrate a common practice of the early craftsmen of leading a figure richly coloured on to a background of quarries of tinted white glass. These quarries were, in many instances, traced with simple patterns and stained, and it is astonishing what a rich and varied effect is produced by these traced and stained quarry grounds.

Figs. 4A to 4F are examples of leaded borders from Canterbury Cathedral. The ingenuity of the old glass-painters is exhibited nowhere more strikingly than in the ornamental leaded borders. The interlacing and intertwining of the patterns, such a notable feature in early Celtic ornament, is managed always with great skill,

and is well adapted to the exigencies of the glazier. There are, it may be observed in passing, some very characteristic examples in Canterbury of the early cut up medallion windows, of which such splendid examples are to be seen in the Sainte Chapelle, Paris, and modern imitations in the Temple Church, Strand.

The seven borders, fig. 5, are also taken from Canterbury. The three "bits" of leaded borders, figs. 6, A, B, and C, are from York Minster. Nothing can be simpler or more effective than such borders. It will be noticed that the early glass-painters were not afraid of putting in plenty of solid back-ground. The places left white would be occupied with ruby or blue glass.

Figs. 7A and 7B are from Salisbury, and are fairly typical examples of geometrical leading combined with tracery. Fig. 8, of a different period to any of the foregoing examples, is taken from the Abbot's Hospital, Guildford. Figs. 9, 9A, to 9C are four "roses," from St. Andrew's, Cheddar. The five borders, fig. 10, are from St. Mary Redcliffe, Bristol, as are also the nine circular patterns, figs. 11 to 11I. The ingenuity of figs. 11B, 11C, and 11I is notable. Of the grotesques, 11C is probably symbolical of Eternity, and 11I we might term the germ of the art of the Renaissance, the striving after effects which the artists of the Renaissance carried to their logical conclusions. The three remaining examples, figs. 12A, 12B, and 12C require no comment.

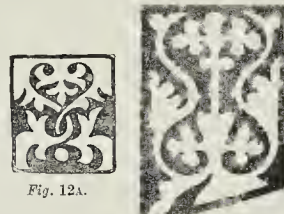


Fig. 12A.



Fig. 12C.



Fig. 12B.

Very many people who receive the keenest and most exalted enjoyment from a visit to one of our noble cathedrals or abbeys have only an eye for the general effect, and almost entirely miss the wealth of detail with which the early craftsmen enriched the fabric of their buildings. And yet keen and discriminating as should be the enjoyment that the *tout ensemble* gives one, it will be found that the fullest enjoyment only can be reached by attention to detail, and though this remark is addressed to those who merely take an interest in old work for its own sake, and not as a part of the business of their lives, it is to be feared that students are too apt to be content with generalities,—with the impression of a building as a whole, to the almost total exclusion of the thousand and one details that go to produce the complete and perfect work.

FRED. MILLER.

Mosaic Work.—Messrs. Diespeker & Co., of Holborn Viaduct, have just finished the mosaic (about 700 yards) at the National Hospital for Paralyzed and Epileptic, Queen-square, Bloomsbury, which is to be opened on the 1st of July by H.R.H. the Prince of Wales, as a national memorial to the Duke of Albany. The same firm has laid the mosaic at the new Birkbeck Institute, which will be opened by H.R.H. on the same day. The mosaic in front of the altar of "Our Lady" in the Oratory at Brompton has also been executed by this firm, after the designs of Mr. H. A. Gribble, the architect of the building.

Illustrations.

DESIGN FOR ADMIRALTY AND WAR OFFICES.

WE publish this week a reproduction, by Messrs. Waterlow's process, of a perspective view, executed especially for our paper, of the design submitted by Mr. H. B. Garling in the recent competition for Admiralty and War Offices. The view shows the building as it would have appeared from St. James's Park.

As many of our readers will remember, Mr. Garling was the gainer of the first premium in the competition for the War Office in 1857.

NEW OFFICES OF THE DAILY NEWS.

The new buildings erected for the *Daily News*, of which we give an illustration this week, are practically in two blocks, having a frontage to Bouverie-street of 85 ft., and five stories in height, including the basement and a story in the roof. The front building is occupied, on the ground-floor, by the publishing and general offices; the first floor, by the management and editorial department; and the upper floors, by the printing and other offices. The rear building is wholly occupied by the printing-offices, paper stores, machine-room, stereotyping department, and engine-rooms. It is stated that the sanitary arrangements, the ventilation, and the fireproof division of the premises have been carefully studied. One feature in the execution of the work has been that the printing of the paper has not been intermitted for one day during the reconstruction of the building, while the new buildings have been erected over the printing-machines. The buildings have been constructed from designs prepared by Mr. T. Chatfield Clarke, F.R.I.B.A., and under his superintendence. The works were carried out by Messrs. Brown, Son, & Blomfield, in a short space of time. The ornamental carving, which includes heads of Milton, Johnson, and Goldsmith, Dickens (the first editor of the paper), Forster, and Douglas Jerrold, was executed by Mr. Anstey, and the ironwork was supplied by Messrs. H. Young & Co.

SCULPTURE AT THE ROYAL ACADEMY. SCENES FROM THE ANNEID, BY MR. HARRY BATES.

We before commented, in an article on the Academy sculpture, on this fine little example of ideal sculpture, which would have been deservedly purchased with the Chantry Fund, but for the technical objection in the fact that, though by an English artist, it was not executed in England. It is rather a pity the bequest was hampered with this formal condition.

The design was originally made for a scheme for the decoration of a dining-room, but, as it was much approved, the sculptor was asked to translate it into bronze. The design was modelled by the sculptor, Mr. Harry Bates, during his travelling studentship, and cast in Paris. We have not often seen work by a young sculptor manifesting so clear a perception of the real aim and scope of sculpture in giving a poetic rendering of an ideal subject. The groups and draperies are beautifully composed, and the figure of Dido, in the first panel, is particularly fine.

THE LARCHES, WROTHAM HEATH, KENT.

This house, situated on the main road between London and Maidstone, about one mile from Wrotham Station and about three miles from the town of West Malling, is erected on one of the most picturesque portions of the estate belonging to the Hon. Lady Caroline E. Nevill, and, occupying a high level, commands extensive views of the surrounding country. The accommodation on the ground-floor consists of drawing-room, dining-room, and morning-room, kitchen, scullery, butler's pantry, and other offices; on the first floor there are six bedrooms, housemaid's closet, sink, &c. The outside walls of the ground-floor story, built with a 2-in. cavity, are of Kentish rag stone, and lined internally with brickwork; the walls of the upper story are of solid half-timber work, with tile hanging in the gables. The roof is covered with red tiles.

The soil of the site is a sandy loam, and an excellent supply of spring water is drawn from a deep well.

The drainage system and sanitary appointments of the house have been carefully

designed and arranged; the soil and waste pipes, all ventilated, are conducted to a large water-tight cesspool, about 100 ft. from the house, accessible for emptying when required, and all the rain water is collected in a large tank in the ground, built of brickwork in cement.

The house has been erected and carried out from the designs and under the superintendence of the architect, Mr. Herbert Hardwicke Langston, of 9, Great James-street, Bedford-row, London; the contractors for the work were Messrs. Pryer & Co., of Maidstone.

BALLOON FRAMING.

The term "balloon framing" is applied, in Canada and the States, to a light kind of timber construction, which is practically independent of skilled labour; it is a rough-and-ready way of nailing sticks together, in an efficient and scientific manner, in the erection of various kinds of buildings, and is quite commonly met with in cottages, houses, and summer hotels in the north-western portions of America.

A descriptive account of the accompanying sketch will illustrate the principle of construction, and its applicability to numerous other structures much more pretentious than the fowl-house illustrated.

Having settled upon the dimensions of the work, we should proceed to the timber-mills and select stuff of the most suitable sizes, 2 in. and 3 in. by aliquot parts of 12 in. being the readiest scantlings, and 12 ft. to 16 ft. the usual lengths, though white pine timber is easily got up to 20 in. square and 30 ft. in length. In the building illustrated the outside studding is 3 in. by 4 in. mostly 14 ft. lengths, the joists 3 in. by 8 in. in 12 ft. and 6 ft. lengths, &c.; thus this part of the labour is dealt with at the mills, the planning of the building being based a good deal on these data, and the timber is brought to the site ready for immediate fixing.

Having got in rough foundations and raised them about a foot above the ground, we proceed to lay the cill, usually 8 in. by 3 in. hollow and spiked at the angles. I name foundation walls, but roughly-squared tamarac (larch) or cedar logs frequently take the place of stone walls.

On the cill the studs are raised and toe-nailed thereto, the angles and door-posts are formed by pairs of studs. On the illustration the angle posts are blocked apart to admit of nailing the end joist to the side studs and for better fixing the internal lining. The intermediate studs are spaced out from 30 in. to 36 in. from centre to centre, the window openings causing the variation.

In this case the ground-floor was formed with concrete, otherwise the ends of the joists would have rested on the cill, close up home to each stud, and have been spiked to cill and stud, forming additional support and perfect tie.

The first-floor is formed by nailing a 1-in. slash or girt, 4 in deep, on the face of the studs, at a level of the under-side of the joists; upon this the ends of the joists rest, close up home to each stud, and are spiked thereto, the combination forming a perfect cross-tie and a solid bearing. Sometimes these girts are let into a sinking on the face of the stud, forming a shoulder for its support, and sometimes the joints are notched over the girt, offering apparent advantages in support and tie; but considering the closeness of the joint and its downright bearing there, is little practical advantage to be gained by this great accession of labour, as will be more apparent when the structure is complete.

In the illustration the building was spaced for the stock length of 12-ft. joists, with half-lengths across the central passage. The joists, where they overlap on either side of the passage studs, are nailed thereto, and notched over the girt, so as to form practically a continuous tie. The joists next the ends of the building are nailed to each stud they pass, every third one being bolted so as to form, when floored over, a perfect longitudinal and transverse tie or diaphragm.

The studs run up the whole height of the structure, passing between the joists, and if any lengthening is required it is done by placing a piece hnt on the top, and splicing by nailing long 1-in. slabs on each side, as shown.

The wall or roof plate is 4 in. by 2 in., nailed to the top of each stud, the rafters notched over and spiked thereto, one directly over each stud; thus the points of support are always direct. According to the size and use of the building, ceiling joists may be used spiked to plate and

after feet, or collars to each rafter, or less frequently, as the case may be.

The frame-house is then covered externally (and by preference in construction internally also), walls and roofs, with 1 in. or 1½ in. grooved and tongued boarding in narrow widths. This provides longitudinal tie, and knits the shell into a tight-box. The framing and lining together form the essentials of balloon framing. The lining, particularly the internal lining, adding immensely to its strength, more especially if placed diagonally. When the floors are laid, and the lining all on, the building practically becomes a series of solid slabs knit and tied together in all directions, with no weight not directly supported and no thrust not directly counteracted.

Angle-ties, bridging, and other stiffening pieces are used in larger buildings for extra strength, where the bearings are long or the stories high, but there is nothing in the nature of the construction requiring skilled labour, or beyond the capacity of a man and a boy to raise, or needing any other tools than a saw and a hammer. In small buildings all the stuff would be out of 1½-in. plank. Except joists, these studs would be 1½ in. by 4 in. rafters, 1½ in. by 5 in. joists, 2 in. by 9 in. all spaced, 30 in. centre to centre.

Outside the boarding the walls and roof are covered with thin asphalted felt, called building paper. The roof in the building illustrated is finished with patent asbestos cement ¾ in. thick, which forms a thoroughly weather-tight roof summer and winter. Varieties of this cement are commonly used here for flat roofs; other roofs are covered with tinned iron roofing plates, welded or double seamed, as the edges, or pine shingles 1½ in. by 6 in. cut feather-edged, and slates, red, green, and blue.

In town districts these structures, such as that illustrated, are cased externally with half-brick walls, tied in and loaded with long rails or strips of sheet iron, thus presenting the appearance of an ordinary brick house; but in rural districts it is usual to finish the exterior with horizontal or vertical weather boarding or panelling. The former, which is called "clapboarding," is cut out of the best end of the log, about 7 ft. in length; the cuts are made with the circular saw from the outside towards the centre, as illustrated, leaving a core or heart of about 3 in., giving boards from 6 in. to 10 in. wide, about ½ in. on the outer edge. On knocking this core out the boards fall apart, and are ready for use. Clap boarding is fixed from the top downwards, the men working on a bracket scaffold screwed to the studs. Each board is driven up home under the edge of that above it, and a chisel nail driven through the two makes a sound and rapid job. The margin or weather face varies from 4 in. to 6 in. or 7 in.

In some cases the walls are finished internally with 1½ in. grooved and tongued lining only, and the space between the studs filled in with sawdust; sometimes they are battened over the boarding, and lathed and plastered in the usual way, or with wrought lining over the rough boarding.

If the inside is lined horizontally or diagonally, the outside may be covered with vertical boarding on horizontal stiffening pieces, or on horizontal or diagonal battens nailed to the studs. Sometimes the upper story is boarded vertically, and the lower one horizontally.

It is maintained that not only are such buildings some 40 per cent. cheaper to raise than brick and timber used in the usual English plan, but they are (for the climate) more comfortable to live in, warmer in winter and cooler in summer, free from all elements of damp, they can be put up with extreme rapidity to meet a want, and finished off at once, and are ready for immediate occupation.

The large hotel at Minnetonka, giving accommodation for some 400 guests, and a great summer resort, was thus built in 100 days. The system prevails throughout the north-west from the merest cottage to the first-class house and the largest hotel. The elaborate framing of English carpentry with dovetails, tenons, mortises, and pinning, "with oak or iron," expensive straps, heavy timber, close centring, &c., are unknown here, and yet these buildings stand perfectly, and would blow over without falling to pieces. Should a stick decay it can be readily replaced, and should alterations be contemplated, there is little or no difficulty to be encountered, and no expensive preparations are required.

THOS. C. SOKRS.

Montreal, Dec. 17, 1884.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4A.



Fig. 4B.



Fig. 4C.



Fig. 4D.



Fig. 4E.

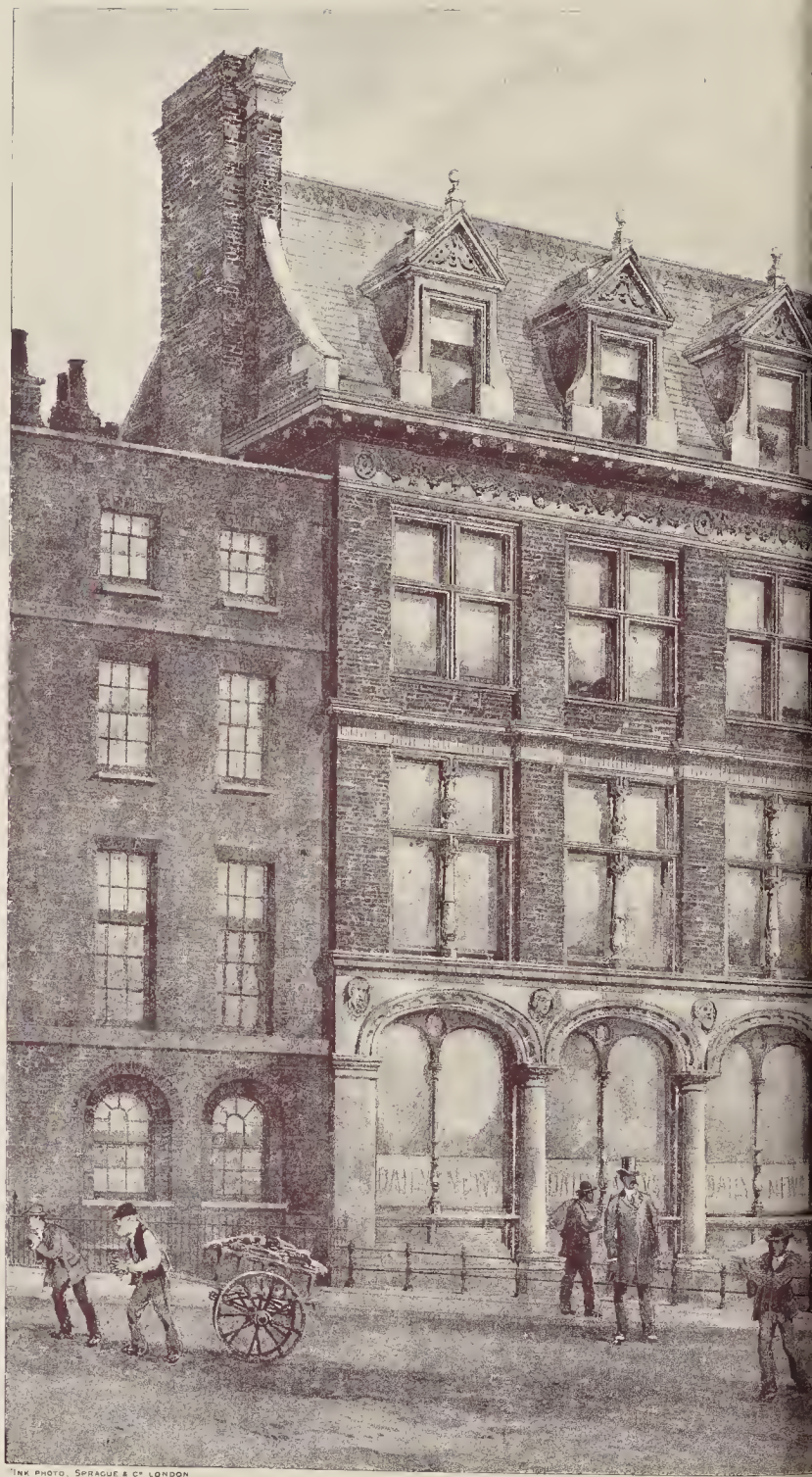


Fig. 4F.



Fig. 5.



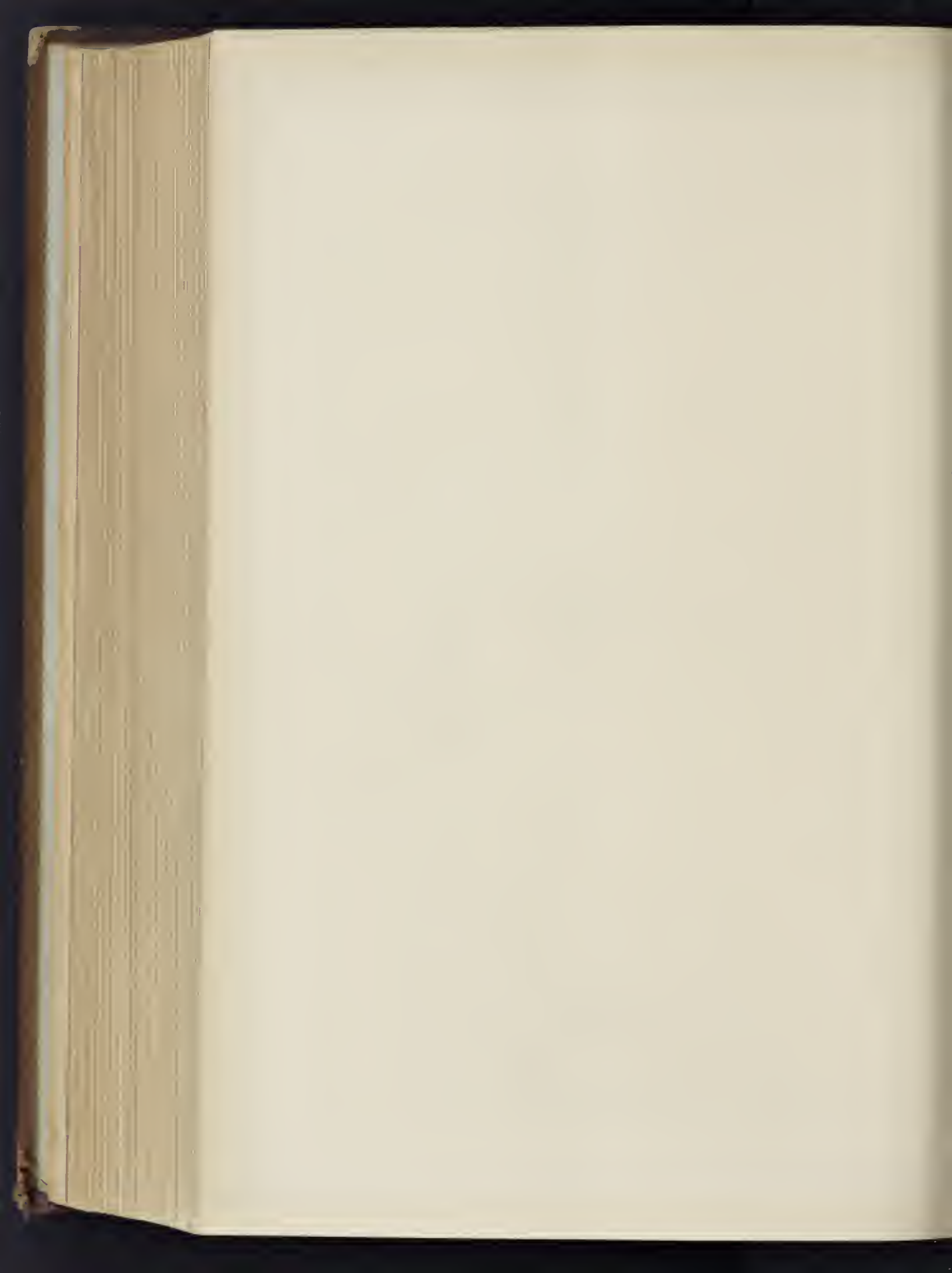


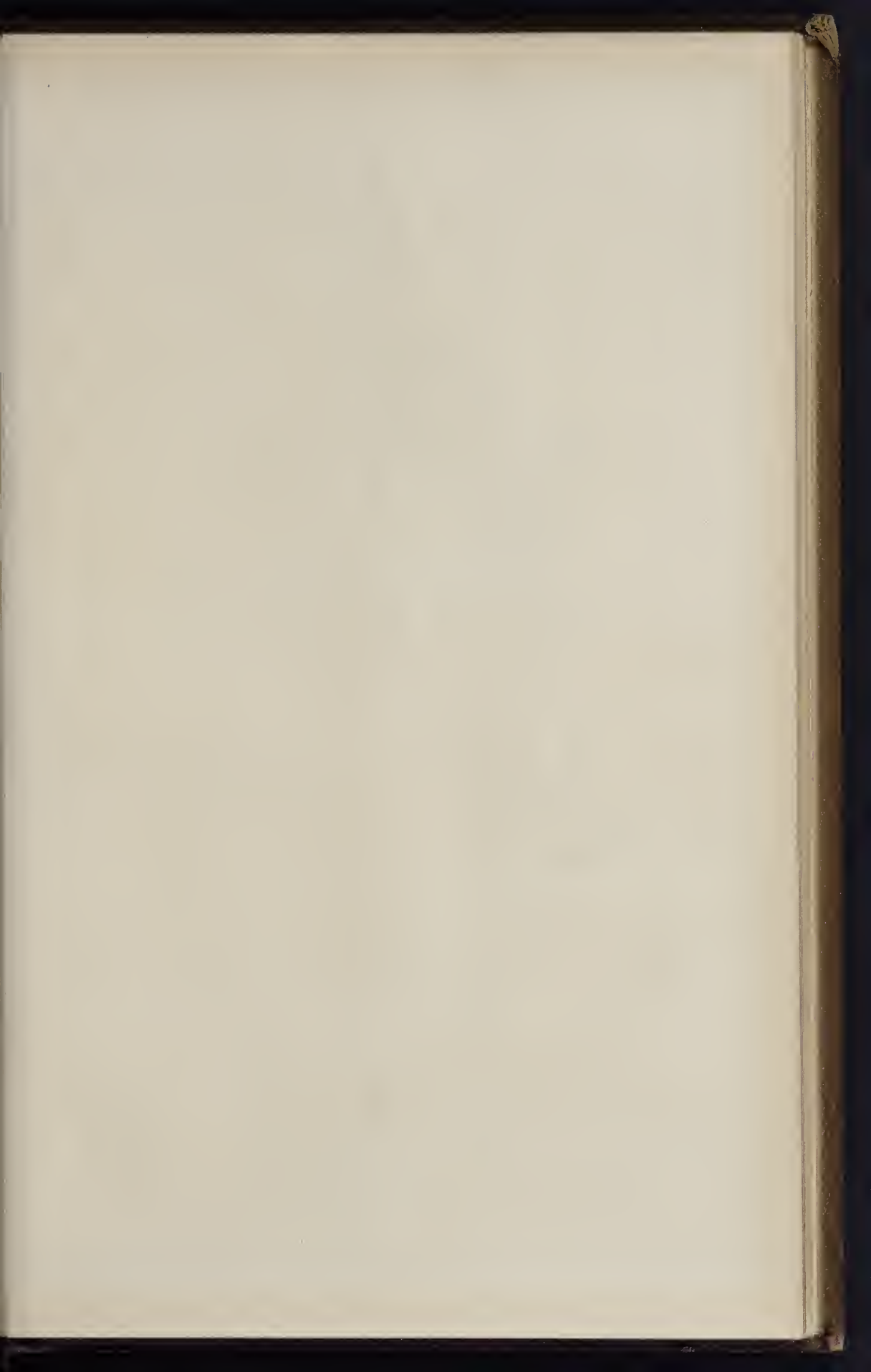
INK PHOTO. SPRAGUE & CO LONDON

NEW OFFICES OF "THE
MR T CHATFIELD CO

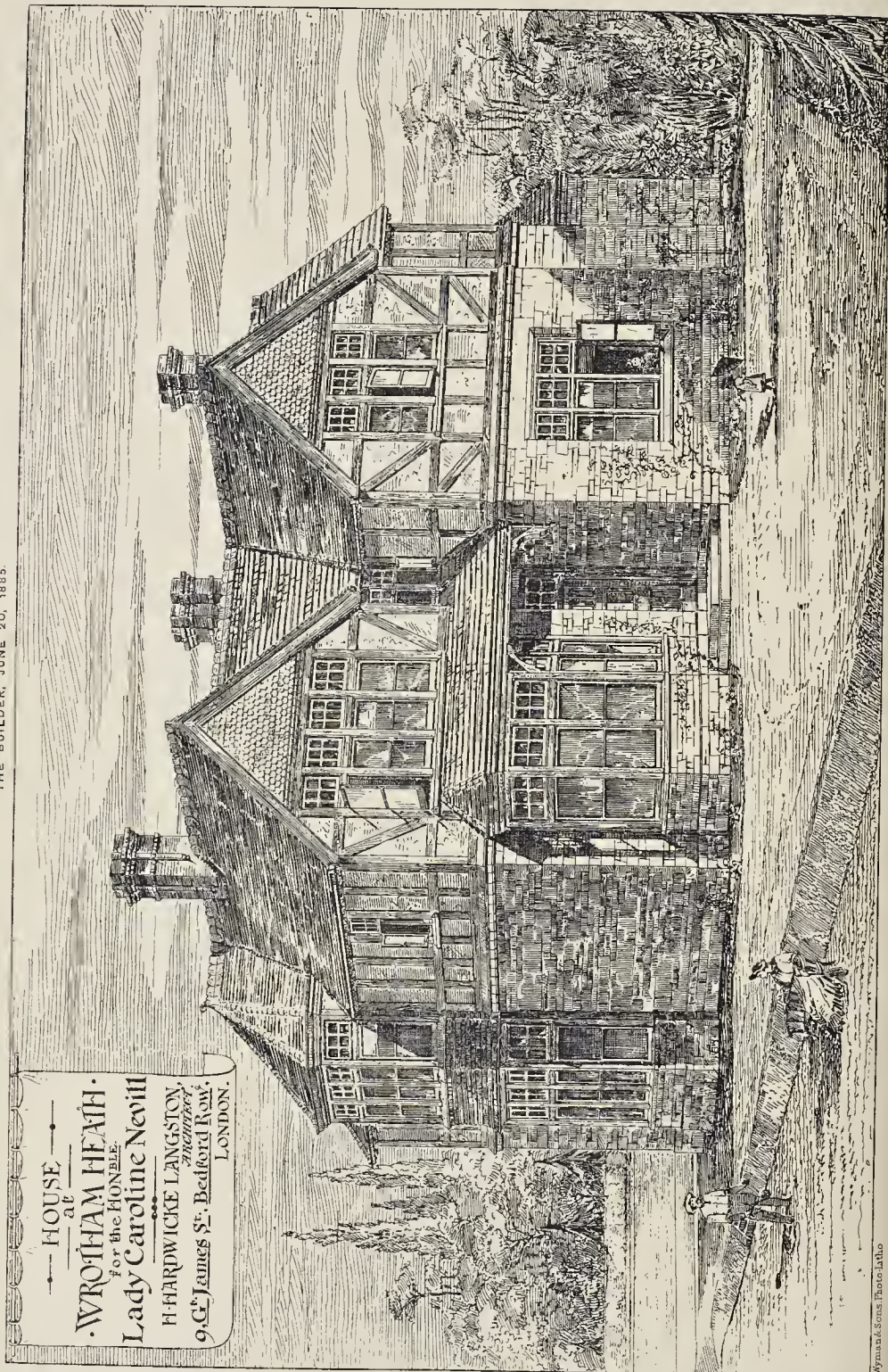


NEWS, FLEET STREET,
J. B. A., ARCHITECT

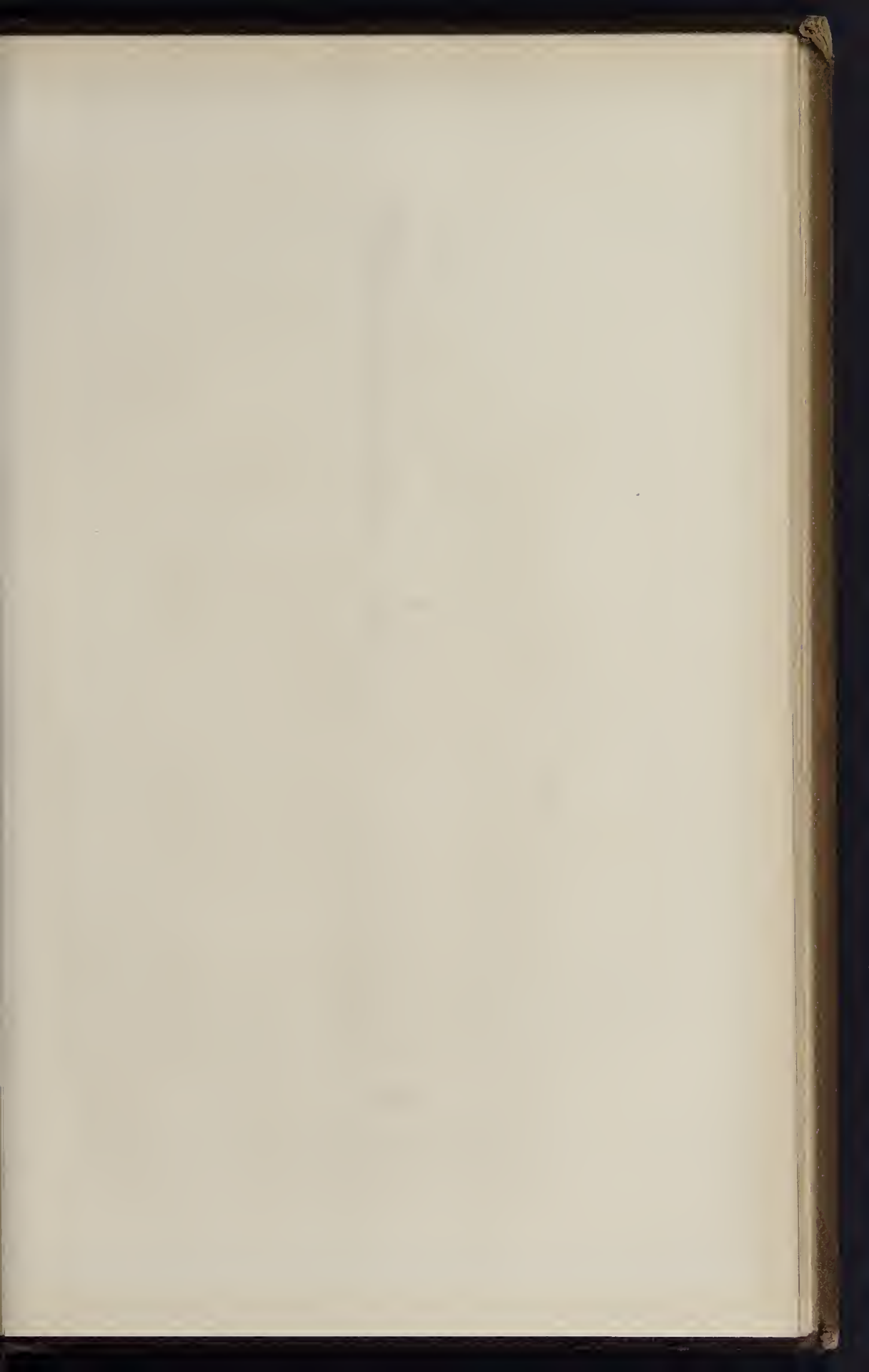




THE BUILDER, JUNE 20, 1865.



— HOUSE —
at
WROTHAM HEATH
for the HON^{BLE}.
Lady Caroline Nevill
HARDWICKE LANGSTON,
Architect,
9, C^o James St., Bedford Row,
LONDON.





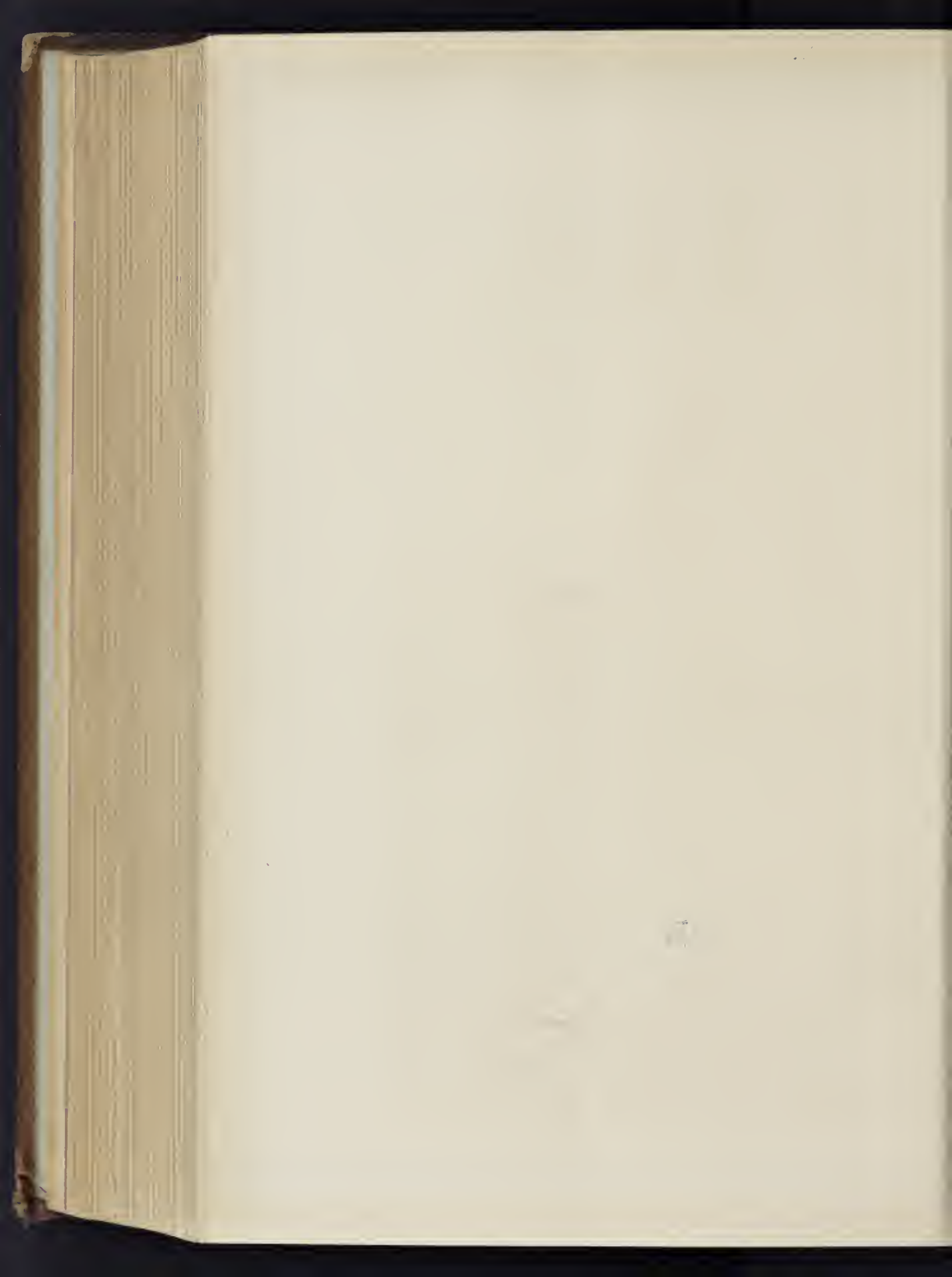
DESIGN FOR ADMIRAL
PARK

H. B. CARLING
1ST PREMIATED COM
COMPE



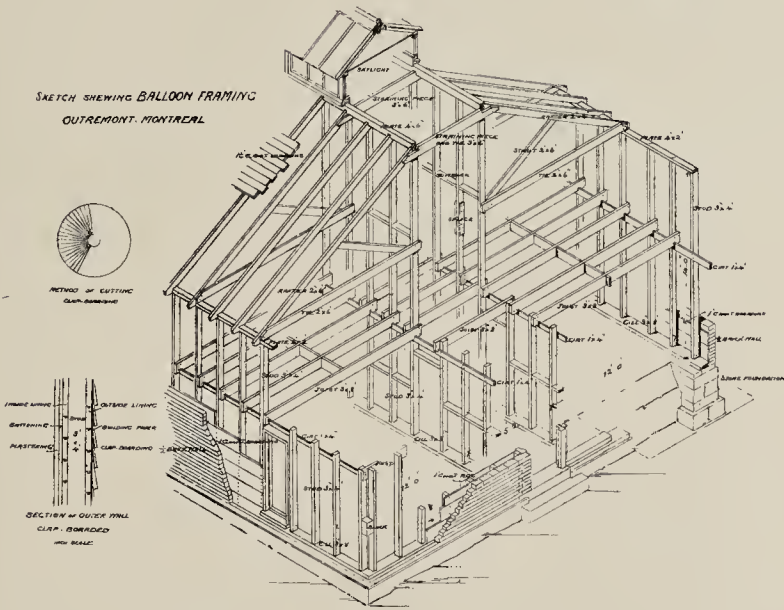
AND WAR OFFICES .
FRONT .

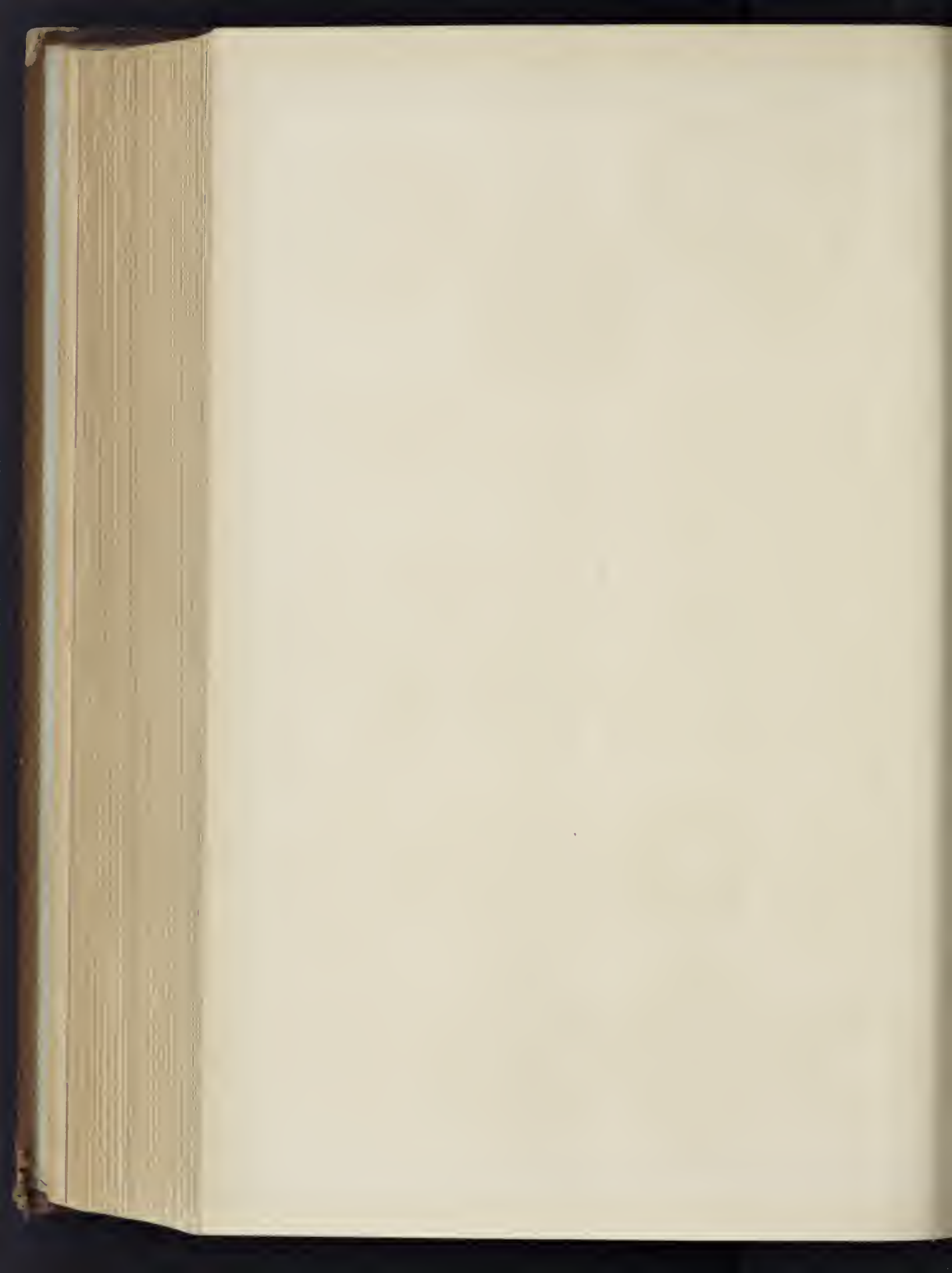
J.B.A. ARCHITECT .
FOR WAR OFFICE .
1857 .

