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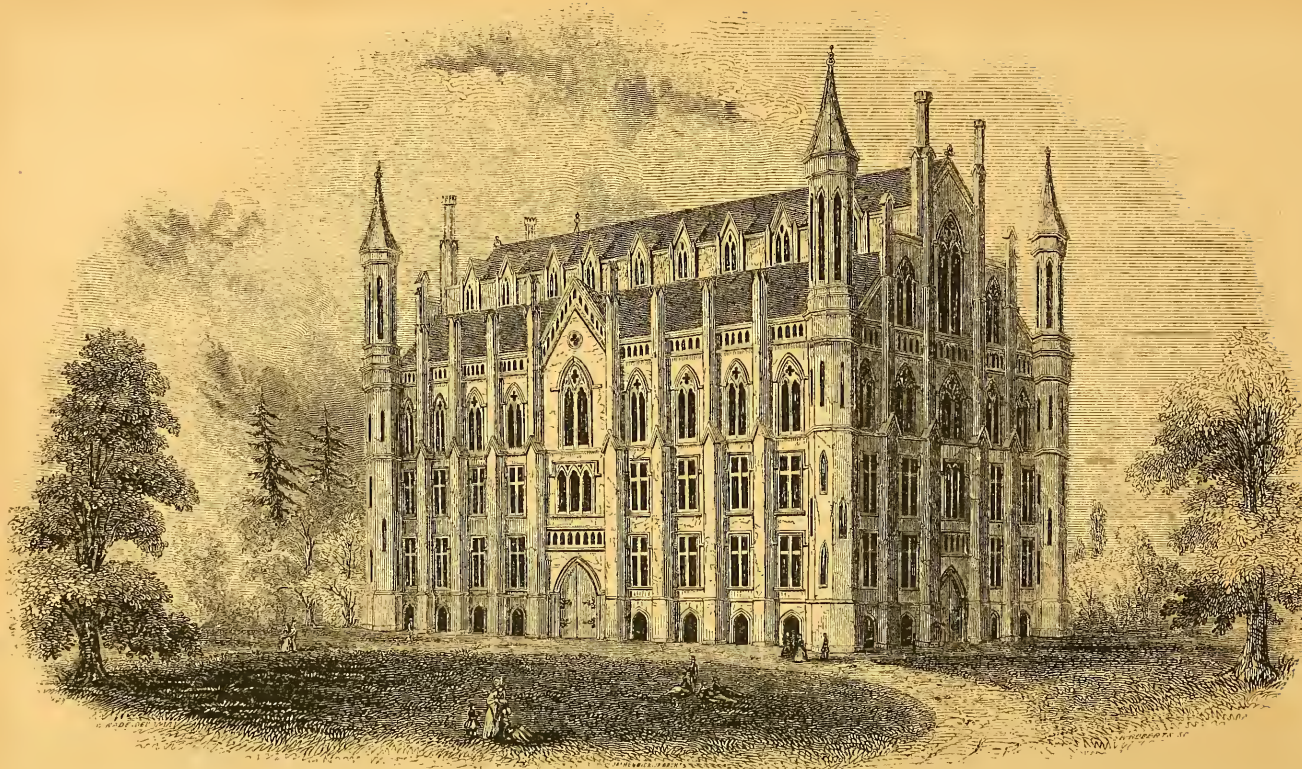

FREE ACADEMY, NEW YORK.

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SCHOOL ARCHITECTURE;

OR

CONTRIBUTIONS

TO THE

IMPROVEMENT OF SCHOOL-HOUSES

IN

THE UNITED STATES.

922 b

BY HENRY BARNARD,

COMMISSIONER OF PUBLIC SCHOOLS IN RHODE ISLAND.

THIRD EDITION.

SMITHSONIAN INSTITUTION.

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PREFACE.

The following contribution to the improvement of school-houses, was originally prepared by the author in 1838, as one of a series of addresses designed for popular and miscellaneous audiences, and as such, was delivered in various towns in Connecticut during the four years he acted as Secretary of the Board of Commissioners of Common Schools for that State. It was printed for the first time in the Connecticut Common School Journal in the winter of 1841; and again, in 1842, as one of the documents appended to his Annual Report to the Board for that year. Since that date it has been repeatedly published, each time with additional plans and descriptions of new and convenient school-houses, until upwards of twenty thousand copies have been gratuitously circulated in the States where the author has been called upon to labor in the cause of common-school improvement, or among the friends of popular education in other parts of the country. At the suggestion of many of these friends, the work has been put into the hands of a publishing house, to be brought before the public, in the hope that it may still continue to help those who are looking round for approved plans of school-houses, by introducing them to the results of much study, observation and experience on the part of many laborers in this department of public education. It was the wish of the author to revise that portion of the work in which the general principles of school architecture are discussed, and to arrange the various plans and descriptions of improvements in the construction, internal arrangement, and furniture of school-houses, which have been added to each successive edition in the order of time in which they have been brought to his notice, under appropriate heads. But his time is too much absorbed in the immediate and pressing duties of his office, to admit of his doing any thing beyond a general superintendence of the publication, and the preparation of a few additional plans, for this edition.

With such views, therefore, as the essay originally presented, and with such modifications and additions as he has been able to embody in each successive edition, it is now committed to the hands of the publishers. These views were formed after a careful consideration of the subject in its various relations, direct and indirect, to the health, manners, morals, and intellectual progress of children, and the health and success of the teacher, both in government and instruction. The subject was forced on the attention of the author in the very outset of his labors in the field of public education. Go where he would, in city or country, he encountered the district school-house, standing in disgraceful contrast with every other structure designed for public or domestic use. Its location, construction, furniture and arrangements, seemed intended to hinder, and not promote, to defeat and not perfect, the work which was to be carried on within and without its walls. The attention of parents and school officers was early and earnestly called to the close connection between a good school-house and a good school, and to the great principle that to make an edifice good for school purposes, it should be built for children at school, and their teachers; for children differing in age, sex, size, and studies, and therefore requiring different accommodations; for children engaged sometimes in study and sometimes in recitation; for children whose health and success in study require that they shall be frequently, and every day, in the open air, for exercise and recreation, and at all times supplied with pure air to breathe; for children who are to occupy it in the hot days of summer, and the cold days of winter, and to occupy it for periods of time in different parts of the day, in positions which become wearisome, if the seats are not in all respects comfortable, and which may affect symmetry of form and length of life, if the construction and relative heights of the seats and desks which they occupy are not properly attended to; for children whose manners and morals,—whose habits of order, cleanliness and punctuality,—whose temper, love of study, and of the school, are in no inconsiderable degree affected by the attractive or repulsive location and appearance, the inexpensive out-door arrangements, and the internal construction of the place where they spend or should spend a large part of the most impressible period of their lives. This place, too, it should be borne in mind, is to be occupied by a teacher whose own health and daily happiness are affected by most of the various circumstances above alluded to, and whose best plans of order, classification, discipline and recitation, may be utterly baffled, or greatly promoted, by the manner in which the school-house may be located, lighted, warmed, ventilated and seated.

With these general views of school architecture, this essay was originally written. The author will be happy to receive from any quarter, plans and descriptions of new school-houses, and to insert them in subsequent editions of this work, with proper acknowledgment for the same.

H. BARNARD.

Office of Commissioner of Public Schools,
Providence, R. I., January 1, 1848.

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INTRODUCTION.

LEST the author should be thought to exaggerate the deficiences of school-houses as they have been heretofore constructed, and as they are now almost universally found wherever public attention has not been earnestly, perseveringly, and judiciously called to their improvement, the following extracts from recent official school documents are inserted, respecting the condition of school-houses in States where public education has received the most attention. The facts herein stated show that, while some advance has been made within a few years past, both in public opinion and public action, still the standard of actual attainment is very low, and the disastrous consequences of neglect are not sufficiently, or generally appreciated.

MASSACHUSETTS.

EXTRACTS *from the* "*Report of the Secretary* (*Hon. Horace Mann*) *of the Board of Education for* 1846."

"For years the condition of this class of edifices, throughout the State, taken as a whole, had been growing worse and worse. Time and decay were always doing their work, while only here and there, with wide spaces between, was any notice taken of their silent ravages; and, in still fewer instances, were these ravages repaired. Hence, notwithstanding the improved condition of all other classes of buildings, general dilapidation was the fate of these. Industry and the increasing pecuniary ability which it creates, had given comfort, neatness, and even elegance to private dwellings. Public spirit had erected commodious and costly churches. Counties, though largely taxed, had yet uncomplainingly paid for handsome and spacious court-houses and public offices. Humanity had been at work, and had made generous and noble provision for the pauper, the blind, the deaf and dumb, the insane. Even jails and houses of correction,—the receptacles of felons and other offenders against the laws of God and man, had, in many instances, been transformed by the more enlightened spirit of the age, into comfortable and healthful residences. The Genius of architecture, as if she had made adequate provision for all mankind, extended her sheltering care over the brute creation. Better stables were provided for cattle, better folds for sheep, and even the unclean beasts felt the improving hand of reform. But in the mean time the school-houses, to which the children should have been wooed by every attraction, were suffered to go where age and the elements would carry them

In 1837, not one third part of the Public School-houses in Massachusetts would have been considered tenantable by any decent family, out of the poor-house, or in it. As an incentive to neatness and decency children were sent to a house whose walls and floors were indeed painted, but they were painted, all too thickly, by smoke and filth; whose benches and doors were covered with carved work, but they were the gross and obscene carvings of impure hands; whose vestibule, after the oriental fashion, was converted into a veranda, but the metamorphosis which changed its architectural style, consisted in laying it bare of its outer covering. The modesty and chastity of the sexes, at their tenderest age, was to be cultivated and cherished, in places, which oftentimes were as destitute of all suitable accommodations, as a camp or a caravan. The brain was to be worked amid gases that stupefied it. The virtues of generosity and forbearance were to be acquired where sharp discomfort and pain tempted each one to seize more than his own share of relief, and thus to strengthen every selfish propensity.

At the time referred to, the school-houses in Massachusetts were an opprobrium to the State; and if there be any one who thinks this expression too strong, he may satisfy himself of its correctness by inspecting some of the few specimens of them which still remain.

The earliest effort at reform was directed towards this class of buildings. By presenting the idea of taxation, this measure encountered the opposition of one of the strongest passions of the age. Not only the sordid and avaricious, but even those, whose virtue of frugality, by the force of habit, had been imperceptibly sliding into the vice of parsimony, felt the alarm. Men of fortune, without children, and men who had reared a family of children, and borne the expenses of their education, fancied they saw something of injustice in being called to pay for the education of others; and too often their fancies started up into spectres of all imaginable oppression and wrong. The school districts were the scene where the contending parties arrayed themselves against each other; the school-house itself their arena. From time immemorial, it had been the custom to hold school district meetings in the school-house. Hither, according to ancient usage, the voters were summoned to come. In this forum, the question was to be decided, whether a new edifice should be erected, or whether the ability of the old one to stand upon its foundations for another season, should be tried. Regard for the health, the decent manners, the intellectual progress and the moral welfare of the children, common humanity, policy, duty, the highest worldly interests of the race, were marshalled on one side, demanding a change; selfishness, cupidity, insensibility to the wants and the welfare of others, and that fallacious plea, that because the school-house had answered the purpose so long, therefore it would continue to answer it still longer,—an argument which would make all houses, and roads, and garments, and every thing made by human hands, last forever,—resisted the change. The disgraceful contrast between the school-house and all other edifices, whether public or private, in its vicinity; the immense physical and spiritual sacrifices which its condition inflicted upon the rising generation, were often and unavailingly urged; but there was always one argument which the advocates for reform could use with irresistible effect,—the school-house itself. Cold winds, whistling through crannies and chinks and broken windows, told with merciless effect upon the opponents. The ardor of opposition was cooled by snow-blasts rushing up through the floor. Pain-imparting seats made it impossible for the objectors to listen patiently even to arguments on their own side; and it was obvious that the tears they shed were less attributable to any wrongs which they feared, than to the volumes of smoke which belched out with every gust of wind from broken funnels and chimneys. Such was the case in some houses. In others, opposite evils prevailed; and the heat and stifling air and nauseating effluvia were such as a grown man has hardly been compelled to live in, since the time of Jonah.

Though insensible to arguments addressed to reason and conscience, yet the senses and muscles and nerves of this class of men were less hardened than their hearts; and the colds and cramps, the exhaustion and debility, which they carried home, worked mightily for their conversion to truth. Under such circumstances, persuasion became compulsory.

Could the leaders of the opposition have transferred the debate to some commodious public hall, or to their own spacious and elegant mansions, they might have bid defiance to humanity and remained masters of the field. But the party of reform held them relentlessly to the battle-ground; and there the cause of progress triumphed, on the very spot where it had been so long dishonored.

During the five years immediately succeeding the report made by the Board of Education to the Legislature, on the subject of school-houses, the sums expended for the erection or repair of this class of buildings fell but little short of *seven hundred thousand dollars*. Since that time, from the best information obtained, I suppose the sum expended on this one item to be about *one hundred and fifty thousand dollars annually*. Every year adds some new improvement to the construction and arrangement of these edifices.

In regard to this great change in school-houses,—it would hardly be too much to call it a *revolution*,—the school committees have done an excellent work,—or rather, they have begun it;—it is not yet done. Their annual reports, read in open town meeting, or printed and circulated among the inhabitants, afterwards embodied in the Abstracts and distributed to all the members of the government, to all towns and school committees have enlightened and convinced a State.

NEW-YORK.

EXTRACT *from the "Annual Report of the Superintendent (Hon. Samuel Young) of Common Schools, made to the Legislature, January* 13, 1844."

"The whole number of school-houses visited and inspected by the county superintendents during the year was 9,368: of which 7,685 were of framed wood; 446 of brick; 523 of stone, and 707 of logs. Of these, 3,160 were found in good repair; 2,870 in ordinary and comfortable repair, and 3,319 in bad repair, or totally unfit for school purposes. The number furnished with more than one room was 544, leaving 8,795 with one room only. The number furnished with suitable play-grounds is 1,541; the number not so furnished, 7,313. The number furnished with a single privy is, 1,810; those with privies containing separate apartments for male and female pupils, 1,012; while the number of those not furnished with *any privy* whatever, is 6,423. The number suitably furnished with convenient seats, desks, &c., is reported at 3,282, and the number not so furnished, at 5,972. The number furnished with proper facilities for ventilation is stated at 1,518; while the number not provided with these essential requisites of health and comfort is 7,889.

No subject connected with the interests of elementary instruction affords a source of such mortifying and humiliating reflections as that of the condition of a large portion of the school-houses, as presented in the above enumeration. One-third only of the whole number visited, were found in good repair; another third in ordinary and comfortable condition only in this respect—in other words, barely sufficient for the convenience and accommodation of the teachers and pupils; while the remainder, consisting of 3,319, were to all intents and purposes unfit for the reception of man or beast.

But 544 out of 9,368 houses visited, contained more than one room; 7,313 were destitute of any suitable play-ground; nearly six thousand were unfurnished with convenient seats and desks; nearly eight thousand destitute of the proper facilities for ventilation; and upwards of six thousand without a privy of any sort; while of the remainder but about one thousand were provided with privies containing different apartments for male and female pupils! And it is in these miserable abodes of accumulated dirt and filth, deprived of wholesome air, or exposed without adequate protection to the assaults of the elements, with no facilities for necessary exercise or relaxation, no convenience for prosecuting their studies; crowded together on benches not admitting of a moment's rest in any position, and debarred the possibility of yielding to the ordinary calls of nature without violent inroads upon modesty and shame; that upwards of two hundred thousand children, scattered over various parts of the State, are compelled to spend an average period of eight months during each year of their pupilage! Here the first lessons of human life, the incipient principles of morality, and the rules of social intercourse are to be impressed upon the plastic mind. The boy is here to receive the model of his permanent character, and to imbibe the elements of his future career; and here the instinctive delicacy of the young female, one of the characteristic ornaments of the sex, is to be expanded into maturity by precept and example! Is it strange, under such circumstances, that an early and invincible repugnance to the acquisition of knowledge is imbibed by the youthful mind; that the school-house is regarded with unconcealed aversion and disgust, and that parents who have any desire to preserve the health and the morals of their children, exclude them from the district school, and provide instruction for them elsewhere?

If legislation could reach and remedy the evil, the law-making power would be earnestly invoked. But where the ordinary mandates of humanity, and the laws of parental feeling written by the finger of heaven on the human heart, are obliterated or powerless, all statutory provisions would be idle and vain. In some instances during the past year, comfortable school-houses have been erected to supply the place of miserable and dilapidated tenements which for years had been a disgrace to the inhabitants. Perhaps the contagion of such worthy examples may spread; and that which seems to have been beyond the influence of the ordinary impulses of humanity, may be accomplished by the power of example or the dread of shame.

The expense of constructing and maintaining convenient buildings, and all other proper appliances for the education of the young, is a mere trifle when contrasted with the beneficial results which inevitably follow.

Of all the expenditures which are calculated to subserve the wants or gratify the caprices of man, there are none which confer such important and durable blessings as those which are applied to the cultivation and expansion of the moral and intellectual powers. It is by such cultivation that human happiness is graduated, and that from the most debased of the savage tribes, nation rises above nation in the scale of prosperity and civilization. The penuriousness which has been manifested on this subject, and the reckless profligacy exhibited on others, is strongly characteristic of the past. In future times, when the light of science shall be more widely diffused, and when the education of the young shall claim and receive the consideration it deserves, a retrospection to the records of the past will exhibit preceding generations in no enviable point of view.

The following remarks and extracts from the Reports of the special visiters appointed by the State Superintendent (Hon. John C. Spencer) in each of the counties, for 1840, and for 1841, are taken from Part I of that admirable work, the "School and the Schoolmaster," Part I, by Prof. (now Bishop) Potter, and Part II, by George B. Emerson, Esq., of Boston.

"I ask, then, *first*, are our common schools places of agreeable resort, calculated to promote health, and to connect pleasant associations with study?

Ans. Say the visiters, in one of the oldest and most affluent towns of the south-eastern section of the state, 'It may be remarked, generally, that the school-houses are built in the old style, are too small to be convenient, and, with one exception, too near the public roads, generally having no other play-ground.' Twelve districts were visited in this town.—*See Report of Visiters* (1840), p. 47.

Say the visiters of another large and wealthy town in the central part of the state, 'Out of the 20 schools they visited, 10 of the school-houses were in bad repair, and many of them not worth repairing. In none were any means provided for the ventilation of the room. In many of the districts, the school-rooms are too small for the number of scholars. The location of the school-houses is generally pleasant. There are, however, but few instances where play-grounds are attached, and their condition as to privies is very bad. The arrangement of seats and desks is generally very bad, and inconvenient to both scholars and teachers. Most of them are without backs.'—P. 28 (*Rep.*, 1840.)

From another town in the north-western part of the state, containing a large population, and twenty-two school districts, the visiters report of district No. 1, that the school-house is large and commodious, but scandalously cut and marked; the school-room but tolerably clean; the privies very filthy, and no means of ventilation but by opening the door or raising the window. No. 2 has an old school-house; the room not clean; seats and desks well arranged, but cut and marked; no ventilation; the children healthy, but not clean. No. 3 has an old frame building, but warm and comfortable. No. 4 has a very poor, dilapidated old frame school-house, though the inhabitants are generally wealthy for that country. No. 5 has a frame school-house, old and in bad condition; school-room not clean; seats and desks not convenient; No. 6 has a frame school-house, old and in bad condition; the school-room is not clean; no cup or pail for drinking water. No. 7 has a log school-house, in a very bad condition; desks and seats are inconvenient. 'Here, too,' say the visiters, 'society is good, and people mostly in easy circumstances, but the school-house very unbecoming such inhabitants. It does not compare well with their dwellings.' No. 8, say the visiters, is 'a hard case.' No. 9 has a frame house in good condition and in a pleasant location, but is 'too small for the number of children.' No. 10 has a log school-house. No. 11 has a 'log shanty for a school-house, not fit for any school.' No. 12 a log house. No. 13 has a log shanty, in bad condition, not pleasantly located, school-room not clean. 'The school-house or *hovel* in this district is so cold in winter, so small and inconvenient, that little can be done towards preserving order or advancing education among so many scholars; some poor inhabitants and some in good circumstances; might have a better school-house.' No. 14 has a good frame house, in good condition, pleasant location, with ample and beautiful play-ground; school-room in clean condition. The visiters add, 'In this district the inhabitants are poor, and the scholars attend irregularly; *the house was built by one man in low circumstances, who has a large family of boys to educate; a noble act.*' No. 15 has a frame house, in a good, warm, and comfortable condition, with a pleasant and retired location and a play-ground. No. 16 has a log shanty for a school-house. No. 17, 'no regular school-house other than some old log house.' No. 18, no school-house. No. 19, a log shanty. No. 20 and 21 are new districts. No. 22 has a frame school-house, in good repair and pleasantly situated. Thus, out of twenty-two school-houses, not more than *five* are reported as respectable or comfortable; none have any proper means of ventilation; eight are built of logs; and but one of them, according to the visiters, has a privy.—*Report* (1840), p. 142.

It is also a subject of frequent complaint in these reports, that the seats are too high (too high, say the visiters in one case, for a man of six feet, and all alike), and are, therefore, uncomfortable for the children, as well as productive of much disorder. 'We have found,' says the report from one town, 'except in one school, all the seats and desks much too high, and in that one they were recently cut down at our recommendation. In many of our schools, a considerable number of children are crowded into the same seat, and commonly those seated beyond the entering place have no means of getting at their seats but by climbing over those already seated, and to the ruin of all regard to cleanliness.'

'We have witnessed much uneasiness, if not suffering, among the children, from the dangling of their legs from a high seat, and, with the one exception, have seen them attempting to write on desks so high that, instead of the elbow resting to assist the hand in guiding the pen, the whole arm has, of necessity, been stretched out; for, if they did not this, they must write rather by guess than sight, unless some one may have the fortune to be near-sighted, and, from this defect, succeed in seeing his work. This is a great evil, and ought to be remedied before we complain of the incompetency of teachers.'—*Report* (1841), p. 38.

These specimens will serve to show how far many of the school-houses, in this state, are pleasant places of resort, or study, and in what degree they are likely to inspire a respect for education, or a desire to enjoy and improve its advantages. The condition and aspect of the building, with its appendages and surrounding landscape, are inseparably associated, in a child's mind, with his first day at school, and his first thoughts about education. Is it well, then, that these earliest, most lasting, and most controlling associations, should be charged with so much that is offensive? Is it to be expected, that the youthful mind can regard that as the cause, next to religion, most important of all others, which is upheld and promoted, in such buildings, as the district school-house usually is? Among the most comfortless and wretched tenements, which the pupil ever enters, he thinks of it with repugnance; the tasks which it imposes, he dreads; and he at length takes his leave of it, as of a prison, from which he is but too happy to escape.

This seems to me to be the greatest evil connected with our school-houses. But their deleterious effect on health, is also to be considered. Air which has been once respired by the lungs, parts with its healthy properties, and is no longer fit for use. Hence a number of persons, breathing the air of the same apartment, soon contaminate it, unless the space is very large, or unless there is some provision for the introduction of fresh, as well as the exclusion of foul air. This ventilation is especially important for school-houses, since they are usually small in proportion to the number of scholars; the scholars remain together a long while at once, and are less cleanly in their personal habits than adults. Yet, important as it is, probably not one common school in fifty, in this state.

will be found supplied with adequate means to effect it. The cracks and crevices, which abound in our school-houses, admit quite enough of cold air in winter, but not enough of fresh. What is wanted at that season, for both health and economy, is a constant supply of fresh warm air; and this is easily obtained by causing the air, as it enters from without, to pass through heated flues, or over heated surfaces.