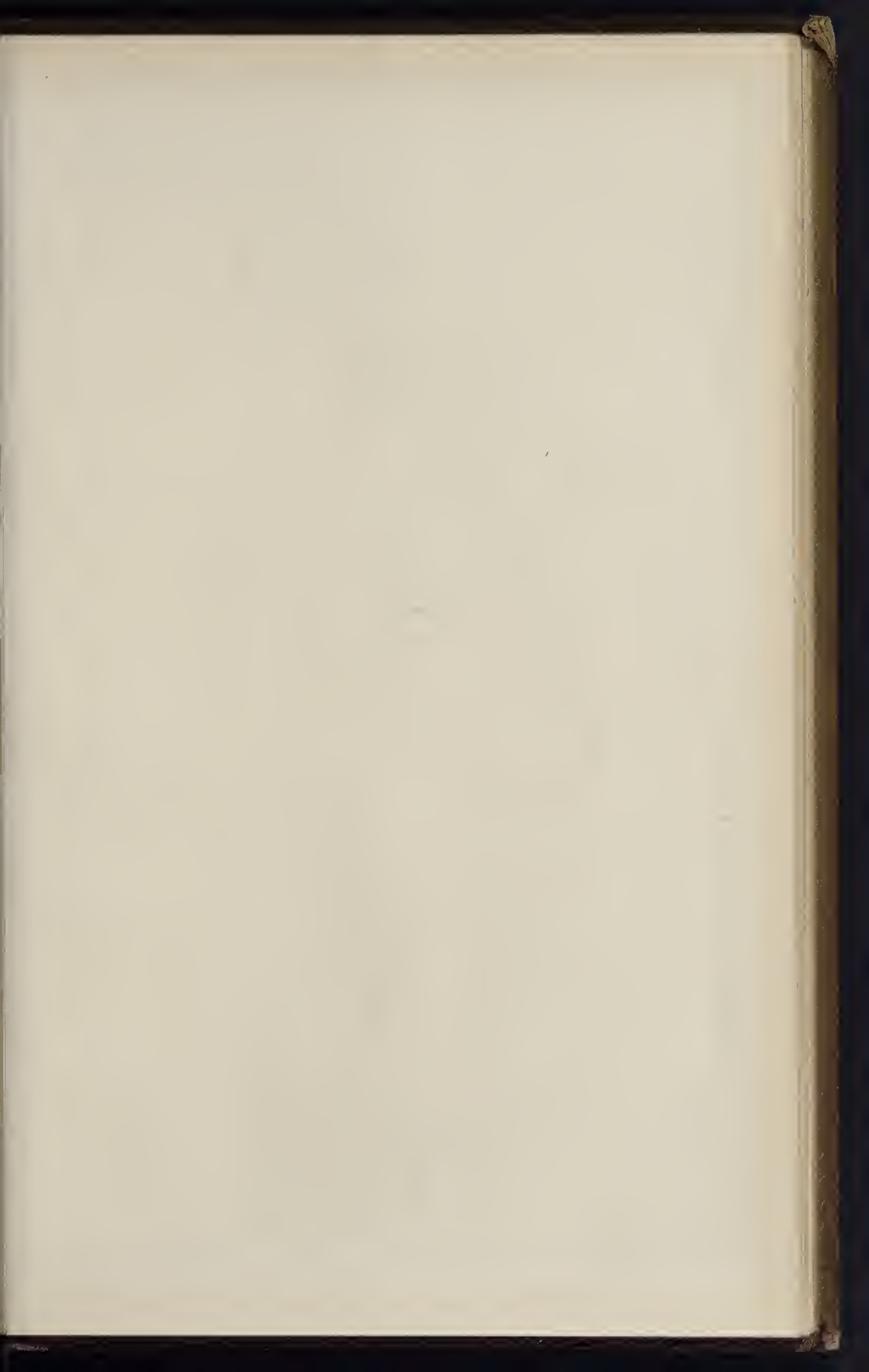




SKETCH SHOWING BALLOON FRAMING
OUTREMENT, MONTREAL







THE BUILDER, JUNE 20, 1885.



II

BRONZE PANELS
SUBJECTS FROM
THE AENEID

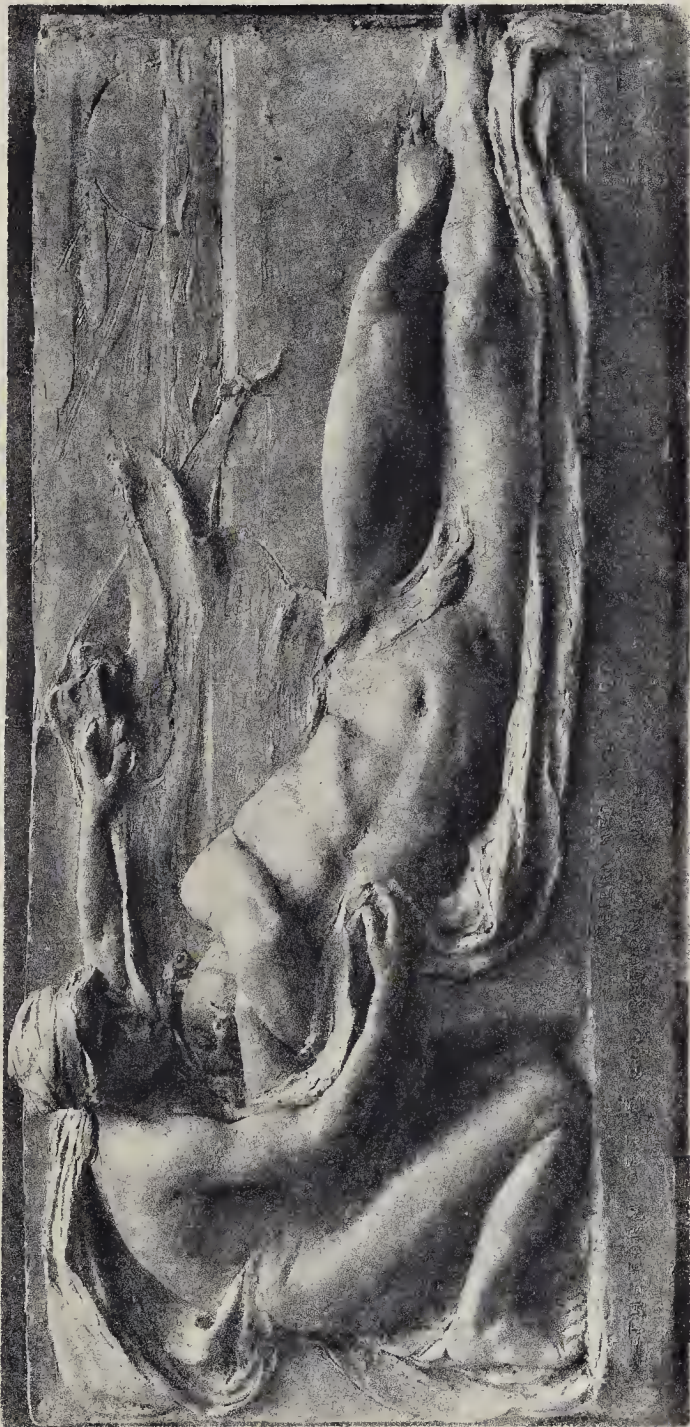
1. *Why does he stop his unrelenting
ears to my words? Whether
doth he fly?*

III. *The form of the god, returning
with the same aspect, appeared
to him in his sleep.*



MR. HARRY BATES
SCULPTOR

III



INK PHOTO SPRAGUE & CO. LONDON

SCULPTURE AT THE ROYAL ACADEMY.

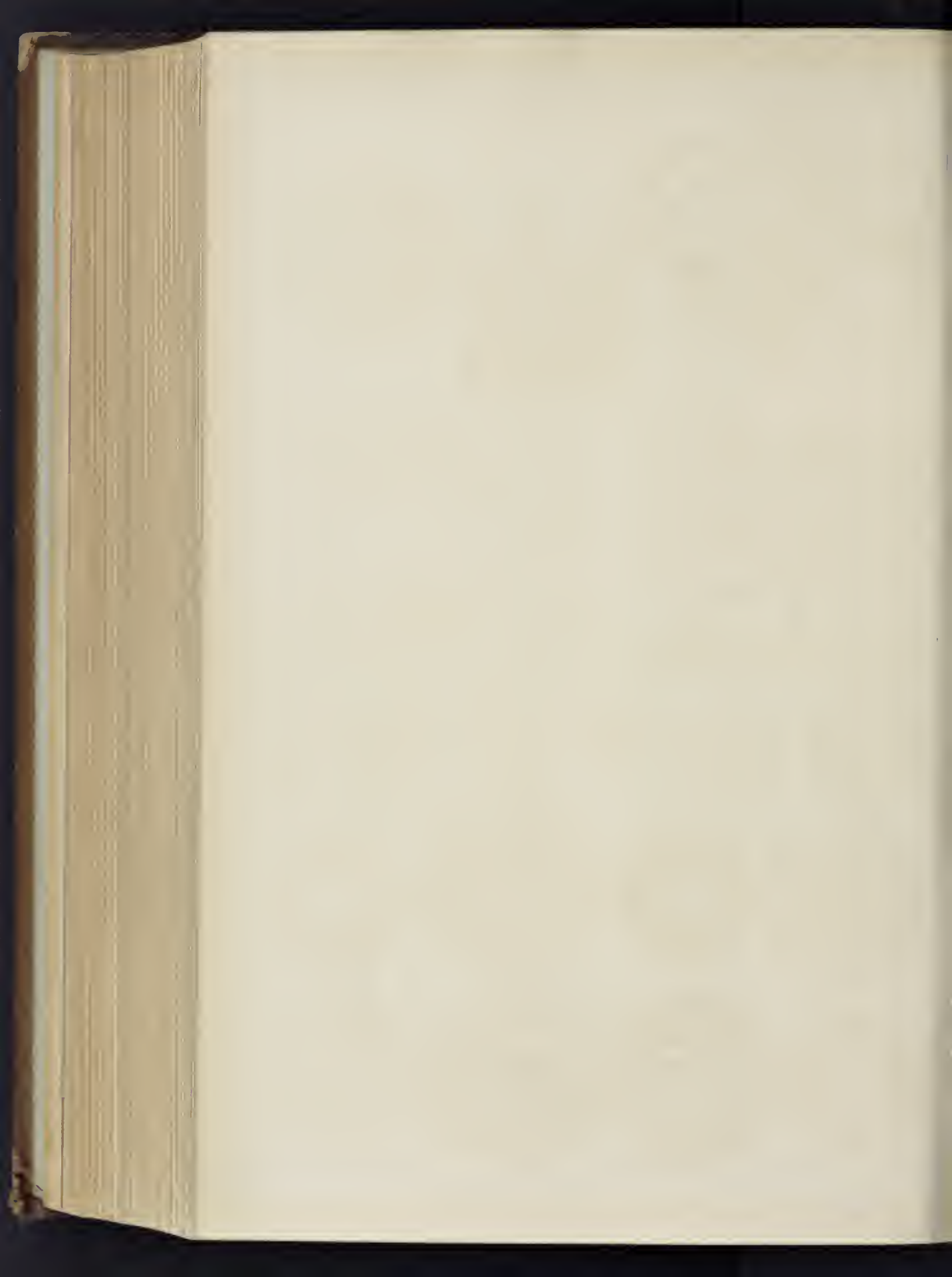




Fig. 6A.



Fig. 6B.



Fig. 6C.



Fig. 7A.



Fig. 7B.

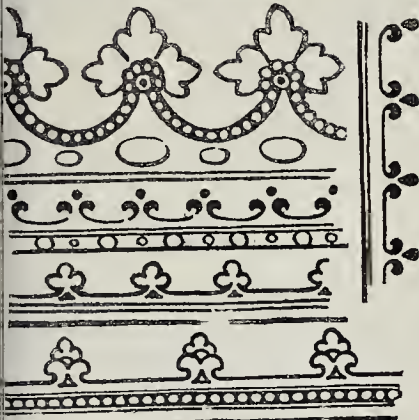


Fig. 10.

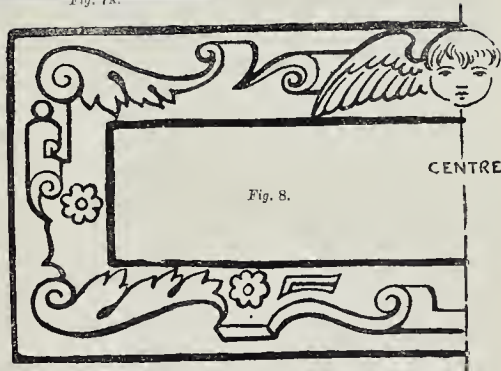


Fig. 8.



Fig. 9.



Fig. 9A.



Fig. 9B.



Fig. 9C.



Fig. 11C.



Fig. 11.



Fig. 11A.



Fig. 11B.



Fig. 11D.



Fig. 11E.



Fig. 11G.



Fig. 11H.



Fig. 11I.

THE ANNUAL REPORT OF THE METROPOLITAN BOARD OF WORKS.

OCCUPYING nearly 200 closely-printed pages, the Report of the Metropolitan Board of Works for 1884 is a record of much useful work done, and, on the whole, done well. Notwithstanding the anomalous constitution of the Board,—its members not being directly responsible to the ratepayers, but being the nominees or delegates of the various vestries and district boards of works,—and, although it only numbers forty-five members, it is entitled to the gratitude of Londoners for the manner in which it has performed the multifarious duties thrust upon it since its creation in 1855, now nearly thirty years ago. That it has earned the public confidence is proved by the fact that year after year Parliament entrusts it with new duties, some of which, however, are obviously only entrusted to the Board in the absence of a properly-constituted municipal governing authority for the metropolis. It may be news to some of our readers, for instance, to be told that the Board is the supervising authority, under the Infant Life Protection Act of 1882, of what are known as "baby-farms," the Board being empowered to fix the number of infants under the age of one year which may be received by any person, the premises themselves being subject to registration, which is refused if they are deemed to be unsuitable. Hampered as the Board has been from the first, by its very constitution, in the work of municipal government, it has, nevertheless, shown the value of unity of administration, so far as it has had authority to adopt it. There are many who think with us that unity of administration would be more easy, and, at the same time, more efficient, under a municipality directly answerable to the ratepayers.

During the past year considerable progress has been made with various new storm overflow and relief sewers supplementary to the main-drainage system proper. The Deptford storm overflow sewer, which cost 34,000*l.*, was completed last September. The new main sewer from Rochester-lane, Putney, to the Clapham-road, which will be carried across some low-lying land at Wandsworth for more than three-eighths of a mile in the form of an aqueduct, is in progress. The contract price is nearly 152,000*l.* New sewers for the relief of the Ranelagh and King's Scholars' Pond Sewers, passing through Piccadilly, Knightsbridge, and Chelsea, are in progress, and it was on the line of these works that the accident which flooded the District Railway the other day occurred. The cost of these sewers will be 96,300*l.* Various other extensive works of sewerage are in progress. As to the state of the Thames, into which all the metropolitan sewage goes, the Board's Report refers to the Report of the Royal Commission, and demurs to some of the conclusions of the Commissioners. But that the state of the river is very bad in hot weather is admitted by the Board, for, after mentioning the arrangements made last year for deodorising the river, the Report says,—“To prevent any difficulty in future from an insufficiency of chemicals, the Board has set up apparatus and machinery at the Crossness Pumping Station, which will enable it to manufacture promptly and in sufficient quantities the compounds required for deodorising purposes.” The Report next briefly refers to the experiments to ascertain the best means of treating the sewage at the outfalls with a view to its purification before being discharged into the river. These experiments were going on when the hot dry weather necessitated the immediate application of deodorising agents to the sewage. The experiments have since been resumed,* and arrangements have been made for a trial of a method of purification on a large scale. The Report points out that the average daily discharge from the metropolitan outfall sewers amounts to nearly 160,000,000 gallons, and says that it is only an experiment on a large scale which can enable a judgment to be formed of the practicability of dealing satisfactorily with such an enormous volume of liquid. The Report next states what was done by the Board during 1884 for the prevention of Thames floods by compelling the owners of riverside property to raise the level of their wharf and quay walls. Dealing next with metropolitan improvements, the Report mentions the new street from Tottenham-court-road to Charing Cross,

* Some particulars of them will be found in the *Builder* for June 6, p. 792, ante.

in connexion with which claims for property required amounting to 278,000*l.* were settled during the year. For the new street from Oxford-street to Piccadilly-circus, nearly all the property to be taken has been acquired, and attention has been directed to the maintenance of the houses in a proper sanitary condition until the ground can be cleared." On the Newport Market area new dwellings for the accommodation of 2,000 persons of the artisan class have been erected. In connexion with the widening of Gray's Inn-road, three sites have been let for the erection of working-class dwellings, "the total purchase-money for them being 3,405*l.* for 999 years' leases at shilling rents." We are pleased to notice that there is a prospect of the new street from Southwark Bridge-road to St. George's Church in the Borough, for which powers were obtained in 1877, being proceeded with without further delay. The street will cut through the once disreputable and now insanitary district known as "The Mint," the houses to be taken are of the worst class, and most of them have to be closed as soon as the Board obtains possession. It is but right to say that the delay in commencing this improvement seems to be due, not to the Board, but to the South-Eastern Railway Company, who obtained powers to construct a new branch railway through the district. Among the many other metropolitan improvements now in progress of execution or of negotiation may be mentioned the widening of Upper-street, Islington, and the Tower-hill improvement, the latter consisting in the removal of the block of houses between Postern-row and George-street, and in a readjustment of the levels, so that a complete thoroughfare, 60 ft. wide, may be formed from Eastcheap to the foot of the Minories. After stating what has been done under the Artisans' and Labourers' Dwellings Improvement Act and its amending Acts during the year, the Report recounts what the Board has done and is doing in the matter of Thames bridges. The foundations of Waterloo Bridge have been deepened and secured; Battersea Bridge, a dilapidated timber structure, is to be rebuilt; Putney Bridge is being rebuilt, at a cost, including approaches, of 210,000*l.*; and Hammersmith Bridge is having its southern pier underpinned, and is to have its superstructure entirely reconstructed. The Report also chronicles the unsuccessful efforts of the Board to get Parliamentary sanction for a subway or tunnel beneath the river at Shadwell and for a bridge at the Tower. An interesting part of the Report is that devoted to Parks, Commons, and open spaces, the total extent of such open spaces under the control of the Board being 1,835½ acres. After reviewing the Bills affecting the metropolis introduced into Parliament during the session of 1884, some of which (especially the London Government Bill) are freely criticised, the work of the Metropolitan Fire Brigade is detailed. The staff of the brigade now consists of 559 men of all ranks, without reckoning 66 coachmen and 14-licensed watermen,—the latter engaged on the steam fire-floats on the river. There are now 55 fire-engine stations in the metropolis, besides 23 street stations with hose carts, and 127 fire-escape stations. From a table contained in the Report, we find that whereas in 1866, when the Brigade passed into the hands of the Board, the total number of fires was 1,338, of which 25 per cent. were serious, in 1884 the total number of fires was 2,289, of which only 9 per cent. were serious. The increase in the number of fires may, we suppose, be accounted for by the increase in the growth of the metropolis during the last eighteen years; the great decrease in the percentage of serious fires is undoubtedly due to the increased strength and efficiency of the Fire Brigade since it passed under the control of the Board. The Board's action with reference to the gas supply of the metropolis is next passed in review, and it is stated that the gas supplied by the companies has been found, when tested by the gas examiners appointed by the Board, to be equal in lighting power and purity to the requirements of the Acts of Parliament. Some additional testing-places have been established. After a passing glance at the subject of electric lighting, the Report deals with the question of water supply, and expresses regret that another year has passed without anything effectual having been done towards giving the inhabitants of London control over their own supply of water. Most of the London companies made

arrangements during the year for extending the constant supply system, under the provisions of the Metropolis Water Act of 1871. After enumerating the tramway extension schemes which came under the consideration of the Board during the year, the Report narates the operations of the Board with regard to the prevention of cattle diseases, the Board being, by the Contagious Diseases (Animals) Act of 1878, constituted the local authority to carry out the provisions of that Act within the metropolis. The action of the Board in regard to the very necessary supervision of dairies, cow-sheds, and milk-stores is next detailed, and then follow particulars of their action with regard to the control of slaughter-houses and offensive businesses; and a reference to the exercise of the powers they possess for regulating the manufacture, conveyance, storage, and sale of explosive substances within the metropolis. In the matter of the storage and sale of petroleum, benzoline, &c., the Board exercises considerable and very necessary authority, having regard to the dangers of storing such commodities in bulk, but it complains of the inaction of the Legislature in not carrying out the recommendations of the House of Lords Committee of 1883 on this subject. After recounting its action under the Infant Life Protection Act, which, in the opinion of the Board, needs amendment with the view to greater efficiency, the Report deals with the financial transactions of the Board, which are certainly on a scale commensurate with the large amount of work done by the Board,—the extent of whose operations can only be appreciated by studying the Report itself, of which we only here give a brief outline. The Board's expenditure during the year amounted to no less than 3,373,170*l.*, of which sum nearly 2,000,000*l.* has been defrayed out of money raised by the issue of Metropolitan Consolidated Stock. An important section of the Report is that which details the Board's action with regard to the supervision of streets and buildings. The total length of new streets sanctioned by the Board during the year 1884 was about fifteen miles. The action of the Board in the direction of ensuring safety of life and limb to the visitors to theatres and music-halls is described at considerable length. Various other matters, such as the re-naming and re-numbering of streets, the supervision and demolition of dangerous structures, &c., are dealt with in this section of the Report, which concludes by saying that, whatever may be the future London local government, "in the mean time the Board has only to continue the course hitherto pursued, that is to say, to apply all its powers and energies, within the limits assigned by the Legislature, to the improvement of the metropolis and the promotion of the health, well-being, and comfort of the vast population resident within its borders."

The Report is supplemented by a number of appendices, including the Report of the Engineer (Sir Joseph Bazalgette), and that of the Superintending Architect (Mr. Geo. Vulliamy). In the first-named Report very full particulars are given of the sewer-works completed or in progress during the year, as well as of the new street improvements, new bridges, and other engineering works carried out by the Board. In the Superintending Architect's Report statistics are given of the building operations of the metropolis. One item of interest is that during the year only eighteen licences for the use of Portland cement concrete for the walls of buildings were granted.

THE ARCHITECTURAL ASSOCIATION.

The adjourned special meeting* of members was held on Friday, the 12th inst., Mr. C. R. Pink, the President, in the chair.

Mr. George Ashlin, of the Royal Hibernian Academy, was elected a member by acclamation, Mr. Harold Lane Brown being elected a member in the usual manner.

A vote of thanks was accorded to Messrs. Ernest George & Peto for permitting the members to visit Buchan Hill mansion, Sussex.

Mr. G. Somers Clarke, F.S.A., submitted a scheme for a monograph on Westminster Abbey. To produce the necessary measured drawings would entail considerable expense, but the work could be carried through at a nominal cost if he had the co-operation of the students of the Royal Academy, of the Royal Institute of

* See *Builder*, p. 719, ante.

British Architects, and of the Architectural Association. The illustrations would be in black and white, but to illustrate the royal tombs and other details coloured plates would be necessary; and for this work he believed he would be able to obtain the assistance of the students of the South Kensington Museum.

As the result of Mr. Clarke's appeal, the meeting authorised the issue of a circular asking for aid from those willing to assist in the work.

The Chairman intimated the reception of a petition signed by over fifty of the members, asking the Committee to arrange for Saturday excursions during the summer months. The matter had been before the Committee, who hoped to meet the wish of the petitioners.

Mr. H. Lovegrove, on the part of the younger members, had been deputed to impress on the committee the desirability of continuing the excursions. They would be very enjoyable during the summer time, especially if they could be carried out within twenty or thirty miles of the metropolis.

The meeting then proceeded to take up the business which had been adjourned from the 29th ult., viz., Mr. Cole A. Adams's motion for increasing the subscription from 10s. 6d. to 11s.

Mr. Hugh Stannus regretted that he would have to vote against the motion of a man whom they all respected so much, believing if it were carried it would be a victory for Mr. Adams which could be only less disastrous than a defeat. He hoped after Mr. Adams's long and excellent term of office he would not divide the Association into two hostile camps. He would, therefore, appeal to him not to press his motion, but to let it drop for a session. The members were all in accord with Mr. Adams in regard to the matter of education, but thought it would be better to postpone the resolution for one year.

Mr. Baggallay said the principal reason urged against the proposed increase of subscription was that it would press most upon the younger and poorer members, but when one entered the architectural profession he must have some money to spare beyond the premium which had been paid. Mr. Sedding had written to the papers stating that the Institute might subscribe largely in this direction, but many of the members of the Association would object to become Institute pensioners.

Mr. J. A. Gotch remarked that one of the reasons for increasing the subscription was for the publication of the papers, and if any one supported that perhaps he was the one. At the same time there appeared to be a considerable objection to their doing this, and he would therefore suggest that that object should be left out for the present. He hoped also that country members would not be compelled to pay a guinea, as the advantages of the Association were almost entirely to be derived by town members.

Mr. Cole A. Adams agreed to the withdrawal of the reference as to publishing the Transactions. The papers and discussions were so well reported and edited in the professional journals that there was no need for it.

Mr. J. D. Sedding believed that the reason for the increase was the advancement of education, but how could this be attained if many of the members withdrew? It would have the effect of debarring the poor student from taking advantage of the classes, and this would be to him a painful matter. In old days it was the dullard who went to the wall, but now he sheltered himself behind professional status. The amount proposed to be raised was a mere flea-bite compared to what was really required. He was sorry to hear Mr. Baggallay say that the Association should not receive any help from the Institute. If they raised this sum to remunerate paid lecturers and professors the Association would lose a grievance, for it was a shame that all the architectural education should be provided by the students and not by the architects. They were now like Lazarus at the gate, but if he became respectable Dives would take all the credit. They would be taxing themselves and playing into the hands of the Institute; they should, therefore, keep on agitating, and make much of their grievance.

Mr. E. W. Poley then moved as an amendment,—"That the question be deferred for twelve months." This was seconded by Mr. Arnold Taylor, and lost.

Mr. Brodie thought the decision on the question should be taken by a voting-paper.

The Chairman explained that under the rules a vote had to be taken by a show of hands.

Mr. Kemp next moved, as an amendment, that the subscription of members residing within twenty miles of London should be raised to one guinea, while that of members outside the radius should remain as at present.

Mr. Gotch seconded the amendment, which was opposed by Mr. Slaton, on the ground that it was difficult to make a hard-and-fast rule on this point, an opinion with which Mr. Pratt coincided. This amendment was eventually withdrawn.

Mr. Stannus then moved as an amendment, "That this Association approves of the improvement and consolidation of the educational scheme, and authorises the committee to go to any expense, not exceeding 100l., during session 1885-6, and postpones the question of increasing the subscriptions till some period towards the close of next session, when the experience gained during the session might guide us in our decision." There was some 200l., he believed, in hand, and they could therefore afford to expend half of it in this manner. Mr. Stannus also read a letter from Mr. R. Phené Spiers, in which he stated that after careful consideration he had come to the conclusion that it was preposterous to ask the members for an extra half-guinea to make a university of the Association. It would be far better, Mr. Spiers added, to have special fees for each class, and if a vote were taken it should be by polling all the members.

Mr. Lovegrove seconded, and Mr. J. Douglas Mathews supported, Mr. Stannus's Amendment.

Mr. Bashill thought they were departing from what had raised the Association from the position it held thirty years ago to that which it now occupied. He could recall the time when only three members turned up at a lecture, and they ought not to lightly depart from the position they had attained. It would be a great mistake to attempt to do that which should be done by the Institute, by appointing professors and paid masters. At the same time the Association should manage its own affairs without asking for heavy subsidies from any other body. He believed the Institute would soon do that which they were thinking of, viz., supply facilities for the higher education of the profession. He would support the amendment as an experiment.

Mr. Atkin Berry opposed the amendment, considering it would not give a sufficient chance of showing what they could do.

Mr. Ellison opposed, and Mr. Blagrove supported the amendment, which after a few remarks from Mr. Cole A. Adams, was put to the vote, and lost by 54 to 60.

The Chairman then put the original motion for increasing the subscription, which was lost on a division, the numbers being 61 in its favour, and 70 against. The result was received with cheers and counter-cheers, and the proceedings terminated.

AN OLD FRESCO AT LINCOLN'S INN.

A SINGULAR discovery has just been made in Old-square, Lincoln's Inn. Between the gateway and the late Sir G. G. Scott's new chambers northwards stand Nos. 2, 3, and 4, Old-square, or, as it is styled in the existing tablet, Old Buildings. These chambers date from more than 250 years since. They are solidly built, and contain a great amount of large-sized oaken timber. Having enjoyed immunity from fire they preserve their pristine condition, but must now fall in pursuance of an extensive scheme for rehabilitating the Inn. Behind the later deal panelling of a room on the first floor of No. 3, to the left hand of one ascending the novel stairs in the turret, is exposed a contemporary fresco, painted on the plaster between the uprights and transoms. Extending from floor to ceiling, it covers, over all, some 70 square feet. Limited to their respective divisions, the subjects include figures, monsters, heads, *amorini*, birds, fruit, flowers, scrolls, and the like,—all well executed, though in somewhat crude coloring. The Cupid discharging his bow, the Pomona (or Ceres), the swinging boy, and the husbandman tilling the soil are very good. The style of the spade used by the last-named is in itself enough to mark the age of a curious mural decoration for whose rescue some effort should be made. To the right is a capital composition of two dolphins depicted in conventional guise, supporting a vase or fountain, whereon are two parrots,

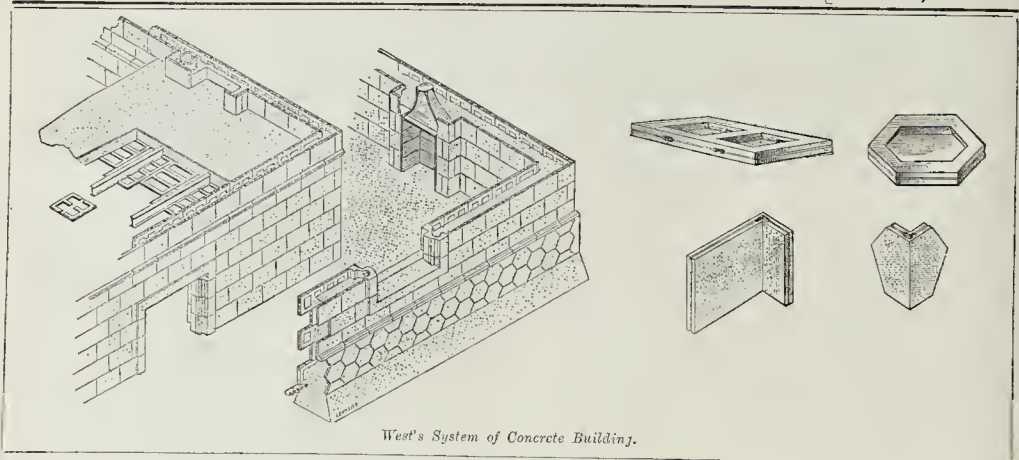
and above them a heart in flames. Going through the now dismantled chambers one recognises a *raison d'être* for the lofty chimneys which project at intervals from against the outer walls. Though it is mainly to them, together with the turrets, that Old-square owes its quaint and picturesque aspect, these chimneys are evidently of more recent origin, and are of "stock," as contrasted with the other smaller "kiln" bricks. They serve, in fact, the additional fireplaces for the lesser apartments into which most of the original large rooms have been subdivided. Nearly all the millioned stone windows are replaced with modern sash frames; one of them, however, remains in the room under review. We understand that the henchers are minded for the present to withhold their destroying hands from so much of the square, including the historic Thurlow chambers at No. 24, as lies south of the gate, and from the gatehouse itself. That venerable portal dates from the year 1518, and is one of the very few of its kind which survive in London. Here, in the top floor of No. 1 staircase, Lord Mansfield, when Mr. William Murray, had chambers; Sir Matthew Hale occupied the set immediately over the archway, looking into what was then known as the Gatehouse Court. Views of the Gatehouse and of the portion that is now being demolished are comprised in Mr. Alfred Marks's admirable photographs of relics of old London.

We are informed, singularly enough, that one or two sets of chambers in Old-square are freeholds.

THE LATE MR. HENRY EDWARD KENDALL, ARCHITECT.

The profession has just lost by death one of its oldest members, Mr. H. E. Kendall, the event occurring on the 9th instant at his residence in Burlington-road, Westbourne Park. He was born in London, and, at the time of his decease, was within a few weeks of being eighty years of age. His father, however (also a well-known architect), lived to the almost patriarchal age of ninety-eight!

The son was pupil to the father, and, from the first, was a facile draughtsman. In 1833 he gained the silver medal of the Royal Academy for measured drawings of St. Bride's steeple, London; and, in 1835, he was rewarded by the Society of Arts by a gold medal for his "Design for a country mansion in the Elizabethan style," having already obtained two other medals in previous years from the same Society for his architectural drawings. Upon entering practice on his own account he was fortunate in securing an extensive and influential connexion, and was employed in erecting or altering many important mansions, including Knoxworth for Sir E. L. Belver (afterwards Lord Lytton); and at Sluckburgh, for Sir Francis Sluckburgh; at Weybridge, Sunbury, and Isleworth, for the Earl of Kilmorey; at Farnborough, the picturesque residence now occupied by the Empress Eugénie; also at Pope's villa, Twickenham; and at Baling. He executed parsonages at Childerly, Foulmire, Stockton (near York), Shelford, Stock, Uffington, &c.; and schools at Bury St. Edmunds, Cambridge, Wilsden, Stannore, Hariton, Good Easter, and elsewhere. Making this latter subject rather a speciality, he published an excellent illustrated book of "Designs," at a time when an improved skill and taste in such matters was beginning to develop itself. His churches are less numerous, but the following may be mentioned:—Kensal-green, Hayward's Heath, Brentwood, and St. Patrick's, Brighton. He was architect to the County Lunatic Asylums for Essex, Sussex, and Dorset, as well as other large public buildings. He was appointed District Surveyor for Hampstead so long ago as 1844, and consequently his was one of the earliest names on the list. During his later years he was greatly assisted in his professional engagements by his son-in-law, Mr. Frederick Mow, and thus they were associated together in works at Staunton Harold, for Earl Ferrers; Gordon House, Isleworth, for Earl of Kilmorey; Madingley Hall, near Cambridge; and in the erection of the new vestry-hall at Hampstead, &c. Among his pupils were Mr. J. T. Wood, the discoverer of the remains of the Temple of Diana at Ephesus, and Mr. J. B. Waring, who will be remembered in connexion with the Exhibition of 1851, and as having produced, in conjunction with Mr. T. R. Macquoid, an elaborate



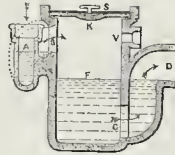
West's System of Concrete Building.

work on Renaissance architecture. The interment took place last Monday, in the family grave in Kensal Green Cemetery, not far distant from that of his father. J. DRAYTON WYATT.

THE "KENSINGTON" GREASE AND WASTE WATER TRAP.

ACCOMPANYING is a section of the trap made by Messrs. Jas. Stiff & Sons under this title. The object is to ensure entire disconnection from the house-drain. The principle is that of a double trap with a grease receptacle between them. We extract the following from the description given by the makers:—

"When used inside the house it should be furnished with the air-tight adjustable cover shown in the above drawings, and should be placed under, or close beside, the sink, and as near as convenient to the external wall of house. A short length of stoneware or metal pipe should be carefully connected with the



ventilating opening V and carried through the external wall to the open air. This will not only relieve all pressure of foul air on the two water seals of the trap, but will minimise the unpleasantness of removing air-tight cover when necessary to cleanse the trap. The stoneware cover, K, rests upon an india-rubber seating, a small bar of galvanised iron, is placed upon the cover and turned up so that its ends slip into specially-prepared grooves in the upper part of trap; a very slight turn of the screwed tap, S, will then be sufficient to press the stoneware cover firmly down upon the india-rubber seating.

When used outside the house, the ventilating pipe, V, and the air-tight cover, K, are both dispensed with, and the trap is furnished instead with an open grid of galvanised iron.

Should foul air ever force its way through the strong seal D, C, it will at once make its exit into the open air through the open grating, or the ventilating pipe, V, and will be unable to exert any pressure on the separate water seal in the syphon inlet A, B."

It appears to us to be one of the most complete and effective traps for disconnection that has been contrived.

"Lincrusta-Walton."—This material has been very extensively used (about 10,000 yards) at the Hôtel Métropole, the bulk of it in the corridors and for bedroom dados. It has been used in Messrs. Spiers & Pond's Exhibition dining-room at the Inventories Exhibition, the whole of which is decorated with "Lincrusta." It has also been applied in the Marquis of Hamilton's room at the Exhibition, and to a room in "Old London."

CONCRETE WALLING.

SIR,—In your notice of a portion of our exhibits at the Inventories Exhibition, in your last issue [p. 826], you say that our slabs, "when set edge-wise on the outer and inner faces of the wall, and keyed to its body," take the place of the movable wooden boarding used by Mr. Tall in his original system of concrete building." Such is not really the case, for when the slabs are keyed to the body of the wall, i.e., when the concrete filling has set, they merely become a permanent facing to the wall, whilst the boarding used by Mr. Tall is entirely removed when the wall has become sufficiently hard.

The chief points about our system are that, instead of forming a casing of wood as is ordinarily done in concrete building, we make a casing of concrete itself in the form of slabs, the courses of which are keyed together by means of a quick-setting cement (such as White's Hygeian Rock) which is poured into key-holes formed for that purpose in the horizontal edges of each slab. These key-holes are so arranged that they shall coincide. The face of each slab may have mouldings upon it, or may be ornamented in any way, and when the filling behind it has set, forms a finished and ornamented face to the wall. The mouldings are applied to the face of each slab by inserting them (made beforehand) into its plastic mass. Heavy mouldings are built up in this system as extra courses.

The enclosed small-scale drawing shows an isometric view of work on this system, and the larger scale drawing shows the slabs in detail.

We recommend this system chiefly on its simplicity, and also because no casings either of iron or wood, and, therefore, no special concrete plant, are required. With this system any ordinarily intelligent mechanic might build his own dwelling.

F. & J. P. WEST.

THE "INVENTORIES."

SIR,—In your interesting article on "Prime Movers," in the *Builder* for June 6th [p. 789], I notice that the writer speaks of a certain car worked by compressed air as being on the M&Karski principle,* from which your readers might be led to consider that that individual had been the inventor of a "system."

So far from this being the case, or the principle of imparting heat to the compressed air on its way to the working cylinder being the invention of M&Karski, it will, I have no doubt, be interesting to your readers to know that this plan was invented by an Englishman, one James Glazebrook, in the year 1797, as may be seen in his specification, No. 2,164 of that year, and in another which he took for further improvements, No. 2,564 of 1801.

It may hardly be credited, but it is, nevertheless, a fact that a few years since some Stock Exchange schemers and company promoters, as well as some financial speculators, aided by the efforts of a "highly scientific" consulting engineer, actually got up a company to purchase the "invention" of M&Karski for some 50,000*l.*, and asked the public to contribute 250,000*l.* to enable them to do so! This precious affair, on these facts, and to the ears of those on the board who were not cognisant of the state of the case, quickly caused them to "bust up" the whole concern, since which time it has not been heard of until I see it cropping up at the "Inventories," whence it is more than probable it may emerge as a wonderful novelty, and one of the greatest inventions of modern times, especially if the original schemers and Stock Exchange speculators are still connected with it.

* The italics are ours.—F. & J. P. W.

Before the public listen to or accept any statements which may be promulgated in regard to it, let me strongly advise them to read over and consider Glazebrook's specifications, and then read and consider No. 3,498 of 1875, that of M&Karski. It will not take a man of ordinary intelligence many minutes to see that in 1797 and in 1801 the wonderful invention and principle of M&Karski in 1875 were recorded in the Patent Office by an Englishman at those dates. C. E.

PUMPS FOR CONTRACTORS' PURPOSES.

SIR,—Referring to the practical article on "Pumps for Contractors' Purposes," by Mr. Powis Bale, in your issue dated June 6th [p. 783], will you permit me, through the pages of the *Builder*, to ask that gentleman, or any of your readers who have had practical experience, what form of valves they recommend as the best for direct-acting steam pipes; and whether those worked by tappets, or moved by steam, are to be preferred? I am told that tappets have been known to get jammed, and even sheared off when the water has been dirty: can you tell me if this is so? I may add that the pumps are required for tunnel-work in Italy, where centrifugal or other simple pumps cannot be made available. A. E.