It is also important, to the health of scholars and teachers in common schools, that the rooms should be larger and have higher ceilings; and that much more scrupulous attention should be paid to the cleanliness of both the room and its inmates. 'An evil,' say the visiters of one of the towns, 'greater than the variety of school-books or the want of necessary apparatus, is having school-rooms so unskilfully made and arranged. Of our 13 school-rooms, only 3 are ten feet high, and of the residue only one is over eight feet. The stupidity arising from foul, oft-breathed air, is set down as a grave charge against the capacity of the scholars or the energy of the teacher. A room for 30 children, allowing 12 square feet for each child, is low at 10 feet, and for every additional ten children an extra foot in elevation is absolutely necessary, to enable the occupants of the room to breathe freely.'—*Report* (1841), p. 38.

Are common schools so conducted, as to *promote habits of neatness and order, and cultivate good manners and refined feelings?*

From the quotations already made from the reports of visiters, it appears that the school-rooms, in many cases, were not clean; and the same thing is often alleged of the children. I will add but one other passage, to which I happen to open on p. 39 of the Report (1840). It relates to a town containing 24 school districts, of which 16 were visited. Of these 16, one quarter are represented to have been almost entirely regardless of neatness and order, viz.: No. 4 'has a dirty school-room, and the appearance of the children was dirty and sickly.' No. 2 'has a dirty school-room, inconveniently arranged, and *ventilated all over*;' the children 'rather dirty,' and no means of supplying fresh water except from the neighbor's pails and cups. No. 3 has 'an extremely dirty school-room, without ventilation, the children not clean, and no convenience for water.' No. 24 'has a school-house out of repair, dirty, and inconvenient in its arrangements.'

It is also a subject of almost universal complaint, that the *school-houses are without privies.* On an average, probably not more than one in twenty, of the school-houses throughout the state, has this appendage; and in these, it was almost invariably found, by the visiters, to be in a bad state. This fact speaks volumes, of the attention, which is paid at these schools, to delicacy of manners, and refinement of feeling. None but the very poorest families think of living without such a convenience at home; and a man, who should build a good dwelling-house, but provide no place for retirement when performing the most private offices of nature, would be thought to give the clearest evidence of a coarse and brutal mind. Yet respectable parents allow their children to go to a school where this is the case; and where the evil is greatly aggravated by the fact, that numbers of both sexes are collected, and that, too, at an age of extreme levity, and when the youthful mind is prone to the indulgence of a prurient imagination. Says one of the visiters (*Report*, 1840, p. 77), 'In most cases in this town, the scholars, male and female, are turned promiscuously and simultaneously into the public highway, without the shelter of so much (in the old districts) as a 'stump' for a covert to the calls of nature. The baneful tendency, on the young and pliant sensibilities, of this barbarous custom, are truly lamentable.' So the visiters of one of the largest and oldest counties: 'We regret to perceive that many of the districts have neglected to erect privies for the use of the children at school. This is a lamentable error. The injury to the taste and morals of the children which will naturally result from this neglect, is of a character much more serious than the discomfort which is obviously produced by it.'—(*Report*, 1840, p. 131.)"

VERMONT.

EXTRACT *from the "First Annual Report of the State Superintendent (Hon. Horace Eaton,) of Common Schools, October*, 1846," *made to the Legislature.*

"It might occur to any one in travelling through the State, that our school-houses are almost uniformly located in an uninteresting and unsuitable spot, and that the buildings themselves too generally exhibit an unfavorable, and even repulsive aspect. Yet by giving some license to the imagination it might be supposed that, notwithstanding their location and external aspect were so forbidding, the internal appearance would be more cheerful and pleasant—or at least, that the arrangement and construction within would be comfortably adapted to the purposes which the school-house was intended to fulfil. But an actual inspection of by far the greatest number of the school-houses in the State, by County Superintendents, discloses the unpleasant fact, that ordinarily the interior does but correspond with the exterior, or is, if possible, still worse. A very large proportion of these buildings throughout the State must be set down as in a miserable condition. The melancholy fact is established by the concurrent report of all our County Superintendents, that in every quarter of the State they are, as a class, altogether unsuited to their high purposes. Probably nine-tenths of them are located upon the line of the highway; and as the geographical centre of the district usually determines their situation, aside from the relation with the road, it is a rare chance that one is not placed in an exposed, unpleasant and uncomfortable spot. In some cases—especially in villages—their location seems to be determined by the worth, or rather by the *worthlessness* of the ground on which they stand—that being selected which is of the least value for any other purpose. Seldom or never do we see our school-houses surrounded by trees or shrubbery, to serve the purpose which they might serve so well—that of delighting the eye, gratifying the taste, and contributing to the physical comfort, by shielding from the scorching sun of summer, and breaking the bleak winds of winter. And from buildings thus situated and thus exposed, pupils are turned out into the streets for their sports, and for other purposes still more indispensable. What better results could be expected under such a system than that our 'girls should become hoydens and our boys blackguards?' Indeed it would be a happy event, if in no case results still more melancholy and disastrous than this were realized.

But this notice of *ordinary* deficiencies does not cover the whole ground of error in regard to the situation of school-houses. In some cases they are brought into close connection with positive nuisances. In a case which has fallen under the Superintendent's own personal observation, one side of the school-house forms part of the fence of a hog-yard, into which, during the summer, the calves from an extensive dairy establishment have been thrown from time to time, (disgusting and revolting spectacle!) to be rent and devoured before the eyes of teacher and pupils—except such portions of the mutilated and mangled carcasses as were left by the animals to go to decay, as they lay exposed to the sun and storm. It is true the windows on the side of the building adjoining the yard, were generally observed to be closed, in order to shut out the almost insupportable stench which arose from the decomposing remains. But this closure of windows could, in no great degree, 'abate the nuisance;' for not a breath of air could enter the house from any direction but it must come saturated with the disgusting and sickening odor that loaded the atmosphere around. It needs no professional learning to tell the deleterious influence upon health, which must be exerted by such an agency, operating for continuous hours.

Such cases, it is hoped and believed, are exceedingly rare. But it is much to be feared that the usual exemption enjoyed by teachers and pupils, from even such outrages upon their senses and sensibilities, as have been detailed, is to be attributed to the fact that such arrangements are not ordinarily convenient, rather than to any prevailing conviction of their impropriety, or any general and settled purpose to avoid them. The case is named as at least strong evidence that the pertinency of considerations, involving a regard either to taste, comfort, or even health itself, is generally overlooked or disregarded, in fixing upon a site for a school-house. At all events these purposes are all *exposed* to be violated under the prevailing neglect of districts to secure the possession of sufficient ground for a yard around the school-house. But it would seem unnecessary to urge, beyond the bare suggestion, the importance of providing for school-houses, a comfortable location, a sufficient yard and play-ground, a wood-house and other out-buildings, a convenient access to water, and the surrounding of the premises with shade-trees which might serve for shelter, as well as delight the eye, and aid to render the school-house—what it should be—one of the most attracting and delightful places of resort upon the face of the earth. It should be such, that when the child shall have changed into the gray-haired man, and his memory wanders back through the long vista of vanished years, seeking for some object on which it may repose, this shall be the spot where it shall love to rest.

In the construction of the school-house—embracing its material, style of architecture, and finish—as little care and taste are exhibited, as might be expected from the indifference manifested in regard to its location and surrounding circumstances. Cheapness of construction seems, in most cases, to be the great governing principle, which decides upon its materials, its form, and all its internal arrangements. No complaint on this score could justly be made, if the general condition of these buildings were clearly and fairly attributed to want of ability. But while our other edifices, both public and private, have improved in elegance, convenience, and taste, with the increasing wealth of our citizens, our school-houses linger in the rear and bear the impress of a former age. In this respect.

> 'That which in days of yore we were
> We at the present moment are.'

Low walls might be instanced as *one* of the prevailing defects in school-house architecture. The quantity of air contained in a school-room of the usual height, is so small as to be soon exhausted of its oxygen; and the dullness, headache and depression which succeed to this result, are but too well known and too often felt, although they may fail of being attributed to their true cause. And why should our children be robbed of a comfortable supply of that pure and wholesome air, with which our Creator, in the largeness and richness of his bounty, has surrounded the earth and filled the sky? But if the condition of the house is such, as in part to prevent the injurious effects arising from a deficiency of pure air, by means of broken windows and gaping crevices—then colds. coughs and as the ultimate and crowning result—consumption—

(and of this disease, what thousands of cases have had their foundations laid in the school-house!) must be the consequence of this sort of exposure. This is true in regard to *all* classes and conditions of pupils. But it should be distinctly kept in mind, although it is ordinarily overlooked and forgotten, that children accustomed to be comfortably protected against cold or vicissitudes of temperature, at home, will inevitably suffer the more when exposed to them in the school-house. And here is an additional reason why these structures should be improved, as our dwelling houses are generally becoming more comfortable.

But there is not room here for details—not even to exhibit *this* topic in all its important bearings. And it has been thus hinted at only to prove that the general charge of faulty construction is not wholly unfounded.

It was the purpose of the Superintendent to discuss at some length, the pernicious influence exerted, both upon the health of pupils, and their progress in learning, by the miserable structures in which the State abounds, but the extent of the remarks already made precludes it.

One cause of the prevailing fault in regard to the construction and internal arrangement of school-houses, doubtless, is the want of proper models. Districts, when about erecting a school-house, cannot well do more than follow the examples before them. To form the plan of a proper school-house—one well adapted to all the various ends which should be sought, such as the convenience, comfort, and health of pupils, convenience for supervision and conduct of the school, and facilities for the most successful prosecution of study—would require such an extent of observation and so full an acquaintance with the laws of health, of mind and morals—and then such a skill in designing a structure in which all the necessary conditions should be observed and secured, that it would be unreasonable to expect that a district could command them, without an opportunity to avail itself of the experience and observation of others. And districts have almost universally felt this lack of guidance. But it is believed that hereafter, information on the subject of school-house architecture, will be more accessible; and if, as a first step, some one district in every town in the State would avail itself of the necessary information, and make a vigorous effort to secure the erection of a well located, well planned, and well constructed school-house, they would perform an act of high public beneficence, as well as confer upon themselves an inestimable blessing. And shall not one or two years realize the accomplishment of this noble purpose? What district will lead the van?

NEW HAMPSHIRE.

Extracts *from the "Report of the Commissioner, (Prof. Haddock, of Dartmouth College) of Common Schools, to the Legislature of New Hampshire, June Session,* 1847."

"The success of our whole system depends as much on a thorough reform in the construction and care of school-houses as upon any other single circumstance whatever.

It is wonderful, and when their attention is called to it, strikes the inhabitants of the Districts themselves as really unaccountable, that careful and anxious parents have been content to confine their children for so many hours a day through a large part of the severest and most trying seasons of the year, in houses so ill constructed, so badly ventilated, so imperfectly warmed, so dirty, so instinct with vulgar ideas, and so utterly repugnant to all habits of neatness, thought, taste, or purity. There are multitudes of houses in the State, not only inconveniently located, and awkwardly planned, but absolutely dangerous to health and morals.

And it has struck me with the greater surprise, that this is true not only of the thinly peopled parts of the State, but of flourishing villages. In one of the largest towns the principal District School was kept, the last winter, in a dilapidated, rickety, uncouth, slovenly edifice, hardly more comfortable than some barns within sight of it. In one enterprising village the school-house, as I looked at it from a little distance, appeared decidedly the shabbiest and most neglected building, not to say dwelling, within reach of my eye. I have been in houses, which no scrubbing could keep clean; they were never made to be clean: and this, in places, where private taste is adorning the town with the ornaments of architecture and enriching the country with the fruits of rural industry.

It is, however, encouraging to find, that a better feeling is coming to prevail on this subject. Many districts are rebuilding, and, in most instances, upon an improved plan. Some examples have been set of good judgment and liberal expenditure for this important object. And it is hoped, that other districts will be stimulated to imitate them.

Whenever a new house is to be erected, it should first be carefully located, so as best to accommodate the whole district, and by all means, on an open, healthy, agreeable site, with ample room about it on all sides, and out of the way of floods of water or of dust. The young spirit loves the free air and the cheerful day; and when confined, as for some six hours it must be, the confinement should be as little unnatural and unwholesome as possible. The cheapest medicine for the body is good air and plenty of room; and the most indispensable pre-requisite to sane thought is a beautiful and happy place to think in. The house itself should be large; so large that the vacant floor may about equal the space occupied by the seats. The difference of ten feet in length is not great in point of expense; in point of comfort it may be incalculable. The walls should be twelve feet high at least; and an opening made in the ceiling for the escape of the overheated and corrupted air. This should be made to be closed at pleasure. Not more than two scholars should sit on one seat; and the seats should be roomy and easy. These are the great points in a school-house. If the architecture is neat, and the grounds tastefully laid out, and every depredation immediately repaired, every stain removed at once, not only will the house answer the essential purposes of health and comfort, but prove a material auxiliary in elevating the minds and correcting the habits of those who receive their education in it."

CONNECTICUT.

EXTRACT *from the "First Annual Report of the Secretary of the Board of Commissioners of Common Schools, for* 1838-39.

"In the whole field of school improvement there is no more pressing need of immediate action than here. I present with much hesitation, the result of my examinations as to several hundred school-houses in different parts of the State. I will say, generally, that the location of the school-house, instead of being retired, shaded, healthy, attractive, is in some cases decidedly unhealthy, exposed freely to the sun and storm, and in nearly all, on one or more public streets, where the passing of objects, the noise and the dust, are a perpetual annoyance to teacher and scholar, —that no play-ground is afforded for the scholar except the highway,—that the size is too small for even the *average* attendance of the scholars, —that not one in a hundred has any other provision for a constant supply of that indispensable element of health and life, pure air, except the rents and crevices which time and wanton mischief have made; that the seats and desks are not, in a majority of cases, adapted to children of different sizes and ages, but on the other hand are calculated to induce physical deformity, and ill-health, and not in a few instances (I state this on the authority of physicians who were professionally acquainted with the cases,) have actually resulted in this—and that in the mode of warming rooms, sufficient regard is not had either to the comfort and health of the scholar, or to economy.

That I have not stated these deficiencies too strongly, I beg leave to efer you to the accompanying returns, respecting the condition of school-ouses in more than eight hundred districts in the State, and in more than forty particulars in each. These returns were made from actual inspection and measurement of school-houses by teachers and others. An abstract of them in part will be found annexed, together with extracts from letters received from school officers on the subject. I might accumulate evidence of the necessity of improvement here for every district in the State. Without improvement in many particulars which concern the health, the manners and morals of those who attend school, it is in vain to expect that parents who put a proper estimate, not only on the intellectual, but the physical and moral culture of their children, will send to the district school. It is not to be wondered at that children acquire a distaste for study and a reluctance to attend school, so long as school-houses are associated with hours of prolonged weariness and actual suffering from a scanty supply of pure air, and seats and desks so arranged and constructed as to war against their physical organization. These things are not forgotten by parents in the construction of churches, nor have the public neglected to provide for a constant supply of pure air in the work-shops and sleeping-rooms of the State Prison at Wethersfield, or the County Gaol at Hartford."

The following extracts are from the communications referred to in the above Report:

"In one hundred and four districts in one county, there are thirty-one school-houses which may be considered as being in very good repair, and seventy-three of which are more or less out of repair. Among them there are but seven which are constructed in such a manner as to be comfortable and convenient. In three the scholars all face the teacher, and in six or seven others, they sit so as to face the centre of the room. In the others the desks are confined to the walls on three sides of the room, and have seats in front of them. By this arrangement the larger scholars sit with their backs to the teacher, except while engaged in reading and spelling. In the first position they have no support at all for the back, and in the latter, the edge of the desk is all that is afforded. The younger scholars are seated in the centre of the room on low seats which in eighty districts are provided with backs. In the remaining twenty-four districts, these seats have not backs. In eight districts, two rooms are occupied by the school, and in ninety-six districts, only one room. The rooms used, will average about twenty feet square, and eight feet in height. In seventy-five districts, close stoves are used for warming the houses, and in twenty-three, stoves and fire-places, and in six, fire-places alone. In none of these houses has any provision been made for ventilation.

In no case is a scraper, or a mat for the feet provided. In one hundred districts they have no play-ground except the highway, or the land of individuals. In about forty districts a few shade trees may be found within twenty or thirty rods of the school-house. Eighty-nine houses stand in the highway, in all or in part. One district has provided globes for the use of the school, and made arrangements for procuring philosophical and chemical apparatus. Twenty-nine districts have blackboards, and three have some maps, and one, a clock. All are destitute of a library, thermometer, and recitation rooms. In country districts, the entry serves as a wood-room, and place for hats and cloaks. In country towns, from thirty to fifty scholars are usually crowded into a room calculated for only twenty or twenty-five.

In another county, out of sixty-two school houses, nineteen are located in the highway, and the ground on which the others stand cannot be worth on an average twelve dollars for each. Thirteen are bounded by two roads. Sixteen are in noisy and improper neighborhoods. None have any shade trees, or any of those adornments which are resorted to to make our homes pleasant and healthy. Twenty-six are in good repair; nineteen are much out of repair; one hundred and seventy-six squares of glass are broken; and very few are sufficiently protected from cold air from beneath; twenty-five have crevices to admit the wind from every quarter. Thirty-eight have never been white-washed; none have blinds and other arrangements to admit the proper degree of light; little or no provisions are made for securing habits of neatness and order, by proper places for hats, cloaks, &c. &c.; in forty-eight instances the desks are attached to the walls, so that scholars sit with their backs to the teacher while engaged in their studies; and when they face him they are obliged to lean, if they rest at all, against the edge of the desk for support; in fifty-two, the seats are without backs, and that in most, the seats are not of proper elevation for children of different sizes, nor are they so adapted to the desks that the scholars could write without violating the laws of their organization, and inducing deformity and ill-health; thirty-eight out of the sixty-four are altogether unprovided with the means of ventilation, except through the crevices about the floors and sides of the room.

In another county, out of fifty school-houses taken at hazard from the returns for the county, forty are all or in part in the public highway; twelve are in situations which are wet and disagreeable; not one of these have any play-ground 'except the gardens and orchards' of neighbors; but two are ventilated by an opening in the ceiling; in thirty, the scholars face the walls, or the windows which are in all cases without blinds or shades; in five only are the seats and desks properly arranged and of proper heights, so as to favor the health, the comfort, or the progress of the pupils; and in all, the dimensions of the room are altogether too contracted for even the average attendance of the district.

In another county, out of forty school-houses, but one has any provision for ventilation; but seven have seats with backs in any case; the average height of the school-rooms is seven feet; the average breadth seventeen and a half feet; the average length, eighteen and a half feet, while the average attendance is over thirty children to each.

I have been greatly discouraged by the entire destitution of maps, globes, and other school apparatus; by witnessing among the *small scholars* great suffering, and the probable commencement of disease and deformity, for want of proper support for the back and feet; and an almost entire neglect of those out-door conveniences which a civilized people are said never to forget or allude to. But the ill location of the school-houses, bad seats and desks, the entire want of school-libraries, globes, and (often) of suitable books, might be the better borne with, were not the children shut out from any tolerable enjoyment of the vital air of heaven. Fifty, sixty, or seventy little ones are often crowded together into a close room quite insufficient to give pure air to one quarter of the number."

"As I passed from one school society to another, I had an opportunity to see many of the school-houses; for they stand generally on the highway, and some near the travelled path. They are in keeping with the school-houses in other parts of the State. 'They are not beautiful outward,' and in some which I entered I found very little in the internal structure and arrangement to approve. The desks, as usual, are where they never ought to be, against the sides of the school-room and against one end, of the same height for all the children, who want desks, whatever be their size and age. The seats are so high that some of the children cannot get their feet to the floor; and in others the height of the desks and seats are disproportionate. While at these desks, (which are often too narrow,) the children are tempted to be looking out at the windows at every passing object, and are liable at times to be incommoded by the too intense rays of the sun, by the air, or cold; their backs are toward their teacher, and not their faces. In getting over their bench to the desks, and then in turning round from them, they annoy one another and distract the school, while the edge of the desk, often hacked, acts alternately upon the breast and back like a kind of saw-fish. In some instances still, the barbarous custom remains, of seating the little children on benches without backs, raised so high that their feet hang dangling."

The following extracts are taken from official documents, published in 1846 and 1847, and fair specimens of the manner in which school-houses are spoken of, in the reports of local committees, from different parts of the State.

"In one district the school-house stands on the highway, with eighty pupils enrolled as in attendance, in a room nineteen and a half feet square, without any outbuildings of any kind.

In another in the same town, the school-house is less than seven feet high, and the narrow slab seats are twenty-one inches high, (four inches higher than ordinary chairs.) The walls, desks, &c., are cut and marked with all sorts of images, some of which would make heathens blush.

In another, the room is fourteen feet square, and six feet five inches high. The walls are very black."

"In this town there is one of the most venerable school servants in the State. The room is small, and less than seven feet high. Slab seats extend around three sides of the room, and are too high for men. The skill of several generations must have been expended in illustrating the walls with lamp smoke and coal images. The crevices of the floor will admit any quantity of cold air. The door sill and part of the house sill have rotted away. The day I visited it, the teacher and pupils were huddled around the stove."

"In one district, the house stands near the travelled road, is low and small, being only seventeen feet by seventeen, and seven feet two inches high, for the accommodation of sixty or seventy pupils. The seats on the outside are from seventeen to eighteen inches. The walls, door, and sides of the house are disfigured with obscene images."

"There are only three good school-houses in the society; only three that have any out-houses. The rest of the school-houses are in a miserable condition. One is thirty-five or forty years old. Most of them have only slab seats, with the legs sticking through, upwards, like hatchel-teeth, and high enough to keep the legs of the occupants swinging. They are as uncomfortable to little children as a pillory. Seats and desks are adorned with every embellishment that the ingenuity o. professional whittlers can devise."

"Two of our school-houses, those in the two largest districts, are in a bad condition, old, unpainted and inconvenient. They are built and constructed *inside* on the old Connecticut plan. Only one row of desks, and that fastened to the wall of the school-room, running quite around it; and long forms, without backs to rest on, the scholars sitting with their backs to the centre of the room. The other two are in better condition, though one is constructed on the same plan as above. The out-buildings are in bad condition generally. One school-house has no out-building nor wood-house. One school-house only is painted outside."

"Of the nine school-houses in this society, not one is really what they all ought to be, for the morals, health, and intellectual improvement of the pupils. Four of them are considered tolerably good, having one out-building, the other five are hardly passable. The desks in most or all of them are where they never ought to be, against the sides of the room and against one end, and with few exceptions, all of a height, with poor accommodations for loose clothes, hats, &c.; all located on or near some highway; no play-ground attached to any of them, except the highway."

MAINE.