KELLY CASTLE.

SIR,—Kelly Castle, near Arbroath, referred to in last week's *Builder* [p. 824], is not a modern building, as supposed by the writer of the paragraph in which it is alluded to. It is at least as ancient as the majority of the "keeps" which form so picturesque a feature in Scottish scenery. It stands on a rising ground, sloping precipitously on the eastern side of the castle down to the Elliot Water. The "keep" commands a very fine and extensive view,—in one direction across the Tay estuary to the Fife Hills, and in another to the German Ocean. It was restored some years ago [just so.—Ed.] for the occupancy of a Dundee gentleman, and buildings were then added to make it more fit for modern requirements. Otherwise it retains all the interest which pertains to buildings of its character and period. G. S. AITKEN.

GAS FIRES IN HOUSES.

SIR,—The statement on p. 820 that gas fires are not sanitary arrangements is surely a misprint.* The gas fire of the present time, if properly made and used with a flue, is at least as sanitary and free from all possible objection as the best coal fire; the heat is purely radiant, and every trace of the products of combustion is taken out of the room; the chimney allows free ventilation, and it would be hard to say how a more perfect heating arrangement could be devised. Gas is beyond comparison superior to coal for a fire, in the fact that the heat is always at command and under the most perfect control, whereas with coal fires the exact heat required is not obtained in practice for one hour out of twelve. As regards ventilation and unobjectionable character of the heat, a gas fire leaves absolutely nothing to be desired. We have used gas fires exclusively for years throughout my own house, and the rooms are at least as sweet and well ventilated as any room I ever enter. It is possible to have a had gas fire, and also to have a coal fire with a smoky chimney; but these exceptional cases cannot be taken as a guide in any way.

As to whether gas cooking will ever take exten-

* Not at all.—Ed.

vide hold in general domestic service, there is no doubt that it will eventually do so, and also that it has done so already in those districts where trouble has been taken to bring the use of gas into notice. In many towns, notably Leicester, gas cooking is almost universal, and nothing more is needed than the use of gas companies to assist intending users to make the use of gas universal. Gas has made its reputation, and its use is extending at an enormous rate.

THOS. FLETCHER.

Warrington.

CASES UNDER THE METROPOLITAN BUILDING ACT.

SIR.—The attention of my client, Mr. R. L. Fedrick, has only just been called to a report under the above heading in your issue of the 23rd ult. (p. 745).

I beg leave, while admitting the substantial accuracy of your report, to qualify your account of what the magistrate said in disposing of the case.

Mr. De Hutten stated that he thought the buildings were of a substantial character, but that a few internal bricks might be objected to, and adjourned the matter that my client might arrange with the District Surveyor for their replacement.

This, as I am instructed, has since been done.

MARCUS A. LEWIS,
Solicitor for the Defendant.

LABOURERS' DWELLINGS.

SIR.—The Liverpool Corporation invite architects and others to submit designs for labourers' dwellings. The gross rental per room is not to exceed 1s. 3d. per week, including the use of all necessary sanitary arrangements. If it is possible to let decent rooms at such a rent, and obtain a fair return for outlay, the proper housing of the poor will no longer be a difficulty. I am, therefore, looking forward with much interest for the solution of this difficult problem.

FRANK NEWMAN.

CENTRAL TOWERS.

SIR.—In your notice of my plan for carrying a central tower exhibited at the Inventories, a footnote is added, which states that I am only carrying a little further the plan adopted by the Normans at Tewkesbury and elsewhere. May I be allowed to point out that there is an essential difference between my plan and any of those adopted in Medieval times, when the weight was always carried vertically on angle-piers, as shown on my plan marked B, causing such an obstruction that 25 per cent. of the congregation cannot see the pulpit; whereas in my plan the tower is carried on great arches crossing each other, and having their abutments outside the area of the towers.

ARTHUR BAKER.

SANTA MARIA DELLE GRAZIE, MILAN.

SIR.—A proposal is on foot to restore the church of Santa Maria delle Grazie at Milan. The cupola and western doorway are attributed to Bramante. It is proposed to remove the western doorway, as not agreeing with the style of the rest of the church, or as an alternative to restore the whole of the church in harmony with the design of the doorway, substituting stone for the terra-cotta in the exterior. The proposal is so monstrous that one would hesitate to believe it unless it were vouched for on good authority. There are a plan and a perspective view of the church in Callet and Lesouere's "Edifices Publics de Turin et Milan," plates 22 and 23, which is in the Institute Library.

X.

PROVINCIAL NEWS.

Exeter.—For the past six weeks the premises of the Constitutional Club have been undergoing thorough internal embellishment. Heretofore the smoking-room accommodation was utterly inadequate to the requirements of a club numbering between 1,200 and 1,300 members; and it was determined to include a portion of the landing in the smoking-room. Mr. Rallig, of Exeter, was the architect called in, and, under his superintendence, the work and the improvement in the ventilation of the two billiard-rooms, as well as the decorations, have been carried out. Mr. W. R. Comings has been the contractor for the alteration to the smoking-room, Mr. T. W. Rice for the work of ventilation in the billiard-room, and Mr. Edwin Algar has carried out the painting and decorating work.

Hulme.—Two memorial stones were on Saturday laid in connexion with a new mission hall, which is in course of erection in Tatton-street, off Lower Moss-lane and Chester-street, Hulme. The new hall will be three stories high. There will be an infants' class-room to accommodate 200 children, a preaching-room, capable of holding a similar number of persons; a large schoolroom, with accommoda-

tion for 400 or 500 scholars; and class-rooms and other conveniences. The work is being carried on by Messrs. Peace & Norroy, from plans drawn by Messrs. Mangnall & Littlewoods, and it is hoped the hall will be ready for opening by the end of August.

Kingstone Bogpize, Berks.—New kennels (for fox hounds) and feeder's cottage have lately been built here for the Old Berks Hunt, from plans and under the superintendence of Mr. F. H. Barfield, F.S.I., architect. The buildings are of brick and slate, and are very complete. The principal floors are laid with "Imperial stone" paving. The lodging-houses have white glazed brick dados, and are fitted with iron bedsteads. The food is cooked and the water pumped by steam, and special attention has been given to the drainage. A neat iron fencing, with cast-iron coping, is fixed to the yard walls and the grass yard for young hounds. Extensive alterations have also been made to the Huntsman's and Whip's houses and the stabling near, and the cost of the whole, including boundary walls, new road, &c., has exceeded 2,200l.

DISSENTING CHURCH-BUILDING NEWS.

Bolton.—Bridge-street Wesleyan Chapel, Bolton, has been re-opened, after internal reconstruction, at a cost of about 3,500l. The plastering and decorating work was let to Mr. Wainwright; Mr. Robert Walsh (Danhill) received the order for the heating apparatus; Mr. Alfred Glover the stonework; Mr. Joseph Bell the plumbing and glazing; the remainder,—joiners' work,—being given to Mr. W. Townson. Messrs. Forster & Andrews (Hull), were requested to build a new instrument, at a cost of about 800l. The chapel will accommodate, as before, about 900 persons. The work has been carried out under the personal supervision of Mr. Osmrod, architect, Bolton.

Abercorn.—By the demolition, commenced on the 1st inst., of Abercorn Free Church, Wood-eud, one of the few old land-marks of the Disruption will be swept away. From 1843 to May, 1878, the congregation was an acknowledged charge under the Free Church, but after the death of their last minister, the Rev. Archibald Currie, the membership fell off considerably; so much so that the congregation were obliged to petition the Assembly of 1878 to reduce the church to a preaching station. This request being granted, the church has remained as such. Within the last few years, however, the membership has so rapidly increased that the congregation is now in a position to build an edifice of more prepossessing appearance than the one in which they have been worshipping so long. The new church will be a parallelogram, with octagonal end, where the pulpit is placed,—the front gable to the roadway being buttressed and terminated with a small helfry. The accommodation of the new church is about 400. The architect is Mr. Hippolyte J. Blanc, of Edinburgh.

Brighton.—The Building Committee having decided, upon the recommendation of the architect, Mr. Arthur Loader, of Brighton, to complete the restoration of Queen's-square Congregational Church, which had to be temporarily stopped for the want of funds, orders have been given to Mr. John T. Chappell, builder, of Lupus-street, London, and Brighton, to proceed with the work at once.

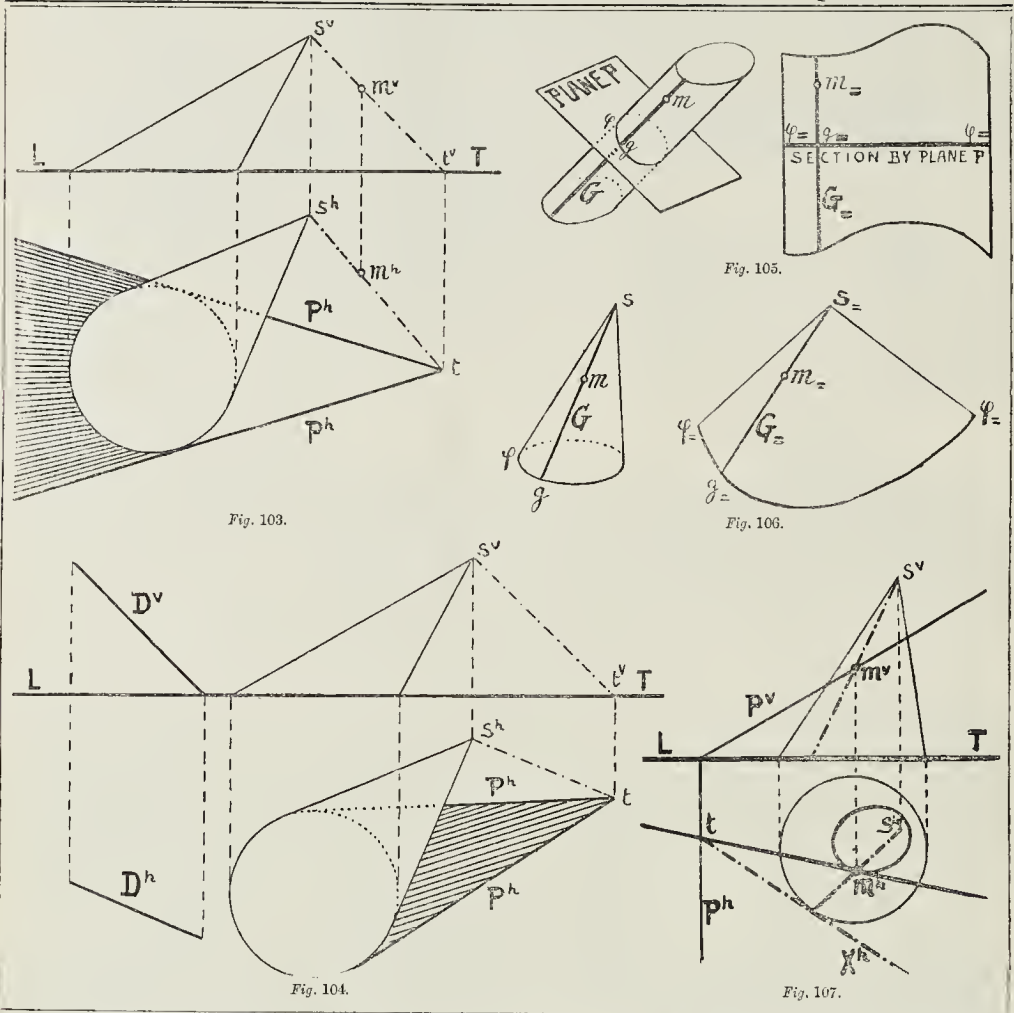
Bagworth (Leicestershire).—A new Baptist Chapel is to be erected here, together with schoolroom and two class-rooms. The new buildings are designed by Mr. John Wills, architect, of Derby, in the Early Gothic style, and will occupy the same site as the old chapel. The cost will be 1,000l.

VARIORUM.

The "City of London Directory" for 1885 (London: W. H. & L. Collingridge) is the fifteenth annual issue of that exceedingly valuable and creditably produced work of reference. It is the City Directory *par excellence*, and in it may be found information as to City institutions not elsewhere easily accessible. It is accompanied by a map on a large scale, prepared from the Ordnance Survey, showing every street in the City, with the boundaries of each ward and parish. A speciality of the work is the guide to the Livery companies, giving the officers of the City guilds, with the history of their halls,

charters, arms (illustrated), charities, and schools. — "The Twenty-fifth Annual Report of the Amalgamated Society of Carpenters and Joiners" from December, 1883, to December, 1884 (Manchester: Co-operative Printing Society, Balloon-street), is a valuable record of the work and position of one of the leading trade-unions of the country. During the year embraced by the Report the Society has opened thirty-three new branches. There was a gain of 1,945 members on the rolls, the total membership being 24,784. The net income for the year was 59,317l., and the net expenditure 57,933l. In "unemployed benefit" the Society paid during the year 23,262l., or 18s. 9d. per member as against 14s. per member in the previous year. In "sick benefit" the sum of 14,852l. was expended, or about 12s. per member. In "trade privileges,"—an item which is explained as covering the whole of the expenses of "trade movements," whether of a hostile or peaceful character,—2,140l. were spent, or about 1s. 9d. per member.—The "Report of the Health of Liverpool, during the year 1884," by J. Stopford Taylor, M.D., Medical Officer of Health for the City and Port (printed by A. Russell, Son, & Bayley, Moorfields, Liverpool), has just reached us. It is an interesting record of valuable work done, and is notable for the statement with which it commences, viz., that "the year 1884 will be memorable for the low death-rate of the city, 25.1 per 1,000, being the lowest on record." There is, of course, still room for improvement, of which there seems to be promise.—Several trade hooks have reached us lately. Mr. G. Shrewsbury, of 122, Newgate-street, sends us a pamphlet in which his "Nonparoil" Gas Conservatory Boilers, and other hot-water apparatus and appliances, are described.—From Messrs. Sharp & Co., of 11, Holborn-circus, we have received a pamphlet issued by them, entitled "The Science of Sanitation in Plain Language for the British Householder." Persons of the numerous class to whom it is addressed will find some useful hints in it.—Messrs. John Warner & Sons, of the Crescent Foundry, Cripplegate, have sent us descriptive catalogues of their boring tools and machinery and mining and quarrying machinery, which contain a good deal of information as to what may be effected in those branches of engineering.—The Eolons Waterspray Company, of 235, High Holborn, have issued a new catalogue of their increasingly-used system of ventilation.—That "accidents will happen" in builders' yards and workshops, and in the execution of building operations generally, many of our readers know from sad experience. It is often of vital importance to have readily at hand the means of dressing wounds and of making the patient comfortable until a doctor arrives. The "Red Cross Pocket Amulance," manufactured by Messrs. Russell & Everett, of Roehampton-street, Vauxhall, and which costs no more than a shilling, will be found very useful in giving first aid to the injured. Under the auspices of the St. John Amulance Association, many thousands of persons of both sexes have qualified themselves to render that aid, and their power of usefulness will be increased now that this compact pocket amulance is within their reach.—The "Trade and Industrial News," the oldest established paper connected with industry in Russia, has taken a new departure. Till very recently it was published in Moscow, in the Russian language, once a month only, but it has been found that the demand for current information was not met with issues so distantly separated as a whole month, and now the proprietors have commenced a weekly edition to supplement the monthly one. The weekly numbers will deal with current topics especially be devoted to explanations of engineering enterprises and publication of details, with illustrations, of new machinery and inventions. Mr. J. W. Vickers, of 5, Nicholas-lane, Lombard-street, is the sole English representative of the paper.

Ensilage.—A gold medal has been awarded to Messrs. F. W. Reynolds & Co., of Acorn Works, Edward-street, Blackfriars-road, London, at the Concours Générale d'Agricolture, Sétif, Algeria, for their patent mechanical appliances for compressing silage, for which they have also been awarded the medal at Montpellier, France.



The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.
IV.

Find a plane, P, tangent to the cone, and passing through a point, m, outside the cone.

ME join the point m to the apex S of the cone; P^m will pass through t, foot of the line m s, and be tangent to the base of the cone. We see by this figure that there are two planes P tangent to the cone through the point m outside it. This problem is identical with find the shade of a cone lighted by a candle; the limits of the shade are the generators of the cone along which the planes P are tangent. (See Fig. 103.)

Find a plane, P, tangent to the cone and parallel to a given line, D.

We take through the apex S of the cone a line, s t, parallel to the given line D; the tangent plane P must contain the line s t, therefore P^m will pass through its foot t and be tangent to the base of the cone. As in the preceding problem there are also two planes P tangent to the cone. This problem is also identical with find the shade of a cone lighted by the sun's rays; and the limits of the shade are the generators along which the planes P are tangent. (See Fig. 104.)

Intersection of Surfaces in general.

The method followed for finding the intersection of two surfaces, S and S', consists in cutting them by a third surface, X, the intersections of which with S and S' can be readily

found; then the points where the two intersections meet are, of course, points of the intersection of the surfaces S and S' themselves. The auxiliary surfaces X are most often planes, but not always; in some cases, for instance, spheres are selected. It is those simple cases of intersection we shall begin to study.

Sections of Cones and Cylinders by Planes.

Remember that it is very easy to change the vertical elevation plane for both these surfaces. For the cone, it means only making a new elevation of the apex; for the cylinder, a new elevation of one generator. Remember also that sections by planes are easiest when the planes are perpendicular to the elevation plane, for all the elevation of the section falls on the vertical trace of the plane. We beg, therefore, in the following diagrams to assume that the elevation plane has been selected perpendicular to the plane of the section.

For the purpose of constructing cones and cylinders out of card-board or sheets of metal, we shall say a few words about developing these surfaces.

If you cut a cylinder by a plane, P, perpendicular to its generator, and then cut the surface along a generator, you will find, in developing the cylinder, that the outline of the section by the plane P will develop in a straight line, and that all the generators of the cylinder will be perpendicular to that developed section. On the development any point, m, of the cylinder will be situated on the same generator as before and at the same height above the straight line

of section as its former distance from the plane P. (See Fig. 105.)

To develop a cone, cut its surface along a generator of same; any point, m, of its surface will be on the developed cone on the same generator, and at the same distance from the apex. (See Fig. 106.)

To avoid repetitions we shall call l the sections of cylinders or cones by planes, m any point of the section, P the plane of the section, G the generator on which the point m is situated. We shall indicate by the sign - placed below the letter as in L-, m-, the sections and points after the plane P has been turned down and laid flat on one of the projection planes, so as to get the real shape and dimensions of the section. In the developed surfaces we shall place the sign = below the letters which indicate the generators, the sections, and the points; we shall have, therefore, G=, l=, m=.

The tangent to the intersection of two surfaces, S and S', will be situated in each of the planes X and Y, tangent the one to surface S, the other to surface S'. We conclude, therefore, that the tangent to the intersection of the surfaces S and S' will be the intersection of the planes X and Y.

In sections of curved surfaces by planes, the tangent to the section will be the intersection of the plane P of the section by the plane X tangent to the surface of the object. For the section of a cone, for instance, we shall find the tangent to the section in the point m pass through t, the point where X^m cuts the plane of the section P. The plan of the tangent to the section is, therefore, m^h, t. (See Fig. 107.)

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

92, Destroying Noxious Gases. S. C. Dean. Sower gas or air contaminated with infectious matter is drawn through a ventilator, and rendered harmless by heat. The ventilator is preferably in the form of a cylinder, about as long as three times its diameter, fitted with a gas jet at top and bottom. Above the upper gas jet it is loosely filled with asbestos, supported on wire gauze. The upper jet only is lighted, a door being provided for that purpose near the top. The gas from the lower one mixes with the impure air, and is burned with it, while passing through the red-hot asbestos. In some cases a receptacle containing coke wetted with lime-water or caustic potash is placed above the ventilator to absorb the noxious gases generated. The ventilator is applicable to hospitals and works as well as to sewers. For ventilating soil-pipes and cesspools it may be smaller, and may be provided with a lamp instead of gas jets.

296, Ventilator and Air Filter. J. Walsh. The ventilator consists of a blind made of fabric, horsehair, grass, or other substance, which is rolled on a roller, and has at its bottom a lath of wood or metal fixed to the sash by a screw, and bent up to clear the centre rib. In opening the window, the blind pulls down with it, and so prevents soot, &c., from entering the room. In some cases the blind is fixed in a recess above the window, or it may be fixed to the bottom sash as well. It may also be applied to doors, railway-carriages, or any sliding window.

994, Wall Facing Bricks. W. Parry. Each brick is made with a weathered projection in front, which slightly overlaps the bricks below for the purpose of preventing the wet from permeating the joint. The vertical joints are protected by a groove formed in the sides of the projection, which provides a channel to intercept water leaking through, or which may be filled with pieces of glazed brick.

578, Wood Staining and Varnishing. M. Williams. A solution of varnish gums in methylated spirit coloured by aniline dyes is used. This varnish is applied in coats, and rubbed down with sand-paper after each coating. In imitation of different woods a black stain is first applied irregularly to imitate the grain of the wood required, and then the varnish suitably coloured is applied. All kinds of wood may be imitated.

3,004, Door Knobs. C. Priestland. The knob is made in two parts, the neck and an expanded elliptical part. The latter is pressed into its shape from a flat circular blank. Projections are made upon the neck, and engage in slots or a groove, so that when pressed together the parts are securely locked so as to form a door-handle of the ordinary shape.

12,935, Anger Bits. A. M. Clark. The auger-bit is formed by a single spiral blade mounted on a central stem terminating in a gimlet at its end. From the chisel-edge of the spiral blade it is very effective, and its form allows it to be used either by hand or machine, and it can be easily sharpened and repaired.

APPLICATIONS FOR LETTERS PATENT.

June 5.—6,533, W. Blackwell, Improvements in Window Sashes.—6,537, J. Corbett, Jointing and Connecting Lead or other Metallic Pipes without the use of Solder.—6,542, C. Grimmer and J. Cook, Window Fastener.—6,544, M. Schumann, Improved Metallic Paint.—6,543, J. Denny, Manufacture of Bricks.—6,559, J. Lorrain, Heating, Cooling, and Ventilating Apparatus.

June 8.—6,559, W. Paul, Window Slide Ventilator.—6,928, A. Ashwell and C. Cross, Indicating Door Fastenings for Apartments and Closets.—6,930, A. Allison, Draining and Cleansing Swimming Baths.—6,955, S. Groves, Improved Method of Producing Reponsé Work.—6,952, W. Chalk, Improvements in the Treatment of Granite and Granitic Stone.—6,963, H. Penrice, Rock Tumbling Machinery.

June 9.—6,961, R. Hill, Improved Sewage Trap and Gully.—7,033, G. Hookham and W. Tonks, Lines or Cords for Suspending Window Sashes, Chandeliers, &c.—7,052, M. Ingram, Automatic Flushings for Lavatories, Closets, Drains, &c.—7,053, M. Ingram, Discharge and Waste Arrangements for Baths, Lavatories, Cisterns, &c.—7,055, H. Johnson, Combined System of Warming and Ventilating.—7,065, E. and G. Warburton, Panel Planning and Thickening.—7,070, W. Morrison and J. Bonn, Construction of Folding Chairs.—7,082, J. Ebner, Composition for Securing Parquet Flooring to Stone, Concrete, Wood, &c.—7,086, H. Haddon, Joiner's Clamp and Screw Press.

June 11.—7,106, A. Patrick, Manufacture of Sewage Pipes, Glazed Bricks, &c.—7,111, G. Wigg, M. Steele, and W. Wigg, Manufacture of Pigments.—7,112, E. Marland, Securing Tops of House and other Chimneys.—7,143, C. Wilkes and W. Millar, Metallic Compounds for Flooring, Paving, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

16,444, R. Holt and Others, Apparatus for Preventing Smoky Chimneys, Ventilating Rooms, &c.—5,607, A. Clark, Caisson or Crib for Sinking

Wells, Shafts, &c.—5,554, E. Robbins, Novel Manufacture of Decorative Concrete.—5,956, W. Lester, Astragals or Glazing Bars for Doors, Windows, and other Lights.—6,225, R. W. Montgomery, Fire-resisting Cement.—6,465, G. Haywood and G. Williams, Ventilating Apparatus.—2,360, H. Fletcher, Improved Set Square.—4,750, A. Eford, Paving Blocks.—5,420, C. Falkenstein, Combined Electric Bell-pump, Incandescent Lamp-holder, and Switch.—5,805, J. Stewart, 45 degrees, and other Reflecting Instruments for Measuring Angles.—5,913, H. Waldron, Attaching Door-knobs, &c., to Spindles.—6,146, H. Haddon, Workmen's Controlling Apparatus or Timekeeper.—412, H. Whiteley, Weather Guards or Draught-preventers for Doors, Casement Windows, &c., also applicable for Preventing Slamming.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

11,276, W. Ayres, Window Sash-weights.—11,515, J. Eaton, Fastening Sliding Sashes.—15,197, E. Turner and J. Reynolds, Combined Circular Rack and Bar Machine for sawing Timber.—3,932, J. J. King, Improvements in Fireproof Floors.—5,579, A. Diss and H. Goodey, Improvements in the Construction of Fireproof Hearths and other Fireproof Parts of Buildings.—10,910, H. Pearson, Water Meters.—11,417, E. Colton, Stench Traps.—11,722, J. Hamilton, Wood Planing Machinery.—12,466, F. Hofmann, Sawing Machinery.—13,411, E. West, Liquid Concrete Refrigerator.—5,728, B. Capitaine, Cooling and Ventilating Apparatus.—5,832, H. Haddon, Disinfecting Water-closets.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JUNE 8.

Hyde Park-square—No. 36, with stabling, 48 years, ground-rent 25l. 4s. 6d. 25,000
By M'CLELL, BOCKER, & Co.
Sidcup—Ground-rents of 32l. a year, reversion in 90 years 763
Limehouse—Dixon-street, &c., ground-rents of 94l. a year, reversion in 94 years 2,110
Peckham—Shards-road, ground-rents of 74. a year, reversion in 62 years 155
Battersea Park-road—Ground-rents of 24l. a year, reversion in 43 years 750
Horselydown—Church-grove, &c., ground-rents of 41l. a year, reversion in 44 years 623
Bow—31, Stephenson-road, the "Earl of Eglington's public house, freehold 4,200
Hackney-road—128, 128, and 148, freehold 2,450
Spitalfields—80, Brushfield-street, freehold 1,049
Whitechapel—14 and 16, Osborne-street, freehold 9,510
Tower Hill—22, King-street, freehold 710
11, Queen-street, freehold 510

By SIMMONS & GASSON.

Horley, Surrey—3, The Grove, freehold 1,150
By DENNISON, TAYLOR, & Co.
Fishery Park—172, 201, and 209, Blackstock-road, 85 years, ground-rent 32l. 1,403

JUNE 9.

Upper Holloway—Improved ground-rent of 27l. 10s., with reversion 495
Kilburn—181, Beilise-road, 65 years, ground-rent 10l. 429
Tottenham—5, 7, and 9, Gloucester-terrace, 39 years, ground-rent 36l. 600
Canberwell—42, 44, and 46, Camb-grove North, 78 years, ground-rent 7l. 4s. 520

By O. H. WHITE.

Chelsea—1 to 5, Foundry-place, freehold 650
Sheerness—The "Hit or Miss" public-house, freehold 160

By DRYER & Co.

Houndsditch—5 to 10, Finch-alley, freehold 2,140
The freehold cottages "Leslie Lodge," with grounds 1,050

By DOWSETT & WOODS.

By TOMES, WILLIAMSON, & Co.
Pimlico—120, Ebury-street, 38 years, ground-rent 12l. 985
122, Ebury-street, 38 years, ground-rent 12l. 1,005

By DENHAM, TAYLOR, & Co.

Morden, Kent—"Widhurst Farm," 231 a. 1 r. 7 p. freehold 5,000
Rotherfield, Sussex—"The Springs," 100 a. 1 r. 2 p. "Stone" Farms, containing 33 a. 2 r. 24 p. freehold 8,600
"Great Egg Farm," 91 a. 0 r. 2 p., freehold 2,000
Castellhill, "Brickfield Farm," 15 a. 1 r. 10 p. freehold 690
Heathfield, "Marl Green" and "Hugget's" Farms, 281 a. 3 r. 6 p., freehold 4,560

By E. FRANK.

Putney—22 and 24, Lower Park Fields, and ground-rents of 11l. 1s. a year, term 50 years 650
Near Haslemere—A plot of freehold land, 2 a. 3 r. 7 p. 142

By DANIEL SMITH, SON, & OAKLEY.

Forest Hill—The residence called "Danesfield," 80 years, ground-rent 12l. 10s. 1,250
The residence called "Springfield," 80 years, ground-rent 17l. 10s. 1,150

By RUSWORTHY & STEVENS.

St. John's Woods—72 and 74, Clifton Hill, freehold 1,886
84 and 86, Clifton Hill, freehold 1,650
Near Elstree—Two plots of freehold land 1,329

By J. G. & A. FRETHER.

Mill End—Copsey-street, the "Princess of Wales" public-house, 57 years, ground-rent 38l. 1,460
3 Nicholas-lane—45 years, ground-rent 34l. 10s. 963
Moody-street, a plot of freehold land 255
Hford—A plot of freehold land 15

By HORSLEY, RICHARDS, & Co.
Clapham—3, Beauchamp-road, 95 years, ground-rent 7l. 13s. 470
Westbourne Park—10, Appleford-road, 80 years, ground-rent 7l. 10s. 200
Brixton—168 to 144, even, Poplar Walk-road, 81 years, ground-rent 16l. 1,026

JUNE 11.

By ROBERTS & BARNARD.
Hackney—Freehold ground-rent of 108l., reversion in 20 years 2,740
Battersea Park-road—No. 225, term 77 years, ground-rent 8l. 600

By R. SMILEY.

Holloway-road—No. 209, term 25 years, ground-rent 40l. 330
Edgware-road—1, Chapel-place, 34 years, no ground-rent 70

By R. REID.

1 to 4 and 44, Hardington-place, 34 years, no ground-rent 823
474, 406, and partly 408, Edgware-road, 37 years, no ground-rent 100
115, Princes-street, 37 years, no ground-rent 160
Dorsel-square—No. 27, term 24 years, no ground-rent 455

By FURBER, PRICE, & FURBER.

Belgravia—47, Gloucester-street, 52 years, ground-rent 12l. 1,036
Bloomsbury—Ground-rents of 176l. 10s. a year, term 22 years 690
Essex—Great Wakering—Best chert of 64. a. a year 110

By DEBENHAM, TAYLOR, & Co.

West Dulwich—1, 3, 5, and 7, Park-road, freehold, 1,800
By NEWSON & HARRING.
Horsney—"The Elm," with grounds, cyphoid 2,640
Hamstead—1, Britannia-villas, freehold 690
Horsney-road—47, Isledon-road, 66 years, ground-rent 6l. 13s. 400

By E. STRIMON.

Walworth—75, 77, and 79, Rodney-road, 64 years, ground-rent 23l. 10s. 1,303
23, 24, and 24A, Steedman-street, 71 years, ground-rent 30l. 143

Kingsland—66, Ufton-road, 35 years, ground-rent 4l. 875
Midway Park—13, St. Jude-street, 47 years, ground-rent 4l. 300
Bexley Heath—1 and 2, Pett's Cottages, freehold 350

Brixton—27, Plato-road, 82 years, ground-rent 6l. 10s. 340
26, Josephine-avenue, 80 years, ground-rent 10l. 600

By NORTON, TRIST, WATNEY, & Co.

Highbury—An enclosure of freehold land, 144 ac. 18,200
17, 20, and 23, Highbury-terrace, freehold 5,650
12, 13, and 14, Highbury-terrace, freehold 5,880
7, 8, and 9, Highbury-terrace, freehold 3,190
1, 4, and 6, Highbury-terrace, freehold 4,170

Holloway-road—Ground-rent, 19l. 10s., reversion in 24 years 1,229
Ground rent, 66l., reversion in 19 years 1,920

By C. C. T. MOORE.

Barking-road—Nos. 394 and 396, freehold 1,140
Clapton—175, Evering-road, 85 years, ground-rent 12l. 840

Poplar—1 to 4, Flint-street, 77 years, ground-rent 13l. 13s. 825
82 to 92, Flint-street, 77 years, ground-rent 23l. 2s. 1,230

Bromley—55 to 63, odd, Devas-street, 63 years, ground-rent 10l. 68d. 400
41 to 53, odd, Devas-street, 36 years, ground-rent 16l. 750

2 and 4, Reeve's-street, 77 years, ground-rent 5l. 2s. 550
Bethnal Green—10 to 16, even, Gardner's-road, 61 years, ground-rent 18l. 1,340

12 to 17, Hartley-street, 41 years, ground-rent 17l. 1,910
South Hackney—66, Gore-road, 65 years, ground-rent 7l. 470

Bow—114 to 121, Antill-road, 62 years, ground-rent 18l. 2,610

JUNE 12.

By DALE & SON.
Whitechapel—86, Back Church-lane, 101 years, ground-rent 5l. 10s. 145

By BARKER & SONS.

Hanwell—The residence called "Hanwell Park," and 29 a. 3 r. 13 p. 7,100
Enclosures of land, 24 a. 1 r. 34 p., freehold 6,000
Shenley, Herts—Enclosure of land, containing 36 a. 3 r. 18 p. 3,130

Chiswick—"Sutton Court Lodge," and 9 a. 3 r. 13 p., freehold 8,650
A plot of freehold land adjoining 1,200

By G. A. WYLLIE.

City—16 and 16, Bishop's Court, freehold 1,140
Warwick-lane—Two freehold sites, area 4,275 ft. 10,625
Muswell Hill—Two enclosures of land, 15 a. 3 r. 22 p., freehold and copyhold 4,800
An enclosure of land, 8 a. 2 r. 24 p., freehold 7,100

MEETINGS.

THURSDAY, JUNE 20.

St. Paul's Ecological Society—Visit to Heddon and Cockham. Train to Taplow from Paddington, 2.30 p.m.

THURSDAY, JUNE 25.

Association of Municipal and Sanitary Engineers and Surveyors—Annual Meeting (at Institution of Civil Engineers). 1. Annual Report and other business. 2. President's Address. 3. Mr. W. Santo Crisp on "Street Lighting." 4. Professor Wanklyn on "Sanitary Gas-making." 5. (Time permitting.) Discussion on the Report of the Royal Commission on the Housing of the Working Classes, to be opened by Mr. E. B. Elton-Clark. 12 noon.—The Annual Dinner will be held at the Criterion Restaurant at 6.30 p.m.

FRIDAY, JUNE 28.

Association of Municipal and Sanitary Engineers (second day).—1. Mr. R. C. Meade on "The Highgate Hill Street Grade Tramway." 2. Mr. S. Gamble on "Dangerous Structures." 11 a.m.—Reception of the members at the Mansion House by the Lord Mayor, who

will entertain them to luncheon. 1 p.m.—Visit to the Holborn Viaduct Subways. 3 p.m.—Visit to the London Central Markets. 4 p.m.

STURDAY, JUNE 27.

Association of Municipal and Sanitary Engineers (third day).—Visit to Blackfriars Railway Bridge Works. 9.45 a.m.—Leave at 11.15 a.m. by train from Blackfriars (District Railway) for Putney, to visit the new Putney Bridge Works.

Miscellaneous.

Mr. S. Dutton Walker, F.S.A.—We regret to announce the death, at the age of fifty-two, of Mr. Samuel Dutton Walker, F.S.A., of the firm of Messrs. Walker & Howitt, architects, Nottingham, which took place at his residence on Monday last. The deceased evinced considerable talent, as may be seen by the buildings in various parts of the town erected from his designs. He also took an active interest in the management and welfare of the Nottingham School of Art, which institution benefited to no inconsiderable extent by his generosity and counsel. He was instrumental in founding two scholarships in connexion with that institution, the funds of one of which were devoted to enabling the holder to study church architecture abroad. For many years after its erection the School of Art presented an unfinished and by no means artistic appearance, owing to the capitals of the pillars being left as they came from the quarry in hand, and soon succeeding in obtaining the necessary funds, converted, by the aid of the mason and carver, what was once an eyesore into an ornament and source of attraction. Mr. Walker was ever ready to give the public the benefit of his knowledge and experience on architectural and other matters by reading papers before the various societies in the town.

The "A B C" Sewage System and the Acton Local Board.—At the meeting of this Board on Tuesday night it was resolved to accept the terms offered by the Native Guano Company to treat the sewage of Acton by means of the "A B C" system. This has reference, however, only to the sewage of houses built within the last two years, the sewage from all properties built earlier than this period being allowed, in pursuance of a judicial decision two years ago, to flow into the Stamford Brook portion of the metropolitan system. But this resolution of the Acton Board is important as affording the "A B C" Company an excellent station conveniently near London where their system can be seen at work. The company has agreed to treat the sewage and produce an effluent water up to the requirements of the Thames Conservators for an annual subsidy of 200*l.* (calculated on a basis of 300 houses, and a population of 1,500), and 5*s.* increase for each ordinary house over and above the 300 houses. The Board has to provide complete works and steam power, with the exception of the sludge-presses and mixing and other apparatus, which the company will supply and maintain. The local authority undertakes to deliver the sewage into the tanks free from rain-water; though some members were strongly of opinion that rain-water should not be altogether excluded, as it was the means which nature had provided for the flushing of the sewers. The company, moreover, deposit 500*l.* with the Board as security against failure, and indemnifies the Board against all loss from proceedings taken against the Board in consequence of the condition of the effluent water. On the whole, the terms were considered very favourable to the Board.

The Stewart Improved Electric Indicator.—In these electric bell indicators, by Messrs. Watford & Stewart, the coils and magnets are mounted on a casting which has two arms, on which hang the discs, exactly fitting into a hole out in the front of the indicator. When a signal is given the discs are drawn to the magnets (about an inch) and then swing backwards and forwards for from two to three minutes as required. The arrangement is so simple that it is impossible for it to get out of order. The discs are large, being 3 ft. and 2½ ft., so that they are easily seen, and are such as to lend themselves freely to decorative purpose, being made to harmonise with the decorations of the hall or room from which the signal is given. Two of these indicators are now fitted up at Mr. Stewart's exhibit, Stand No. 1,377, East Arcade, International Inventions Exhibition.

The Safety of Cast-Iron Columns.—The Berlin police authorities, in consequence of unfavourable experiences with cast-iron columns in recent fires at Berlin, have lately issued regulations forbidding the use of such supports in the construction of dwelling-houses, but permitting the employment of columns of wrought-iron and Dutch brick in cement-mortar. Cast-iron columns may only be employed if they are surrounded with immovable mantles of wrought-iron, separated from them by an air space. Professor Bauschinger, of München, has recently experimented with columns of cast and wrought iron, and pillars of stone, brick, and cement-mortar. His results appear to throw doubt on the discretion of the Berlin authorities. He heated cast and wrought iron columns weighted with loads usually imposed in structures first to 300°, next to 600°, and finally to red-heat, and suddenly cooled them afterwards by a jet of cold water, as applied in extinguishing fires. The experiments demonstrated that cast-iron columns, although they were bent by red-heat, and showed transverse cracks when water was applied, supported the load imposed upon them, whilst wrought-iron columns were bent before arriving at a state of red-heat, and were so much distorted by the application of water that straightening was out of the question. In reality, they would have collapsed under the load they had to support. Professor Bauschinger concludes from his experiments that cast-iron columns, notwithstanding cracks and bends, would continue to support the loads imposed upon them, while wrought-iron columns would not. In examining pillars of stone, bricks, and cement concrete, the latter proved to be the best. Concrete pillars withstood the action of fire for from one to three hours; those of ordinary bricks, as well as those of clinkers, set in cement mortar, displayed great resistance; whilst natural stone—granite, limestone, and sandstone,—were not fireproof.—*Iron.*

Safety of Theatres and other Places of Public Resort.—At the meeting of the Metropolitan Board of Works on the 12th inst., a report was received from the Building Act Committee, recommending that Mr. Spencer Chadwick be informed, in reply to his letter stating that he has been instructed by Mr. J. C. Humphreys to prepare drawings for the erection of the building known as "Humphreys' Hall," at Knightsbridge, which was recently destroyed by fire, and asking for a copy of the Board's requisitions for the original building, together with any other suggestions which may be considered advisable with respect to the proposed new building, that such requisitions are no longer applicable, but that if it is proposed to open the new building as a licensed place of public entertainment, it must be constructed strictly in conformity with the Board's regulation; and further recommending that a copy of such regulations be sent to Mr. Chadwick, and that he be also informed that he must submit his drawings and specification to the Board for their approval before the commencement of the works. Also recommending, with reference to the letter from Sir S. Ponsonby-Fane, stating that the Lord Chamberlain will be ready to consider the draft of a Bill transferring to the Board the licensing of theatres in London under his Lordship's jurisdiction,—provided the measure embraces the licensing of all theatres and places of public amusement within the Metropolitan District, and that, meanwhile, his Lordship hopes that he may be favoured with the advice of the Board as to the structural security of the theatres licensed by him,—that the letter and the whole question of further proposed legislation with respect to places of public entertainment in the metropolis be referred to the Works and General Purposes Committee, for consideration and report. These recommendations, with some others of a cognate character, were adopted.