EXTRACT *from a special "Report of the Secretary of the Board of Education, upon the subject of School-Houses."*

"It is worthy of note, and of most serious consideration, that a majority of the returns speak of ill-constructed school-houses as one of the most prominent 'defects in the practical operation of the law establishing common-schools.' The strength and uniformity of the language made use of, as well as the numerous applications to the members of the board, and their secretary, for information upon this subject, leave no room for doubt as to the existence of a wide-spread evil; an evil, the deleterious influence of which, unless it is reformed, and that speedily, is not to be confined to the present generation, but must be entailed upon posterity. In remarking upon this subject, as long ago as 1832, it was said by the board of censors of the American Institute of Instruction, that 'if we were called upon to name the most prominent defect in the schools of our country; that which contributes most, directly and indirectly, to retard the progress of public education, and which most loudly calls for a prompt and thorough reform, it would be the want of spacious and convenient school-houses.' From every indication, there is reason to believe that the remark is applicable to our school-houses, in their present condition, as it was when made. For the purpose of contributing, in some small degree, towards effecting a reform for which so urgent a necessity exists, and rendering some assistance, in the way of counsel, to those who are about erecting new school-houses, or remodelling old ones, this report is prepared, under the direction of the board. It makes no claim to originality of thought or language; it is, in fact, a mere compilation of the thoughts and language of others who have given the subject a careful investigation, whose opinions are the result of close observation and long experience, and are therefore entitled to our confidence and respect. To save the necessity of giving credit, upon almost every page of this report for borrowed language, as well as ideas, it may here be remarked, that the principal sources from which the information herewith communicated has been compiled, are, the reports upon the subject of school-houses, by Hon. Horace Mann and Henry Barnard, Esq., and 'The School-master,' by Mr. George B. Emerson; gentlemen to whom, for their efforts in the cause, a large debt of gratitude is due from the friends of education; a debt which can be discharged in no manner more acceptable to them, than by entering into their labors, and adopting and reducing to practice their very valuable suggestions."

RHODE ISLAND.

EXTRACTS *from "Report on the condition and improvement of the Public Schools of Rhode Island, submitted Nov.* 1, 1845, *by Henry Barnard, Commissioner of Public Schools."*

"The condition of the school-houses, was, in my circuit through the schools, brought early and constantly under my notice, and to effect an immediate and thorough reform, public attention was early and earnestly called to the subject. The many and great evils to the health, manners, morals, and intellectual habits of children, which grow out of their bad and defective construction and appurtenances, were discussed and exposed, and the advantages of more complete and convenient structures pointed out. In compliance with the request of the Committee on Education, a law authorizing school districts to lay and collect a tax to repair the old, and build new school-houses, was drafted and passed; and in pursuance of a resolution of the General Assembly, a document was prepared embodying the results of my observations and reflections on the general principles of school-architecture, and such plans and descriptions of various structures recently erected, for large and small, city and country districts, and for schools of different grades, as would enable any committee to act understandingly, in framing a plan suitable to the wants of any particular district or school. The same document was afterwards abridged and distributed widely, as one of the '*Educational Tracts*,' over the state. I have secured the building of at least one school-house in each county, which can be pointed to as a model in all the essential features of location, construction, warming, ventilation, seats and desks, and other internal and external arrangements.

During the past two years, more than fifty school-houses have been erected, or so thoroughly repaired, as to be substantially new—and most of them after plans and directions given in the above document, or furnished directly by myself, on application from districts or committees."

"Of these, (three hundred and twelve school-houses visited,) twenty-nine were owned by towns in their corporate capacity; one hundred and forty-seven by proprietors; and one hundred and forty-five by school districts. Of two hundred and eighty school-houses from which full returns were received, including those in Providence, twenty-five were in very good repair; sixty-two were in ordinary repair; and eighty-six were pronounced totally unfit for school purposes; sixty-five were located in the public highway, and one hundred and eighty directly on the line of the road, without any yard, or out-buildings attached; and but twenty-one had a play-ground inclosed. In over two hundred school-rooms, the average height was less than eight feet, without any opening in the ceiling, or other effectual means for ventilation; the seats and desks were calculated for more than two pupils, arranged on two or three sides of the room, and in most instances, where the results of actual measurement was given, the highest seats were over eighteen inches from the floor, and the lowest, except in twenty-five schools, were over fourteen inches for the youngest pupils, and these seats were unprovided with backs. Two hundred and seventy schools were unfurnished with a clock, black-board, or thermometer, and only five were provided with a scraper and mat for the feet."

"Such was the condition of most of the places where the public schools were kept in the winter of 1843–44, in the counties of Kent, Washington and Newport, and in not a few districts in the counties of Providence and Bristol. In some districts, an apartment in an old shop or dwelling-house was fitted up as a school-room; and in eleven towns, the school-houses, such as they were, were owned by proprietors, to whom in many instances, the districts paid in rent a larger amount than would have been the interest on the cost of a new and commodious school house. Since the passage of the Act of January, 1844, empowering school districts to purchase, repair, build and furnish school-houses, and since public attention was called to the evils and inconvenience of the old structures, and to better plans of construction and internal arrangement, by public addresses, and the circulation of documents, the work of renovation in this department of school improvement has gone on rapidly. If the same progress can be made for three years more, Rhode Island can show, in proportion to the number of school districts; more specimens of good houses, and fewer dilapidated, inconvenient and unhealthy structures of this kind, than any other state. To bring about thus early this great and desirable result, I can suggest nothing beyond the vigorous prosecution of the same measures which have proved so successful during the past two years.

1. The public mind in the backward districts must be aroused to an active sense of the close connection of a good school-house with a good school, by addresses, discussions, conversation and printed documents on the subject, and by the actual results of such houses in neighboring districts and towns.

2. Men of wealth and intelligence in their several neighborhoods, and capitalists, in villages where they have a pecuniary interest, can continue to exert their influence in this department of improvement.

3. School committees of every town can refuse to draw orders in favor of any district which will not provide a healthy and convenient school-room for the children of the district; and to approve plans for the repairs of an old, or the construction of a new house, which are to be paid for by a tax on the property of the district, unless such plans embrace the essential features of a good school-house.

4. The Commissioner of Public Schools must continue to furnish gratuitously, plans and directions for the construction and arrangement of school-houses, and to call the attention of builders and committees to such structures as can be safely designated as models.

Districts should make regulations to preserve the school-house and appendages from injury or defacement, and authorizing the trustees to make all necessary repairs, without the formality of a special vote on the subject."

MICHIGAN.

Extracts *from "Annual Report of the Superintendent (Hon. Ira Mayhew,) of Public Instruction of the State of Michigan, submitted December* 10, 1847."

"The *place* where our country's youth receive their first instruction, and where nineteen twentieths of them complete their scholastic training, claims early attention. We may then profitably dwell upon the condition of our common school-houses.

In some instances school-houses are favorably located, being situated on dry, hard ground, in a retired though central part of the district, in the midst of a natural or artificial grove. But they are usually located without reference to taste, or the health and comfort of teacher or children. They are generally on one corner of public roads, and sometimes adjacent to a cooper's shop, or between a blacksmith's shop and a saw-mill. They are not unfrequently placed upon an acute angle, where a road forks, and sometimes in turning that angle the travel is chiefly behind the school-house, leaving it on a small triangle, bounded on all sides by public roads.

At other times the school-house is situated on a low and worthless piece of ground, with a sluggish stream of water in its vicinity, which sometimes even passes under the school-house. The comfort and health even of children are thus sacrificed to the parsimony of their parents.

Scholars very generally step from the school-house directly into the highway. Indeed, school-houses are frequently one half in the highway, and the other half in the adjacent field, as though they were unfit for either. This is the case even in some of our principal villages.

School-houses are sometimes situated in the middle of the highway, a portion of the travel being on each side of them. When scholars are engaged in their recreations, they are exposed to bleak winds and the inclemency of the weather one portion of the year, and the scorching rays of the meridian sun another portion. Moreover, their recreations must be conducted in the street, or they trespass upon their neighbors' premises. Such situations can hardly be expected to exert the most favorable influence upon the habits and character of the rising generation. * *

Although there is a great variety in the dimensions of school-houses, yet there are few less than sixteen by eighteen feet on the ground, and fewer still larger than twenty-four by thirty feet. Exclusive of entry and closets, when they are furnished with these appendages, school-houses are not usually larger than twenty by twenty-four feet on the ground, and seven feet in height. They are, indeed, more frequently smaller than larger. School-houses of these dimensions have a capacity of three thousand three hundred and sixty cubic feet, and are usually occupied by at least forty-five scholars in the winter season. Not unfrequently sixty or seventy, and occasionally more than a hundred scholars occupy a room of this size.

A simple arithmetical computation will abundantly satisfy any person who is acquainted with the composition of the atmosphere, the influence of respiration upon its fitness to sustain animal life, and the quantity of air that enters the lungs at each inspiration, that a school-room of the preceding dimensions does not contain a sufficient quantity of air to sustain the healthy respiration of even *forty-five* scholars, three hours, the usual length of each session; and frequently the school-house is imperfectly ventilated between the sessions at noon, or indeed, for several days in succession.

The ordinary facilities for ventilating school-rooms, are opening a door, or raising the lower sash of the windows. The prevailing practice with refrence to their ventilation, is opening and closing the door, as the scholars enter and pass out of the school-house, before school, during the recesses, and at noon. Ventilation, *as such*, I may safely say, has not hitherto been practiced in one school in fifty. It is true, the door has been occasionally set open a few minutes, and the windows have been raised, but the object has been, either to let the *smoke* pass out of the room, or to *cool* it when it has become *too warm*, not TO VENTILATE IT. Ventilation, by opening a door or raising the windows, is imperfect, and frequently injurious. A more effectual and safer method of ventilation, is to lower the upper sash of the windows, or, in very cold or stormy weather, to open a ventilator in the ceiling, and allow the vitiated air to escape into the attic. In this case, there should be a free communication between the attic and the outer air, by means of a lattice window, or otherwise. A ventilator may be constructed in connection with the chimney, by carrying up a partition in the middle. One half the chimney, in this case, may be used for a smoke flue, and the other half for a ventilator.

There are few school-houses the internal construction of which is in all respects alike; yet, by far the majority of them will rank in one of the three following classes:

1. The first class embraces those which are constructed with one or two tiers of desks along each side of the house, and across one end of it; the outer seat having the wall of the house for its back, and the front of each tier of desks constituting the back to the next inner seat. There is usually an alley on each side of the house and at the end of it, leaving the seats of sufficient length to accommodate from five to eight scholars. Those sitting next the alleys can pass to and from their seats without discommoding others. All the rest, (usually not less than three-fourths the entire number,) disturb from one to five or six scholars every time they pass to or from their seats; unless, (which is about as commonly practiced, especially with the scholars most distant from the alleys,) they *climb over the desks* in front of them.

Occasionally the desks are shorter, accommodating three or four scholars; and, sometimes, they are intended to accommodate two scholars only, so that each of them, (excepting the outer ones at the end desks,) sits adjacent to an alley, and can pass to and from his seat without disturbing others. There is usually a desk, or table, for the teacher's use, (or at least a *place* for one,) at the end of the house not occupied by the cross seats.

2. The second class embraces those in which the desks extend across the house, with an alley through the middle of it lengthwise, and occasionally one around the outside of the room. All the desks of the second class front the teacher's desk or table.

3. The third class embraces those which are constructed with a row of desks along each side of the house, and across one end of it, the desks fronting the walls of the house, so that the backs of the scholars, while sitting at them, are turned towards the teacher. In this class of houses there are usually three long seats without backs, just within the desks. Sometimes the seats are joined at the corners so as to continue unbroken, twice the length of the house and once its width, a distance of forty-five or fifty feet. There is usually a second tier of seats, and sometimes desks within them, fronting the central part of the room.

There is one impropriety in the construction of a majority of school-houses. The desks are generally constructed with close fronts extending to the floor, whereby a free circulation of air, and consequent equilibrium of temperature, are interrupted, which would take place were the seats and desks so arranged as to allow suitable channels of communication. The scholars behind the desks are necessarily troubled with cold feet, unless the room is kept too warm. Were this evil removed, the first class, with short desks, would constitute a very comfortable and convenient arrangement, except from the circumstance that the children are placed opposite each other, which is a serious evil, especially where both sexes are in the same room, as is the case in nearly all of our common schools.

Another objection to long desks, is the inconvenience to which the scholars are subjected in passing to and from their seats. This objection exists to a considerable extent in the second class of houses, especially where there is not an alley around the outside of the room. Were it not for this inconvenience,—which might be obviated by introducing a greater number of alleys and shortening the desks, so as to accommodate but two scholars, each of whom would sit adjacent to an alley, and could pass to and from his seat without disturbing others—the *second* would, in my judgment, constitute the preferable plan. All the scholars should face the teacher, but none of them should face each other. This is particularly important where both sexes attend the same school.

And what shall I say of the third class?—I can readily enumerate some of its inconveniences, but its real advantages are, in my opinion, few. The following are some of the inconveniences: 1. There is little or no uniformity, usually. in the position of the scholars. Some of them face the walls, others the inner part of the room, and others still sit astride the seat. 2. When the teacher desires the attention of the school, a portion of the scholars must either turn about, or sit with their backs towards him, while he addresses them. 3. In changing their positions in foul weather, the scholars are apt to muddy the seats, and the clothes of those who sit adjacent to them. 4. The change of position is frequently embarrassing to the girls. 5. Front lights are less pleasant, and more injurious to the eyes, than side lights or back ones are. 6. Sitting on a plane seat, without a back, is uncomfortable, and often engenders disease of the spine, especially in childhood and youth.

The principal supposed advantage of this construction is, I believe, that it affords the teacher a better opportunity for detecting the scholars when engaged in mischief. I do not see how any material advantage of this kind can exist, till the bodies of children become transparent.

But were the *supposed* advantage real, it seems to me to be tempting children to do wrong, to give the teacher an opportunity of displaying his skill in detecting them. When children cannot see their teacher, they frequently think he cannot see them, and conduct accordingly.

There are several inconveniences not yet specified, existing to a less or greater extent, in each of the three classes of houses I have described.

1. The height of the seats, although sometimes adjusted with great care, is frequently determined without any apparent regard to the size and comfort of the scholars who are to occupy them. I have visited many schools in which the majority of the scholars reverse the ordinary practice of *standing up* and *sitting down.* They literally *sit up* and *stand down*, their heads being higher while *sitting* than when *standing.*

2. The desks, with their close fronts, are frequently several inches too high. I have visited many schools in which all that could be seen of a majority of the scholars occupying the back seats, was a *part of their heads*, and that, too, when they sat erect upon their seats. The desks, moreover, are frequently inclined twenty-five or thirty degrees, so that a book laid upon them immediately slides off. An inclination of one inch to the foot will be found more convenient than greater obliquity. A space of three inches on the most distant portion of the desk, should be left horizontal, for inkstands, pencils, pens, etc.

3. The floor is sometimes considerably inclined, for the purpose, I suppose, of giving the teacher a better opportunity of seeing the more distant scholars. The whole school is not only subjected to the inconvenience of walking up and down an inclined plane, but what is much worse, when scholars sit upon their seats, and rest their feet upon the floor, when within reach, they are constantly sliding from under them.

School-houses are not generally furnished with suitable conveniences for disposing of the loose wearing apparel of the scholars, their dinners, etc. There are sometimes a few nails or shelves, in a common entry, through which all the scholars pass, upon which a portion of their clothes may be hung or laid, and where dinners may be deposited. But in such cases, the outside door is usually left open, the rain and snow beat in, and the scholars, in haste to get their own clothes, frequently pull down as many more, which are trampled under foot. Moreover, the dinners are frozen, and not unfrequently they are devoured by dogs, and even by the hogs that run in the street. But the majority of school-houses are not furnished with an entry; and where there is one, frequently not even a nail can be found in it, upon which a single article of clothing may be hung. Neither are there nails or shelves for this purpose within the school-room. Scholars generally are obliged to throw their clothes across the desks, upon the seats, or into the windows.

School-houses are generally warmed by means of stoves, some of which are in a good condition, and supplied with dry wood from the wood-house. The instances, however, in which such facilities for warming exist, are comparatively few. It is much more common to see cracked and broken stoves, the doors without either hinges or latch, and rusty pipe of various sizes. Green wood, and that which is old and partly decayed, either drenched with rain or covered with snow, is much more frequently used for fuel, than sound, seasoned wood, protected from the weather by a suitable wood-house. With this state of things, it is difficult to kindle a fire, which burns poorly, at best, when kindled. The room is filled with smoke a considerable part of the time, especially in stormy weather. The school is frequently interrupted two or three times a day, to fasten together and tie up the stove pipe. This may seem a little like exaggeration. I know there are many exceptions. But in a majority of instances some of these inconveniences exist, and the most of them are united in more cases than people are aware of. I have heard trustees and patrons who have visited their school with me, for the first time in several years, say, "We ought to have some dry wood to kindle with;" "I did'nt know as it was so smoky;" "We must get some new pipe; really our stove is getting dangerous," etc. And some of the boys have relieved the embarrassment of their parents by saying, "It don't smoke near as bad to-day as it does sometimes."

The principal reason why the stoves in our school-houses are so cracked and broken, and why the pipes are so rusty and open, lies in the circumstance that *green wood from the snow bank*, is used for fuel, instead of *dry wood from the wood-house.* There are at least three reasons why this is poor policy.

1. It takes at least double the amount of wood. A considerable portion of the otherwise sensible heat becomes latent in the conversion of ice, snow and moisture into steam.

2. The steam thus generated cracks the stove and rusts the pipe, so that they will not last one half as long as though dry wood from the wood-house were used. And,

3. It is impossible to preserve an even temperature. Sometimes it is too cold, and at other times it is too warm. Several teachers have informed me that in order to keep their fires from going out, it was necessary to have their stoves constantly full of wood, that a portion of it might be seasoning while the rest was burning. Moreover, very offensive and injurious gases are generated in this manner.

There are, perhaps, in the majority of school-houses, a pail for water, cup, and broom, and a chair for the teacher. Some one or more of these are frequently wanting. I need hardly say every school-house should be supplied with them all. In addition to these, every school-house should be furnished with the following articles:—1. An evaporating dish for the stove, which should be supplied with clean pure water. 2. A thermometer, by which the temperature of the room may be regulated. 3. A clock, by which the time of beginning and closing school, and conducting all its exercises, may be governed. 4. A shovel and tongs. 5. An ash-pail and ash-house. For want of these, much filth is frequently suffered to accumulate in and about the school-house, and not unfrequently the house itself takes fire and burns down. 6. A wood-house, well supplied with seasoned wood. 7. A well, with provisions not only for drinking, but for the cleanliness of pupils. 8. At last, though not least, in this connection, two privies, in the rear of the school-house, separated by a high close fence, one for the boys and the other for the girls. For want o. these indispensable appendages of civilization, the delicacy of children is frequently offended, and their morals corrupted. Nay, more, the unnatural detention of the *fæces*, when nature calls for an evacuation, is frequently the foundation for chronic diseases, and the principal cause of permanent ill health, resulting not unfrequently in premature death.

In architectural appearance, school-houses have more resembled barns, sheds for cattle, or mechanic shops, than Temples of Science,—windows are broken—benches are mutilated—desks are cut up—wood is unprovided—out buildings are neglected—obscene images and vulgar delineations meet the eye without and within—the plastering is smoked and patched—the roof is so open as to let in a flood of water in a storm, sufficient to drown out a school, were not the floor equally open."

We close this mass of testimony as to the deplorable condition of the common, or public school-houses in States where public instruction has received the most attention, with an extract from a "*Report on School-houses published by order of the Directors of the Essex County Teachers' Association in* 1833."

"There is one subject more to which we must be permitted to refer. One in which the morals of the young are intimately connected, one in which parents, instructors, and scholars, should unite their efforts to produce a reform; there should be nothing in or about school-houses, calculated to defile the mind, corrupt the heart, or excite unholy and forbidden appetites; yet considering the various character of those brought together in our public schools, and considering also how inventive are corrupt minds, in exhibiting openly the defilement which reigns within, we do not know but we must expect that school-houses, as well as other public buildings, and even fences, will continue to bear occasional marks both of lust and profaneness. But we must confess that the general apathy which apparently exists on this subject, does appear strange to us. It is a humbling fact, that in many of these houses, there are highly indecent, profane, and libidinous marks, images and expressions, some of which are spread out in broad characters on the walls, where they unavoidably meet the eyes of all who come into the house, or being on the outside, salute the traveler as he passes by, wounding the delicate, and annoying the moral sensibilities of the heart. While there is still a much greater number in smaller character, upon the tables and seats of the students, and even in some instances, of the instructors, constantly before the eyes of those who happen to occupy them. How contaminating these must be, no one can be entirely insensible. And yet how unalarmed, or if not entirely unalarmed, how little is the mind of community directed to the subject, and how little effort put forth to stay this fountain of corruption. We will mention as evidence of the public apathy, one house which we suppose is this day, it certainly was a few months since, defiled by images and expressions of the kind referred to, spread out in open observation upon its walls, which are known to have been there for eight or ten years. In this building during all this time, the summer and winter schools have been kept; here the district have held their business meetings; here frequently has been the singing-school; here, too, religious meetings have often been held; here, too, the school committee, the fathers, mothers, and friends of the children, have come to witness the progress of their children in knowledge and virtue; all of whom must have witnessed, and been ashamed of their defilement, and yet no effectual effort has been put forth to remove them. Such things ought not to be; they can, to a considerable extent, be prevented. The community are not therefore altogether clear in this matter.

We will close these remarks by observing that after an extensive and careful examination of the state of a great number of school-houses in this and other States, we are constrained to believe, that in regard to accommodation, the convicts in the State Prisons, except those condemned to solitary and perpetual confinement, and we are not certain that in all cases these should be excepted, are better provided for, than the dear children of New England, the glory of the present, and the hope of the coming age. And when we regard the deleterious effect which the want of accommodation and other imperfections in and about these buildings, must have upon the growth, health, and perfectness of the bodily system, upon the mental and moral power, upon the tender and delicate feeling of the heart, we must suppose there is as pressing a call for the direct interference of the wise and benevolent, to produce an improvement, as there is for the efforts of the Prison Discipline Society, or for many of the benevolent exertions of the day. And we do most solemnly and affectionately call upon all, according to their situation in life, to direct their attention to the subject; for the bodies, the minds, the hearts of the young and rising generation require this. It is a service due to the present and future generation. A service due to their bodies and souls."

SCHOOL ARCHITECTURE.

In treating of School Architecture, it will be convenient to present—

I. Common Errors to be avoided.
II. General Principles to be observed.
III Plans and directions for erecting and fitting up school-houses adapted to the varying circumstances of country and city, of a small, and a large number of scholars, of schools of different grades and of different systems of instruction.

I. COMMON ERRORS IN SCHOOL ARCHITECTURE.

Under this head it will be sufficient to enumerate the principal features of school-houses as they are.

They are, almost universally, badly located, exposed to the noise, dust and danger of the highway, unattractive, if not positively repulsive in their external and internal appearance, and built at the least possible expense of material and labor.

They are too small. There is no separate entry for boys and girls appropriately fitted up; no sufficient space for the convenient seating and necessary movements of the scholars; no platform, desk, or recitation room for the teacher.

They are badly lighted. The windows are inserted on three or four sides of the room, without blinds or curtains to prevent the inconvenience and danger from cross-lights, and the excess of light falling directly on the eyes or reflected from the book, and the distracting influence of passing objects and events out of doors.

They are not properly ventilated. The purity of the atmosphere is not preserved by providing for the escape of such portions of the air as have become offensive and poisonous by the process of breathing, and by the matter which is constantly escaping from the lungs in vapor, and from the surface of the body in insensible perspiration.

They are imperfectly warmed. The rush of cold air through cracks and defects in the doors, windows, floor and plastering is not guarded against. The air which is heated is already impure from having been breathed, and made more so by noxious gases arising from the burning of floating particles of vegetable and animal matter coming in contact with the hot iron. The heat is not equally diffused, so that one portion of a school-room is frequently overheated, while another portion, especially the floor, is too cold.