The Holloway Sanatorium, Virginia Water.—On Monday last the Prince of Wales formally opened this institution, founded at the cost of the late Mr. Thomas Holloway. The architect of the building is Mr. W. H. Crossland. It has been fully described in past volumes of the *Builder*, and among the illustrations of the building which we have published is a large view of the interior of the Recreation Hall, in which last Monday's ceremony took place. This illustration, drawn by Mr. H. W. Brewer, appeared in the *Builder* for Jan. 7, 1882. Upwards of 300,000*l.* have been spent upon the building.

Cholera in Europe.—The increase of cholera in the east of Spain and the invasion of fresh towns may be regarded as an indication that the year will not pass away without a repetition of some of the calamities which marked the appearance of the disease in France an Italy last summer. As yet there is no confirmation of the report that Marseilles is again the seat of the disease; but there can be no question of its prevalence in Madrid, and as the season progresses and the warm weather of June and July has had opportunity to exert its influence, we shall doubtless hear of the extension of cholera into more northern latitudes. Whether England may come within the area of its operations during the present year, it is as yet too early to predict; but the fact that the second week of June has nearly ended without any sign of cholera in the direction which it usually follows before reaching this country is no criterion that we shall escape. The inoculations of Dr. Ferrás will doubtless excite more interest on the Continent than in England; our own defences against the disease are fortunately not only of a more trustworthy but of a more permanent character.—*The Lancet.*

International Inventions Exhibition.—Amongst the recent additions to the Historic Loan Collection is Queen Elizabeth's lute (lent by Lord Tollemache of Helmingham), which was left by the queen, in 1584, at Helmingham Hall, Suffolk, where it has been preserved until the present day. The lute is in an exceptionally fine condition, and bears the maker's name, "Joannes Rosa Londini Fecit. In Bridwell, the 27th of July, 1580." An extremely valuable collection of early manuscripts has also been received from the Stiftsbibliothek of St. Gall, including the celebrated copy of Notker's German translation of the Psalms, and the Antiphoner traditionally said to have been brought from Rome to St. Gall in the eighth century. Collections of portraits in oil have been received from the Royal Society of Musicians and the Bodleian Library. The decorated spinet made for Queen Christina is lent by Lord de Lisle; and autograph letters of Mendelssohn, Franz, &c., Beethoven's will, and many other valuable manuscripts, have also been added to the collection.

Liverpool Architectural Society.—The second meeting of the Junior Debating Club was held at the Rooms, No. 9, Cook-street, on the evening of Monday, the 15th inst. Mr. James B. Hinks was elected chairman for the evening. There was a good attendance of members. The paper for the evening was on "Early Gothic Vaulting," and the lecturer, Mr. Thomas J. Dalziel (visitor), prefaced his remarks by a rapid survey of the various styles of vaulting that preceded the Early Gothic. Mr. Dalziel drew attention to the capabilities of pointed barrel-vaulting, giving several examples of its adaptation to the roofing of polygonal apses and their aisles, &c. He advocated the use of ridge-ribs; but admitted that, unless in the case of vaults having intermediate ribs introduced between the diagonal and transverse ribs, they were constructionally unnecessary. A discussion followed the reading of the paper, in which Messrs. J. S. A. Mercer, Edmund Rathbone, J. H. Dawson, &c., took part, the proceedings terminating with the usual votes of thanks.

Public Works at Portsmouth.—The Mayor of Portsmouth has laid the foundation-stone of a new wharf in the upper part of the harbour, the contract, which was given to Mr. F. Bevis, of Landport, amounting to upwards of 30,000*l.* The quantities were taken out by Mr. H. P. Foster, of John-street, Adelphi, who has for some years acted as quantity surveyor to the Portsmouth Corporation, and has in that capacity been connected with the erection of a gaol and lunatic asylum, and the drainage works. A committee of the Corporation is now engaged in settling the question of a site for a Town Council House, and when that has been settled Mr. Foster will be instructed to take out the quantities for that building.

Cabmen's Shelter Fund.—The new cabmen's shelter recently placed on the cab-stand at Hyde Park-corner (opposite St. George's Hospital) was formally opened by Mr. F. A. Bevan on Tuesday afternoon. This shelter,—the gift of Miss Paris,—which is constructed of corrugated iron painted, has been built by Messrs. J. Arthur Young & Co., of Victoria-street, and is the thirty-sixth shelter erected in London by the Cabmen's Shelter Fund.

CONTRACTS:

Epitome of Advertisements in this Number.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Erection of Shops	Bromley Local Board	E. Monson, jun.	June 23rd	ii.
Kerbing Works	Official	do.	do.	ii.
Iron and Concrete Fireproof Floor	West London Sch. Dist.	Official	June 24th	xx.
Painting and Whitewashing	Beckenham Local Board	G. B. Carlton	June 26th	ii.
Flushing Tanks and Pipe Sewer	Met. Asylums Board	A. & C. Harston	do.	xx.
Weighbridge	St. Giles, Camberwell	Official	do.	xiii.
Having	do.	do.	June 30th	xiii.
Pipe Sewer	Bognor Assembly Room Association, Limited	A. Smith	do.	xiii.
Erection of Hall, &c.	Tottenham Local Board	De Pape	do.	xx.
Covering Wall in Dock, and Retaining Wall.	New Windsor U. S. A.	do.	do.	xx.
Paving High-street	Cardiff Corporation	J. A. B. Williams	July 1st	ii.
Laying Pipes, &c.	Chiswick Local Board	A. Ramsden	do.	ii.
Flushing Siphons, &c.	East Wesleyan Methodist School Association	Chas. Bell	July 2nd	ii.
New College, Canterbury	Great Northern Ry. Co.	J. Fraser & Sons	July 3rd	ii.
Construction of the Dewsbury Branch Railway	Margaret's, Barking	C. J. Dawson	July 4th	ii.
Making Roads, Draining, &c., Erection of Chapel and Lodge, &c.	Bernondesty Vestry	Official	July 6th	ii.
Broken Guernsey Granite	Henley-on-Thames U. S. A.	I. Shone	July 7th	xiii.
Severage Works, Henley-on-Thames	Hendon Local Board	Lacey	do.	xx.
Paving	Admiralty	Official	July 10th	ii.
Office's House, Cottages, &c.	Portsmouth U. S. A.	Sir F. Bramwell	July 16th	ii.
Severage Works	Met. Board of Works	Official	July 20th	ii.
Brick Sewer and Subway, Footways, &c.	St. Peter's Ch., Hornsey	do.	Not dated	ii.
Oak Fencing	Lock & Gihert	F. Foster	do.	xiii.
Semi-Detached Houses	C. Bell	do.	do.	xiii.
Erection of a Wesleyan Chapel, Wolverhampton	do.	do.	do.	xiii.

TENDERS.

For the erection of board-road and offices, dispensary and relief offices, in the Clerkenwell-road, London, for the Guardian of the Poor of the Holborn Union. H. Saxon Snell & Son, architects, 22, Southampton-buildings, London.

Perry & Co.	£18,928 0 0
Kirk & Randall	18,920 0 0
Mowlem & Co.	18,920 0 0
W. J. Adcock	18,919 0 0
B. E. Nightingale	17,947 0 0
Wall Bros.	17,698 0 0
Mark Geentry	16,450 0 0

For whitewashing, distomping, cleaning, &c., at the St. Olave's Union Infirmary, Rotherhithe, for the Guardians of the Poor of the St. Olave's Union. Messrs. H. Saxon Snell & Son, architects, 22, Southampton-buildings, London.

W. Bamford	£55 0 0
Vigor & Co.	411 0 0
Sherrman & Sons	388 0 0
Dicksee & Dicksee	308 0 0
W. G. Lilly	234 0 0

For proposed new building for the College of Preceptors, on the site of Nos. 2 and 3, Bloomsbury-square, and 23, Southampton-street, Holborn. Mr. F. Pinches, architect. Quantities supplied by Mr. H. P. Foster.

Lovatt	£22,118 0 0
Chappell	11,684 0 0
Foster & Dicksee	11,999 0 0
Bywaters	11,274 0 0
Macey	10,173 0 0
Nightingale	10,920 0 0
Kirk & Randall	10,785 0 0
Wall	10,668 0 0
Patman & Fotheringham	10,650 0 0
Elkington	10,490 0 0
Mowlem	10,490 0 0

For rebuilding Crowder's Music Hall, Greenwich. Mr. James Geo. Buckle, architect, 10, Adam-street, Adelphi-buildings, London.

Steel Bros.	£2,195 0 0
G. W. Sly	2,100 0 0
Laing & Son	1,970 0 0
Elkington & Son	1,774 0 0

For the erection of new stables, &c., at the "Wingfield," Banstead, for Mr. W. Johnson. Mr. C. C. Cunniffe, architect.

S. Evans, Carshalton	£693 0 0
W. Hazell, Mitcham	680 0 0
W. Taylor, Banstead	633 0 0

For the erection of the Baptist Tabernacle and Schools, Regent-street, Swindon. Mr. W. H. Read, architect.

Ben of stone	£26,890 0 0
Iron columns in	£6,940 0 0
Dorset, Bristol	6,890 0 0
D. C. Jones & Co., Gloucester	6,890 0 0
King, Gloucester	6,895 0 0
W. Jones, Gloucester	6,400 0 0
Webb, Swindon	6,149 0 0
Phillips, Swindon	6,054 6 0
W. Adams, Swindon	6,003 0 0
Wiltshire, Swindon	5,936 0 0
Barrett	5,798 10 0

For market, &c., Brisham. Mr. G. Sonden Bridgman, architect, Torquay.

J. Reed, Plymouth	£3,560 0 0
Dart, Devonport	3,559 0 0
Spencer & Hayman, Brisham	3,447 0 0
Goss, Torquay	2,884 0 0
Vanstone & Mumford, Torquay	2,775 0 0
Manscraft & Hawkins, Dawlish	2,770 0 0
Hazlewood, Brisham	2,770 0 0
M. Bridgman, Paignton	2,669 0 0
Drake, Torquay	2,655 0 0
Speyer, Paignton	2,610 0 0
Smerdon, Torquay	2,586 0 0
Crocker, Torquay	2,523 0 0
Foaden, Ashburton	2,494 0 0

[Architect's estimate, £2,650.]
* Accepted.
* Not late.

For the erection of oak cleft fence at new Sanitary Hospital, Bournemouth for the Bournemouth Commissioners. Mr. G. R. Andrews, surveyor.

Rowland Bros., Bletchley	£366 15 0
Hoare Bros. & Walden, Bournemouth	338 1 6
Tanner, Ringwood	299 12 6
Crook, Southampton (accepted)	289 15 0
Harris-Corbin, Bournemouth*	232 10 0
Pickhall, Bournemouth (withdrawn)	214 15 6

For building a roadman's cottage and fixing weigh-bridge, for the Louth Corporation. Mr. T. W. Wallis, Borough Surveyor.

Harrison Bros.	£218 17 0
Clark & Richards	206 10 0
H. Vickers	205 0 0
R. Mawer	184 12 4
P. Allen	130 0 0
Thompson & Sons (accepted)	130 0 0

For alterations at the Cambridge Music Hall, Commercial-street, E., for Mr. William Riley. Mr. Edward Clark, architect, 43, West Strand.

F. Mark	£2,275 0 0
H. Banks	2,231 0 0
C. Wall	2,213 0 0
T. Great	2,203 0 0
Johnson & Manners	2,063 0 0
J. Amey (accepted)	1,948 0 0

For the erection of farmhouse and alterations to hind's cottage, Low Coken, co. Durham. Mr. F. B. Leighton, architect, Fence Houses.

Thompson & Pinshon, Chester-le-Street	£720 0 10
J. Jopling, Chester-le-Street	610 11 11
G. & J. Gates, Penshaw	590 16 4
R. Allison, Sunderland (too late)	562 0 0
T. Hunter, Washington, co. Durham	533 11 10
Atkinson & Lodge, Plawsworth	514 15 0

For the erection of a suspension foot-bridge over the river Thames, and a lattice-girder foot-bridge over the lock adjoining for the Teddington Local Board, Teddington. Mr. George Pooley and Mr. Edward Thompson, joint engineers, 26, Chancery Cross.

J. Tildesley, 73, Gracechurch-street	£8,164 0 0
W. Hill & Co., 28, Great George-street	7,803 0 0
T. Vernon & Co., 7, Westminster-chambers	6,633 7 0
W. Hickinbotham, Teddington	6,512 0 0
A. D. Dawson, London Bridge House	6,505 0 0
M. H. Davies, Bernondesty	6,100 0 0
Kirk & Randall, Woolwich	5,970 0 0
S. Chafon, Rotherhithe	4,900 0 0
B. Cooke & Co., Phoenix Wharf, Battersea	4,818 0 0

For the road-making, paving, kerbing, channelling, surface-drainage, and other works in Quadrant-road, Richmond, Surrey. Mr. Walter Brooke, Assoc. M. Inst. C.E., Town Surveyor.

G. Aldred, Chiswick	£531 0 0
Bloomfield, Tottenham	480 17 7
Nowell & Robson, Kensington	473 0 0
Mowlem, Burt, & Freeman, Westminster	457 1 3
Marshall, Brighton (accepted)	445 0 0
F. Sims, Richmond (withdrawn)	416 0 0

Accepted for rebuilding shop, 108, Salmon's-lane, Limehouse, for Messrs. Charlesworth & Austin. Messrs. T. & W. Stone, architects, 2, Great Winchester-buildings, London Wall.

Howlett, Limehouse	£245 0 0
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[No competition.]
For repairs to houses, Nos. 82 and 84, Rhodesswell-road, Limehouse, and St. Leonard's-avenue, Bromley, for Mr. Charles Barry. Messrs. T. & W. Stone, architects.

Peppiatt	£140 0 0
Sail	130 0 0
Howlett, Limehouse	85 0 0
Deacon	80 0 0
Walker (accepted)	80 0 0

For the erection of three houses at Peckham Rye, for Mr. Martin.

Riches	£1,074 0 0
Hobson	966 0 0
White & Co.	901 0 0
Pack	893 0 0
Long	880 0 0
Killour	885 0 8
Buller	858 0 0
W. Martin	857 0 0
Leck	850 0 0
Aldridge & Jervay	830 0 0
Longdon	829 0 0
Pinage	825 0 0
Harris	816 0 0
Aris & Son	810 0 0
R. Martin	799 0 0
Price	784 0 0
Abb	778 0 0
Sugden	769 0 0
Lamprell	758 0 0
Andrews	755 0 0
Hill & Testor	745 0 0
Austin & Emery	730 0 0
Manning	696 0 0
Godbold	692 0 0
Homes, Fraser, & Co.	689 0 0
Sannders	660 0 0
Watkins	630 0 0
Holding	618 0 0
Storey	600 0 0
Barkett	650 0 0
Borall & Son	475 0 0
Cox	475 0 0

For alterations to back premises, 196, Salmon's-lane, Limehouse. Messrs. T. & W. Stone, architects.

Johnson	£267 0 0
Walker	250 0 0
Salt	239 0 0
Peppiatt	170 0 0
Deacon	160 0 0
Howlett, Limehouse (accepted)	140 0 0

For mission-hall, Sheepcote-lane, Battersea. Messrs. Searle & Hayes, architects, 68, Ludgate-hill. Quantities supplied.

S. Peacock	£3,021 0 0
Dove Bros.	2,375 0 0
Candle	2,330 0 0
S. Higgs	2,293 0 0
Thos. Wontner Smith & Son	2,179 0 0
Holloway	2,050 0 0

For alterations and repairs at 35, Highbury-place. Mr. J. D. Mathews, architect, 11, Dowgate-hill, E.C.

Dove Bros.	£435 0 0
Williams & Son	613 0 0
Thos. Wontner Smith & Son	468 0 0
Spencer & Co.	440 0 0

For new house at Shelford, Cambs. for Mrs. Hall. Messrs. Arundell & Tarte, architects, London and Cambridge.

W. Bell & Sons, Cambridge	£1,445 0 0
W. Bindall, Cambridge	1,400 0 0
J. Saint & Sons, St. Ives, Hunts.	1,282 13 0
Johnson & Manners, London	1,280 0 0

For works to the Church of St. Stephen, Walkbrook (exclusive of stained-glass work amounting to about 1,000l.). Mr. Alexander Peebles, architect. Quantities by Mr. W. E. Stoner.

Holland & Hannen	£2,741 0 0
Ashby & Horner	2,651 0 0
Brass & Son	2,651 0 0
Colls & Son	2,474 0 0
Ramey	2,462 0 0
Dowse	2,368 0 0

For building two villa residences at Bedford for Mr. G. S. Plovman. Messrs. Bisher & Anthony, architects and surveyors, Bedford.

W. Freshwater, Bedford	£1,889 0 0
T. Spenser, Bedford	1,880 0 0
J. F. White, Bedford	1,373 0 0
Peters & Co., Potton	1,371 0 0
Warton & Co. Bedford	1,360 0 0
S. Foster, Kempston	1,329 0 0
G. Harrison, Bedford	1,311 0 0
J. Polter, Bedford	1,270 0 0

For the erection of five cottages on the Bower Estate, Bedford. Mr. H. Young, architect.

Wharton & Walker	£860 0 0
Corby & Sons	831 0 0
Warwick & Osborne	811 7 0
J. P. White	758 0 0
G. Harrison	752 0 0
T. Laughton	743 0 0
J. Smith	737 0 0

For alterations and additions to the male and female infirmary wards at the Workhouse, Chesterfield. Messrs. Robinson & Son, architects, Chesterfield.

A. Wright, Chesterfield	£445 0 0
F. Glossop, Chesterfield	435 0 0
J. Margerson, Barlow	398 0 0
E. Tinkler, Clay Cross (accepted)	391 12 0

For fixing wrought-iron railing, &c., on the Highgate Archway (north side), for the Hornsey Local Board. Mr. T. de Courcy Meade, engineer and surveyor.

Brass & Co., Pentonville-road	£925 0 0
Aspinall & Son, Horton	845 0 0
Gullett & Dyke, Highgate-road	492 10 0
Mowlem & Co., Westminster (accepted)	361 0 0
Rowe, Edmonton	325 0 0

For the erection of a pair of semi-detached villas at Green Sea Park Estate, Wilhamstown, for Mr. W. lezard.

W. W. Goode	£670 0 0
E. L. Price	630 0 0
J. Borlan	630 0 0
J. Stone, Tottenham	630 0 0

* Accepted, with hot-water service.

For additions to Arlington House, Eastern-road, Brighton, for Mr. E. Burman. Mr. M. E. Macartney, B.A., architect, 14, Hart-street, Bloomsbury. Quantities by Messrs. Evans & Deacon, 1, Adelaide-street, Charing Cross:—
 Foster & Dicksee..... £950 0 0
 Maides & Harper..... 867 0 0
 A. M. Deacon & Co..... 835 0 0

For alterations to the buildings of the St. James's Hall Company, Mr. W. Emden, architect, 29, Southampton-street, Strand. Quantities by Messrs. Evans & Deacon, Adelaide-street, Charing Cross:—

Contract No. 1.	
Nightingale.....	£2,450 0 0
McLachlan.....	2,210 0 0
Dickenson.....	1,998 0 0
Bywater.....	1,938 0 0
Kirk & Randall.....	1,775 0 0
H. & E. Lea.....	1,737 0 0
Swanson (accepted).....	1,593 7 2

For new roads, sewers, and surface-water drains, &c., for the British Land Company, Limited, on their estate at Earlsfield, Wandsworth, Mr. Henry B. Michel, surveyor:—

Nowell & Robson, Kensington.....	£2,738 0 0
W. Harris, Camberwell.....	2,388 0 0
E. W. Keoble, Regent's Park.....	2,352 0 0
E. Wilson, Whitehampton.....	2,305 0 0
J. Bloomfield, Tottenham.....	2,300 0 0
J. Pizzev, Horsaey.....	2,257 0 0
J. Jackson, Leyton.....	2,190 0 0
C. Killingsley, Camden Town.....	2,184 0 0
Pell & Sons, Bromley (accepted).....	2,182 0 0

For taking down and rebuilding the Bakers' Arms Inn, Waddesdon, for Mr. Thomas Parsons. Mr. Charles Carter, architect, Great Marlow:—

W. Creed, Maidenhead.....	£758 0 0
G. H. Gibson, Wycombe.....	740 10 0
C. Crook, Waddesdon.....	749 8 9
G. H. Gibson, Wycombe.....	749 8 9
G. Cooper & Co., Aylesbury (accepted).....	707 12 0

For repairs and alterations at the Old Parsonage, Great Marlow, for Mr. P. W. Morgan. Mr. Charles Carter, architect, Great Marlow:—

W. Creed, Maidenhead.....	£597 0 0
G. H. Gibson, Wycombe.....	498 0 0
J. S. Carter, Marlow.....	459 0 0
A. Corby, Marlow.....	449 0 0
A. B. Walker (accepted).....	444 0 0

For pulling down and rebuilding 246, Upper-street, Islington, for Mr. Harding. Mr. E. J. Harrison, architect:—

Dove Bros.....	£2,716 0 0
Deating & Son.....	2,630 0 0
Coombe & Son.....	2,597 0 0
Wentner Smith.....	2,469 0 0
Simpson & Co.....	2,390 0 0
Baylis.....	2,210 12 0
Ward & Lambie (accepted).....	2,137 0 0

For the erection of stabling at Rutland Lodge, Shortlands, for Mr. W. W. Palmer. Mr. Charles J. Smithem, architect:—

C. Ansell.....	£921 0 0
R. Lowe.....	619 15 0
J. Taylor & Son.....	610 0 0

For the erection of business premises and stabling at 23, Bernonville New-road, for Mr. J. E. Armfield. Mr. Charles J. Smithem, architect:—

Spencer & Co.....	£1,760 0 0
W. & F. Croaker.....	1,620 0 0
Battley.....	1,567 0 0
Shepherd.....	1,155 0 0

Accepted, for erecting shop and warehouse at Whitecross-street, Messrs. W. & J. Y. Brown, architects, 6, Poultry, E.C.:—

F. Smith.....	£280 0 0
[No competition.]	

Accepted for reinstating damage by fire at 271 and 273, Oxford-street, W., Mr. W. Stokes, architect:—

F. Smith, 54, Coleman-street, City.....	£346 10 0
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Accepted for the completion of three houses in Overhill, Dulwich. Mr. J. Clarkson, architect:—

T. Watson, Dulwich.....	£625 0 0
[No competition.]	

For erecting a billiard-room, and other additions at 10, Lyndhurst-road, Hampton. Mr. Alfred Burr, architect, 10, Queen-square, W.C.:—
 Richardson..... £398 0 0
 Wells & Son..... 378 0 0
 Bridgman..... 368 0 0
 T. White..... 390 0 0

Re Tenders for Making-up Mount View-road.—Mr. T. de Courcy Meade, Engineer and Surveyor to the Hornsey Local Board, writes:—"I notice in last week's *Builder* your extract from Mr. Nicholls' letter re making-up Mount View-road. I beg to inform you that the prices supplied from this office were correct, the tender of Mr. Walker and not Mr. Nicholls having been accepted by the Board. Mr. Walker subsequently withdrew his tender, and consequently at the last meeting of the Board the tender of Mr. Nicholls, the next lowest, was accepted, subject to satisfactory references."

Wesleyan Methodist Schools, Folkestone.—Mr. D. Baker, of Toulme-street, Folkestone, writes:—"I find in your last week's *Builder* you omit my name as one of the tenderers; my tender, amounting to 5,634*l.*, was the lowest, and most unfairly passed over in favour of builders residing in the same town as the architects. It is omitted in your list." [We printed the list as it was sent.]

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

A. B. J.—F. S. Two fear it is not a class of art which interests us much.—Rev. N. S. (two communications) and E. T. G. J. (shall be attended to).—W. K.—F. J. C.—W. S. (below our mark).—J. B.—H. R.—R. H. C.—H. H. B.—A. W. I. (they were mostly German).—G. M.—F. W. B. & Co.—A. W. I. (drawings received).—"Country House" (the only thing we can recommend under the circumstances is the "Patent Lead-cast Block-tin Pipe," a pipe manufactured with a lining pipe success in and suited with it; but it is not a W. B. & H. (shall have attention).—Rev. W. F. C. (thanks for your note).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

Notz.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications. Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT RECEIVED.

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

PUBLISHER'S NOTICES.

CHARGES FOR ADVERTISEMENTS. SITUATIONS VACANT, PARTNERSHIPS, APPOINTMENTS, TRADE, AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under..... 6d. Each additional line (about ten words)..... 0s. 6d. Terms for Series of Trade Advertisements, and for Special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED. FIVE Lines (about THIRTY words) or under..... 2s. 6d. Each additional line (about ten words)..... 0s. 6d. PREPARATION IS ABSOLUTELY NECESSARY.

* Stamps must not be sent, but all small sums should be remitted by Cash in Registered Letters by Money Order, payable at the Post-office, Covent-garden, W.C. to DOUGLAS FOUBINIER, Publisher.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY. The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have Copies sent direct to the Office, 46, Catherine-street, Covent-garden, W.C. free of charge. Letters will be forwarded if addressed to our office as sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION. "THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 12*s.* per annum, PAYABLE TO countries within the Postal Union, 2*s.* per annum. Remittances payable to DOUGLAS FOUBINIER, Publisher, No. 46, Catherine-street, W.C.

Best Bath Stone. WESTWOOD GROUND, Boz Ground, Combe Down, Corsham Down, And Fairleigh Down. RANDELL, SAUNDERS, & CO., Limited, Corsham, Wilts. [Advr.]

Bath Stone. ALL DESCRIPTIONS OF BEST QUALITY. PICTOR & SONS, BOX, WILTS. [Advr.]

Doubling Freestone. The stone from these quarries is known as the "Weather Beds," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England. THE BRAMBLEDITCH STONE. Is of the same crystalline nature as the Chelynch Stone, but finer in texture, and more suitable for finemoulded work. HAM HILL STONE. Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice. Prices, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—Mr. E. WILLIAMS, 16, Craven-street, Strand, W.C. [Advr.]

Doubling Free Stone For prices, &c., address S. & J. STAPLE, HAM HILL STONE, Quarry Owners, Stone and Lime Merchants, Stoke - under - Ham, Ilminster. [Advr.] BLUE LIAS LIME (Ground or Lump), Ilminster.

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ILLUSTRATIONS.

New Premises for Sir H. Peck, Bart., Eastcheap.—Mr. A. Peshley, F.R.I.B.A., Architect.....	900-901
Sculpture at the Royal Academy; "Edward I."—Mr. Hamo Thornycroft, A.R.A., Sculptor.....	904
"Herant d'Armes": Bronze Chandelier on the Staircase of the Hôtel de Ville, Paris.—M. Fremiet, Sculptor.....	905
Oratory, St. Wilfrid's House, Exeter.—Mr. F. Newman, Architect.....	908
House, Kensington-court.—Mr. T. G. Jackson, Architect.....	909
Victoria Hospital for Children; Out-Patients' Department and Nurses' Residence.—Messrs. H. Saxon Snell & Son, Architects.....	912
A Gable of an Old House, Orpington, Kent.—Drawn by Mr. Lionel Littlewood.....	913

CONTENTS.

Two Seaside Resorts.....	851	House at Kensington Court.....	893	New Ventilating Hot-water Coll.....	913
New Light on a Statue by Polyclitus.....	853	Out-Patients' Department and Nurses' Home, Victoria Hospital for Children.....	898	"Italian Silver-grey Slates".....	915
Proposed "Shippers" Exhibition in Liverpool.....	854	A Gable of an Old House, Orpington, Kent.....	919	Provincial News.....	914
Note.....	854	Architectural Societies.....	918	Church-Building News.....	917
The Spinning-Builder.....	856	Building on Private Areas.....	918	School-Building News.....	917
Common Things: An Architect's Note—(Illustrated).....	856	Ancient Lights: Scott's Pope.....	915	Roman Catholic Church-Building News.....	917
Sir Henry Peck's New Premises in Eastcheap.....	858	Case under the Metropolitan Building Act: What is a "Public Building".....	915	Recent Patents.....	917
Sculpture at the Royal Academy—"Edward I.": By Mr. Hamo Thornycroft, A.R.A.....	858	Whitewash.....	915	Recent Sales of Property.....	918
"Herant d'Armes" at the Hôtel de Ville, Paris.....	858	Pumps for Contractors' Purposes.....	916	Meetings.....	918
Oratory, St. Wilfrid's House, Exeter.....	858			The Student's Column: Descriptive Geometry—Part II.....	913
				Miscellaneous.....	921

Two Seaside Resorts.



SEPARATED by some eighty miles of sea, but nearly one hundred and thirty apart by railway, lie on our southern coast old Torquay and new-fledged Bournemouth.

When Bournemouth was as yet but a dream of the future, comprising two or three private houses, a small tavern (only within the last month or two demolished), and a few cottages, Torquay was a well-known and well-frequented health resort, a small hut long-established port, and the chief centre of life in the ancient parish of Tor, whose simple and venerable church and tower look forth this day from the populous "God's Acre" around them, upon the two dozen or so of conformist and nonconformist fanes, which, in all the various forms,—good, bad, and indifferent,—of modern Pointed architecture, have sprung up to assert their predominance over the modest, solemn, old-world, grey stone church. What a tale is told of time and change, of life and death, of long quiet past, and busy, fussy present, by this contrast between the old parish church and its modern compeers, and how much of a people's history might be written with such a contrast for a text. Such, however, is not the theme proposed in "this present writing," the aim of which is rather a comparison between the two modern towns whose names are coupled above,—a comparison often essayed in one shape or another by visitors to both.

One of the most striking points of contrast between Torquay and Bournemouth is in the form of the ground on which they are built; Torquay, rising in almost amphitheatrical shape from the coast level, tier above tier, and terrace above terrace, to between 300 ft. and 400 ft. of elevation; Bournemouth, with a sand-cliff of some 100 ft. in height, ranging its houses parallel to its front, with the land sloping slightly inland to the heathery moorland which backs it to the north; save where the little stream which, draining some five square miles of country, and giving its name to the place, has formed a narrow valley, through which it travels, with no very high pace, to the sea. Here, as regards the picturesque,—one great element in sea-side attraction,—arises at once a marked point of difference, which must certainly be weighed greatly in favour of Torquay; for not only does the form it takes afford much of the more striking picture of the two, but it gives scope for much more extended enjoyment of the sea view; the dwellings even far inland

looking over their neighbours beneath them, and all in their degree looking out on the expanse of water, and catching the refreshing breath of the sea-breeze, as it flows inland. The geological character of the two sites is no less dissimilar than their visible form; the hard, marly limestone of the Devonshire hay forming bold rugged points and picturesque detached sea-girt rocks; while the sand and shingle-drift of Hampshire, rapidly worn by water from both above and below, form clear, well-defined sweeps of steep, warm-tinted cliff, broken at intervals by wooded chimes, and varied here and there near the sea level by the cool grey of underlying beds of "Dorset clay."

Both these characters of coast are eminently picturesque, and if in boldness and force the Tor Bay sea face he given the palm, aided as its effect is by the full rich foliage of shrubs and underwood, nothing can well exceed in beauty of colour the rain-swept scarps and hollows of the Bournemouth cliffs, the whole extent of which from Hengistbury Head to Poole Harbour, forming the main sweep of Poole Bay, are at once in view from the beach or from the cliff walks; and in the flying lights of a sunny breezy day afford a varying dioramic picture of great loveliness and interest. Facing so fully south, Bournemouth at mid-day suffers the full glare of reflection from the sea; but this very circumstance of aspect, adverse at noon, renders the moonlight effects to be seen there among the most striking which the English coast affords.

It is not very easy to say whether the more compact dimensions of Tor Bay, not quite four miles and a half across from Hope's Nose to Berry Head, or the nine miles span of Poole Bay he preferable from a painter's point of view. The moderate elevation of Berry Head, however, gains importance from its nearness as seen from Torquay; but the height and fine forms of the Purbeck Downs, seen in a like but more distant relation to Bournemouth, have a dignity which the corresponding view of Tor Bay lacks.

The view of the Isle of Wight in the opposite direction gives also a great charm to the Bournemouth sea view, which, however, has little, if any, nautical interest, as, although looking out southward on the full track of shipping up and down Channel, vessels, for the most part, keep so far out as to add nothing of life to the view; the coasters and steamers from Southampton by the Solent scarcely breaking to the eye the monotonous line of horizon at ten or twelve miles' distance; and the great area of sea overlooked from the cliffs, a surface of fully 130 square miles, is often for days undotted by a speck.

Taking Torquay on somewhat similar points; from its upper parts on the east, the fine out-

line of Dartmoor, with its peaks and tors, forms a striking background to the west, while its possession of a harbour and a coasting trade ensures some movement on its tides. Yachts frequent it too in the summer, and with the fine fishing smacks of Brixham across the Bay sailing in fleets of scores at a time, give the scene that life and stir which we English islanders are accustomed to associate with our salt-water surroundings.

To step ashore again. The pine trees of Bournemouth, the result of liberal planting some seventy years ago, have become almost proverbial, and evergreens and rhododendrons luxuriate there to the full; while not the less the almost tropical vigour of vegetation at Torquay clothes it with a richness of greenery which leaves little advantage to the Hampshire firs.

Not to dwell tediously on the natural features of the Hants and Devon health resorts, it may be noted that Bournemouth has the advantage in range of sands, and Torquay in picturesque seaside paths, while the depth and clearness of the water in Torhay make the effects of sea-colour finer than at Bournemouth; and a run of sea, too, gets up in a gale, which the shoal and sheltered water of Poole Bay cannot emulate, the rise of the highest waves at Bournemouth reaching but 10 ft. or so from hollow to crest; and residents there familiar with the English lakes assert that Windermere in a strong gale can show a much heavier "sea" than ever rises in this quiet centre of Poole Bay. Before passing to some notice of the artificial characteristics of these towns, one word as to climate. The difference in this respect is remarkable, although both places are recommended for those suffering from pulmonary disorders, it may be presumed, by a non-medical critic, of different characters. Torquay is warm, moist, and relaxing; Bournemouth dry, sunny, and comparatively bracing. The Torquay climate, affording comfort to those who, confined during the winter months almost entirely within doors, cannot hear the stress of a low temperature, has not a beneficial effect on strangers who are under no such restraint, London physicians finding obstinate bronchial cases for summer treatment among those who, in health, have accompanied, for a winter's sojourn at Torquay, consumptive friends for whom its mild temperature was prescribed. Dryness is the essential characteristic of the Bournemouth climate. Though the range of the thermometer is moderate, the winters there can, it is said, be cold enough to brace the nerves of any southern county native, and the summers are not too hot for agreeable exercise. If sunshine is to be had on the south coast it generally finds its way thither. As to the artificial features of the two, it must

he borne in mind that Torquay has grown and Bournemouth is growing, and that, too, under conditions of travel and of society which did not fully prevail while the Devonshire town was making its chief advances. Foremost among artificial advantages must be named, unquestionably, the charming public pleasure-grounds of Bournemouth, unique probably among English watering-places. The valley of the Bourne, happily offering itself for this purpose, was early and wisely appropriated, and laid out, length by length, in successive years, until there is now something like a mile of nearly continuous walks, grass-plats, and ornamental shrubbery, reaching directly inward from the outlet of the Bourne at the pier. These, with the walks along the pine-sheltered roads, may be held to compensate, in great measure for the want of any variety of country walks near at hand, in which, as before said, Torquay excels, the cliff walks and drives at Bournemouth scarcely giving the variety which visitors desire.

The natural difference of site, first noticed, produces, of course, an artificial difference of a very material kind in the entirely dissimilar character of the suburban roads and of the measure of interest they afford. At and about Torquay the reach and variety of view from the roads on the higher ground contrast greatly and favourably with the generally confined style of the landscape which can be enjoyed on the roads about Bournemouth. A railway journey of a few miles will, it is true, give those who are active pedestrians good starting points for long walks on the Dorset Downs and Hampshire New (?) Forest, but the roads laid out for drives and home walks rather give the limits for comparison in a notice like the present, and the architectural character of the two towns may now come under review. The elements for architectural effect exist, of course, much more largely in Torquay, with its terraced formation, than on the plateau which forms the general site of Bournemouth; and an appearance of more unity of purpose in the general planning and laying-out of building sites also marks the Devonshire town, and helps its natural features. A much more divided ownership in the Bournemouth land would seem to be one cause of this difference, and, possibly, a local control less wisely or authoritatively exercised over the laying-out of different centres of building; at all events, the impression of each planner doing what is good in his own sight exists much more strongly at Bournemouth than at Torquay. It is curious to note, as can as yet still be noted at Bournemouth, the common course of growth in such places of resort; the laying-out, in the first instance, of the principal roads and drives near the sea front, under the direction of some practised authority in such matters; the building on the lines of these, of modest two-story villas, comfortable-looking and unambitious; the gradually-added growth of larger and more important houses on the best sites, marked generally by the attention to arrangement and quiet style which belong to the English gentleman's house; and coeval with these one or two moderate-sized and unpretentious hotels. The first portion of a church will accompany these, and some very moderate speculations in the way of shop-building. Not long, however, does this sober process prevail. Enter the "speculative builder," and behold a new scene! The careful adaptation of building to site disappears; modesty of style and care of arrangement vanish, and a prevailing air of fuss and worry, of obtrusiveness and vulgar "look-at-me-ism" take their place; and flaring notice-boards announce that Messrs. So-and-so, "architects and builders," have these very eligible villa residences at their disposal. Torquay does not at the present time exhibit these symptoms of building fever in at all the same measure as its Hampshire rival. It has, as said above, "grown," though not probably to full stature; Bournemouth is most emphatically "growing," and where it will stop seems hard to guess, a strange notion having lately seemed to seize on its traders that it can be made a great town quite apart from its

health character (its only real plea for being), and really, as it seems, consequent on no existing cause! Buildings of pretentious, if not of very attractive, design, are carried up to five stories in height where three sufficed before; building sites fetch fabulous prices, and "premiums" over and above these prices are paid to some one or other, but not, it may be presumed, reaching the land-owners' purses.

The architectural visitor to places in this course of growth can learn almost all he may wish to know on local building practice and prospects by looking round the nearly completed "villas," "residences," and "mansions," on the look-out for buyers. He will not probably long have paced about a "villa" plot, and gazed in wonder, perhaps, at the particular brickwork and multi-styled features and decorations displayed, ere he will be accosted by an unmistakable "builder on speculation," with the inquiry whether he were on the look out for a house! This opens the way for general talk on the building subject at large, and the visitor will learn generally how very little, as a rule, architecture or architects have to do with the strange productions with which they are credited. "Do you design your own houses?" "Well—no, Mr. Dash" (a local architect whose name you know) "designed these for me." "Indeed! Did he design that porch, and the oriel over it?" "Well, no. When I say he designed them for me,—that is, partly, you know,—there wasn't no porch nor hang-out window in his design; but Smith, him as owns them next villas, has been getting of these things out on his, and buyers has got to asking for them, so I gets them out on mine; an improvement, don't you think?" If you go further, and learn what is paid in the way of fees for the design, "partly, you know," of these productions, you will conclude, most likely, that an architect could afford to bestow little thought or study on such work, and that the less he has to do with it the better, as the builder-proprietor is pretty sure to barter, by "additions and alterations" after his own heart, whatever of style or character may have been aimed at in the architect's work. There may be two sides to this question, and it may be said that if the speculative builder he left to his own devices, what horrors would result! But in the interests of art (if the phrase be not obsolete), were it not better that its name, even "partly, you know," were kept separate from what in its tolerably certain final shape can only couple it with vulgarity, often with absurdity and gross malconstruction. This is a digression not specially bearing perhaps on either Torquay or Bournemouth, but capable of some application to most of our salt-watering places, from Scarborough to Penzance or Tenby. One very general complaint is made of the want of medium-sized houses at moderate rentals; a gap generally being found between the pretentious high-rented, albeit probably very badly arranged, "villa," and the small, poky, inconvenient "cottage," with no accommodation beyond what would suffice for a retired shopkeeper or small tradesman: this applies to both Torquay and Bournemouth, more emphatically perhaps to the latter. The placing of the dwellings on their plots of land, and the management of the approaches from the road being, at Torquay, from its steep style of site, much more of a problem than at generally level Bournemouth, has led to much more apparent skill and thought, giving the impression that architectural advice, in its reality, has been more usually sought at Torquay; and, indeed, the sobriety and simplicity of design in the majority of the houses conveys a like impression in comparison with the Hampshire town; but the fact that the latter is in a brick district, and has the questionable advantage of easy use of varieties of coloured material may have something to do with this.

While Torquay has its harbours,—the new and the old,—Bournemouth has its pier, an iron-and-wood structure of some merit constructively, but most wonderfully Cockney in its approaches and embellishments. The fact that it was, as may be remembered, opened by the Lord Mayor of the day some years since,


may make this character rather appropriate, but the thought will occur of what will happen to these gimcrack appendages if some day a storm-driven sinking vessel has to be hauled up by all the force which can be mustered, and a stout hawser, manned by a score or two of boatmen and fishermen, should sweep along the balustrading! The materials for concrete so abundant on the spot (and have been well applied in the substructure of the pier approaches), that another thought occurs to a visitor; why should not a small harbour of concrete block masonry have been formed, large enough to hold a dozen yachts or so, and its bottom flushed by the dammed up waters of the Bourne? The water is shoal, but its depth at the pier-head would have sufficed if carried shoreward, and the means of scour suggested would apparently suffice too. No yachting men or their families will frequent Bournemouth, as there is no near shelter and no good anchorage; a yacht may occasionally drop her anchor for a tide or so off the pier, but the least show of foul weather sends her off post haste to Poole or Lynton; and here, of course, Torquay claims an advantage. Both towns carry their sewage into the sea; Torquay by a costly tunnel having its outlet at Hope's Nose; Bournemouth by three iron pipe discharges, one central at the pier, and other two at some mile or more eastward and westward. Is there never to be found a remedy for this surely false and injurious system? Is it at all possible, tides and currents notwithstanding, that the sea-water can escape pollution, and its use for bathing not be seriously damaged? And is it not a reproach to the economic chemistry of our day that such a waste of fertilising material should take place? The subject in its bearing on our present topic is an unsavoury one, but not perhaps the less suggestive.