They are not furnished with seats and desks, properly made and adjusted to each other, and arranged in such a manner as to promote th comfort and convenience of the scholars, and the easy supervision on the part of the teacher. The seats are too high and too long, with no suitable support for the back, and especially for the younger children. The desks are too high for the seats, and are either attached to the wall on three sides of the room, so that the faces of the scholars are turned from the teacher, and a portion of them at least are tempted constantly to look out at the windows,—or the seats are attached to the wall on opposite sides, and the scholars sit facing each other. The aisles are not so arranged that each scholar can go to and from his seat, change his position, have access to his books, attend to his own business, be seen and approached by the teacher, without incommoding any other.

They are not provided with blackboards, maps, clock, thermometer, and other apparatus and fixtures which are indispensable to a well regulated and instructed school.

They are deficient in all of those in and out-door arrangements which help to promote habits of order, and neatness, and cultivate delicacy of manners and refinement of feeling. There are no verdure, trees, shrubbery and flowers for the eye, no scrapers and mats for the feet, no hooks and shelves for cloaks and hats, no well, no sink, basin and towels to secure cleanliness, and no places of retirement for children of either sex, when performing the most private offices of nature.

II. GENERAL PRINCIPLES OF SCHOOL ARCHITECTURE.

1. Location—Style—Construction.

The location should be dry, quiet, pleasant, and in every respect healthy. To secure these points and avoid the evils which must inevitably result from a low and damp, or a bleak and unsheltered site, noisy and dirty thoroughfares, or the vicinity of places of idle and dissipated resort, it will sometimes be necessary to select a location a little removed from the territorial center of the district. If possible, it should overlook a delightful country, present a choice of sunhine and shade, of trees and flowers, and be sheltered from the prevailing winds of winter by a hill-top, or a barrier of evergreens. As many of the pleasant influences of nature as possible should be gathered in and around that spot, where the earliest, most lasting, and most controlling associations of a child's mind are formed.

In the city or populous village, a rear lot, with access from two or more streets, should be preferred, not only on the ground of economy, but because the convenience and safety of the children in going to and from school, the quiet of the school-room, and the advantage of a more spacious and retired play-ground will be secured.

In the country, it will sometimes be desirable for two or more districts to unite and erect a school-house at some point, to which all the older children can go from all parts of the associated districts, while the younger attend school in their several districts. In this way the school-houses can be more appropriately fitted up, and the advantage of a more perfect classification in respect both to instruction and government, as well as a wiser economy in the employment of teachers, be gained.

The style of the exterior should exhibit good, architectural proportion, and be calculated to inspire children and the community generally with respect for the object to which it is devoted. It should bear a favorable comparison, in respect to attractiveness, convenience and durability, with other public edifices, instead of standing in repulsive and disgraceful contrast with them. Every school-house should be a temple, consecrated in prayer to the physical, intellectual, and moral culture of every child in the community, and be associated in every heart with the earliest and strongest impressions of truth, justice, patriotism, and religion.

The school-house should be constructed throughout in a workmanlike manner. No public edifice more deserves, or will better repay, the skill, labor, and expense, which may be necessary to attain this object, for here the health, tastes, manners, minds, and morals of each successive generation of children will be, in a great measure, determined for time and eternity.

2. Size.

In determining the size of a school-house, due regard must be had to the following particulars.—

First.—A separate entry, or lobby, for each sex, furnished with scraper, mat, hooks or shelves, sink, basin and towels. A separate entry thus furnished, will prevent much confusion, rudeness, and impropriety, and promote the health, refinement, and orderly habits of children.

Second.—A room, or rooms, large enough to allow, 1st, each occupant a suitable quantity of pure air, i. e. at least 150 cubic feet ; 2d, to go to and from his seat without disturbing any one else ; 3d, to sit comfortably in his seat, and engage in his various studies with unrestricted freedom of motion ; and, 4th, to enable the teacher to approach each scholar in his seat, pass conveniently to any part of the room, supervise the whole school, and conduct the readings and recitation of the several classes properly arranged.

Third.—One or more rooms for recitation, apparatus, library, and other purposes.

3. Light.

The arrangements for light should be such as to admit an abundance to every part of the room, and prevent the inconvenience and danger of any excess, glare, or reflection, or of cross-light. A dome, or sky-light, or windows set high, admit and distribute the light most steadily and equally, and with the least interruption from shadows. Light from the north is less variable, but imparts less of cheerfulness and warmth than from other directions. Windows should be inserted only on two sides of the room, at least three and a half or four feet from the floor, and should be higher and larger, and fewer in number than is now common. There should be no windows directly back of the teacher, or on the side towards which the scholars face, unless the light is modified by curtains or by ground glass. Every window should be suspended with weights, and furnished with blinds and curtains; and if in a much frequented street, the lower sash should be glazed with ground glass.

4. Ventilation.

Every school-room should be provided with means of ventilation, or of renewing the vital portions of the atmosphere which are constantly absorbed, and of removing impurities which at the same time are generated, by the breathing and insensible perspiration of teacher and pupils, and by burning fires and lights.

The importance of some arrangements, to effect a constant supply of pure air, not only in school-rooms, but in any room where living beings congregate in numbers for business or pleasure, and where fires or lights are kept burning, has been strangely overlooked, to the inevitable sacrifice of health, comfort, and all cheerful and successful labor. We practically defeat the beautiful arrangements of our Creator by which the purity of the air would otherwise be preserved by its own constant renewal, and the harmonious growth and support of the animal and vegetable world maintained. We voluntarily stint ourselves in the quantity and quality of an article, which is more necessary to our growth, health and comfort, than food or drink, and which our beneficent Father has furnished pure, without money and without price, to our very lips, and so abundantly that we are, or should be if we did not prevent it, literally immersed in it all our lives long.

The atmosphere which surrounds our earth to the height of forty-five miles, and in which we live, and move, and have our being, is composed mainly of two ingredients, oxygen and nitrogen, with a slight admixture of carbonic acid. The first is called the vital principle, the breath of life, because by forming and purifying the blood it alone sustains life, and supports combustion. But to sustain these processes, there is a constant consumption of this ingredient going on, and, as will be seen by the facts in the case, the formation and accumulation of another ingredient, carbonic acid, which is deadly hostile to animal life and combustion. This gas is sometimes found in wells, and will there extinguish a lighted candle if lowered into it, (and which should always be lowered into a well before any person ventures down) and is not an uncommon cause of death in such places. It is almost always present in deep mines and at the bottom of caverns. Near Naples there is one of this description, called the Grotto del Cane, or the Grotto of the Dog, because the guides who accompany strangers to the interesting spots in the vicinity of Naples, usually take a dog along with them to show the effects of this gas upon animal life. Being heavier than common air it flows along the bottom of the cavern, and although it does not reach as high as the mouth or nostrils of a grown man, no sooner does a dog venture into it, than the animal is seized with convulsions, gasps and would die if not dragged out of it into the pure air. When recovered, the dog shows no more disposition to return to the cavern, though called by his own name, than some children do to go to places called school-houses, where experiments almost as cruel are daily and hourly tried. But this gas, bad as it is in reference to animal life and fires, is the essential agent by which our earth is clothed with the beauty of vegetation, foliage, and flowers, and in their growth and development, helps to create or rather manufacture the oxygen, which every breathing creature and burning fire must consume. The problem to be solved is how shall we least mar the beautiful arrangement of Providence, and appropriate to our own use as little as possible of that, which though death to us, is the breath and the life blood of vegetation.

The air which we breathe, if pure, when taken into the mouth and nostrils, is composed in every one hundred parts, of 21 oxygen, 78 nitrogen, and 1 of carbonic acid. After traversing the innumerable cells into which the lungs are divided and subdivided, and there coming into close contact with the blood, these proportions are essentially changed, and when breathed out, the same quantity of air containes 8 per cent. less of oxygen, and 8 per cent. more of carbonic acid. If in this condition (without being renewed,) it is breathed again, it is deprived of another quantity of oxygen, and loaded with the same amount of carbonic acid. Each successive act of breathing reduces in this way, and in this proportion, the vital principle of the air, and increases in the same proportion that which destroys life. But in the mean time what has been going on in the lungs with regard to the blood? This fluid, after traversing the whole frame, from the heart to the extremities, parting all along with its heat, and ministering its nourishing particles to the growth and preservation of the body, returns to the heart changed in color, deprived somewhat of its vitality, and loaded with impurities. In this condition, for the purpose of renewing its color, its vitality and its purity, it makes the circuit of the lungs, where by means of innumerable little vessels, inclosing like a delicate net work each individual air cell, every one of its finest particles comes into close contact with the air which has been breathed. If this air has its due proportion of oxygen, the color of the blood changes from a dark purple to a bright scarlet; its vital warmth is restored, and its impurities, by the union of the oxygen of the air with the carbon of blood, of which these impurities are made up, are thrown off in the form of carbonic acid. Thus vitalized and purified, it enters the heart to be sent out again through the system on its errand of life and beneficence, to build up and repair the solid frame work of the body, give tone and vigor to its muscles and restring all its nerves to vibrate in unison with the glorious sights and thrilling sounds of nature, and the still sad music of humanity.

But in case the air with which the blood comes in contact, through the thin membranes that constitute the cells of the lungs, does not contain its due proportion of oxygen, viz. 20 or 21 per cent, as when it has once been breathed, then the blood returns to the heart unendued with newness of life, and loaded with carbon and other impurities which unfit it for the purposes of nourishment, the repair, and maintenance of the vigorous actions of all the parts, and especially of the brain, and spinal column, the great fountains of nervous power. If this process is long continued, even though the air be but slightly deteriorated, the effects will be evident in the languid and feeble action of the muscles, the sunken eye, the squalid hue of the skin, the unnatural irritability of the nervous system, a disinclination to all mental and bodily exertion, and a tendency to stupor, headache and fainting. If the air is very impure, i. e. has but little or no oxygen and much carbonic acid, then the imperfect and poisoned blood will act with a peculiar and malignant energy on the whole system, and especially on the brain, and convulsions, apoplexy, and death must ensue.

Abundant instances of the beneficent effects of pure air, and the injurious and fatal results of breathing that which is impure, might be cited from the history of hospitals and prisons, and writers generally on health and education. In the Dublin Hospital, between the years 1781 and 1785, out of 7650 children, 2944 died within a fortnight of their birth—that is, more than *one in three*. Dr. Clark, the physician, suspecting the cause to be an imperfect supply of pure air, caused it to be introduced by means of pipes into all of the apartments, and in consequence, during the three following years, only 165 out of 4242 died within the two first weeks of their birth—that is less than *one in twenty*. Dr. Buchan, at a little earlier date, by the same arrangement reduced the mortality of children in a hospital in Yorkshire, from *fifty in one hundred* to *one in fifty*. In these two cases there was an immense saving of human life. But the good done by these intelligent and observing physicians was not confined to these hospitals. For in a few years, the results of their observation and labors led to the introduction of more perfect arrangements for a supply of pure air in all structures of a similar character in England and elsewhere. And at this hour there are hospitals in this country and in England, in which there is a larger number of cubic feet of air, and that kept pure by perfect means of ventilation, allowed to *each patient*, than is contained in many school-rooms occupied by 20, 30, or 40 children, heated with a close stove, and provided with no means of ventilation except such as time and decay have made.