In both Torquay and Bournemouth much of what architectural character exists is derived from the ecclesiastical buildings of each; and the principal building of this class in each is the work of the same architect, the late Mr. Street, R.A. St. John's Church, at Torquay, and St. Peter's, at Bournemouth, are both characteristic designs of their very able author, and both perhaps may be considered to illustrate his superiority in internal as compared with external design. Neither the tower of St. John's, Torquay, now just completed, nor the spire of St. Peter's, Bournemouth, added some four years ago, is a very successful work, but the interior effect of both churches is striking; that of the Bournemouth church, probably, the better. There is more of variety (as well as of number) in the Torquay churches, and more names of well-known architects, Mr. Salvin and others, attach to them. Mr. Street was the established adviser in such matters of the well-known church-building visar of St. Peter's, Bournemouth, the late Rev. A. Morden Bennett, and the parish church and several in outlying districts were of his design; a part of an earlier single-span St. Peter's, however, being retained in the south aisle of the present church. Mr. Norman Shaw, who, in this field of architecture may be regarded as one of Mr. Street's pupils, was the author of two other churches at Bournemouth, one, St. Michael's, being, in a modified form, for the present completed, and St. Swithin's, as yet a chancel only. An elaborate church, from the design of Mr. Pearson, R.A., is in course of building as a memorial to the clergyman just named, the nave being nearly completed; it is groined in stone throughout, and presents features more usually associated with larger buildings,—a triforium passage, for instance,—and is in other respects very characteristic of its author's style. Another incomplete church is St. Clement's, of Mr. Sedding's design; and a Lombard building, by Mr. Ferguson, of Carlisle, Holy Trinity Church, presents, in its plain red brick exterior, a marked contrast to its more ambitious neighbours of stone, its scale being, however, as large as any. No one can visit Bournemouth and converse with its residents there on the growth and history of the town without discovering how much of ecclesiastical influence entered into both, and

how largely Mr. Bennett contributed to make its fortunes. A High Churchman, zealous and liberal in promoting his views, he would seem to have aimed at forming a community of like views exclusively; but doctors would not so limit their recommendations, nor would the climate assume exclusiveness, and thus a separate interest grew up which resulted in the establishment of Holy Trinity church and parish. A rather remarkable design, in Belgian Gothic, is the Roman Catholic church by Mr. H. Clutton, with the comfortable clergy-house annexed to it, where the priests, under Jesuit direction, preside over a congregation consisting partly of those born in their communion, but largely recruited, it is locally stated, from among the surrounding "Anglican" congregations, well prepared, by ritualistic training, for migration to the Marian church.

An immense establishment (for such a town) is nearing completion under the title of the "Mount Dore," for hydropathic purposes, the intention being to localise the various mineral waters of the Continent. The speculation seems bold, and may prove successful, but an outsider may be pardoned, perhaps, for a little scepticism on the point. The varying popularity of health resorts, well evidenced, for instance, by Bath (and even by Torquay itself), should read a lesson to those whose material interests are wrapped up in them, as to the caution which should guide them in laying out building land and in interfering with their natural features. In the latter respect Torquay seems to have been fairly well guided; but the destruction of the pine woods, where not specially protected, about Bournemouth does not afford a similar assurance; and in both places ideas may grow up of unlimited demand for house accommodation which may not unlikely lead to ultimate grievous disappointment and loss.

NEW LIGHT ON A STATUE BY POLYCLEITOS.

 Do not pretend to know why Herr Anton Springer has been holding high festival on May 4th; we can only conjecture that, like Prof. Curtius, he has had an archaeological birthday fête. What concerns us is that, in true German fashion, each of his friends has written a learned tract to do him honour, and that to the volume thus collected Dr. Benndorf has contributed an essay* so original and so brilliant that Dr. Springer's birthday book (if birthday book it be) becomes at once for archaeologists "epoch-machende."

Literature dealing with the dark places of Pliny's art-criticism already abounds, but, as Dr. Benndorf remarks, it is not usually of a character greatly to encourage further enterprise. Sometimes, but very rarely, archaeological discovery, a statue, a coin, an inscription throws to the seeing eye unexpected light, and what was before of hopeless obscurity is instantly obvious. Just such a self-commending interpretation we believe Dr. Benndorf to have given of a passage hitherto torn and vexed by interpreters, given too in a fashion that throws light on literature as well as art.

In the *locus classicus* on the works and style of Polykleitos occurs the following passage:—"Fecit [Polykleitos] . . . nudum *talo incessentem*, *duosque pueros item nudos talis ludentes*" (Pliny, N. H., xxxiv., 55). *Talus* bears, of course, two meanings: either it is the ball-like bone of the ankle-joint anatomically, or it is the same bone used as a die to play with. Now in first reading the words, it would strike every one that, whatever *talus* means in the one passage, it must,—considering the close and seemingly intentional juxtaposition,—mean the same in the other; otherwise Pliny has given us a dull and awkward pun. "*Pueros talis ludentes*" can mean nothing but boys playing with knuckle-bones (*astragaloi*).

Groups of boys so playing are a perfectly familiar artistic type, and we can easily believe that Polykleitos made such a group. But when we come to "*nudum talo incessentem*," if we keep "*talus*" to mean the die (*astragalos*), what are we to make of the passage? Can we conceive that Polykleitos made the statue of a youth "*treading on a die*," or was it a youth attacking some one with a die in his hand? Archaeologists up to Benndorf's time have decided that the attitude of treading on a die, which from the literary point of view would give the natural meaning to Pliny's words, is from the artistic point of view a posture too unnatural to be maintained as the motive for a statue; the other alternative, "*attacking with a die*," is a motive worthy of a mere boy, but impossible for a serious athlete: it would turn the statue into a mere bit of *genre*. Driven thus to bay, archaeologists have tried emendation. "*Talo incessentem*" would give fair sense, but then it spoils the correspondence evidently intended between the two clauses. "*Talon incessentem*" gives sense, and turns the statue into a mythological piece representing *Talos*, the mythological, iron watchman of Crete; but this emendation again abolishes the necessary correspondence. Finally, archaeologists, by an almost unanimous consensus, decided to give up the "*die*" interpretation and credit Pliny with a stupid pun. "*Talo incessentem*" was to mean in some way attacking by means of the heel bone. Gesner ("*Chrestomathia Pliniana*," p. 920, 9) was the first to begin this line of interpretation,—he suggested "*talo incessentem*," kicking one foot against the other. This was not felt to be satisfactory either to art or language; and Otfried Müller ("*Handbuch der Archæologie*," s. 120, 3) went further, and fared much better. He ingeniously suggests that "*talo incessentem*" is the Latin form of the Greek *ἀποπτερίζω*, which may roughly be rendered, "to do the heel trick." Polykleitos then, according to Pliny as interpreted by Otfried Müller, made a statue of a naked youth doing the heel trick. Now, it will at once occur that if this was the motive of the statue the youth must have been "*doing the heel trick*" with nobody to do it on, as Polykleitos made a single statue, not a group. This, however, is not a fatal objection, as representations of preliminary practice, *i.e.*, the mock or shadow fight (*σκιμαγία*), were far from uncommon. Hence this interpretation has met with wide and almost universal acceptance. Ulrichs ("*Chrestomathia Pliniana*," p. 318) considers that this motive of the heel trick is an added instance of the "*ponderation*" peculiar to the statue of Polykleitos, *i.e.*, the fashion considered to be so characteristic of making his statues stand on one leg (*uno crure ut insisterent*), Prof. Brunn ("*Geschichte der Gr. Künstler*," i., p. 216) says decidedly that in the statue of the "*talo incessentem*" we have not a dice-player, but a "*wrestler whose peculiar skill consists in his use of the heel*." Dr. Overbeck ("*Geschichte der Griech. Plastik*," i., 397) takes up the same tale. Mr. Perry *more suo* repeats the second-hand verdict "*talo incessentem*," showing his art in the use of his heels ("*Greek and Roman Sculpture*," p. 354). Mrs. Mitchell, in like manner ("*History of Ancient Art*," p. 385), "*talo incessentem*," striking with his heel; only Mr. Murray, with fine caution, declines to translate the untranslatable, and writes "*talo incessentem*," "*whatever that may here mean*."

We think if such caution were a little more exercised it would promote sound progress; a blank, frankly acknowledged, stimulates inquiry, but a half explanation, even when known to be inadequate, soon becomes stereotyped and traditional, and lulls the archaeological conscience; it is also apt to pervert the instinct of beginners. Happily, however, there are men whose minds do not gladly suffer a half explanation, who will not strain language in the supposed interests of archaeology, but who know that these two are never really at issue, and who in cases of seeming conflict wait for the further light that brings evident reconciliation. Dr. Benndorf felt that the traditional interpretation of "*talo incessentem*" by "*doing the heel trick*" sinned first against language by not

providing the required correspondence in meaning between "*talo*" and "*talis*"; secondly somewhat against art by providing for a statue by Polykleitos a motive difficult, transitional, and unrefined,—a motive, in fact, which we should much more readily associate with the name of Myron than of Polykleitos. Last and chief, he maintains that Pliny could not be translating *ἀποπτερίζω*, because *ἀποπτερίζω* means something wholly different. This takes him to anatomy. The heel part of the feet has three bones, each with their clear and well-defined names both in Latin and Greek; the ankle bone (*τὰ σφυρά, malleoli*), the ball of the heel (*ἀστράγαλος, talus*), the heel bone (*πίρρα, calcx*). Dr. Benndorf does not deny that in common parlance a certain laxity would not naturally beset this terminology, but he maintains, and we think justly, that in translating a Greek term which described a perfectly well-known palestraic *schemata* there could be no reason why Pliny should not use the natural and correct equivalent *ἀποπτερίζω, calcx incessere*.

But Dr. Benndorf goes on to say, "Was Pliny translating *ἀποπτερίζω* at all?" What actually is this palestraic *schemata*? Here we must be content to state Dr. Benndorf's conclusion without going in detail through his arguments. The *locus classicus*, on this wrestling *schemata*, as in the "*Herolikos*" of Philostratos, p. 678; ii., p. 146. 4, from this and other passages it is abundantly clear that the *schemata* takes place when the wrestler who employs it is on his back, making a feint of defeat (*ὁ χαλεπὸν κείμενος τῶτος ἢ ὑπαισθόμενος*). It is the *schemata* which lends Pindar a fine metaphor (Isth., iii., 65), the *schemata* in which the man is in sleight as a fox (*μῆριν δ' ἀλώπηξ*), "*that spreadeth out her feet, and preventeth the swoop of the eagle*." The modern fox is no less crafty. Dr. Benndorf cites Reinecke Fuchs, xii., 163, where there is a long account of how the fox lies on his back feigning defeat, and as the wolf is delivering a homily on preparation for death, the prostrate fox deals him a fatal blow. Now had archaeologists taken the trouble to ascertain the strict use of *ἀποπτερίζω*, they would never have ventured to attribute to Polykleitos a statue representing a single athlete prostrate in this attitude.

Here Dr. Benndorf's destructive criticism ends; the "*heel trick*" theory he has, we think, disposed of for ever. With the field thus clear before him he returns to "*talo incessentem*." It is an ancient monument, not an ancient text, that has lent him the clue. On the 8th of April, 1878, in front of the steps of the terrace on which the treasure-houses of Olympia stood, there was found, a little south of the seventh treasure-house (counting from the west), a marble basis, in the form of a knuckle-bone die (*astragalos*). This *astragalos* is published in the "*Ausgrabungen*," taf. xvi., and a cast was made and sent to Berlin. Examining it, Dr. Benndorf found that on the top there are two distinct foot-marks, surrounded by holes for riveting, showing clearly that a bronze statue once stood actually on this very *astragalos*. Pliny can now be translated simply and naturally. As we have monumental evidence that a bronze statue actually stood once on an *astragalos* basis, there is no difficulty in supposing that Polykleitos made just such a statue, and that it was described as *γυμνὸς ἀστράγαλῳ ἐπιεπίσμενος*, which Pliny, not very clearly understanding, rendered "*nudum talo incessentem*."

But further there is a strong presumption that this *astragalos* basis is actually the basis of the statue by Polykleitos of which Pliny wrote. The marks of the feet show that the left foot was firmly planted toe and heel both on the ground, while the right foot hung behind in the true Polykleitan *uno crure* attitude. Of this attitude we have not only literary but positive monumental tradition. Of the many bases discovered at Olympia, one is certainly proved to have supported a statue by the elder and greater Polykleitos, and on this basis (published in the *Arch. Zeit.*, 1882, p. 190) there are marks of the two feet in a position exactly analogous to that of our *astragalos* basis. But now arises a further question. If we have in

* O. Benndorf, "Ueber ein Werk des älteren Polykleitos," Separatdruck aus: Gesammelte Studien zur Kunstgeschichte, eine Festschrift zum 4. Mai, 1885, für Anton Springer."

this basis the actual basis of Pliny's statue of the "talo incessentem," what was the motive of the statue? Whom did it represent, and why was he represented standing on an astragalos? Here we come to the last and perhaps most ingenious portion of Dr. Benndorf's argument. The astragalos must evidently have some meaning, must be in a sense attributive, show the character, or somehow mark the fortune, of the figure it supports. Now, about the symbolism of the astragalos, there is no manner of doubt it constantly indicates fate, good or bad, according as it was cast.

Without going into details of dice-throwing, we may note that of the two long narrow sides of the astragalos one, the broader side, was the easier throw, and consequently unlucky; it was called the *χῆρον*; the other and narrower side was more difficult, and hence the luckier, —it went by the name of *κῆρον*. On this, the lucky side, our astragalos stands. To the Greek eye this would have an obvious meaning. The figure standing on this astragalos in the *κῆρον* throw was somehow a figure of happy omen. It would have been quite possible to suppose the figure was that of a victorious athlete, or even that a pun was intended on his name,—that he was a Coan man, a man of Cos. Such punning monuments are quite in the Greek manner. But there lies at hand a simpler and a finer interpretation. It will be remembered that the astragalos basis was found in front of the terrace of the treasure-houses. Now, Pausanias tells us (v., 14—9) that as he was passing from the Metroon to the Stadium,—passing, therefore, close beneath the treasure-house terrace, as a glance at the plan of the excavations will show,—he noted two altars at the entrance of the Stadium,—one to Hermes Enagionos, *i.e.*, Hermes the patron of athletes, the other to Kairos. He goes on to say that the Chian poet, Ion, had written a hymn in honour of Kairos, and in this hymn made Kairos the youngest of the sons of Zeus. This hymn, it seems very possible, was written to celebrate the inauguration of the cult of Kairos at Olympia.

Drawing together the threads of his argument, Dr. Benndorf conjectures that Polycleitos, who would be roughly the younger contemporary of Ion, made a statue in the honour of this same cultus of Kairos, that the statue stood near the altar seen by Pausanias, and that of this first statue of Kairos we have the astragalos basis.

How probable,—how almost certain,—this conclusion is, we can only see if we examine for a moment the character of this divinity, Kairos. It is the merit of Dr. Curtius to have, in a brilliant essay published some years ago ("Die Darstellungen des Kairos Arch. Zeit." 1876, p. 1), given the god a new actuality. He is not among the ranks of the early Greek gods. Homer knows nothing of him; he is one of the secondary divinities (*δωδεκαθεα*), the religious conceptions that grew up to answer to the wants of a later and more self-conscious civilisation. Because of this, and because from the want of capital letters in ancient writing, it is hard sometimes to know if Kairos is a person or an abstract noun; he is apt to be somewhat shadowy in our minds. We associate him with late art, we accredit Lysippus with the invention of his sculptured type, and we charge him with a certain cold abstractedness for embodying such a vague personality. Sometimes, indeed, about these secondary gods there is a good deal of shadowiness; sometimes, as Dr. Curtius notes, they obtain in literature and find no place in art, *e.g.*, Angelia, daughter of Hermes; sometimes the reverse, *e.g.*, the god of contests, Agon, of whom statues were made, but who never appears in literature.

But, if we look at facts, Kairos is no such shadowy personage. He is a god, indeed, who is the very outcome of Greek character, and bears the sign manual of the national genius, a god common to Greek literature and Greek art; a god, too, who comes into real being just with the finest flowers of Greek genius, and who loses much of his meaning, all his distinct personality in the decadence of Alexandrian days. The distinction between Chronos and

Kairos was only possible to a language instinct with logic. Chronos, time the *continent*, time in its extension, an abstract conception, a condition indeed of thought, but merely the frame, the background of action. Kairos, time the *content*, time possessed by action, time seized and vitalised by human energy, made effective, made actual, time cut off (*εἰρω*), and made momentous, time the inert, transformed into Attic activity (*τὸ δραστηριον*). Chronos refused to be localised into a personality, but not so Kairos. He was at home in the palaestra, and there becomes, as an aspect of Hermes, the athlete god, most entirely personal. It was Kairos who seized the lucky moment in the wrestling bout, Kairos who grazed the goal so closely with his chariot-wheels, Kairos to whom all men offered sacrifice as they entered the Stadium, Kairos who guided the hand of the happy dice-player. The statue by Polycleitos we may conceive, then, as a young man fresh and "fit," alert, with winged feet, poised in delicate balance but yet at rest. Such a thought was very far from any conception of mere chance (*τυχή*), mere good luck; it was the man and the time come together,—man's ability and time's opportunity. But we can readily see how the thought could be vulgarised. Kairos is the god of the man with mind eager to think and body trained to act. Chance is the god of the sluggish and the fool. And, in fact, a thought so perfect as that of Kairos could not and did not tarry long; in the later monuments of art we have the youth balancing the scales of fate on a knife edge (*ἐπὶ ἑνὸς ἀκμῆς*), or again the clumsy figure halancing itself on winged wheels, risky, unrestful, and last we have the ugly, literal, unplastic outline of the figure with the bald crown and long locks of hair to the front. The earliest example Dr. Curtius quotes is a mere fragment of Athenian work, one leg and part of the body, but easily recognisable from the curious characteristic pose of the lower limbs thrown far forward.

If we are to believe Kallistratos, the figure of Kairos by Lysippus embodied all these ugly innovations. It stood on a rolling ball, had locks of hair falling on the forehead, and was shaven behind. But if Dr. Benndorf be right, we cannot credit Lysippus with the invention of the type: it must have been traditional in the Peloponnesian school, beginning probably with Polycleitos. It was a subject thoroughly athletic in character, and therefore perfectly suited to Polycleitos and Lysippus. It is quite possible that Lysippus softened the type, investing it with something of the pensive, slightly allegorical manner of Praxiteles, who seems at least as much concerned with the thought as the personality. Very possibly, too, as Mr. Murray suggests ("Hist. Greek Sculpture," ii., p. 340), the statue was "worked out in the older analogy of the god of sleep, Hypnos." Kairos and Hypnos were, indeed, but two aspects of the god Hermes, the god of human action,—Kairos, the effectiveness of actual energy; Hypnos, the no less real and necessary effectiveness of sleep. However, to reconstruct the statue of Lysippus is no part of our purpose; it is enough that Dr. Benndorf has given us new light on a statue by the elder Polycleitos.

Proposed "Shippers" Exhibition in Liverpool.—It is intended to hold in Liverpool during the year 1886 an Exhibition of Navigation, Travelling, Commerce, and Manufacture, in a building to be specially erected for the purpose. The site chosen is the Edge-lane Hall Estate, adjoining Waverter Park and the Botanic Gardens, of which an area of about thirty-five acres has been placed at the disposal of the Executive Council by the Corporation of Liverpool; and in addition to this it is hoped that the use of the Botanic Gardens, admirably adapted as they are for out-door *fêtes*, may be granted for that purpose on special occasions. At a recent meeting of the Exhibition Council, the secretary reported that the guarantee fund amounted to 30,025*l.* Sir James A. Picton's name was added to the building committee. Mr. Henry Summers was requested to act as consulting architect to the exhibition, of which there is every prospect of success.

NOTES.



THE irruption of water into the Houghton-le-Spring Colliery on the 3rd of June has been followed by an explosion of unusually fatal consequences at the Clifton Hall Colliery, near Manchester, on the 18th of the same month. Three hundred and forty-eight men and boys went down that pit on the Thursday morning; and out of this number 214 have been brought up alive, although four of them have since died. Twenty-three bodies were brought up in the course of the day, and forty-one more up to 5 p.m. on the 19th. Contrary to ordinary precedents, no opinion has yet been offered as to the probable cause of the calamity. Walter Travis, one of the miners who were rescued, gave an account of his experience in the case. Three seams of coal are worked from the same shaft. It was in the third, called the Trencarbonate seam, that the explosion took place. The depth below the surface is 540 yards, but the seam drops down a steep decline from the shaft, and seven side levels run from it in an oblique direction. "All of us," said Travis, "had been working with candles." No gas had been noticed in the workings; but at 20 minutes past 9 a.m., as the men were at breakfast, an explosion occurred, and the lamps and candles were blown out. The effects of the after-damp became immediately sensible, but the miners managed to put a brattice, and thus maintained such a ventilation as to save their lives. There seems thus little room to doubt that the mine was one ordinarily so free from gas that the dangerous practice of working it with open lights was followed; and that in one of those sudden disengagements of stored up gas, of which we have had so many examples, the blower came in contact with the naked flame, with the fatal result described.

ATTENTION should be directed to the large area of underground gallery that appears to have been worked from a single shaft at the Clifton Hall Colliery. There is a connexion with the Agricolt Colliery, about a mile away, but it is not stated whether this connexion is made in each of the three superposed seams of coal. There is also an upcast shaft, used principally for the purpose of ventilation, but which is provided with a capstan-rope. The cages, however, were jammed by the force of the explosion in the downcast shaft, and it proved impossible to descend to a lower level, so that the extrication of the imprisoned miners had to be effected from the Agricolt mine. One hundred and fifteen men, in one of the upper levels, although uninjured by the explosion, were in imminent danger of suffocation by after-damp. Fuller particulars will, no doubt, be forthcoming as to the ventilation of the mine; but it would seem, from the statement that "two great gaps in the wall of the shaft had opened a communication with the upcast shaft"; that the pits spoken of as distinct were, in fact, one, divided by a wall, for the purpose of ventilation. In workings covering such an area, in which so many lives are risked, it is essential that there should be at least two entirely distinct shafts. We do not mention this as throwing any reflection on the management of the Clifton Hall Colliery, as the connexion with the Agricolt Colliery, to which those rescued owe their lives, may possibly have been all that was needed. But of the need that two distinct shafts, and not one large shaft divided by a brattice or wall, should be insisted on as a condition of the working of a colliery we have here another fatal illustration.

THESE are the facts of the most recent case on the law of light, namely, *Bullers v. Dickinson*, to be found in *Law Reports 29, Chancery Division*, p. 155. There was an old woodman toll-house in Jacob-street, Bermondsey, which stood out into the road, so that its frontage of 14 ft. 6 in. was not in a line with the rest of the buildings. The ground-floor room was used as a shop, and almost the whole front was filled with a window, which had a right of light attached to it.

Ultimately this old house was pulled down by the owner, and the projecting portion was sold to the vestry for the purpose of widening the street. At once, on the remainder of the site, a brick building, one story high, instead of three, was erected, and a window was placed in this new building substantially on the same level as the old one. But it was several feet further back than the original window, and the room was not more than half the size of that the portion of the site of which it now occupied. In the report from which we take these facts, a small plan is published, any one who desires to refer to it will find it explains the case quite clearly. The light to the new window was obstructed by a new building, and hence an action arose, the contention of the alleged infringer of the right being that the owner of the window had abandoned his right by his treatment of the site. But Mr. Justice Kay held that there had been no abandonment of the right in question, because the rebuilding of the same sized windows in practically the same position, but further back, was not an abandonment of the original right.

IT must be confessed, however, that the judgment in *Buller v. Dickinson* appears to carry the law further than it has yet gone in favour of the owner of an ancient light. It is a comparatively modern extension of the right which allows the owner to claim the old right in regard to a window enlarged or altered in shape, but in such cases the window is in the same position, though not the same in size or form. Here we have a new window in a new place, and in a new wall, for the wall was set back 4 ft. at the west, and 7 ft. 9 in. at the east end, and except that the new window was of the same size and on the same horizontal level as the old window, it appears to have no connexion with it at all. It is easy to imagine a building which might have been an obstruction to the light of the old window, which would not be one to the new window. Hence it appears to us that the owner did not possess the same right of light in the two walls, and it is on the assumption that it is the same right that he is entitled to the protection of the law. It may be that the case will be carried to a Court of Appeal and will there be fully discussed; at present it must be regarded as extending the right of the owner of the dominant tenement in a somewhat startling manner, with a result not altogether to the public advantage.

THE proposed people's palace for the East-End seems to be growing up by degrees into a definite project, the realisation of which may be expected at no very distant date. At a meeting at the Mansion House on Tuesday it was stated by the Chairman, Sir Edmund Hay Currie, that whereas a year ago they were merely trustees of a fund of 11,000*l.*, they had now 40,000*l.* in hand. The Institution is proposed to include, when complete, a technical school, a library and museum, as well as means of recreation of various kinds. The Prince of Wales proposed the first resolution, "That this meeting views with satisfaction the progress which has already been made in furthering the great scheme of the Beaumont Trustees for providing opportunities amid the dense population of East London for rational amusement and technical education; and having regard to the eligible site now vacant in the Mile End-road, would urge the Trustees to complete the purchase of the land and commence the erection of the necessary buildings." The resolution was seconded by the Archbishop of Canterbury, and carried unanimously.

IT is to be hoped that those philanthropists who have been interesting themselves in the question of housing the poor will not rest satisfied with improving the slums and rookeries of our great towns, but that they will be able to keep an eye on the dwellings inhabited by artisans in special trades. Of these, colliers and miners are notorious sufferers, as everybody knows who is acquainted with mining districts, though it must be admitted that the barren and unprepossessing character

of the neighbourhood, with its dreary spoil-banks and slag-tips, give the locality the slenderest chance of looking attractive. Many a grimy and blackened exterior contains a comfortable home within, though the majority, whether in Durham, Staffordshire, or South Wales, are very far from being what they ought to be. One cause of this is that the ground, being so worked out underneath, is apt to settle, causing all kinds of irregularities and cracks in the walls of the dwellings; but the chief reason is that, as a rule, mine-owners are not the proprietors of the land around and about the mines, and are unable to build houses for their workmen, owing to the short leases generally allowed by the ground landlord. When colliery proprietors are also owners of the soil, and are inclined to do the right thing, as at Earl Fitzwilliam's pits in Yorkshire, and those of the Staveley Company in Derbyshire, the building of proper houses has had the happiest effect, not only on the good health and sanitation of the community, but in the prevention of that constant change and migration that is such a feature amongst men of this class. Owners should bear in mind that the investment in home comforts for their "hands" is always a paying one, and that a workman becomes more and more valuable the longer that he stays in the same place.

THE disused burial-ground in Union-street, Southwark, known by the ghastly name of the "Crossbones," was recently sold by the trustees of a local charity, to whom it belonged, for 2,300*l.* The Metropolitan Public Gardens Association, fearing that a further attempt may be made to utilise the ground for building purposes, have memorialised the Metropolitan Board of Works to take steps to prevent the ground in question being used for the erection of houses. It may be true, as the poet says, that "the earth rings hollow 'neath our feet, and warns us of her dead," and that in most ancient cities there are but few localities that have not, at some time or other, been used for the purpose of interment, but it is desirable that some time should elapse before "the house appointed for all living" should be converted into eligible building plots.

AT Pasadena, one of the colonies round Los Angeles, some 500 miles south of San Francisco, a system of irrigation is carried on by the agency of companies, who supply the water for agricultural as well as domestic purposes. Owing to its scarcity the water is so valuable that it has to be conveyed by pipes in order to save loss from evaporation and soakage. The head of water allowed to each 250 dollar share of stock in the Association is 25 inches for 1½ hour, sufficient to irrigate 10 acres, the original value of which, from 1½ to 2½ dollars only, has risen to between 250 and 350 dollars when set out with orange and other fruit trees, so enormously valuable is the effect of irrigation. The pipes, locally termed "laminated," are formed by inserting one sheet-iron pipe into another little larger pipe, and joining the whole together by filling the space between the two with asphalt. The two pipes are made in sections, 8 ft. long, rolled, lapped an inch, and welded by a composition solder that makes the joint actually stronger than the iron itself, as proved by experiments, in which it was found that the iron always ripped while the joint remained sound. The inner shell is telescoped into the outer while immersed in hot asphalt, specially prepared, giving a thickness between the shells of 1-16th of an inch, which prevents the possibility of corrosion and forms a strong band. Pipes 4 in. in diameter thus made are guaranteed to stand a pressure of 500 lb. to the square inch, whereas riveted pipes of the same size begin to leak at 150 lb., and, at 250 lb., are unfit to conduct water. The net returns from irrigated orange groves, after paying all expenses, are said to vary from 250 to 500 dollars, or roughly, from 50*l.* to 100*l.* per acre. The Irrigation Commission, deputed by the Australian Colonies to America, is publishing much useful information on the subject.

SOME time ago Mr. Gladstone intimated to the Lord Provost of Edinburgh his desire to restore the ancient city cross, removed about the beginning of this century from the High-street, as it was considered an obstruction to the thoroughfare, an incident referred to in Scott's spirited lines:—

"Dun-Edin's cross, a pillar'd stone,
Rose on a turret octagon;
But now is raised that monument,
Whence royal edict rang,
And voice of Scotland's law was sent
In glorious trumpet clang.
Oh! be his tomb as lead to lead
Upon its dull destroyer's head!
A minstrel's malison is said."

This cross was erected in place of an earlier structure removed in 1617 upon the occasion of the visit of James VI. to his native country. It consisted of an octagonal structure about 18 ft. in diameter and 15 ft. high, having at each angle Ionic columns, from the capitals of which were corbelled out small rounded turrets. Between these columns the wall-space was contained within semicircular arches, with key-stones and key-blocks. In the upper part of each arch there were sculptured medallions containing heads having no particular value historically or artistically. These medallions were secured by Sir Walter Scott, and are built into the garden-wall at Abbotsford. There they form a more interesting object than they would be if incorporated into the restored (or rather new edition) of the old cross. Access to the flat roof of the octagon was gained by a staircase, which was guarded at the foot by a heavy oak door studded with iron nails. In the centre of the platform stood an octagonal shaft about 30 ft. in height, having a capital of Late Gothic character, upon which was placed a rampant unicorn hearing the royal standard. This shaft now stands within the railings of St. Giles's Cathedral, where it was placed about ten years ago. The shaft is much chipped, and is encased in a coating of cement. It is proposed to incorporate this shaft with the new structure, but it would, in our opinion, be better to allow it to remain where it is to tell its own tale, and to make a facsimile of it for the new structure. Mr. Gladstone has entrusted to Mr. Sydney Mitchell, architect, the work of preparing the design, and the Town Council have fixed upon a site to the eastward of St. Giles's Cathedral, and to the westward of the Police Buildings, a site most suitable in all respects, and close to where the old structure stood.

THE progress of the works of Herr Krupp at Essen may be said to be one of the marvels of modern industry. The most recent and authentic data show that in 1860 the total number of workmen employed by Herr Krupp was 1,764. In 1870 they had increased to 7,084. At the present time (1885) the total number employed in all the establishments of Herr Krupp exceeds 20,000. If we add the wives and children dependent upon the workmen, the total number of persons supported by the Krupp works is not less than 65,381. Of this number fully 29,000 dwell in cottages built by Herr Krupp, and belonging to his works. There are eight separate and distinct departments belonging to this enormous concern. In the first place, we have the vast extent of workshops at Essen; secondly, three coal-mines at Essen and Bochum; thirdly, no fewer than 547 iron-ore mines in various parts of Germany; fourthly, several iron mines near Bilbao, in Spain; fifthly, an extensive series of smelting-furnaces; and sixthly, the ranges at Meppen, for the testing of the Krupp guns. Besides the eleven smelting-furnaces there are 1,542 puddling and heating furnaces. The number of steam-boilers employed on Herr Krupp's works is 439, and the total horsepower of the 450 steam-engines in use is 185,000. There are thirty-seven miles of railway in the works, on which the traffic is performed by eighty-eight locomotive engines, and a park of 893 luggage-wagons. There are no fewer than thirty-five telegraph-stations, with forty miles of telegraph-wire and fifty-five Morse apparatus in operation on the works.

IN reference to the recent Congress of French Architects, we are asked to mention that the morning of Friday, the 12th of June, was specially reserved for the consideration of the subject of the "Caisse de Défense Mutuelle des Architectes," of which we have more than once spoken. At that sitting the new association was constituted, and its statutes approved, subject to confirmation by a general assembly, to be held next November. The powers of the committee of organisation, now become the committee of administration, have been prorogued until the meeting of that assembly.

THE new branch offices for the Bank of Scotland in George-street, Edinburgh, form an important addition to the architectural features of that street. The building has been designed by Messrs. Kinnear & Peddie, who have adopted the severe style of Italian Renaissance practised in Florence. The ground-floor is boldly rusticated, and the windows consist of large circular-headed openings, divided by stone transoms supported by fluted columns. These are flanked by doorways, the western one leading to the bank proper being emphasised by a portico of coupled columns with a pediment filled in with the cognisance of the bank, executed by Mr. D. W. Stevenson, A.R.S.A. The first-floor windows are surmounted by pediments supported by fluted columns, and those in the third and uppermost floor are framed by moulded architraves, and the wall-head is finished by a boldly-projecting dentilled cornice. There is an unusual amount of wall space in the upper stories, which gives a dignified and severe aspect to the façade, in keeping with the purposes of the building, but the general effect, although every detail is perfectly correct, is cold and uninteresting.

AT Messrs. Bellman & Ivey's rooms at 37, Piccadilly, there is at present on view a collection of the productions of Mr. T. W. Maclean, the sculptor, which includes some very admirable work. The largest group is a marble one suggested by, or rather a reproduction in sculpture of, two figures in the painting of the "Spring Festival" by Mr. Alma Tadema. Mr. Maclean has succeeded very well in giving in sculpture the type of sensuous Roman face which we know so well in Mr. Tadema's paintings; but we prefer his more original figure entitled "Comedy," in which he has succeeded in imparting a very genuine *vis comica* to the countenance without transgressing the proper limits of sculptural expression. There are other fine works there, especially a marble bust, "Meditation," a monument (terra-cotta has-relief) to be erected in Weeting Church, Norfolk, and the terra-cotta version of the "Ione," which will be remembered as an object of attraction in the Grosvenor Gallery some time since.

THE SPECULATING BUILDER.

The speculating builder, like the long-suffering Israelite, is a member of a separate caste. Like him he is become a necessary unit in our social life, and like him is the bearer of much numerated obloquy. His very name sounds an alarm to suspicion and distrust. His astuteness, which all allow, is exaggerated at the expense of his integrity, which all are prone to deny. Abused and avoided, he is, nevertheless, secretly admired by an intensely commercial world as the possessor of occult and mysterious powers which make for wealth. His real business is not building, but finance; and in the skill or maladroitness with which he picks his way through complicated financial problems lies his good or evil fortune. In all this he reflects the characteristics of his ancient counterpart. And there are said to be other resemblances upon which we need not insist. As with other original and adventurous minds, the exercise of his genius is variously rewarded. The lives of some of the brotherhood are bound in shallows and in miseries; whilst others attain wealth, position, even rank, and the good or ill which these bring in their train. There have been, and there are, speculating builders of liberal

views and unimpeachable character; whose business calls for administrative powers of a high order, and who have found the wisdom of entrusting the architectural section of their works to architects,—but these do not fall within the scope of our little sketch. Mr. Balbus is a good typical illustration of the class with which we are dealing. Uneducated, or, at best, ill-educated, he was heavily handicapped in life's race, and his success is so much the more to his credit. Beginning life as a bricklayer, it soon became apparent that he was born for better things. From taking work by the job he speedily became a sub-contractor on a more comprehensive scale, and under his gentle compulsion an army of meager mortals called rapidly into being some miles of those elegant but precarious tenements which adorn our London suburbs. His spirit of enterprise was not to stop here. Backed by his small accumulation of capital and that of a friendly publican, he negotiated on his own account for a large "take" of land which was then in the market, and available for the erection of those genteel villas for which, the lessor intimated, an overflowing and excited population was absolutely clamouring. The land was situated in what is known to some as an "improving" neighbourhood. Now the improvement of neighbourhoods is our friend's *specialité*. In this he is *facile princeps*. His plan is simple and effective. Take a meadow, the larger the better. Cut down the fringing elms and grub up the hedges. Break up the surface into small sections of a few feet square by running tracks of broken rubbish through it. If the ensoulèd gravel dig it up and sell it. You will not, of course, save it for concrete, or the sand for mortar. We assume you are not a simpleton. Any extravagance of that kind would never prosper. You then fill in the pits with refuse matter, and proceed to build thereover small, slender, rickety brick shells, divided up horizontally and vertically by strips of deal. An artful arrangement of battens supporting a thin film of slate furnishes a roof; and the painter, plasterer, and paperhanger convert them like magic into the brightest, stickiest, and genteelst of villas, which are occupied before the paint is dry. They are damp. They are cold. They are hot. What of that? They let. The builder sells them: he sells the improved ground-rents he has created, and before his handiwork has time to come to pieces, he is off. He found a solitude, and leaves a slum, and he walks away serenely satisfied with the result, and looks around for some secluded spot in want of similar "improvement." A more questionable form of improvement consists in buying some fine old mansion, with its eight or ten acres of pleasure-grounds, such as you see will lately on the margin of our London commons, and within memory bounding many an open green within the postal radius. The house is pulled down, and sold piecemeal, the gardens desecrated, the birds are driven from their immemorial home, and a general havoc is made. Roads are driven longitudinally through the whole, and rows of showy houses stare at each other in long broken lines, as monotonous and uninteresting as the lives of their inhabitants. But his effrontery reaches the sublime when he leases a disused burial-ground for the basis of his operations, and builds houses for the living on the decayed and decaying dwelling-places of the dead. By such arts as these Balbus grows rich; and to be rich is to be respected. He is a member of the vestry, and eloquent on all questions affecting the sanitary legislation of the parish. He is also on very good terms with the surveyor, and particularly so with the inspectors of nuisances. It is needless to say that he is a staunch supporter of the local building societies, whose members relieve him of the genteel residences which he erects. He retains a few of the better-built for his misuse, and he appears to have some unexplained mysterious interest in many of those which have nominally passed out of his hands. He is a tall, dark, saturnine man, with a hard, weather-beaten face, and small, keen, restless eyes; able to say curt and even strong things to tenants who complain and want something done; but full of jests and pleasantries to "the little dears wot is a-going to pay." He drives a very shiny "village" cart, drawn by a very sleek and knowing pony, who evidently sees through his master, and disapproves of many of his ways. With this equipage he is always going to and fro upon the earth collecting his rents, looking after his men, and prospecting new localities

yearning for his improving touch. His own house is large and elaborate, and was built for a City gent, who did not live (financially) to inhabit it. An architect designed it,—an incipient architect, that is,—and the original design was by no means a bad one. But the builder's fatal talent for improvement could not be at rest. The instinct which leads little boys to embellish the theatrical posters by putting monstachios on the ladies' lips, and pipes in their lovers' mouths, induced our friend to add little twirls and flourishes to the work of his collocationeur. A good deal may be done with a sprinkling of terra-cotta vases, a few glazed tiles, and a dash of cast-iron crests and finials; and the free use of a miscellaneous assortment of these articles, bought cheap, added much artistic interest to the original scheme. The good man opens his own splendid front door in his shirt-sleeves and shows you his house and grounds, his carriage-sweep and greenhouse, his dodos and country flowers, with pardonable pride; and in the rustic summer-house in the remotest corner of the grounds, his friends from town on Sunday afternoons calmly smoke their long pipes and sip their brandy and water, listening contentedly for the hundredth time to the incidents of their friend's unbroken successes. As a rule he has rather a contempt for art, and looks upon it as "umbug." That which suits his customers and is pretty in their eyes is pretty in his. But his own house is an exception. There he has "garnered up his heart," and regardless of cost, has shown once for all that when so minded "Todgers's can do it." His sons will not follow the business. They know that they will be fairly provided for. One is to be a lawyer; for experience has taught his father that one way or another much of the current coin of the realm finds its way into the lawyers' pockets. His daughters have a dreary time with their upstairs neighbours, who keep persistently aloof. The fact is that Mrs. B.'s "ways are peculiar," and social intercourse is beset with some curious little risks and surprises. But the whole family share the paternal skill in finance, and the next generation will set these little matters straight. The old gentleman with his shirt-sleeves and long pipe, and the old lady with her strange orthodoxy, will have moved off; and the family of Balbus will take the position in the world to which their talents and their means entitle them. There is another side to the picture. The speculating builder, with too little capital and too much conscience, is like to have a hard time of it. Demands come upon him from all quarters. From lawyers and their mysterious City friends, from surveyors and timber merchant, and merchants innumerable. The outgoings are manifold and inevitable. The incomings are precarious and problematical. In the endeavour to live he is often unjust to others, and others are not always just to him. If, however, he were to consult their interest before his own he would be unlike the rest of the world. That his calling is not an abnormally profitable one is shown by the fact that his Israelitish counterpart does not engage in it. Perhaps he is too honest. And if our friend Balbus were too much overweighed with this quality,—well, he would never live in the house he does, and drive Mrs. B. to "the Oaks" in his own trap.

COMMON THINGS.

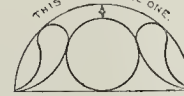
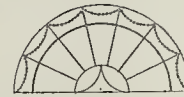
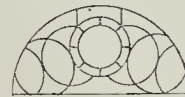
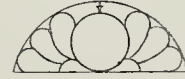
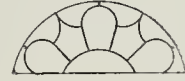
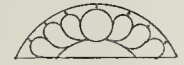
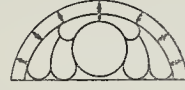
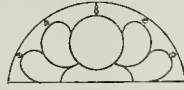
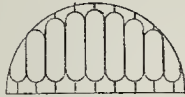
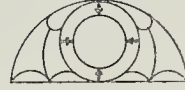
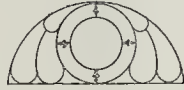
AN ARCHITECT'S NOTES.

As in other subjects of study, so in architecture, there is a great deal to be learned from the common things that we pass every day on our way to business. Putting aside the work of the last fifty years, which we may claim as our own, and which undoubtedly contains more good points than it is generally allowed to do, there is much pleasure to be derived from the study of the numberless quiet buildings previously erected and that did not come under the influence of the Greek and Gothic revivals.

The English Renaissance, if traced from the beginning of the sixteenth century to its interruption by those revivals, will be found to reveal several successive waves of style, each bearing on its crest a distinct individuality, and all moving forward towards an ever-distant shore.

The rock of revivals appeared itself and checked these waves in mid-ocean and broke

FAN LIGHTS.



No Scale. 3'6" average diam:

5

their crests into confused spray, which, however, is now gradually settling down again, and the wave is on its way, leaving, we hope, the rock far behind.

How interesting it is to watch the robust wood-work of the early part of the eighteenth century passing through softening changes until, towards its close, it becomes refined and delicate, and thoroughly thought out in every detail. If any one will take the trouble to examine a row of entrance-doors built about a hundred years ago, he will find such perfection of grammar in their design that the sight of haphazard details pitched together in the work of our own time will give him quite a shock.

For instance, there is a row of busses in Kensington Park-road, built probably under the influence of the Adams, in which there is a series of porticos that should satisfy the most fastidious taste; every projection is duly calculated for, nothing is left to chance.

Such doorways may be found in various towns; for instance, Deal teems with them.

In connexion with these doorways,—and, indeed, with many quite plain ones,—may be observed their very unpretending fan-lights, which exhibit an infinite variety of designs. One passes dozens of these in every neighbourhood, where there are houses old enough to contain them. Those that are illustrated on p. 897 may be seen on one side only of a suburban road, and within a range of about a mile and a half, and are exclusive of rectangular and elliptical fan-lights and of larger semicircular ones.

It will be seen that there are twenty-seven varieties in this short space, in which numerous similar houses may have been taken down, while many of the existing fanlights have been filled with plate glass and other kinds of glazing. And these twenty-seven examples, with two or three more, have been copied,—good, bad, and indifferent,—just in the order in which they came. It will, therefore, be readily inferred that in London alone there must be sufficient varieties to admit of making a selection of really good examples with a little trouble.

The houses of this period are no more sensational in style than a quiet Medieval church,—indeed, there is nothing in them to go into ecstasies over, whereas the village church might inspire the pen of a Ruskin; and yet, in a humble way, these fanlights exhibit the same kind of fertility in design that we admire in following the varieties of a series of stone tracery windows.

Many readers will know Billing's work on the infinite number of changes to be rung on certain leading forms of tracery. Here we have a great variety in the leading forms themselves. All that is provided is a semicircle, or the greater portion of one; the rest is a blank to be filled. And as it is *not* the object of the writer that even the best of these designs should be imitated, it would be good practice for a student to put these away and fill a dozen semicircles with fresh designs of his own.

As to construction, the earlier fanlights had wooden sash bars, which were necessarily thick and presented difficulties in the way of curved lines. These appear to be executed in lead or other soft metal, which can be easily "run" with moldings and rebate, and then be bent and soldered together. Where very delicate parts are used the glass passes entirely behind them, and a great charm of the treatment consists in the cast ornaments that are so happily combined with the bars.

Imitative architecture is not yet quite dead amongst us, and the last new book of photographs, even of the grossest and coarsest Flemish Renaissance work, is often used as a "crib" to re-appear in some of our fashionable thoroughfares.

If it be asked in what way these fanlights may bring legitimate grist to our mill, the answer is simple. There are, at least, three elements in every detail of architecture,—(1) purpose, (2) form, and (3) construction.

If, therefore, the purpose be the same, the modern designer should invent new forms of fanlights. If the forms of these old fanlights be found suggestive, they can be applied to other purposes, with other means of construction. If the constructive treatment be found applicable to other forms, we shall get another fresh departure.

It is by such means that the successive styles of architecture have been developed, but by direct imitation—never.

Illustrations.

SIR HENRY PEEK'S NEW PREMISES IN EASTCHEAP.

THESE premises have recently been erected, partly upon land purchased by the baronet from the Joint Committee of the Metropolitan Railway Companies, after the widening of Eastcheap in conjunction with the completion of the Inner Circle Railway, and partly upon the site of a portion of his own property. The frontage in Eastcheap is about 85 ft., and the return frontage in Love-lane about 65 ft., and the building contains two stories below the pavement level. The façades upon the ground story are composed of Argyleshire gray granite, finely axed, with slightly incised carving, and the remainder of Portland stone in large blocks, relieved with a minimum of carving executed in low relief. The panel of camels upon the circular corner is the trade-mark of the firm, and has been modelled and sculptured by Theod. The Mansard roof and the cupola are covered with red tiles and terra cotta, and impart a pleasing skyline and amount of colour to the structure. The joiners' work is of polished oak. Several of the floors are of concrete, and internally the premises are abundantly lighted, and are fitted up throughout in a substantial manner, with polished oak partitions and fittings designed to harmonise with the building. The lobby and vestibule are laid with mosaic, and the staircase, which is very spacious, has the stairs covered with Hawksley's treads. The premises are heated throughout by hot water, there being but two fireplaces in use. Mr. Alexander Peebles, F.R.I.B.A., is the architect; the contractor was Mr. J. T. Chappell; the engineer for the very considerable amount of iron construction was Mr. M. T. Shaw; the hot-water engineers were Messrs. Waller & Co.; and the gas-fittings have been designed and supplied by Messrs. H. Greene & Son; Mr. P. J. King being the clerk of works. Another portion of these premises, with a frontage of about 50 ft. in Saint-Mary-at-Hill, is in course of demolition, and will be re-built under Mr. Peebles's directions, to correspond with this building, by Messrs. Clarke & Bracey.

SCULPTURE AT THE ROYAL ACADEMY.

"EDWARD I."

BY MR. HAMO THORNYCROFT, A.R.A.

WE give this week, from a photograph kindly furnished us by the sculptor, an illustration of Mr. Hamo Thornycroft's wax model, on a small scale, of an equestrian figure of Edward I., which was, we believe, originally designed for a competition for statues for Blackfriars Bridge, for which position the powerful and monumental style of the design would have very well suited it, were there only a decent and fitting architectural pedestal on the bridge to put such a work upon.

The model of the statue is in the "Lecture-Room" at the Royal Academy Exhibition.

THE "HERAULT D'ARMES" AT THE HÔTEL DE VILLE, PARIS.

THIS equestrian statue, of which we have before spoken, was commissioned from M. Fremiet in 1882 for the decoration of the grand staircase of the Prefecture of the Seine, in the new Hôtel de Ville. The commission was simply for a candelabrum, but the artist produced the model in plaster of this work to serve that purpose, which was afterwards cast in bronze in the ateliers of Messrs. Thiebaut, at a cost of 10,000 francs, and placed in position in April last, on the occasion of the great fête given in aid of the poor of Paris.

With the exception of the blazon of the City of Paris, which stands out in coloured enamels on the mantel of the herald, the work offers now, in its general surface, a uniform golden tone or patina, which is very rich in effect. The statue, independently of artistic merit, is an example of the archaeological resource and knowledge of costumes and accessories which the works of M. Fremiet have always displayed; the trappings of the horse and the dress of the horseman are all according to the period, and taken from the most authentic sources. The jump itself was scrupulously copied from one figured in Viollet-le-Duc's remarkable and well-known work. The stem serves as a gas-pipe to feed six burners, disposed in corona form.

We may add, in conclusion, that M. Fremiet has been engaged in the study of a project for an addition to the decoration of the garden of the Trocadéro, and which comprises groups of animals emerging from the pool of water which falls in cascades in the midst of the lawns opposite the exhibition palace. This project will be submitted to the approbation of the Municipal Council when it proceeds to consider the treatment of the Trocadéro and of the Champs de Mars in view of the universal exhibition of 1889.

R. B. FENWICK.

ORATORY, ST. WILFRID'S HOUSE, EXETER.

THE Sisters of St. Wilfrid's House, or Home, Exeter, have, up to the present, rented a house for their occupation, but it having been thought advisable to establish a permanent home, a freehold, old-fashioned house has been purchased. This has been added to and altered to meet the requirements of the community. The old roof has been taken off, and another story built, which, together with the rooms in the new roof, gives nine additional bed-rooms, a bath-room, water-closet, &c. Great care has been taken to make the ventilation and sanitary arrangements as perfect as possible. The oratory is built in the garden at the back, and is connected with the house by a covered way. The walls are of local red bricks, with Cornham Down dressings; the roof covered with red tiles; inside the walls are plastered; the roof and other woodwork is of pine. The floors are formed of deal blocks, 6½ in. by 2½ in. by 2½ in. with borders of salt-glazed stoneware tiles, having patterns in low relief. These were specially made by Messrs. Cliff & Son. They are very true, and of a rich red-brown colour. The altar-steps are of Red Mansfield, the spaces paved with the salt-glazed tiles mixed with ordinary paving tiles. The east window, supplied by Messrs. Burlison & Grylls, is chiefly composed of white glass with silver stains, a small amount of colour being introduced to give tone. The other windows are temporarily filled with leaded lights. The stalls, &c., are not yet made, but are to be of English oak. Mr. Thomas Sharland, of Exeter, is the builder, and Mr. F. Newman, of Folkestone, the architect.

HOUSE AT KENSINGTON COURT.

THE house shown in our illustration is built from Mr. Jackson's designs, at Kensington, overlooking Kensington Gardens, and nearly opposite the Palace-gate. It stands upon a corner site, upon the ground formerly occupied by the house and grounds of Baron Albert Grant, and is the first house begun and finished on this estate.

The materials are red brick, with dressings of buff terra cotta.

The interior is finished with an oak staircase, oak floors and panelling in the best rooms, chimney-pieces and panelling of painted deal in other rooms, and pavements of black and white marble in the hall and passage.

The principal rooms and passages and offices are lighted by electricity, which is generated by dynamos the power for which is supplied by a gas engine.

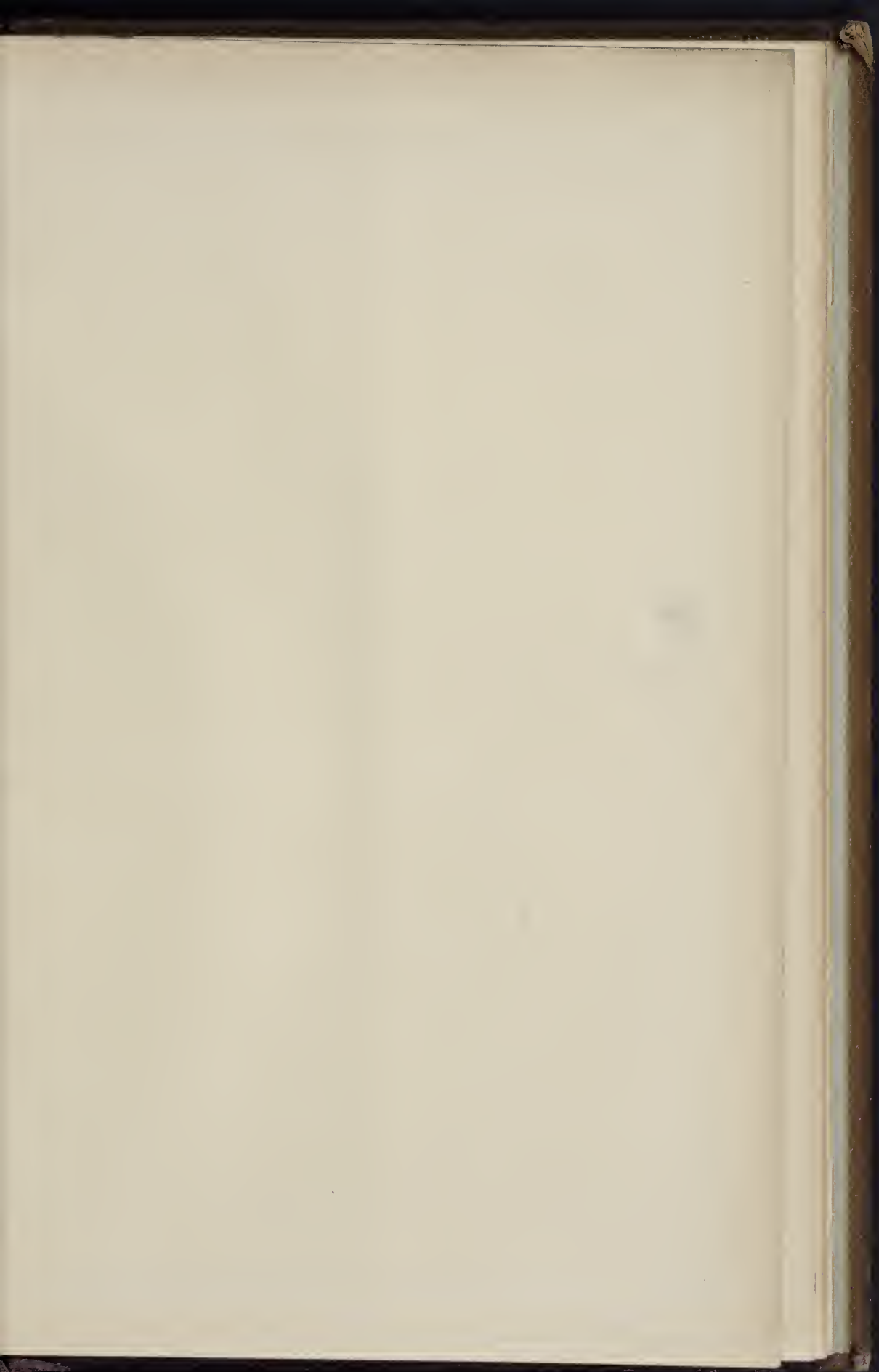
The terra cotta was modelled from Mr. Jackson's designs by Messrs. Farmer & Brindley, and made by Messrs. Doulton. The general contractor was Mr. Estcourt, of Gloucester; and Mr. Robert Edwards was clerk of works. The hot-water apparatus is by Messrs. Haden & Son, and the electric lighting by Messrs. Strode & Co.

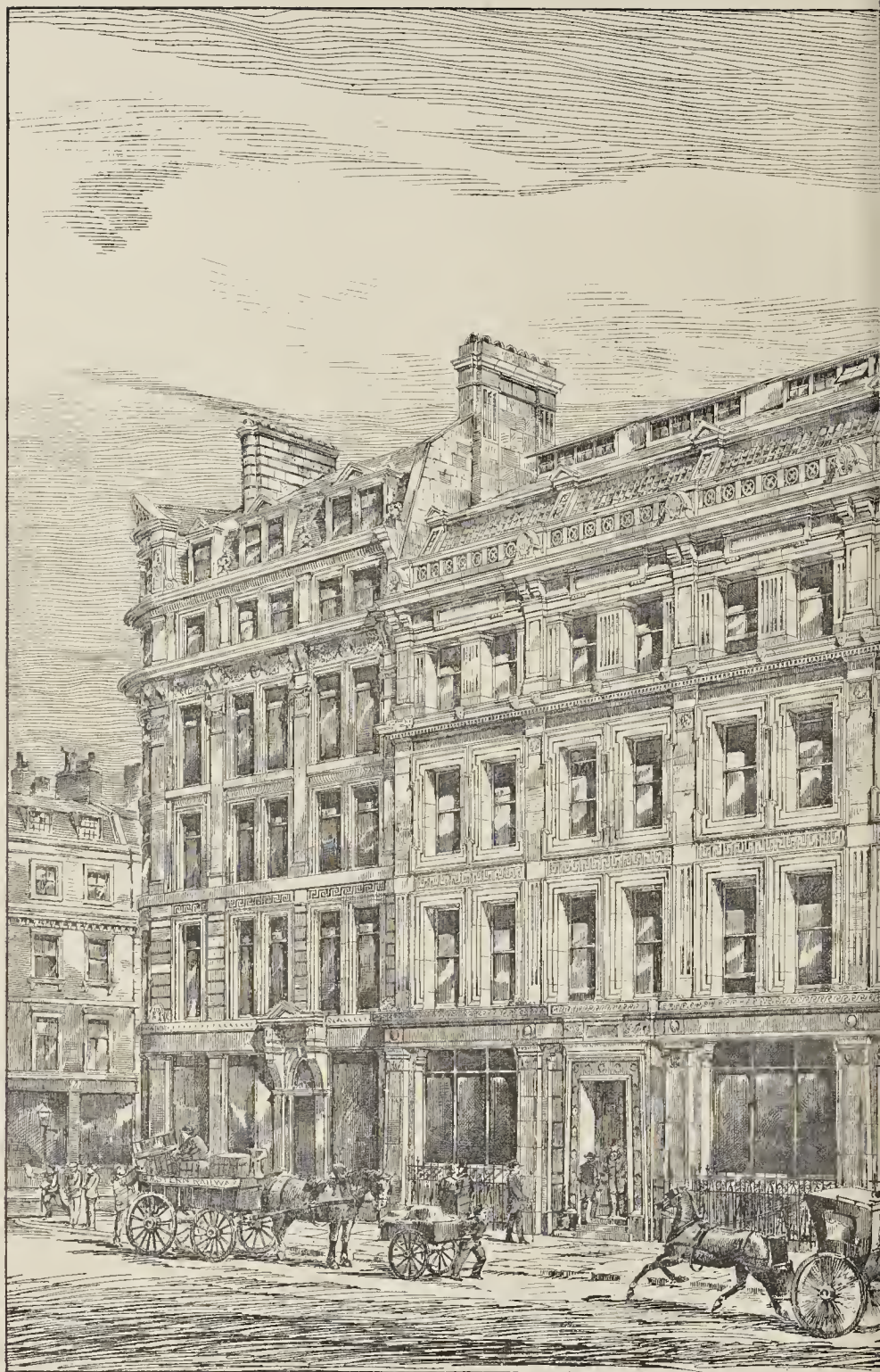
The illustration is from a drawing exhibited this year at the Royal Academy.

OUT-PATIENTS' DEPARTMENT AND NURSES' HOME, VICTORIA HOSPITAL FOR CHILDREN.

THE first stone of this building was laid by H.R.H. Princess Louise (Marchioness of Lorne) on Tuesday last.

This hospital, situated at the junction of Tite-street and Queen's-road, Chelsa, was established in the year 1866 for the treatment as in-patients of boys between the ages of two and twelve years of age, and of girls between the ages of two and sixteen; also as out-patients all children under sixteen years. It is also a training-school of nurses for children. The management of the building generally is conducted by a board, of which Mr. Harvie Farquhar is chairman, and





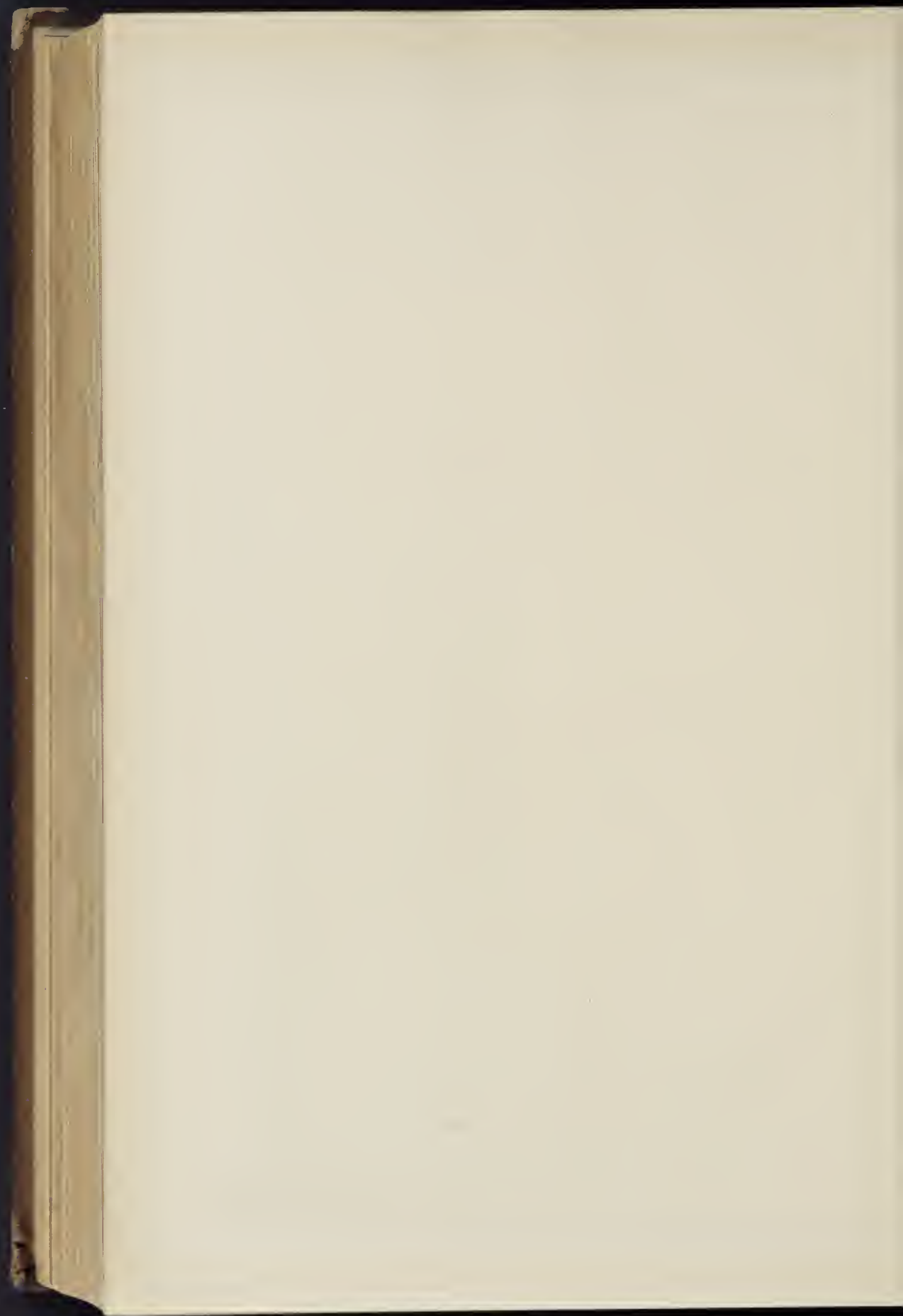
Wyman & Sons Photo-Litho.

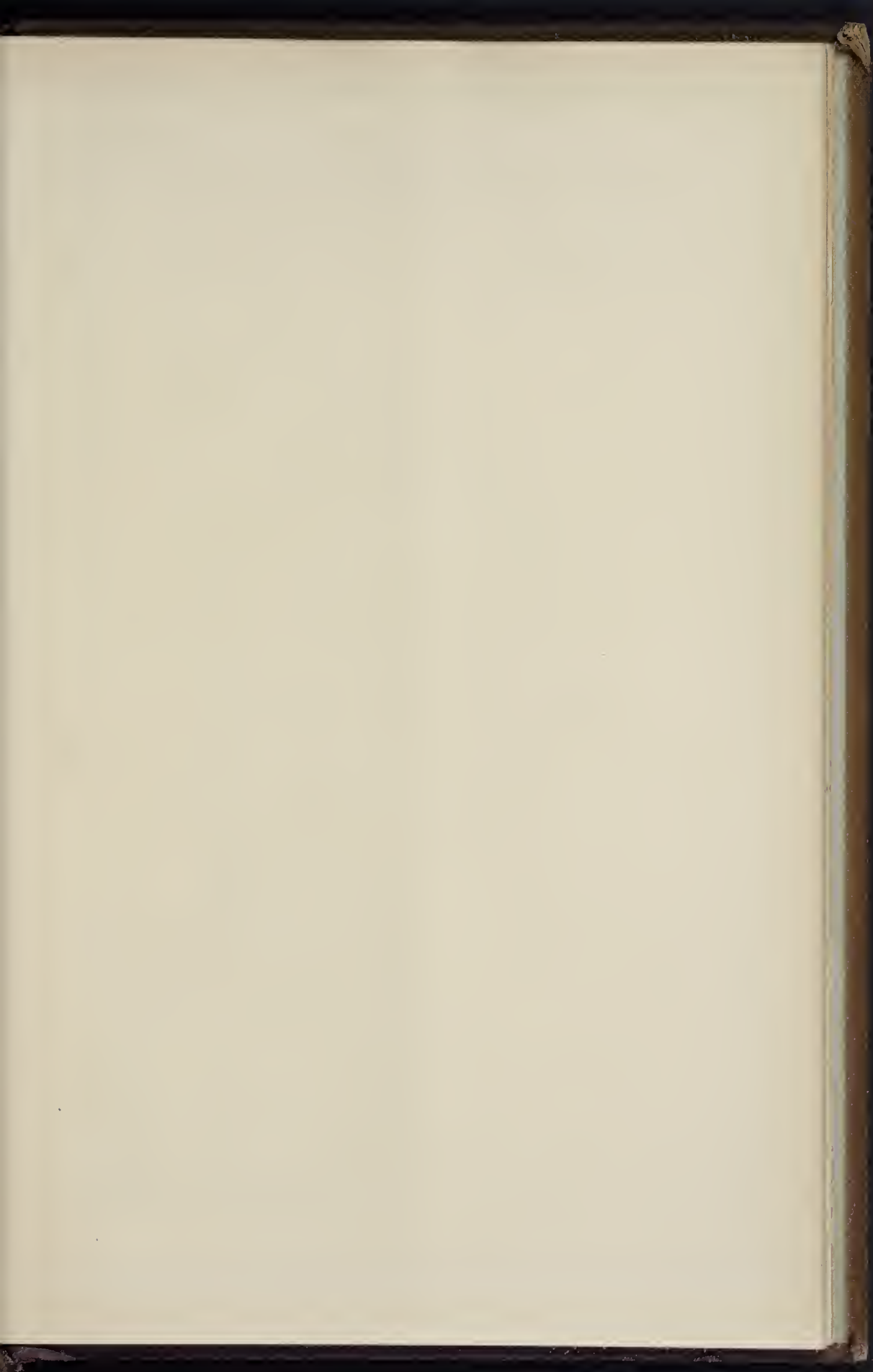
NEW PREMISES FOR SIR H. PEEK, BART.,



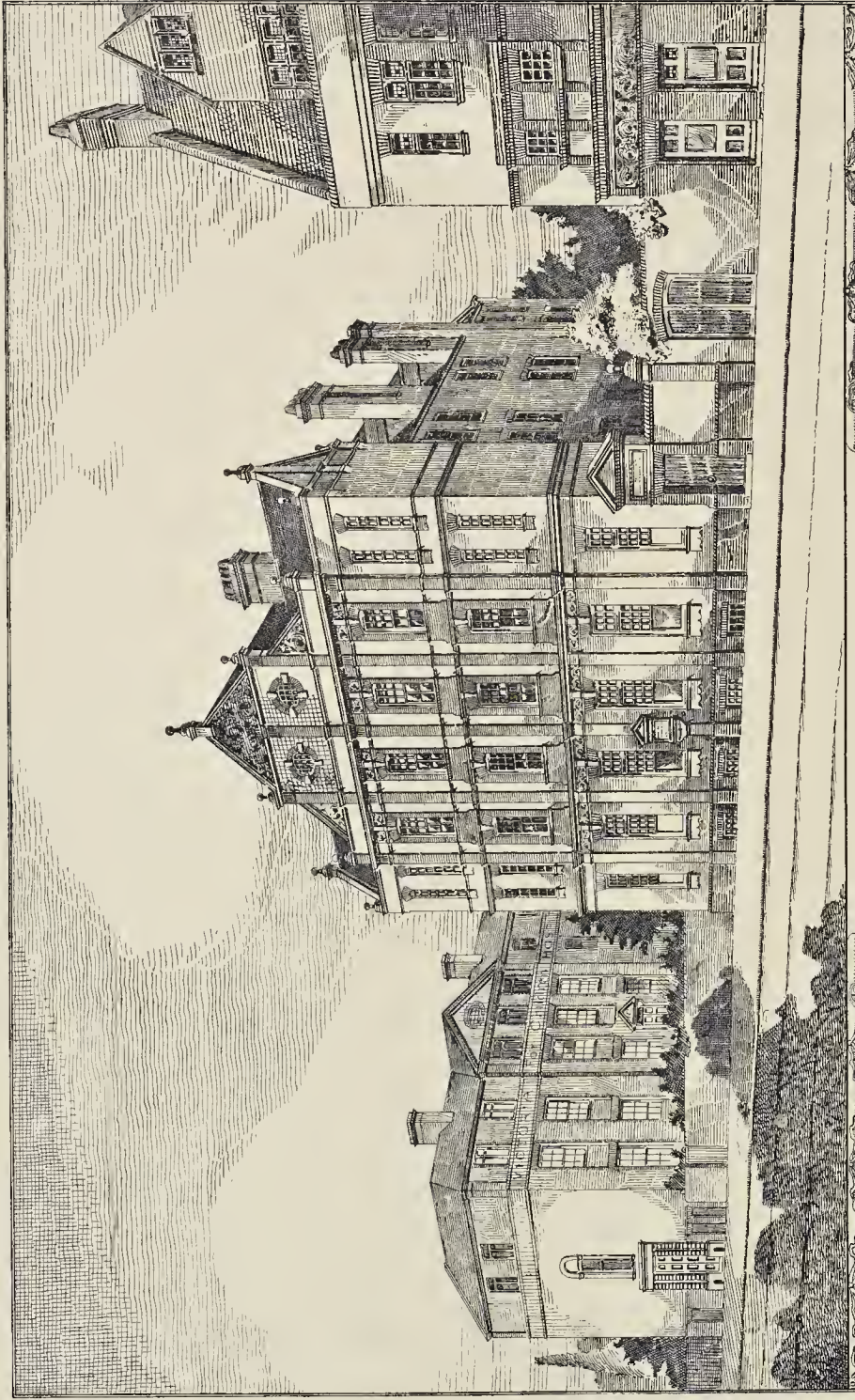
Queen St London W.C.

CHEAP.—MR. A. PEBBLES, F.R.I.B.A., ARCHITECT.

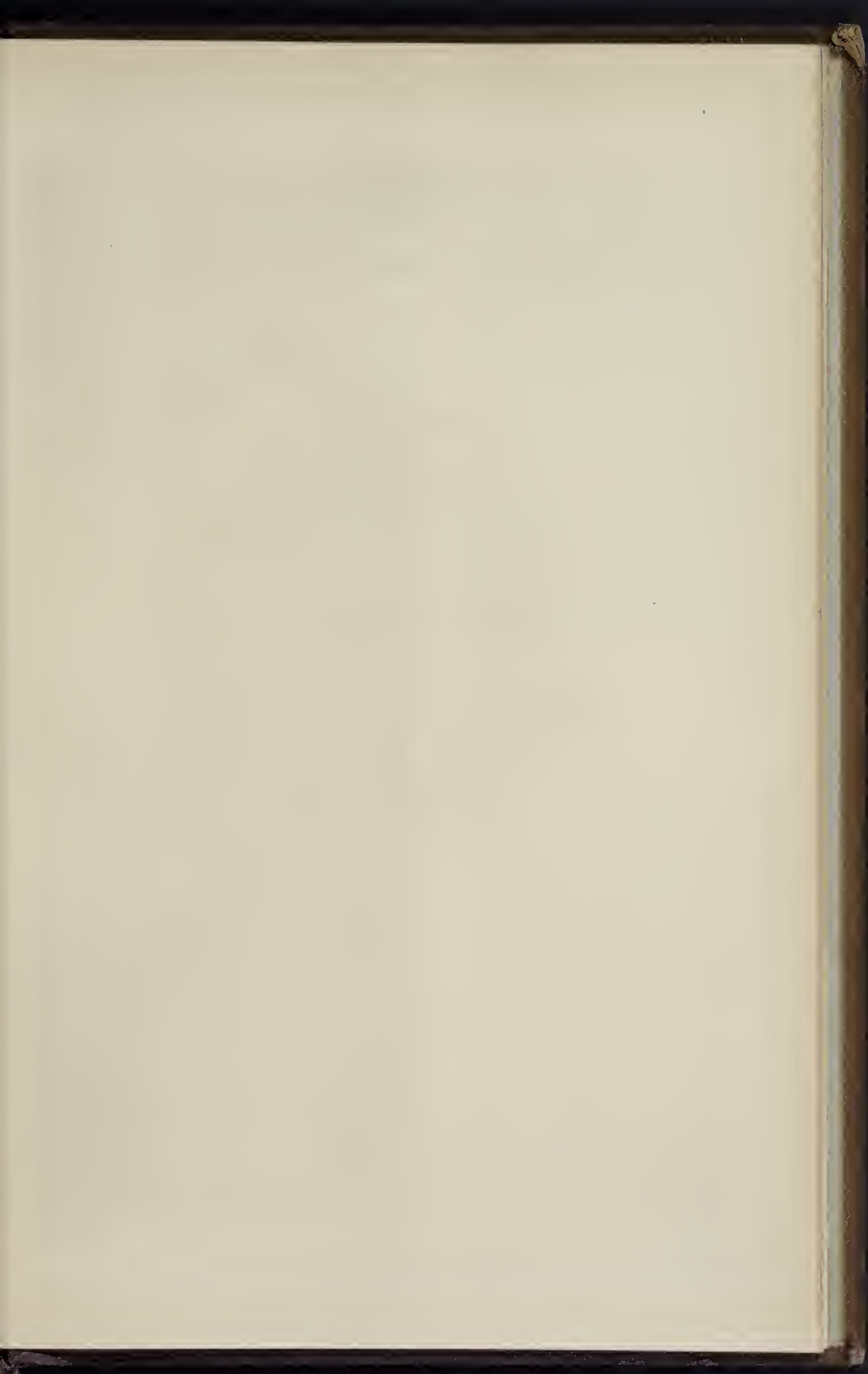


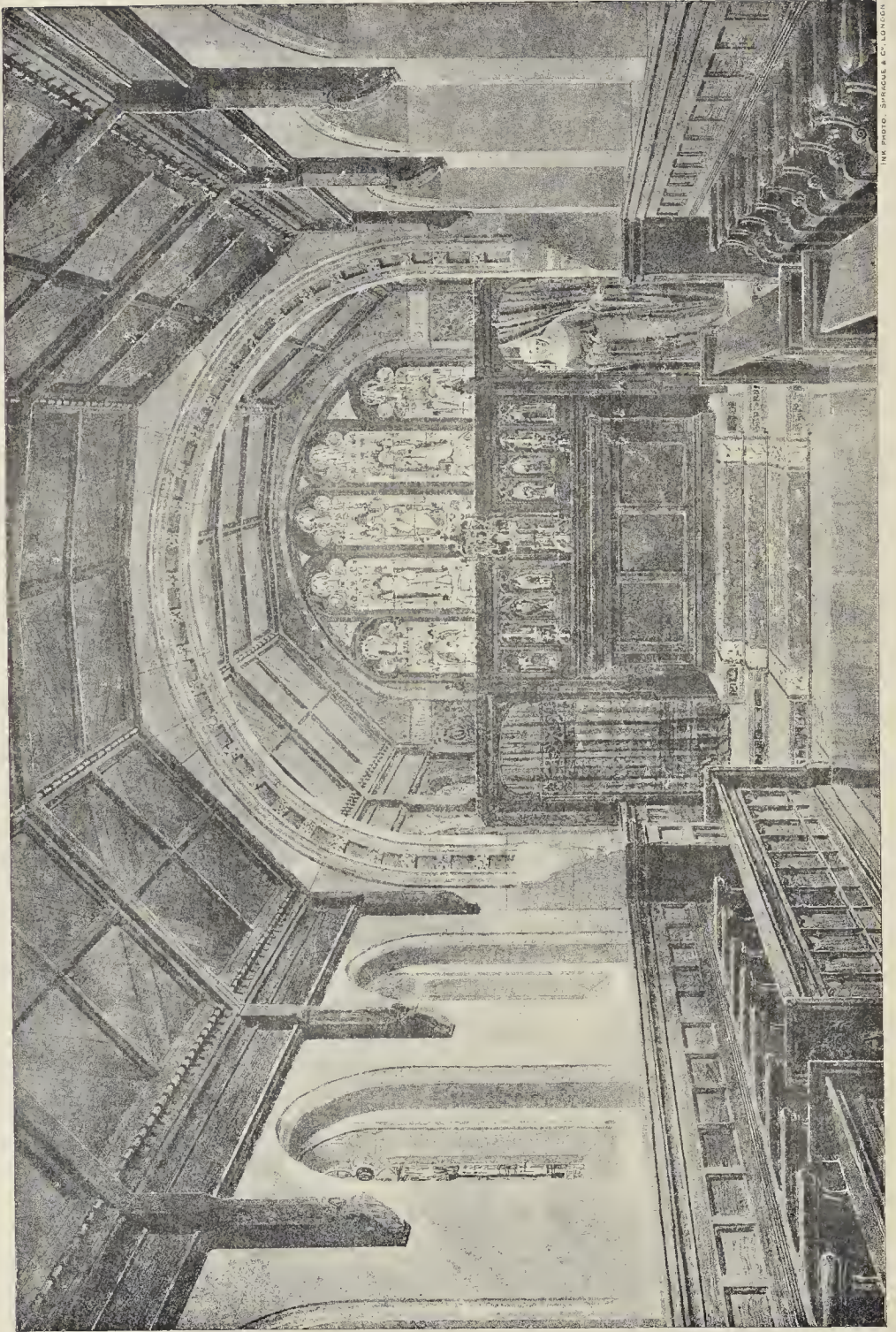


THE BUILDER, JUNE 27, 1886.



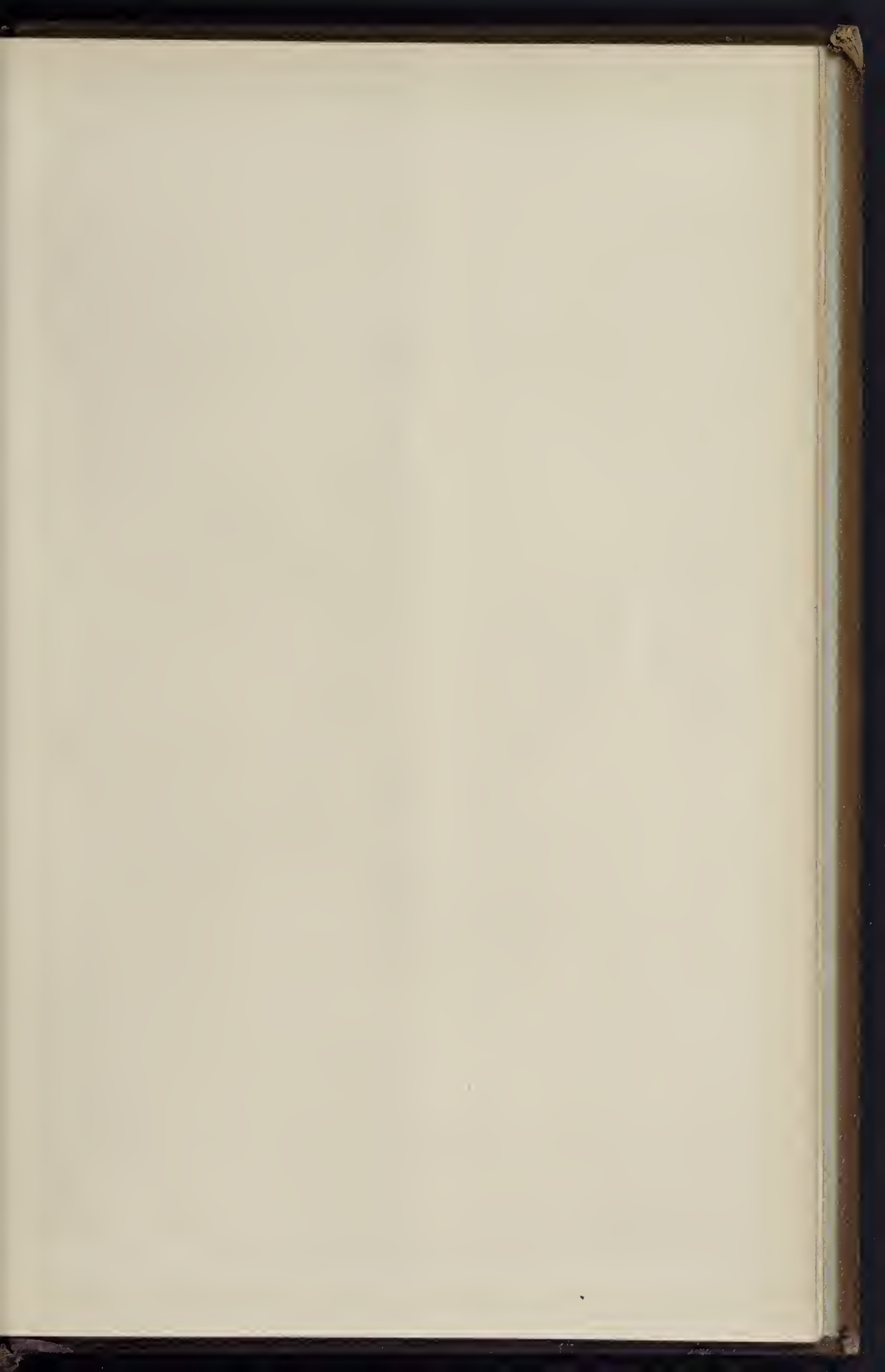
VICTORIA HOSPITAL FOR CHILDREN
OUTPATIENTS' DEPARTMENT & NURSES' RESIDENCE
H. SAXON SNELL & SON, ARCHTS.





THE PHOTO. SHREVE & CO., LONDON.

ORATORY, ST WILFRID'S HOUSE, EXETER.





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SCULPTURE AT THE ROYAL ACADEMY

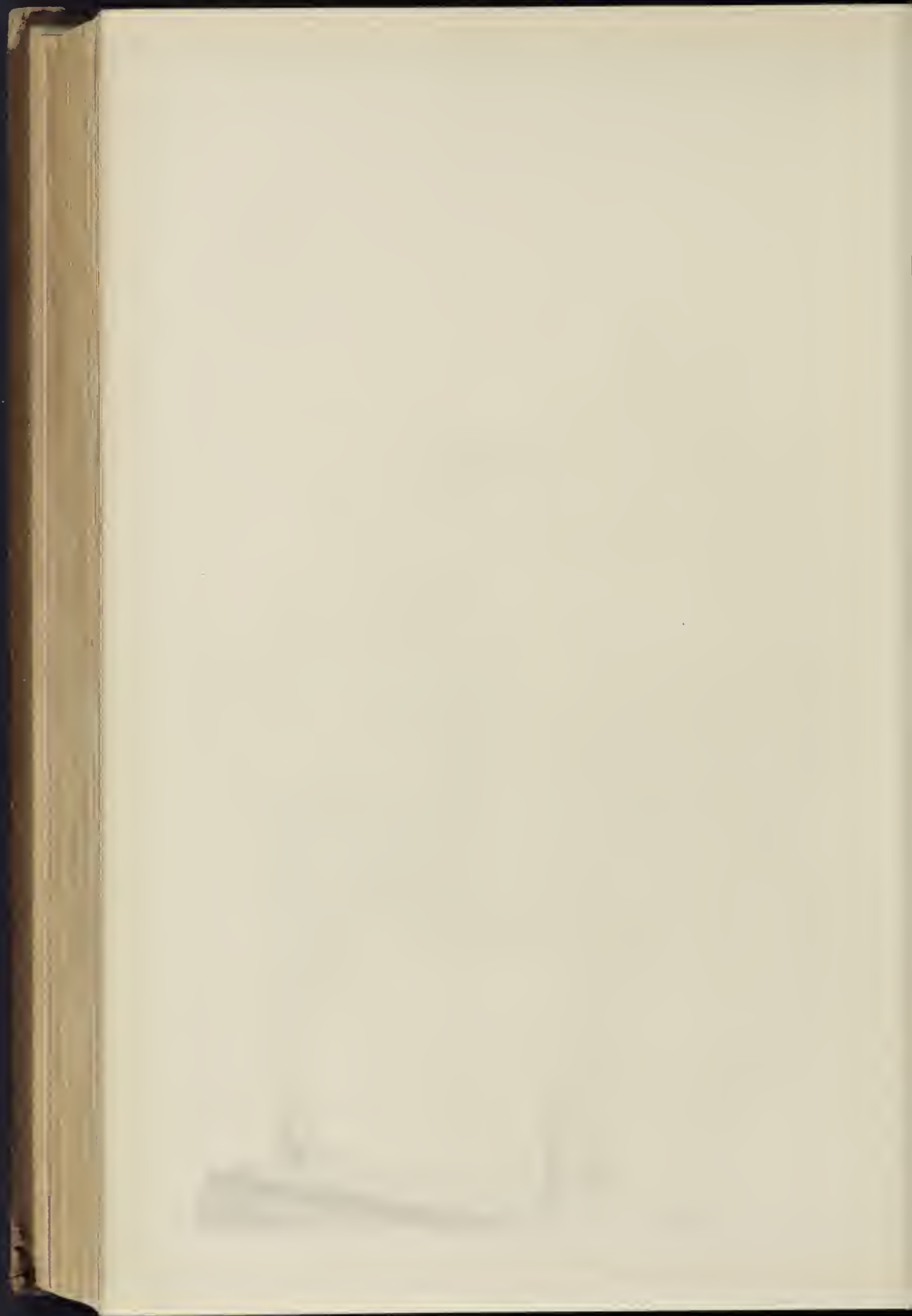


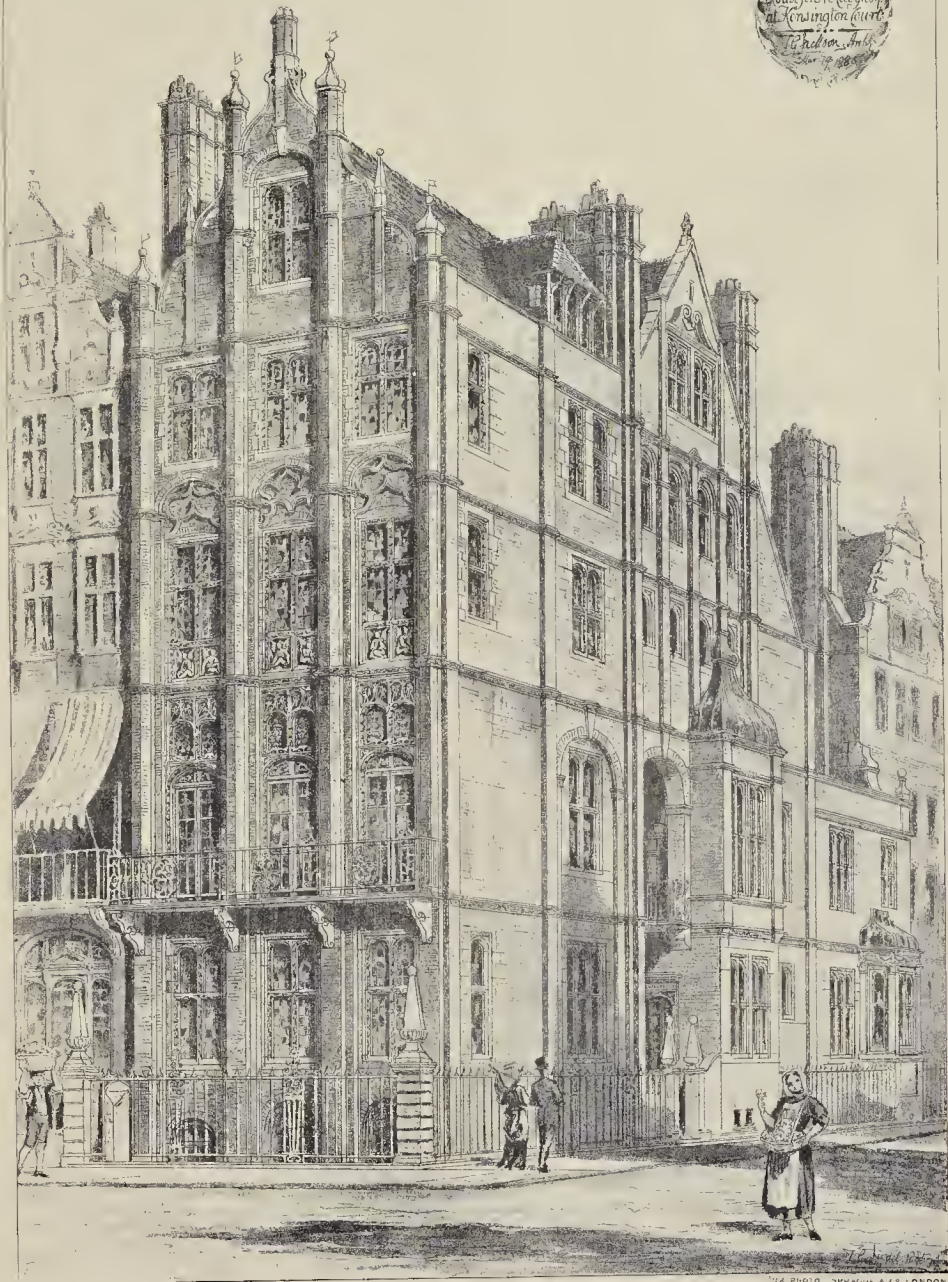
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"HERAUT D'ARMES"

BRONZE CHANDELIER ON THE STAIRCASE OF THE HOTEL DE VILLE, PARIS

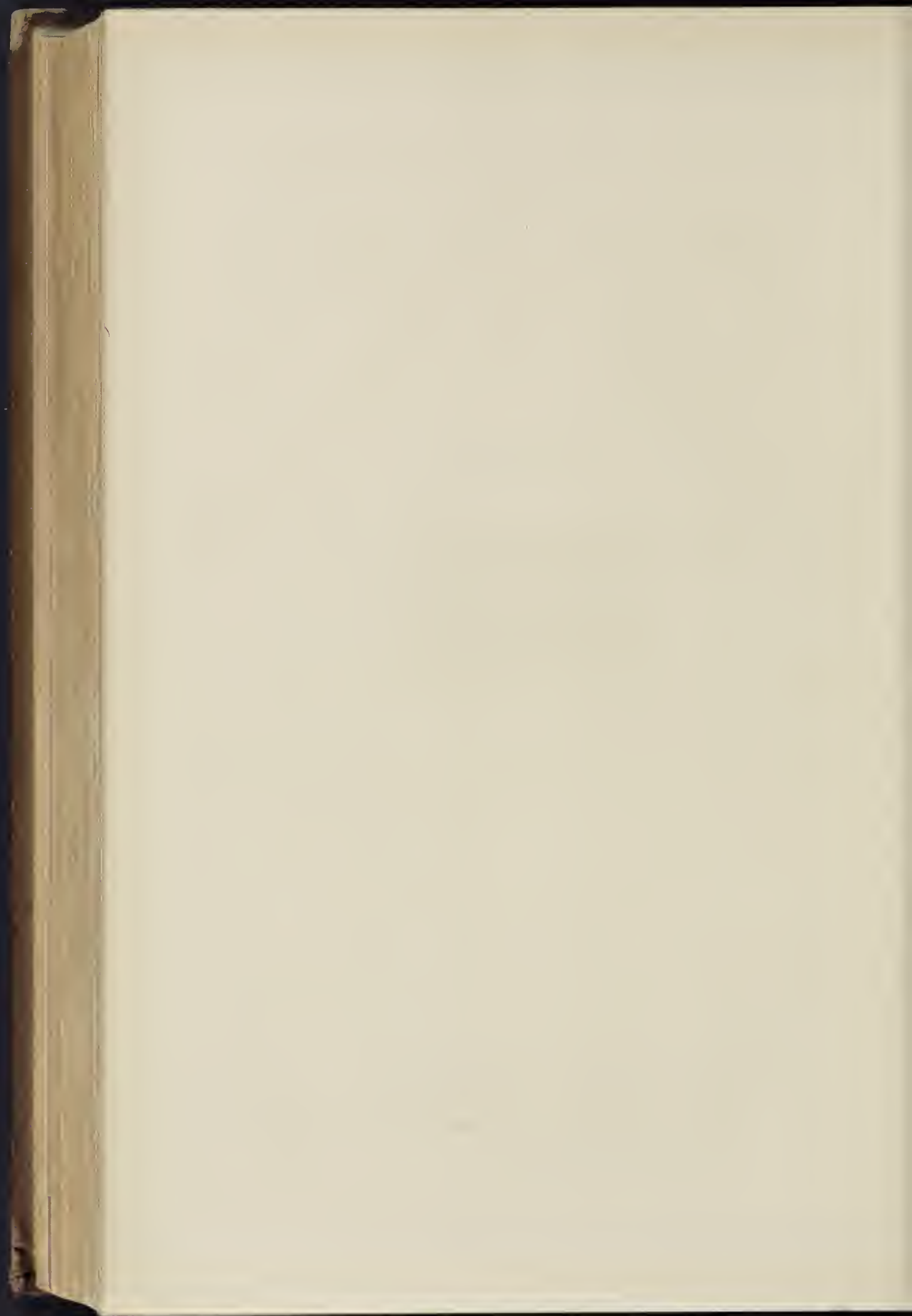
M. FREMIET, SCULPTOR



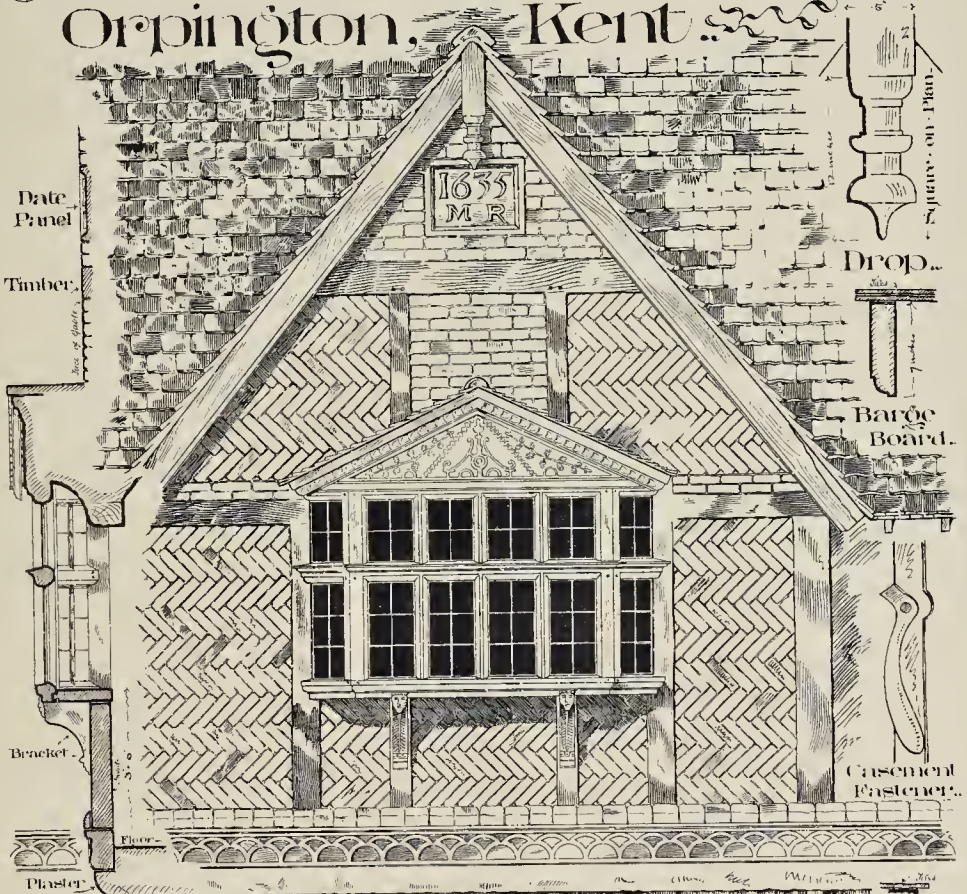


HOUSE, KENSINGTON COURT
MR T G JACKSON ARCHITECT

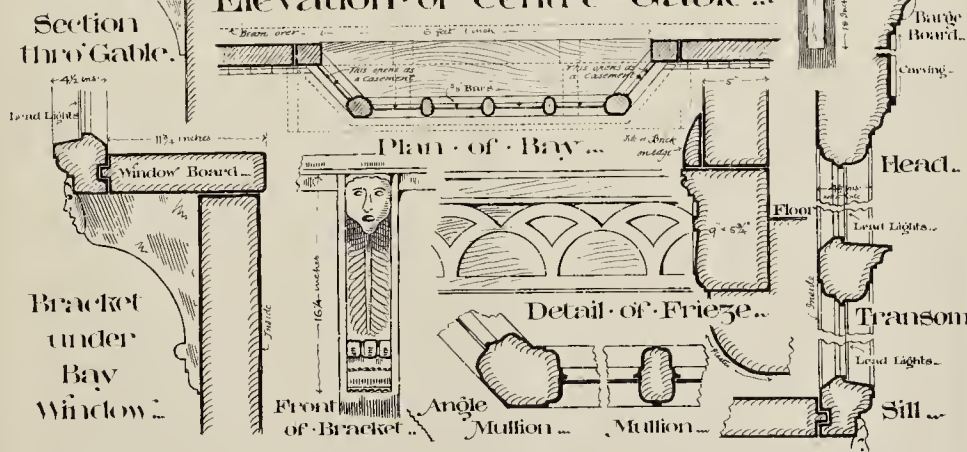
THE PHOTO SPRAGUE & CO LONDON



A Gable of an Old House... Orpington, Kent



Elevation of Centre Gable...



Mr. R. Martin Smith the treasurer; Capt. Blount, R.N., is the secretary.

The building now accommodates sixty in-patients, located in the old building originally occupying the site, and which has been judiciously altered to the purposes of a hospital. It is, however, intended, as soon as funds will permit, to add an additional wing, constructed upon more modern principles.

The out-patients are at present accommodated in the basement of the old building, and the arrangements are necessarily of a primitive and unsatisfactory character. The accommodation for the nursing staff is also very inconvenient, as part of it has to be located in premises situated on the opposite side of the Queen's-road. Hence the necessity for erecting the new building.

The architects of the new building are Messrs. H. Saxon Snell & Son, and the arrangements are such that the ground-floor is devoted to the purposes of an out-patients' department, and contains a waiting-hall, 53 ft. by 20 ft. and 16 ft. in height. Ranged down one side are the surgeons' and physicians' rooms, a dressing-room, and a small ward for the temporary accommodation of patients after having undergone operations. At one end is a dispensary with a separate small waiting-room for nurses coming for medicines from the main building. This department is entered by a gate from Tite-street, and the courtyard giving access to it has a low shed ranged down one side for the shelter of children's perambulators.

The upper part of the building is entirely detached from all communication with the out-patients' department upon the ground-floor. It consists of three floors, containing twenty-nine bedrooms for the nursing staff and Sisters, and in addition a sitting-room and bedroom for a superintendent. Two sitting-rooms are also provided, the one for nurses and the other for lady probationers. The basement of the building contains the porter's apartments, a mortuary, post-mortem room, a drug-store, and cellarage.

The entire cost of the structure will be 6,550., but with the funds at present in hand it will only be possible to complete the out-patients' department and the carcassing of the upper portion of the building.

The builder is Mr. Chas. Wall.

A GABLE OF AN OLD HOUSE, ORPINGTON, KENT.

This quaint old Kentish gable is one of many which tells us how fond our forefathers were of the picturesque, and yet how true and honest they were in their art of building.

The old building from which this gable is taken has a pleasing outline. The roof is steep-pitched, tiled, and hipped at both ends, whilst this gable rises in the centre of the front. The lower story is half-timbered, filled in with horizontal coursed brickwork; the upper story projects 1 ft. 9 in. on wood brackets, and is filled in with herring-bone brickwork. The windows have lead lights, with casements opening outwards. The carving in the pediment of the window is in wood. The Jacobean door, with its carving, together with the latch, catch, handle, and quaint knocker, are well worthy of a special notice.

The Carpenters' and Joiners' Companies awarded the author of this drawing their silver medal and 5l. at Carpenters' Hall last year.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—On Saturday afternoon last the members of this Association made an excursion to Alvechurch and Beoley churches. On arriving at Redditch the party walked a distance of about two miles to Beoley, where they were met by the Vicar, the Rev. C. J. Langston, who conducted them over the church, now being restored by Mr. E. Ray, architect, of Worcester. The church is an old stone building in the Norman and Early English styles, consisting of chancel, nave, aisles, a lady chapel, and tower, with six bells; in the lady chapel are many ancient monuments, most probably the work of Italian artists, to the Sheldon family, who formerly held this manor. The tomb to W. Sheldon and his wife, with recumbent effigies, is especially worthy of mention as being one of the finest and most elaborately-decorated examples of Elizabethan ornamental architecture in the country. After

a pleasant ramble of about five miles through the fields, the party reached Alvechurch, where an inspection was made of the church restored by Mr. Butterfield.

Liverpool Architectural Society.—At a meeting of the Council of the Liverpool Architectural Society, held at the new rooms, Cook-street, on Friday, the 12th inst., Mr. Thomas Mercer was unanimously elected president for the coming session.

BUILDING ON PRIVATE AREAS.

MR. FREDK. JNO. JOHNSON, of the Sussex Arms, Loughborough Park, Brixton, was summoned at the Lambeth Police-court, before Mr. Chance, for that he did unlawfully, without the consent of the Metropolitan Board of Works, form or lay out a certain road, passage, or way, leading out of Acorn-place, Camberwell, for building, as a street, for purposes of foot traffic, in such a manner that such road, passage, or way would not afford direct communication between two streets, contrary to 45 Vic., cap. 14, sec. 7; and further, that he did unlawfully form or lay out the above way as a street for foot traffic without the consent of the said Board, contrary to sec. 8 of the above-mentioned Act.

Mr. Avory, instructed by Mr. Thos. Burton, appeared for the Metropolitan Board of Works, and Mr. Bealey for the defendant.

Mr. Avory stated that the defendant had erected six blocks of artisans' dwellings in Acorn-place, Meeting-house, Camberwell. The blocks comprised three sides of an open quadrangle, of an average width of 60 ft., and about 79 ft. deep from north to south, the quadrangle being enclosed at the northern end, next Acorn-place, with an ordinary railing, in which gates had been put up, the central gate being 3 ft. wide and capable of admitting a wagon. Side gates had also been made, 4 ft. wide each, and led into two footpaths. The centre portion of the quadrangle was paved with wood, and a footpath, 6 ft. 6 in., was made round three sides of the quadrangle. The blocks had each a frontage of 33 ft. upon the quadrangle, and were three stories in height, each block containing six sets of tenements of three rooms each, in all, thirty-four tenements, capable of accommodating 144 to 200 persons. A caretaker resided on the premises; and at the south-west angle of the block was a gateway 10 ft. wide, leading to an open space at present used for storing building materials. In the rear of the blocks was a footway 4 ft. wide, with a doorway at the eastern end leading into High-street, Camberwell. The site of the buildings complained of was surrounded by property belonging to adjoining owners, and the only access was through Acorn-place. The buildings had been completed, and were partly occupied. The railing enclosing the quadrangle on the north side had been erected, and the gates, it was believed, were usually kept closed.

Mr. Avory called Mr. John Hobb, the Assistant Superintending Architect to the Board, and Mr. Henry Jarvis, District Surveyor, in support of the above facts.

Mr. Bealey, for the defence, contended that the blocks of buildings being enclosed by gates, which were not within the provisions of the Act, and that the defendant had done nothing to form or lay out a road, passage, or way, and cited several cases in support of his contention, and called Mr. Grace, the freeholder.

Mr. Chance, the magistrate, stated he should hold that the buildings in question came within the Act, and required the consent of the Board, and fined the defendant the nominal penalty of 10s. and 2s. costs.

Notice of appeal was given.

ANCIENT LIGHTS.

SCOTT V. POPE.

This case recently came up in the High Court of Justice, Chancery Division, before Mr. Justice North.

The plaintiff was the owner of a building on the west side of Denton Yard, Newcastle-upon-Tyne, which was erected in 1872 on the site of old building, the windows of which had undoubtedly been ancient lights. In rebuilding, the plaintiff had advanced the east wall by 2 ft. or 3 ft. nearer to the defendant's building. No record had been kept of the window in the old building, but, on arbitration, it had been ascertained that although none of them corresponded in their entirety with the new windows, yet some of them did occupy parts of the spaces of those windows. The defendant had pulled down his building and was erecting it to a greater height, so as to interfere with the lights of the plaintiff, who sought an injunction to restrain the encroachment.

Mr. Rigby, Q.C., Mr. G. Bruce, Q.C., and Mr. Wm. Druce were for the plaintiff; and Mr. Wm. Barber, Q.C., and Mr. J. Chester for the defendant. The point of law argued in the case was whether the plaintiff had not by altering the plane of his wall in 1872 abandoned his ancient lights.

His Lordship, after dealing with the facts of the case and the authorities, held that the defendant

had not established that which alone could justify him, viz., a clear intention on the part of the plaintiff to abandon his ancient lights, so far as he had not himself closed them up. No conclusive evidence of such intention had been adduced, and the law maintained the right in respect of any substantial part which was preserved of an ancient window. There were cases which showed that the "retirement" of a wall when altering buildings did not take away the previously-existing rights in respect of that wall, and the same principle must apply to the "advancement" of a wall. Notwithstanding the alteration the plaintiff was entitled to an injunction.

Costs ordered to be paid by defendant.

CASE UNDER THE METROPOLITAN BUILDING ACTS.

WHAT IS A "PUBLIC BUILDING"?

JOSELYN V. MEESON.

THIS was an appeal (heard in the Queen's Bench Division, before Lord Coleridge and Mr. Justice Mathew) from the conviction of a builder for a breach of the provisions of the Metropolitan Building Acts of 1855 and 1873 and the by-laws of the Metropolitan Board, in building an ambulance station without depositing plans and sections with the District Surveyor for East Hackney. It appeared that notice was given, but without the plans and sections as required by the Acts and by-laws in respect of "public buildings," and the question was whether this ambulance station was a public building within the Acts such as to require the deposit of plans and sections along with the notice. The statutory definition of "public buildings" was "any church, hospital, or building for any other public purpose." The ambulance station was erected at Homerton by the appellant for the Metropolitan Asylums Board, under the superintendence of Messrs. A. & C. Harston, architects. It was not actually connected with any fever hospital, though it was near one, and it was intended for the use of all fever hospitals in the metropolis by way of stabling for horses, &c. The builder being summoned before the magistrate for a breach of the by-laws, it was contended that he was not liable, as this was not a public building. The magistrate, however, thought otherwise, and convicted the builder, but stated a case to raise the question, and it stated that the public were not admitted to it under any circumstances.

Mr. Gye (instructed by Messrs. Rogers, Sons, & Russell, solicitors) appeared for the defendant, and argued that it was not a "public building" within the Act.

Mr. Meeson, the Surveyor of the Board, appeared in person, and submitted that it was a "public building."

The Court, however, were clear that it was not, and gave judgment for the appellant, with costs.

WHITEWASH.

SIR,—I trust that the unpretentious heading of this communication will not exclude it from your columns. It may be that in these days of scientific sanitation we dig deep and travel far for things of less value than those which lie upon the surface, and are close to our hand. The well-to-do and middle class may avail themselves of novelties, but we must look to the health of our poorer brethren, whom we have always with us, and who, in most instances, cannot help themselves.

Whitewash is a simple thing, but I believe that its application may be made an important aid to health amongst the masses thrust together and cooped up in our cities and towns. What we recommend for their use must be something very simple and very cheap, and my prescription meets both these requirements. Whitewash or limewash is so well known as to need no special description, but with your permission I will try to describe how to make it,—how to use it, and what benefits may be expected.

How to make it.—Get a lump or two of burned lime, slake it by pouring water upon it in a bucket or other vessel. It will fall away into powder, add more water, until it is of the proper thickness, stirring well all the time, and for about a penny you will have a bucket of limewash ready for use.

How to use it.—Clean down the wall, or other place to be washed, with a brush or broom, so as to remove all dirt, cobwebs, &c., and then lay on the whitewash, brushing it into every part, and giving it a good coat. By the time the first coat is finished, if it be a drab day, the wall will be dry enough to begin a second coat, and this done, you will have a sweet, clean, white wall to look at instead of a dark, dirty, depressing blank.

* See *Builder*, Nov. 22, 1884, p. 709.

Anybody can do it, but if the work be done by men used to the job the cost will be about one-halfpenny per square yard. But what I want is to encourage the working man to do it himself. I strongly recommend the tenants of cottages, especially in crowded places, to have the walls of buildings and back premises done for the sake of the light, health, and cheerfulness which will be imparted, and owners of such property might greatly help where the poorest of the poor live. The difficulty with the labouring class is the whitewash brush,—the cost of a good one being 3s. 6d.,—rather a large investment for a working man for one article only rarely used. To meet this difficulty, and to encourage the work, when I was Town Surveyor at Burnley, about twenty-five years ago, I advised the Commissioners (now Corporation) to purchase whitewash brushes and lend them to poor people at a charge of one penny each, and the result was very gratifying. It was a sight on Saturday afternoon, or in the evening of spring and summer days, to see the working men and women turning out the loose odds and ends of their dwellings, and working with a will at their simple wall decoration of sweet linewash. Hundreds of dwellings in the poorer districts were cleansed,—dark and dreary blank walls were made bright and cheery,—light was reflected into dark dwellings, and an appearance of neatness and cleanliness imparted, where, but for the penny brush and the lump of lime, it would have been unknown. Wishing to know whether this loan system was being continued at Burnley, I recently inquired of the very active and intelligent Sanitary Inspector, Mr. C. Slater, and herewith append a summary of particulars supplied by him, and extending over twelve years past:—

The number of brushes lent by the Corporation has been.....	26,541
The cost of the brushes.....	£125 6 3
The sum received for loans.....	124 18 1
Value of brushes in stock.....	10 0 0

showing an actual profit over and above the cost of the brushes lent!

It will be seen that this loan system has been a great success, and Mr. Slater says that much good has been done and few brushes lost. As before remarked, the brush is the difficulty with the poorer class. Lend them a brush, and supply a pennyworth of lime, or tell them where to get it, and you will see with what earnestness they will set to work to lighten up many a darksome and cheerless outlook. 26,541 whitewash brushes set to work in and about the dwellings of the labouring class, and the first cost more than repaid by the loan pence, is an instance of practical sanitary work I think worth knowing, and worth imitating by any Corporation or other body, Urban or Rural, having charge of public health. We are under no special panic just now, nor need be as to approaching cholera, but certainly the utmost possible precautionary measures are imperative and urgent, and I know no more cheap and simple safeguard against epidemic or illness amongst the working class than a liberal use of linewash.

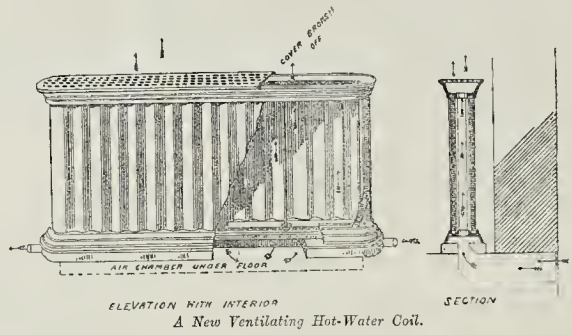
JOSEPH BRIERLEY, M.Inst. C.E.

PUMPS FOR CONTRACTORS' PURPOSES.

SIR,—In reply to "A. E." in your last issue [p. 884], who asks my opinion as to the best form of valves for direct-acting steam-pumps (printed pipes) for contractors' use, I conclude "A. E." refers to the steam and not the pump valves, and he has asked a question that has long been a matter of controversy amongst engineers, and something may be said in favour of each system. For the purpose "A. E." names, i.e., tunnelling where the water is usually gritty and muddy, if he must use direct-acting pumps, I do not think he would do amiss in having them arranged with ordinary steam slide valves and the water passages made extra large.

M. POWIS BALE.

Impermeable Floors.—Medical men have long been preaching, and are now beginning to practise, the employment on sanitary grounds of flooring laid without interstices to catch the dirt, and with polished, or at least smooth, clean, and washable surfaces. Costliness has been hitherto a drawback to the adoption of such flooring. The solid 1-in. parquet floors of Bucher & Durrer (agents, Scheibler, Bros. & Co., 23, New Broad-street, E.C.) supply the needed element of relative cheapness.—*London Medical Record.*



ELEVATION WITH INTERIOR
A New Ventilating Hot-Water Coil.

NEW VENTILATING HOT-WATER COIL.

SIR,—The desirability of admitting warm fresh air into buildings for the purpose of ventilation has long been recognised. The methods usually adopted in the case of hot-water or steam coils are not always successful, even with and by the aid of deflecting plates, to say nothing of the cost of these extraneous fittings.

The coil here represented is made out of stout corrugated iron or steel, with waterway of 1 in. surrounding the air-chamber; the bottom and top boxes are of cast iron, and made suitable to receive the corrugated metal, with proper packing, afterwards bolted together.

The top is a loose cone, and perforated to admit the fresh warm air into the room.

It will be seen that the coil is simple in construction, and complete in itself. The effective heating surface is equal to a 20-in. pipe coil, 6 ft. long. It has been seen by one of the most eminent London architects, who pronounces the principle perfect, but suggests that the coils should be placed in window recesses,—with which, of course, I agree.

I may add that the body of the coil being made of wrought metal, the breaking from frost that so often attends the cast pipes will be avoided; and further, the place of the coil may have any shape suited to the position it would best occupy.

ROBT. CRANE.

"ITALIAN SILVER-GREY SLATES."

SIR,—We have only now seen, in your issue of the 13th [p. 850], a letter on the above subject from Messrs. E. & C. Braby, and in reply have much pleasure in informing them and others who may be interested in the matter that it is from quite a different and vastly superior rock that the slates for the English market are now procured, because that of which he complains was found to be unsuited for the purpose. The present quarries are altogether in another district, now rendered more accessible owing to the making of a new road and erection of a wire-rope tramway, thereby cheapening the cost of the slates very considerably.

As a proof of their durability we have only to mention the celebrated Church of Carignano at Genoa, which stands high and is very exposed; it was covered in about 1810 with these slates, and the roof has never been repaired; also the Church of San Fruttuoso, the burial-place of the Dorias, which is open to very severe gales, is roofed with the same slates, which have been on more than a century.

We could bring forward many more proofs of their marked superiority since the time to which Messrs. E. & C. Braby allude, and we feel certain that a trial made of them now "would result in something far better and more useful."

With regard to the change of colour it has come to our notice that houses in England roofed with them had quite an immunity from the heat of last summer, of which their neighbours were complaining, these slates being non-conductors of heat.

BUBB & CO.

Sta. Margherita, Liguria, Italy, June 17.

PROVINCIAL NEWS.

Bristol.—The new tobacco factories just completed in Redcliff-street for Messrs. Edwards, Ringer, & Co., constitute one of the largest blocks erected in the city of late. The building has been constructed from designs furnished by the late Mr. J. H. Hirst, architect, Bristol, and it has been carried out with but very slight alterations from the original plan, under the joint supervision of the son of the original designer, Mr. H. C. M. Hirst, and Mr. H. Crisp, architects. The front elevation was designed, chiefly, by Mr. H. C. M. Hirst, from ideas suggested by his late father. The treatment is Italian throughout. This frontage in Redcliff-

street consists of shops, with all necessary store-rooms. The central entrance to the works is picturesque, and is of an unusual width. The whole building is as nearly as possible a square of about 130 ft. The front part is of Mansfield stone and granite plinths, and the carving is by Mr. J. Steele, of 13, Kingsdown-parade. The manufactory is built of white, red, and blue Cattybrook bricks. The whole of the flooring is fireproof, and was laid by Messrs. Dennett & Angle, Whitehall, London, who also provided the ironwork for the central hall and roofing. The iron staircases and galleries near the entrance-gates are by Messrs. Macfarlane, of Glasgow. The factory will be heated throughout by the steam apparatus supplied by Mr. Hodges, Temple-street, Bristol. The general contractors were Messrs. Stephens & Bastow. Mr. George Salmon was clerk of the works. The plumbing and gasfitting were entrusted to Messrs. Jones & Hudson, Redcliff-street, who carried out the work most satisfactorily. Mr. C. H. James, C.E., will superintend the arrangement of the new machinery.

Liverpool.—The Edgehill Tunnel, Liverpool, which will be well remembered by travellers to and from the Lime-street Station, has been abolished. The *Liverpool Courier* says that when the tunnel was first opened, and for a long period afterwards, the trains used to be hauled up a wire rope attached to the stationary engine up at the head of the tunnel at Edgehill. The process of hauling up the trains by the fixed engine and rope was found not at all adapted to the rapidly-increasing traffic at Lime-street. Then it was determined to attach engines to the trains going up and down the tunnel. This certainly increased the speed of the journey, but not its pleasantness. The smoke and steam emitted from the many engines going up and down the tunnel lodged there, although all the improved means of ventilation and dispersion were tried. An atmosphere of a very noxious character accumulated, which, along with the darkness that prevailed, made the journey through Lime-street tunnel a disagreeable experience to many railway travellers. The noisome atmosphere was to some extent purified by the stupendous ventilating-shaft erected in the middle, and equipped with fan extractors of gigantic power. But all these expedients,—costly and laborious,—were unsatisfactory, and in the end the company decided upon the radical cure of taking the roof off the tunnel bodily, and converting it into a wide open cutting. This was a task of great difficulty and cost. When the tunnel was first made, the land above, between Lime-street and Edgehill, was but little built upon; of late years it has been covered by houses. All these had to be acquired, and the cost of opening up the great tunnel has entailed upon the railway company a large expenditure of money. Now, however, the work is accomplished. With the exception of a bridge across it in Trowbridge-street, the tunnel is opened now all the distance from Lime-street to Edgehill. Two additional lines of rails and sidings have been laid down, and other improvements facilitating the traffic have been effected, so that four lines of rails now exist where before there were only two.

West Hartlepool.—The West Hartlepool Commissioners have decided, on the recommendation of a special committee, to erect new offices for themselves and for the Board of Guardians.

Preston.—On the 18th proximo the Prince of Wales is to visit Preston, and, proceeding to

the works for improving the navigation of the River Ribble, he will lay the foundation-stone of a 40-acre dock, probably with the Masonic ceremony. The Ribble Improvement and Dock Works are being carried out on a slight modification of Sir John Coope's scheme by Mr. T. A. Walker, of Westminster, to whom the contract was let in September last for 456,600*l.* The enormous powers of the Corporation for these works amount to 650,000*l.*, but the general opinion now is that they will cost nearly 1,000,000*l.* The contract includes the diversion of the river, the construction of a tidal basin of 4½ acres, and a dock of 40 acres, with the necessary adjuncts of locks, lock-gates, &c. The diversion of the river will be from near Penwortham Bridge to the Chain Caul, a distance of about three-quarters of a mile, and it will skirt the wooded eminence on which stands the ancient church of Penwortham. There are now daily employed in the excavations on both sides of the river upwards of 1,000 men, and during the work many remains of extinct animals have been brought to light.

CHURCH-BUILDING NEWS.

Halifax.—The Church of St. Anne in the Grove, which has been remodelled from the designs of Mr. W. Swinden Bacher, has recently been re-opened. The greater part of the interior fittings, including the brass lectern and black wrought-iron gasfittings, were supplied by Messrs. Jones & Willis, of Birmingham and London.

Stanford-in-the-Vale (Berks).—The north aisle and porch of St. Mary's Church, in this parish, having become very dilapidated, are now being restored under the supervision of Mr. F. H. Barfield, F.S.I., architect and surveyor, of Faringdon, Berks, Messrs. Cadell & Son, of that town, being the contractors. The new roofs are of oak, with the timbers and boarding exposed, the aisle being covered with new lead, and the porch with stone slates.

Manchester.—On Monday, the 15th inst., the church of St. Agnes, Birch-in-Rusboldme, was consecrated, the foundation-stone having been laid by the Bishop of Manchester on the 19th of July, 1884. The church will comfortably seat 502 adults. It is built of brick, inside and out, the design having been carefully worked out in detail to suit the material. The roofs are covered with Ruabon tiles, with slight patterns of darker tiles. The chancel terminates to the east in a semi-hexagonal apse. The reredos is mainly of cream-coloured stone with moulded cornice, surmounted by a plain Latin cross. The communion-table is raised seven steps above the nave, and the nave floor sloping up about a yard towards the east, a very dignified elevation is obtained without an undue number of steps. The font, a bowl of cream-coloured stones with carved cornice, is supported by columns of Devonshire marble with carved caps. Various appropriate inscriptions are introduced in the floor tiling of the chancel, the entrance porch, the vestries, and other parts of the church. The doors and chancel fittings are of oak; the nave seats of pitch-pine. The windows are glazed with good glass in carefully-designed patterns. It deserves to be noted that this church, containing as it does a great deal of carefully worked-out detail, has been consecrated within a year from the date of the contract for the shell, or for the church without the fittings. It is built on the estate of Sir W. R. Anson, who has given the site. The various details have been worked out minutely by Mr. Medland Taylor, the architect, who has personally superintended the erection of the church.

SCHOOL-BUILDING NEWS.

Walthamstow.—Mrs. Gladstone, who was accompanied by the Honourable Mrs. Courtney Warner, on the 20th ult. laid the foundation-stone of the St. Michael and All Angels' Sunday Schools, Walthamstow. The building is from the designs of Mr. J. M. Bignell, architect, Clapham, the builder being Mr. S. J. Scott, of London-wall and Walthamstow.

Eglosayle.—The memorial-stone of new Sunday schools in connexion with the parish church of Eglosayle, near Wadebridge, has just been laid. The schools are intended partly as a memorial to the late Canon Shuttleworth,

who was for thirty-four years vicar of the parish. They will consist of a plainly-built edifice. The material employed will be local stone from Grogley Quarry, with dressings of buff bricks (from Messrs. Condy & Co., of Chudleigh), and granite. The windows will be fitted with pointed arches. The contractors are Messrs. J. Paul (masonry) and J. Goodfellow (carpentry), both of Wadebridge. Mr. W. J. Jenkins, of Bodmin, is the architect. The memorial-stone, which faces the church, consists of a block of granite measuring 3 ft. 6 in. by 2 ft. 4 in., and was cut by Messrs. Doney & Evans, of Bodmin. The cost of the school will be upwards of 400*l.*, including the cost of the site and transfer.

Moulsham.—Extensive alterations and additions are about to be made at the Moulsham National Schools. The infants and boys' schoolrooms are to be knocked into one, and the boys' and girls' classrooms are also to be united. A new infants' schoolroom is to be built to the north of the present one, with which it will be connected by an open porch. The new room is to accommodate 180 children. Mr. C. Pertwee is the architect, and Messrs. Crompton & Fawkes are the builders, the amount of their contract being 864*l.*

Birmingham.—On the 30th ult. Mr. H. G. Reid laid the foundation-stone of a new school and lecture-hall attached to the Congregational Church, Westminster-road, Birchfield, Birmingham. The new school is to be erected by Mr. W. Bennett, of Bennett-street, Lozells, from plans by Messrs. Ingall & Hughes, of Temple-row West, Birmingham. It will accommodate 400 scholars, or 350 persons when it is used as a lecture-hall. It will cost about 1,200*l.*

Eccleshill.—A new Wesleyan Sunday School is being built here, from designs by Mr. F. S. Smith, architect, Yeading. The building will cost 1,600*l.*, or 1,700*l.* The contracts have been let to Messrs. Baxter & Whitfield, masons; Mr. John Thomas (Idle), joiner; Mr. Thomas Norton, plumber; Mr. E. Walker (Idle), painter; and Mr. Jos. Thornton, slater.

Darlington.—The memorial stone of the Central Board Schools, Darlington, has been laid. These schools are intended to replace the Bank Top Schools,—the site of which is required by the North-Eastern Railway Company for the station extension,—the Skinnergate, and the Bridge-street Board schools, and will accommodate about 1,000 children. The schools are divided into three departments,—senior, junior, and infants,—with hat and cloak-rooms, playgrounds, and covered play-sheds for each department. Teachers' rooms are arranged conveniently to the playgrounds, so that supervision can be had over the children during play hours. The main entrances to each school are from Beaumont-street, separate entrances being provided in each case for boys, girls, and infants. The buildings are being erected with hand-made common bricks for the general walling, relieved by red pressed brick, string courses, pilasters, and arches, supplied by Mr. J. C. Edwards, of Ruabon. They are being carried out from the plans, chosen in competition, of Mr. F. W. Brooks, architect, at a cost of about 5,000*l.* The contractors for the different works are Mr. George Marshall, brickwork, slating, &c.; Mr. John Hewitt, carpenters' and joiners' work; and Mr. Emerson Smith, plumbing. The clerk of the works is Mr. T. W. Robson.

Ipswich.—On the 13th inst. the Rose Hill school for infants, just erected by the Ipswich School Board, was opened. The buildings, which are in the Tudor style, provide accommodation for 184 infants. The material used for the exterior is red brick, with Broseley tile roofs. The desks are very strong and well made, and are adapted to the Kindergarten system. They were supplied by Mr. Hawes, of Norwich. The contract was taken by Mr. R. S. Smith, builder and contractor, of Ipswich, for 1,303*l.*, and this amount has only been exceeded by a trifling sum. The whole of the work has been executed from the designs and under the supervision of Mr. E. F. Bishop, architect and diocesan surveyor, Ipswich.

Meanwood Institute, near Leeds.—The committee of the Meanwood Institute, of whom the Rev. Annesley Powys, Vicar of Holy Trinity, is the chairman, having decided to increase the accommodation by the erection of a Public Hall, &c., plans were invited in limited competition, and the designs of Mr. T. Butler Wilson, of Leeds, were selected.

ROMAN CATHOLIC CHURCH-BUILDING NEWS.

Manchester.—On the 31st ult. special services were held at the Church of the Holy Name, Oxford-street, Manchester, to celebrate the opening of the Sacred Heart Chapel, situate to the east of the high altar. The chapel contains an altar, the panel forming the front of which contains a sculptured group of the Agony in the Garden. The angle shafts of the altar are of serpentine. The superaltar is richly diapered, and in the centre is to be a tabernacle, with door of *reposus* work, and the emblem of the Sacred Heart, encircled with the crown of thorns, and surrounded with jewels. The reredos has a lancet-shaped arch in the middle, with a standing figure of our Lord displaying His sacred heart. The altar and reredos are flanked by tall niches, in which are placed statues of St. John and St. Bernard, with sculptured pedestals, marble shafts, canopies and arcade of Painswick stone, with richly-carved diaper, foliated spandrels, and cresting of vine leaves. The whole is surmounted by a rose-window filled with painted glass. The work is in the style of the thirteenth century, from the designs of Mr. Charles A. Buckler, of Hereford-square, London, architect. The masonry and sculpture are by Mr. Boulton, of Cheltenham; the tabernacle by Messrs. Hart, Peard, & Co., London; and the glass by Mr. Pearce, of Chelsea.

Liverpool.—On Sunday evening, June 21st, the Catholic bishop of Liverpool laid the foundation-stone of a magnificent chapel, to be built on St. Francis Xavier's Church, and the initial cost of which will be 6,000*l.* The entrance to the new chapel is obtained out of the side aisle by means of a new archway formed in the space now occupied by the two aisle windows nearest the chancel. The arch opens into an octagonal-shaped chapel, in the walls of which are six arched openings, the principal one leading into the chapel chancel, around which are chancel-aisles, leading from church to house. The end of the chapel which is nearest the present belfry is planned for a small chapel, also with aisles, and called the Bona Mors chapel. The small chapel, like the chancel, is connected with the octagon by arched openings. Internally the whole of the materials will be Bath stone and marble, in large and smaller columns. The exterior will harmonise with the style of the church, and give the idea of a Lady or Sainte chapel. The builders are Messrs. Brown & Backhouse; the contractors for the marble-work, Messrs. John Stubbs & Son; and the architect is Mr. Edmund Kirby.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,322, Sliding Windows or Sashes. F. Oldfield.

A vertical screw fixed in a groove on one side of each sash works in a nut wheel attached to the frame. The wheel gears with a skew wheel operated upon by a handle. Spur-wheels keyed on shafts attached above the top sash and underneath the bottom sash gear, with racks fixed to the frame insure uniform motion in the sashes.

2,413, Roofs. D. Griffiths.

This roof is nearly flat, and is supported by wooden beams, the under-side of which are straight, and are utilised as ceiling joists. The beams may rest upon the internal as well as the outer walls, and may be strengthened in several ways described by the patentee. The roof is covered with tiles raised and grooved round the edges to suit various modes of jointing, all of which avoid having the tiles anywhere doubled. Special ridge hip-and-gutter tiles necessitated by the flatness of the roof, are also described.

3,254, Astragals, or Glazing Bars. W. R. Lester.

The glazing-bar consists of an inverted bar of T-section, on the lower part of which a sheath of thin metal forming a trough is applied, and upon which the glass rests. The glass is retained in its place by strips of lead bent over it, the strips being also bent, so that they are held by the sheath. The upper ends of the glazing-bars are entered into a groove in the top cross-bar, and the bottom ends are secured by means of brackets. The flanges of the T-bars may be bent upwards by being drawn through dies. Similar means are employed to put on the metal sheath and the lead strips.

3,873, Concrete-mixing Machine. J. Powell.

Boxes for apportioning materials, hopper, and mixer. The boxes are of rectangular transverse section, with adjustable hinged doors or slides, and are secured to forks resting on wheeled supports,

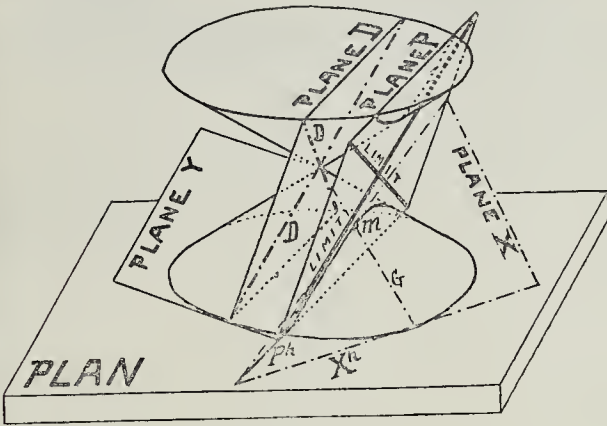


Fig. 108.

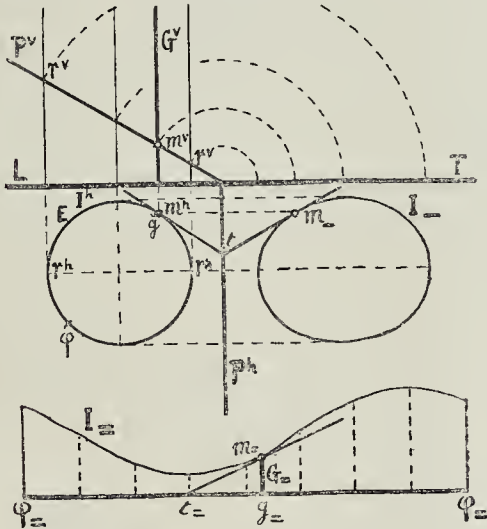


Fig. 109.

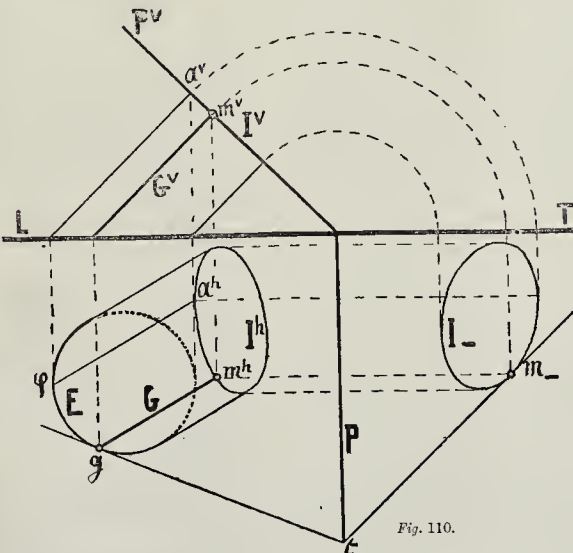


Fig. 110.

plane. In short, the plan of the intersection is the base E itself, and its elevation is a portion of P^v between r^v and r^v .

To find the real shape of the section we turn down the plane P round P^h , and lay it flat on the plan, an operation we have done often before. The tangent to the section through the point m is projected on the plan in $m^h t$, and as t is on the hinge round which the plane P moves, it will be a point of the tangent after the plane P has been laid flat on the plan; the tangent to the section will therefore be $t m$.

To develop the cylinder, we cut it open down one of its generators, such as the one whose foot is ϕ , and starting therefrom we can draw on the development a series of generators G_2 , remembering that the distance between ϕ_2 and G_2 is equal to the length of the arc of the base between ϕ and G . The base E develops in a straight line $\phi_2 \phi_2$, and if we carry above that line the series of points m_2 , where the generators are cut by the plane P, we obtain by joining them the curve I_2 , which is the development of the section.

The tangent to that curve in a point, m , will be found by making $g_2 t_2$ equal to $g t$, then joining $m_2 t_2$ we have the tangent. For we have formed by our construction a triangle $g_2 t_2 m_2$ equal to the triangle $g t m$, the real triangle formed by the tangent in space and its projection; therefore the lines $m_2 t_2$ and $m t$ form the same angle with the generator G , which is the very condition a tangent should fulfil on the developed curve. (See fig. 109.)

Find the section of an oblique cylinder by a plane, draw the real shape of the section, and develop the surface of the cylinder.

Here, again, the section has its elevation I^v on the line P^v ; by marking the intersections of a series of generators, G, by the plane P we get I^h the plan of the section.

To find the real shape of the section, we turn down the plane P round P^h and lay it flat on the plan as before.

To find the tangent to any point of the real section, we draw through the foot of the generator on which the point m is situated a tangent to the base; this is not, as with the right cylinder, the projection of the tangent to the section, but only the trace of the generator; nevertheless, the tangent to the section will go through t on the hinge P^h , round which the plane P moves; $m^h t$ will be the projection of the tangent, and $t m_2$ will be its position on the real section. (See fig. 110.)

To develop an oblique cylinder we must begin by cutting the cylinder by a plane, P, perpendicular to its generators, and find the real shape of its section; that section developed will form a straight line I_2 , from which we can measure the length of any generator so as to draw the curved line E_2 , the development of the cylinder's base.

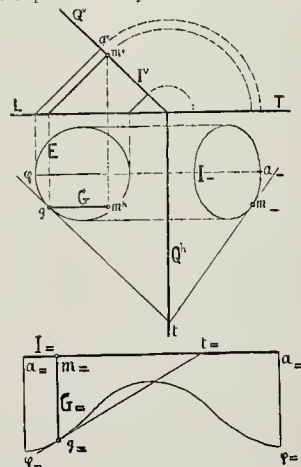


Fig. 111.

To find the tangent to any point g_2 of the developed base, we take $t_2 m_2$ equal to $t m_2$ of the real section, and $g_2 t_2$ is the tangent required, for it forms the same angle with the generator G_2 , as the tangent did in space. (See fig. 111.)

Miscellaneous.

The Colombo Breakwater.—This great work, which has occupied in its construction about twelve years, received the ceremonial finishing touch at the hands of its designer, Sir John Coode, on the 22nd of April last. The exposure to which a work of this kind is subjected during the long period required to complete it furnishes a sufficient guarantee that it is fitted to withstand any influence attacking it, and the colony of Ceylon and its engineer may be congratulated on the successful termination of a work likely to contribute so greatly to the progress of the island. The closing ceremony consisted simply in the laying, by Sir John Coode, of the last square of concrete capping; and Mr. Kyle, the resident engineer, whose services have contributed so greatly to a successful issue, has finally reported that "the whole of the work reclaiming the inner harbour foreshore, including jetties, sheds, &c., has now been completed, and all hands have been withdrawn and the account closed." The total cost incurred from the commencement of the operations in 1873 to the commencement of 1885, is 8,125,433 rupees, or in round figures about 812,500*l.* There appears no reason to hope that for the present the local Government will entertain the carrying out of Sir John Coode's design in its entirety by undertaking the construction of a northern breakwater.—*Engineer.*

A New Water Supply for New York.—The New York City Water Company has submitted to the City Commissioners of the sinking fund a proposition to supply the dry goods district of New York with water from wells. The new company was organised in January last with a capital of 1,500,000 dollars. There is in New York City a water-bearing strata into which wells can be driven, which, it is estimated, would furnish a daily supply of 5,000,000 gallons of fresh water. This supply would be drawn from the wells and from storage tanks distributed through the district bounded by Chambers, Bleecker, and Centre streets and West Broadway. Hydrants would be placed at various points in this district, and water forced to them by powerful engines. The water would reach the flames at a height of 150 ft. without the intervention of fire engines. The company propose to furnish machinery and lay ten miles of service within one year from the acceptance of their offer. They agree to furnish water to the city for twenty years for a fixed price per hydrant, not less in the aggregate than 150,000 dollars a year. A city committee has been appointed to investigate the need of a special water supply for the dry goods district, the feasibility of the proposed plan, and the financial responsibility of the water company.—*Iron.*

Irish Artisans' Exhibition Medal Competition.—The *Belfast Newsletter* says that in the medal competition in connection with the Irish Artisans' Exhibition at Dublin, Mr. J. Quiller Lane, of Belfast, has been successful in securing the first prize. The competition was an open one. The reverse of his design is divided by five circles, the larger being in the centre, and containing an Irish cross, formed of strapwork, with a trefoil between each member. The four surrounding articles contain respectively symbols of Painting, Sculpture and Modelling, Architecture, Weaving, and Engineering. These are united by a wreath of laurel leaves, the additional spaces being ornamented by straps and scroll work. The reverse has the words "Irish Artisans' Exhibition, Dublin," on the outer band, the ground of which is formed of shamrock leaves. This is divided horizontally by a label extending right across the medal, the year 1885 being divided between the external wings, the centre space being left for the winner's name and the department in which the medal is awarded. The background is occupied with the old Irish harp, the ground being filled in with strap work.

Netley.—The new church at Netley is to be built upon a site overlooking the Abbey grounds, given by Colonel the Hon. H. Crichton. The tenders for the work (one of which is to be accepted) are now before the Committee, and it is proposed to commence the building immediately. The contract for the first portion of the work amounts to 3,000*l.* The walling is to be faced with Swanage stone, and the dressings to be of Donling stone. The architect is Mr. J. D. Sedding.

Curious Discovery at Folkestone.—A few days ago, whilst some workmen in the employ of Mr. Harry Hems, of Exeter, were engaged in erecting a rich arcade of polished alabaster and marbles around the chancel of the parish church at Folkestone, they removed some portion of the Early English, or possibly Norman, north wall in the sanctuary, and under a stone slab, supposed to be the original credence-table, they came across a leaden casket, measuring 18 in. by 10 in. by 6 in. It is of beautifully stamped diaper work, having straps of lead around it, and was found to contain female remains, consisting of a part of a skull, the thighs, fingers, and other bones. From their position and surroundings, little doubt exists that these are the relics of the Princess Eansyth, daughter of Eadwald, king of Kent. This princess, who is accredited, by legendary lore, with the power of working miracles, built a nunnery on Folkestone Cliff, and was ultimately buried herself within its Chapel of St. Martin. The encroachments of the sea finally destroyed this edifice, but not before the remains of St. Eansyth had been reverently removed to the then new parish church of SS. Mary and Eansyth, at Folkestone. Where they were put there, however, history does not record, and it has remained a mystery until last Wednesday, when, in the unexpected manner recorded, the workmen brought the remains to light. The works at present in hand at Folkestone Church are under Mr. S. Slingby Stallwood, architect, of Reading. The "find" is considered in antiquarian circles to be a most important one.

Railway Extension in Essex.—Southend-on-Sea as a health resort is rapidly rising in popular favour, and a new route to the bathing-place at the mouth of the Thames has just been commenced by the Great Eastern Railway Company. The new line leaves the Colchester and Ipswich main road near Brentwood, and proceeds through Billericay and Rayleigh, an ancient market town, direct to Southend. It will not only afford an alternative route to and from London, but furnish great facilities of communication to the whole of the eastern counties, and directly connect the important military centres of Shoeburyness, Warley, and Colchester. Branch lines will also be made to Maldon and Southminster, thus opening up a little-known corner of Essex. An illustration of the enhanced value acquired by land in the vicinity of the railways under construction was given at a land sale held a few days ago at Southend by Messrs. Baker & Sons, when for some building plots near the almost forgotten town of Rayleigh exceptionally high prices were realised. It is expected that quite a little township will spring up on the main road between Rayleigh and Southend.

The Medway Portland Cement Company (Limited).—The prospectus of this Company has been issued. The proposed capital is 60,000*l.*, in 12,000 shares of 5*l.* each. The first issue will be of 35,000*l.* in 7,000 shares of 5*l.* each, divided into 6,000 ordinary shares and 1,000 vendors' shares; the latter not ranking for dividend until a dividend at the rate of 6 per cent. has been paid upon the ordinary shares. The 1,000 vendors' shares fully paid will be allotted in part payment of the properties purchased by the Company, and the 6,000 ordinary shares are now offered for subscription. The Company has been formed for the purpose of acquiring and working the recently-erected cement, &c., works at Cuxton, on the river Medway, near Rochester, which have recently come into the market in consequence of the sudden death of the proprietor. The secretary *pro tem.* is Mr. W. F. Watkins, and the temporary offices of the Company are at 7 and 8, Ironmonger-lane, E.C.

Sale of Land at Cromer.—For the first time in the history of Cromer, the beautiful but much-neglected sea-side place on the north-east coast of Norfolk, a public sale of freehold building plots was held a few days ago, when 4,860*l.* was realised for the first sixty lots put up, the prices obtained being at the rate of 1,500*l.* per acre. This successful auction was undoubtedly due to the energy of Mr. Alfred Baker, of Baker & Sons, Queen Victoria-street, who conducted the sale. It may interest our readers to learn that among the works in immediate contemplation are the erection of a large hotel, with extensive recreation-grounds, and a new pier. It is stated that the service of the Great Eastern Railway to Cromer has lately been greatly improved.

The Trafalgar Institute, Montreal.

The *Montreal Gazette*, of the 10th inst., gives particulars of the project for the erection of the Trafalgar Institute, "which," we are informed, "is destined to mark a new era in the history of the development of the higher education of women in Montreal." The origin of the establishment is due to the late Mr. Donald Ross, years ago a prominent citizen of Montreal, who by his last will and testament left means for the purpose of erecting an institute for the purpose indicated. Recently the Hon. Donald A. Smith, following up the spirit of the bequest of Mr. Ross, has granted \$25,000 to carry the project to a successful issue. The work will be commenced on the 1st of October next. In answer to an invitation for plans for the building, the Trafalgar Institute Committee received designs from fourteen competitors, representing the architectural profession in all parts of the Dominion and the United States. Mr. T. C. Sorby, architect, 162, St. James-street, Montreal, was the successful competitor. At first the establishment will afford accommodation for only thirty boarders, but the plans contemplate, when it is found necessary, accommodation for a much larger number of pupils.

Plymouth.—Tenders for the erection of the new church of St. Matthias, Plymouth, to be erected on a fine site at North Hill, were last week received from six of the principal contractors of Plymouth. The tender of Messrs. Finch & Son at 8,778*l.* for the complete work,—being the lowest,—was accepted, and the building will be forthwith commenced. The design, by Messrs. Hine & Odgers, shows a church in the Perpendicular style, with clearstoryed nave, aisles, chancel, vestries, and tower at the west end of the nave, rising to the height of 112 ft. above the floor. The walls will be of local limestone, having dressings chiefly of Box ground and Portland stone. The Bishop of Exeter has promised to lay the foundation-stone next month.

A History of Hampton Court Palace.—A new history, dedicated, by special permission, to her Majesty, is announced under the title of "The History of Hampton Court Palace in Tudor Times," by Mr. Ernest Law, B.A. It is illustrated with 130 autotypes, etchings, engravings, maps, and plans. Messrs. Bell & Sons are the publishers.

The Late Professor Jenkin.—The Professorship of Civil Engineering in the University of Edinburgh has become vacant by the death of Professor Fleeming Jenkin, F.R.S., who expired on the 12th inst. from blood-poisoning, after undergoing a surgical operation.

TENDERS.

For proposed Allen's Boys' Schools, Dulwich, for the Governors of Dulwich College. Messrs. Oliver & Leeson, architects, Newcastle-on-Tyne:—

Schools only, Roads, &c.	Less Blue Slates.
Higgs & Hill.....	£12,584 4 320
Peto Bros.....	12,606 0 355
Stephens & Bastow.....	12,459 0 365
J. & C. Bryant.....	12,430 0 312
Perry & Co.....	12,331 0 320
Howell & Son.....	11,384 0 380
C. Wall.....	11,250 0 254
W. J. Mitchell.....	10,410 0 395

For the erection of grain-store and extension of goods warehouse at Norwich City Station, for the Eastern and Midlands Railway:—

G. Hammond, Norwich.....	£1,777 0 0
Holmes & Reed, Norwich.....	1,480 0 0
Youngs & Son, Norwich.....	1,440 0 0
Bardes Bros., King's Lynn.....	1,358 0 0
North & Wilson, St. Stephen's, Norwich (accepted).....	1,294 10 0

For shop, house, stables, and warehouses, at Stamford, for Mrs. Young. Messrs. Richardson & Son, architects, Stamford:—

Lillian & Corby.....	£1,933 2 6
Nicholls Bros.....	1,341 2 0
Roberts Bros.....	1,340 0 0
Clayson Bros.....	1,245 0 0
J. Woolston.....	1,245 0 0
Ladlow & Emmerton.....	1,236 0 0
Hinson Bros.....	1,190 0 0
Scholes, Rouse, & Clarke (accepted).....	1,165 0 0

For new school and class-rooms at Swindon. Mr. Thos. Lansdown, architect:—

W. Jones & Son, Gloucester.....	£730 0 0
T. Colbourne, Stratton.....	730 0 0
G. Wiltshire, Swindon.....	693 0 0
G. R. Hineley, Swindon.....	659 12 0
T. Barrett, Swindon.....	618 0 0
J. Williams, Swindon (accepted).....	445 0 0

For new road, Castle Hill, Wycombe, for the Right Hon. Lord Carrington. Mr. Artaur Vernon, surveyor, High Wycombe:—

Stone.....	£255 10 0
Hunt.....	240 0 0
Hill (accepted).....	235 10 0

CONTRACTS AND PUBLIC APPOINTMENTS:

Epitome of Advertisements in this Number.

CONTRACTS.

Table with 5 columns: Nature of Work, By whom required, Architect, Surveyor, or Engineer, Tenders to be delivered, Page. Includes entries for cleaning and whitewashing, yellow deal for firewood, paving, brick and pipe sewer, school and office buildings, etc.

PUBLIC APPOINTMENTS.

Table with 5 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in, Page. Includes Engineer's Assistant at Belfast & Co. Down Ry.

Table listing quantities supplied for the erection of new infants' school and alterations to class-rooms at Churchfield Schools, for the Woodford School Board. Lists items like brass, Newman, C. Robson, Dixon & Co., Scott, Pratt, Morgan & Newman, Barnes, Osborne, Stawart, J. J. Robson, Watson, Wills, England & Thompson, Foster, Bangor, Webb.

Table listing quantities supplied for new offices, Mill Dam Quay, in the Borough of South Shields, for the River Police and Tyne Post-Office. Lists items like J. Elliott, North Shields, S. Storor, Gillilan Bros., W. M. Hudson, E. Allison, W. Harwood, Fishburn Bros., W. Richardson, Gateshead.

Table listing sundry works and repairs at No. 45, Queen's-garden, Hyde Park, W. Mr. Robert Willey, architect, 68, Ludgate Hill.

Table listing the erection of a girls' school in connexion with Christ Church, Ealing. Mr. Robert Willey, architect, 68, Ludgate Hill.

Table listing quantities supplied for new ragged schools, Giffen-street, Deptford. Lists items like Dow Bros., J. Mowlem & Co., Pack Bros., Staines, Rider & Son, Greenwood, Jerard, Teyman, J. C. Perkins, Holloway Bros.

Table listing repairs and alterations to No. 304, Camden-road, N.W., for Mr. G. Bridges. Mr. Walter J. Ebbetts, architect, 115, Strand, W.C.

Table listing laundry fittings at the new schools for the Oldham Union. Mr. A. Banks, architect, 46, Union-street, Oldham.

Table listing stone boundary wall to the new schools, for the Oldham Union. Mr. A. Banks, architect.

Table listing accepted for twelve houses, Delph, Yorkshire. Mr. A. Banks, architect. Includes Brickwork and Stonework, C. Winterbottom, J. Wood, J. Whithead, C. & W. Shaw.

Table listing two villa-residences at Queen's-road, Oldham. Mr. A. Banks, architect. Lists items like J. Whitaker, J. Booth, J. Booth, Jackson & Randall, J. J. Whitehead, E. Stephenson.

Table listing building Congregational Sunday schools at Oldham. Mr. A. Banks, architect. Lists items like E. J. Whitaker, C. Schofield & Co., J. Booth, Jackson & Randall, J. J. Whitehead, E. Stephenson.

Table listing the erection of shops in High-road, Kilburn, for Mr. O. Davies. Mr. Edward Menson jun., architect, Acton. Lists items like A. E. Wickham, F. J. Crabbe, R. G. Bentley, W. A. Pryor, J. Ridout, J. Edgar, W. Martin, Brass & Co., Hann & Co., G. Lyford, R. Julian, W. Went & Bowen, T. May, Acton, A. H. Harris, W. Martin, J. M. Goodwin, H. Hunt.

Table listing the erection of schools at Page Green, Tottenham, for the Tottenham School Board. Messrs. E. Ellis & Son, architects. Lists items like Humphrys & Son, Linzell, Nixon, Sibley & Son, Huck, Steinas & Son, Conshall Bros., Nightingale, Harper & Co., Stephenson, Parlat, Garrod, C. Manning, Williamson, O'Wall, Harris, Angood.

Table listing the erection of schools at West Green, Tottenham, for the Tottenham School Board. Messrs. E. Ellis & Son, architects. Lists items like Nixon, Conshall Bros., Huck, Sibley & Son, Parlat, Pata Bros., Nightingale, Stephenson, Angood, C. Manning, O. Manning & Son, Williamson, Garrod, C. Wall, Harris.

Table listing rebuilding the Royal Standard Concert Hall, Westminster, and making certain alterations to the public-house adjoining. Mr. B. Wake. Mr. H. I. Newton, architect, 17, Queen Anne's Gate.

Table listing alterations to the Victoria Hotel, Chatterhouse-street, for Mr. J. S. Manley. Mr. A. W. Saville, architect, 95, Strand. Lists items like Walker, Anley, Smith, Royal, Heath, Ward & Lambie, Spencer & Co., Cook.

Table listing Peabody's Work. Lists items like Davidson, J. Wame, Heath, Helling, H. T. Wame, Sanders & Son, Wats & Co., Mathews.

Table listing building new mansion at Frensham, near Farnham, Surrey, for Mr. J. F. Woodroffe. Mr. A. E. Purdy, architect. Lists items like Patman & Fotheringham, Wall Bros., Oddard & Sons, Roberts Bros., Tompsett & Kingham, Carless & Co., Woods, Martin, Walls, & Co.

Table listing accepted for estate offices, clerk's residence, stabling, and cottage at Easton-on-the-Hill, Northamptonshire, for Mr. Neville Day. Mr. J. B. Corry, architect, Stamford.

Table listing additional farm buildings at Wellington, Lincolnshire. Mr. J. B. Corry, architect, Stamford. Lists items like J. Holmes, Wainstead, R. H. Dunkley, Eastville, J. T. Turner.

Table listing the erection of a house and shop, No. 31, Chapel-street, Broadway, Westminster, for Mr. W. C. Shean. Lists items like Colla & Sons, Macey & Sons, Scott, Faulkner, Shurmer, W. L. G. & Co., Mayle & Son, Downs, Smith & Son, Prestige & Co., Green.

Table listing accepted for constructing new road and sewer on the Newton Estate of the Bee Land Company, under the superintendence of Mr. Ernest Turner, architect to the Company. Lists items like Atkins, Teddington.

Table listing the erection of St. Matthias's Church, Plymouth. Messrs. Hine & Odgers, architects. Lists items like A. * B. + Paik & Partridge, Peckish Bros., Berry, Harley, Marshall, Finch & Son.

For building new schools, &c., for the Hampton Wick School Board. Mr. R. T. Elam, architect, Hampton Wick. Quantities by the architect:—

Ventham & Gaze, Kingston	£2,767 0 0
A. Newland, Cobham	2,100 0 0
F. R. Toner, Notting Hill	2,041 11 6
Whitely & Sons, East Molesey	2,000 0 0
J. H. Jarvis, Sarbiton Hill	1,963 0 0
T. Hardy, Cowley, Uxbridge	1,929 0 0
Servener & Co., Regent's Park	1,923 0 0
C. Girdridge & Sons, Norbiton	1,907 0 0
W. Schofield, Bucklersbury	1,900 0 0
A. Robb, City-road	1,889 0 0
G. Constable, Hampton Wick	1,870 0 0
W. R. Wood, Hampton Wick	1,845 10 7
G. Huckle, Norbiton	1,833 10 0
Prentice & Co., Grosvenor-road	1,830 0 0
W. Hickinbotham, Teddington	1,810 0 0
J. F. Colhinson, Teddington	1,795 0 0
C. Bonell, Teddington	1,785 0 0
T. Hiscock, Hounslow	1,755 0 0
J. Piner, Teddington	1,728 0 0
A. Harris, Sutton	1,699 0 0
C. Manning, Barnes	1,695 0 0
Collier, Teddington (accepted)	1,636 0 0
Brass & Co., King's Cross	1,226 10 6

For supplying and laying 2,500 ft. lineal of 12 in. by 6 in. Norwegian granite edge kerb (straight), for the Bromley Local Board. Mr. High S. Crogeen, surveyor:—

Woodhams & Fry	1 8 per foot.
J. G. B. Marshall	1 8 "
Catley	1 8 "
E. & H. Bevers	1 7 1/2 "
J. Mowlem & Co.	1 7 "
H. B. Froehner & Co.	1 5 1/2 "
J. S. Gabriel (accepted)	1 4 1/2 "

For building dwelling-houses for pier-master and crew at Managers'-street, Poplar, for the Managers of the Metropolitan Asylum Board. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities supplied:—

G. Lunn	£1,588 0 0
J. H. Pettor	1,490 0 0
W. Johnson	1,390 0 0
J. H. Johnson	1,337 0 0
S. Chafon	1,335 0 0
J. Holland	1,329 0 0
Van Camp	1,310 13 5
E. Proctor	1,280 0 0
Ward & Lambie Hornsey-street, Holloway (accepted)	1,175 0 0

For repairs, painter's work, &c., at the Offices of the *Morning Advertiser*, Fleet-street, Mr. W. T. Farthing, architect:—

Flowers	£161 10 0
Mston	159 0 0
Wythe	131 14 0
Pickersill	123 0 0
Beale	120 0 0
Crabtree	114 19 0
B. Cook (accepted)	107 15 0

For new warehouses and buildings at Blackfriars, for the National and Provincial Plate Glass Insurance Company. Mr. Marshall N. Inman, architect. Quantities by Mr. Walter Barnett:—

Boyce	£4,687 0 0
Holland & Hannen	4,144 0 0
Mowlem & Co.	3,955 0 0
Andrew & Nanson	3,905 0 0
Brown, Son, & Bloomfield	3,850 0 0
Stimpson	5,633 0 0
Grover & Son (accepted)	3,490 0 0

For engine, pumps, and tank at West Ham Union:—

T. Middleton & Co.	£350 0 0
Taylor & Sons	746 0 0
Brown, Tottenham	745 0 0
Meads & Co.	725 0 0
Warner & Sons	520 0 0
Scott & Sons	589 0 0
J. & F. May	570 0 0
H. Lowe, Hackney	559 0 0
Bennett & Sons	515 0 0
T. Horn & Sons	492 0 0
W. Harris, Forest Lane (accepted)	492 0 0

For sewer and road on the Cotton Estate, Cricklewood. Mr. P. D. Tuckett, surveyor:—

Heard, Hornsey	£845 0 0
Roger & Dickens, Notting Hill	823 0 0
Killingback, Camden Town	815 0 0
Novell & Robson, Kensington	799 0 0
Watts, Hampstead (accepted)	787 10 0

For pulling down present school at Hyde, near Fording-bridge, Hants, and erecting new school on site. Mr. Robert J. Beale, architect, Palace-chambers, Westminster:—

W. Dibben, Salisbury	£714 0 0
A. Hubbard, Tottenham	628 0 0
G. Harris, Salisbury	615 0 0
Sperring & Wheeler	595 0 0
T. Clarke, Bickton	565 0 0
Thak & Carley, Ringwood	560 0 0
A. Head, Ringwood	552 9 0
R. Tuck, Ringwood	550 15 0
J. Shering, Fordingbridge	518 7 6
W. E. Alexander, Ringwood	490 0 0
C. Mitchell, Downton (accepted)	458 0 0

Accepted for the erection of a pair of cottages at Shenley, Herts, for Mr. John Brissers. Mr. Robert J. Beale, architect:—

W. Carter, Shenley	£370 0 0
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For the erection of stabling, &c., at 134, High-street, Deptford, for Mr. H. Wallhalow. Mr. John James Downes, architect, 183, Lewisham High-road:—

M. Redman, Brockley	£350 0 0
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(No competition.)

For alterations at 142, Lewisham High-road, S.E., for Mr. John Snaith. Mr. J. J. Downes, architect:—

T. D. Long, Deptford	£167 0 0
J. Almond, Bermondsey	160 0 0
M. Redman, Brockley (accepted)	147 0 0

For alterations to premises, No. 189, Mile End-road, for Mr. William Greaves. Mr. Robert Wm. Dexter, architect, Jewry-street, Aldgate:—

Mark Gentry	£397 0 0
W. Greer	374 0 0
John Loveday	328 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 48, Catherine-street, W.C., not later than **Four p.m. on THURSDAYS.**

TO CORRESPONDENTS.
F. P.—E. C.—E. J. T.—C. L. (Paris).—O. E.—A. A.—J. R. C.—W. G. S.—J. N. (address note).—J. D. R.—F. J. H. (your letter is not one that we could print).—C. & Co.—P. E.—C. M. S.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline printed out books and giving addresses.

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.

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 strictly business matters should be addressed to THE PUBLISHER, and not to the Editor.

PUBLISHER'S NOTICES.

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SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.
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* Stamps must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent-garden, W.C. to DOUGLAS FOURDRINER, Publisher, Addressed to No. 48, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.
The Publisher cannot be responsible for DRAWINGS, TESTS, MONIALS, &c., left at the Office in reply to Advertisements, and strongly recommends that the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY evenings.

PERSONS advertising in "The Builder," may have Replies addressed to the Office, 48, Catherine-street, Covent-garden, W.C. free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

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"THE BUILDER" is supplied gratis from the Office to residents in any part of the United Kingdom at the rate of 1s. per annum. For aID. To countries within the Postal Union, 2s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 48, Catherine-street, W.C.

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And Farleigh Down.
BANDELL, SAUNDERS, & CO., Limited,
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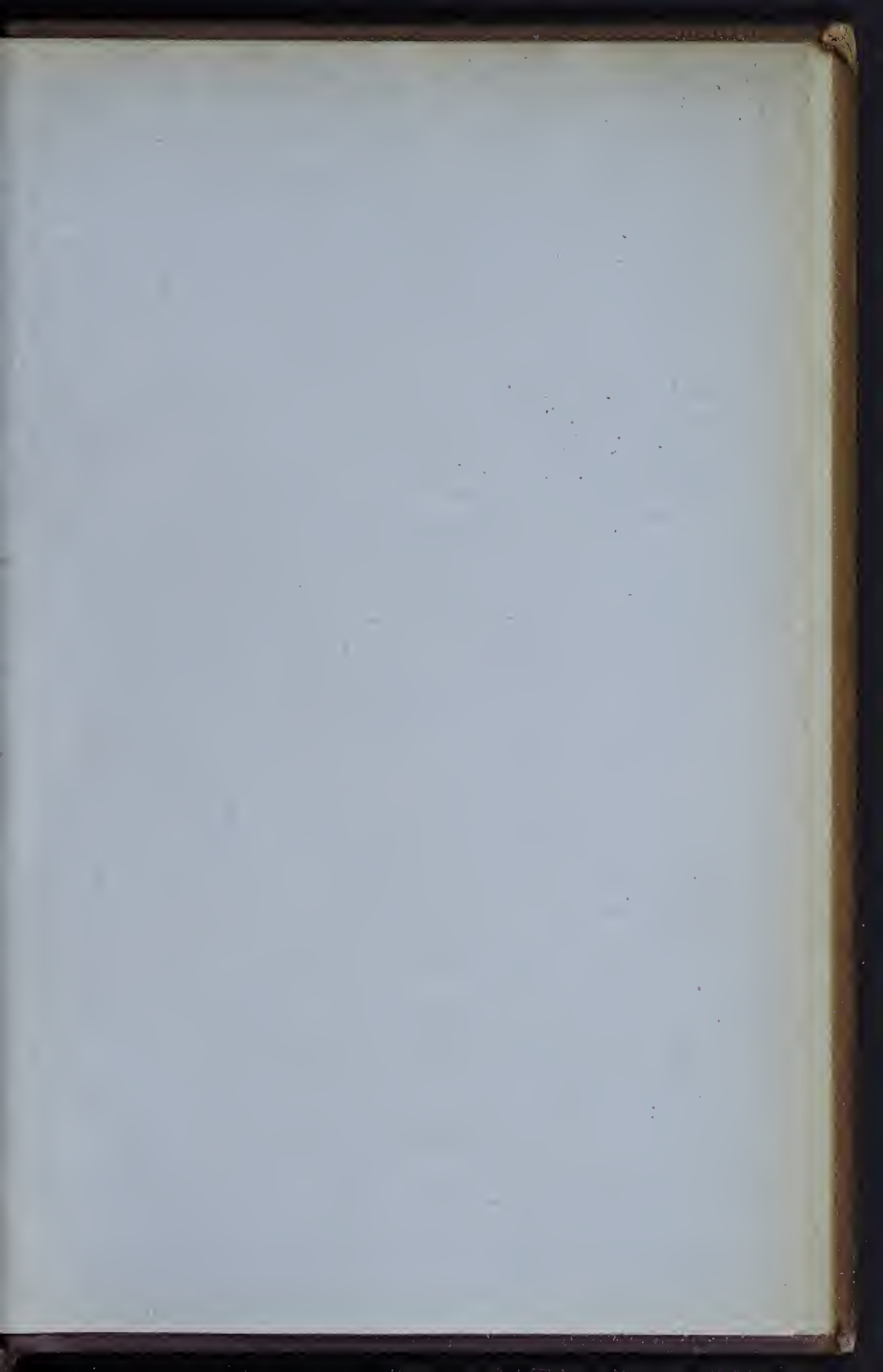
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