The diminished mortality of prisons, and the almost entire disappearance of that terible scourge, the jail fever, so frequent before the days of Howard, is to be attributed mainly to the larger allowance and regular supply of pure air secured by improved principles of prison architecture and discipline. There are instances on record, where the inmates of prisons have escaped the visitation of some prevalent sickness, solely on the ground of their cells being better provided with pure air, than the dwelling-houses all around them. The prisoners in the Tolbooth, in Edinburgh, were unaffected by the plague, which caused such dreadful mortality in that city, in 1645, and this exemption was attributed to their better supply of pure air. Humboldt in his Personal Narrative, mentions the case of a seaman who was at the point of death, and was obliged to be removed from his hammock, which brought his face to within a foot of the deck, into the open air in order to have the sacrament administered according to the forms of the Catholic Church. In this place he was expected to die, but the change from the stagnant, impure atmosphere in which his hammock was hung, to the fresh, purer atmosphere of the deck, enabled the powers of life to rally, and from that moment he began to recover. Even the miserable remnant of the party who were confined in the Black Hole of Calcutta, sick as they were of a malignant, putrid fever, recovered on being admitted to the fresh air of heaven, under proper medical treatment. But the history of this whole affair is a terrible lesson on this subject, which though often repeated, cannot be too often dwelt upon. This Black Hole is a prison in Calcutta, 18 feet square, into which the Nabob of Bengal after the capture of Fort William from the British in 1756, thrust 146 English prisoners. The only opening to the air, except the door, was by two windows on the same side, strongly barred with iron. Immediately on the closing of the door a profuse perspiration burst out on every prisoner. In less than an hour their thirst became intolerable, and their breathing difficult. The cry was universal and incessant for air and water, but the former could only come in through the grated windows, and the latter, when supplied by the guards without, only aggravated their distress. All struggled to get near the windows, and in this death-struggle as it were, many were trampled under foot. In less than three hours several had died, and nearly all the rest were delirious and prayed for death in any form. On the opening of the doors at six o'clock in the morning, less than eleven hours after it was closed, death had indeed come to the relief of 123 out of the 146, and the remainder had sunk down on their dead bodies sick with a putrid fever. Now what did all this anguish, and these murderous results spring from? From breathing over and over again air which had become vitiated and poisonous by passing repeatedly through the lungs, and by exhalations from the surface of the bodies of the persons confined there. "This terrible example," says Dr. Combe in his Principles of Physiology, "ought not to be lost upon us, and if results so appalling arise from the extreme corruption of the air, results, less obvious and sudden, but no less certain, may be expected from every lesser degree of impurity."

"In our school-rooms," says Dr. Bell, "churches, hospitals and places of public evening amusements, and even in our private dormitories, we not unfrequently make near approaches to the summary poisoning process of the Black Hole at Calcutta." We do not appreciate the magnitude of the evils produced by breathing frequently, even for a short period at any one time, a vitiated atmosphere, because the ultimate results are both remote, and the accumulation of repeated exposures. Besides, the immediate effects may be not only slight, but may apparently disappear on our breathing again a free and pure air, so that we forget to appreciate the temporary inconvenience or suffering, and to refer them to their true cause. How often do we retire at night, perfectly well, and rise up in the morning unrefreshed with sleep, with an aching head, a feverish skin, and a sick stomach, without reflecting that these symptoms of a diseased system are the necessary effects of breathing the atmosphere of a chamber, narrow in its dimensions, closed against any fresh supply from without, and not unlikely, made still more close by a curtained bed, and exhausted of even its small quantity of oxygen, by a burning fire or lamp? These same causes, a little longer in operation, or a little more active, would produce death as surely, although not as suddenly, as a pan of ignited charcoal in the room. Who has not noticed that the fainting and sickness which so often visit persons, and especially females of delicate health in crowded churches and lecture-rooms, only occurs after the air has become overheated and vitiated, by having been a long time breathed, and that an exposure to the open air generally restores the irregular or suspended circulation of the blood? In the relief and newness of life which we experience on emerging from such places of crowded resort, we forget that the weariness and languor, both of mind and body which we suffered within, were mainly the depressing effects of the imperfectly vitalized blood, and that the relief is simply the renovated life and vigor, which the same blood, purified of its carbon by coming in contact with the oxygen of the air, imparts to the whole system, and especially to the brain. But in spite of our forgetfulness of the cause, or the apparent disappearance of the temporary inconvenience and distress, which should warn us to beware of a repetition of the same offence against the laws of comfort and health, repeated exposures are sure to induce or develope any tendency to disease, especially of a pulmonary or nervous character, in our constitutions, and to undermine slowly the firmest health. Who can look round on a workshop of fifteen or twenty females, breathing the same unrenewed atmosphere, and sitting perhaps in a position which constrains the free play of the lungs, and not feel that disease, and in all probability, disease in the form of that fell destroyer of our fair countrywomen, consumption, will select from among those industrious girls, its ill starred victims? The languor, debility, loss of appetite, difficulty of breathing, coughs, distortion of the frame, (fallen away from the roundness natural to youth and health,) nervous irritability, and chronic affections of various kinds, so common among females in factories, even in our own healthy New England, or those who have retired from such factories to their own homes to die, or wear out a dying life all their days, are the natural fruits of an exposure, day after day, to an atmosphere constantly becoming more impure from the vitiated breath of forty or fifty persons, and rendered still more unfit for respiration by dust and minute particles floating in it, tending to irritate the already inflamed and sensitive membrane which incloses the air cells of the lungs. To this exposure in the workroom should be added the want of cheerful exercise, and innocent recreation in the open air, and the custom of herding together at night in the small, unventilated sleeping apartments of our factory boarding-houses.

In the school-room the same poisoning process goes on day after day, and if the work is less summary, it is in the end more extensively fatal, than in the Black Hole of Calcutta. Every man and woman, who received any portion of their early education in the common school, can testify to the narrow dimensions, and low ceiling of the school-rooms, and to the discomfort arising from the close, stagnant, offensive atmosphere, which they were obliged to breathe. Who does not remember the comparative freshness and vigor of mind and body with which the morning's study and recitations were begun, and the languor and weariness of body, the confusion of mind, the dry skin, the flushed cheek, the aching head, the sickening sensations, the unnatural demand for drink, the thousand excuses to get out of doors, which came along in succession as the day advanced, and especially in a winter's afternoon, when the overheated and unrenewed atmosphere had become obvious to every sense? These were nature's signals of distress, and who can forget the delicious sensations with which her holy breath, when admitted on the occasional opening of the door, would visit the brow and face, and be felt all along the revitalized blood, or the newness of life with which nerve, muscle, and mind were endued by free exercise in the open air at the recess, and the close of the school? Let any one who is sceptical on this point visit the school of his own district, where his own children perhaps are condemned to a shorter allowance of pure air than the criminals of the State, and he cannot fail to see in the pale and wearied countenances of the pupils, the languor and uneasiness manifested, especially by the younger children, and exhaustion and irritability of the teacher, a demonstration that the atmosphere of the room is no longer such as the comfort, health and cheerful labor of both teacher and pupils require.

In this way the seeds of disease are sown broadcast among the young, and especially among teachers of delicate health. "In looking back," says the venerable Dr. Woodbridge in a communication on school-houses to the American Institute of Instruction, "upon the languor of fifty years of labor as a teacher, reiterated with many a weary day, I attribute a great proportion of it to *mephetic air;* nor can I doubt, that it has compelled many worthy and promising teachers to quit the employment. Neither can I doubt, that it has been the *great cause* of their subsequently sickly habits and untimely decease." A physician in Massachusetts, selected two schools, of nearly the same number of children, belonging to families of the same condition of life, and no causes, independent of the circumstances of their several school-houses, were known to affect their health. One house was dry and properly ventilated—the other damp, and not ventilated. In the former, during a period of forty-five days, five scholars were absent from sickness to the amount in the whole of twenty days. In the latter, during the same period of time and from the same cause, nineteen children were absent to an amount in all of one hundred and forty-five days, and the appearance of the children not thus detained by sickness indicated a marked difference in their condition as to health.

The necessity of renewing the atmosphere, does not arise solely from the consumption of the oxygen, and the constant generation of carbonic acid, but from the presence of other destructive agents, and impurities. There is carburetted hydrogen, which Dr. Dunglinson in his Physiology, characterizes, "as very depressing to the vital functions. Even when largely diluted with atmospheric air, it occa sions vertigo. sickness, diminution of the force and velocity o the pulse, reduction of muscular vigor and every symptom of diminished power." There is also sulphuretted hydrogen, which the same author says, in its pure state, kills instantly, and in its diluted state, produces powerful sedative effects on the pulse, muscles, and whole nervous system. There are also offensive and destructive impurities arising from the decomposition of animal and vegetable matter in contact with the stove, or dissolved in the evaporating dish.

The objects to be attained are—the removal of such impurities, as have been referred to, and which are constantly generated, wherever there is animal life and burning fires, and the due supply of that vital principle, which is constantly consumed by breathing and combustion. The first can be in no other way effectually secured, but by making provision for its escape into the open air, both at the top and the bottom of the room; and the second, but by introducing a current of pure air from the outside of the building, warmed in winter by a furnace, or in some other mode, before entering the room. The two processes should go on together—i. e. the escape of the vitiated air from within, and the introduction of the pure air from without. The common fireplace and chimney secures the first object very effectually, for there is always a strong current of air near the floor, towards the fire, to support combustion, and supply the partial vacuum in the chimney occasioned by the ascending column of smoke and rarified air, and in this current the carbonic acid and other impurities will be drawn into the fire and up the chimney. But there is such an enormous waste of heat in these fireplaces, and such a constant influx of cold air through every crevice in the imperfect fittings of the doors and windows, to supply the current always ascending the chimney, that this mode of ventilation should not be relied on. The common mode of ventilating, by opening a window or door, although better than none, is also imperfect and objectionable; as the cold air falls directly on the head, neck, and other exposed parts of the body, when every pore is open, and thus causes discomfort, catarrh, and other more serious evils, to those sitting near, besides reducing the temperature of the whole room too suddenly and too low. This mode, however, should be resorted to at recess.

There should be one or more openings, expressly for ventilation, both at the top and the bottom of the room, of not less than twelve inches square, capable of being wholly or partially closed by a slide of wood or metal, and, if possible, these openings, or the receptacle into which they discharge, should be connected with the chimney or smoke-flue, in which there is already a column of heated air. By an opening in or near the ceiling, the warmer impurities (and air when heated, and especially when over-heated, will retain noxious gases longer) will pass off. By an opening *near the floor*, into the smoke-flue, the colder impurities (and carbonic acid, and the other noxious gases, which at first rise, soon diffuse themselves through the atmosphere, cool, and subside towards the floor) will be drawn in to supply the current of heated air and smoke ascending the chimney

These openings, however, may let cold air in, and will not always secure the proper ventilation of a school-room, unless there is a current of pure warm air flowing in at the same time. Whenever there is such a current there will be a greater economy, as well as a more rapid and uniform diffusion of the heat, by inserting the outlet for the vitiated air near the floor, and at the greatest distance from the inlet of warm air.

The ventilation of factories, mines, reading rooms, and halls intended for large assemblies of people, has received, of late, much attention from men of science and large practical views in England. In factories, the large apartments are heated by steam or hot water pipes, and the air which has become vitiated by breathing and perspiration, is drawn out by a fan-ventilator. This contrivance resembles somewhat our common fanning mill, or machine for winnowing grain. The impure air of the room is drawn into the fan to supply that which is condensed by the revolving wings, and forced out through a pipe leading into the open air.

In the House of Commons, the rapid change of air is effected by means of an artificial draft in a chimney erected on the outside of the building, and in which a large fire is kept burning, for this purpose solely. The fresh air from without is first introduced through a perforated wall into a chamber below, connected by doors with an apartment containing the hot water apparatus for warming the house. The pure air can then be warmed or not, according to the season of the year, before it passes into the apartments above. This is done, not by rising in a large volume, through one or two openings, but imperceptibly through a large number of very small holes in the floor. The air thus admitted, after becoming vitiated by respiration and combustion, escapes through apertures concealed in the ornaments of the ceiling into a common flue or receptacle above, which is connected by a descending pipe with the chimney noticed before. In warm weather, the air, before passing into the house, is cooled and freshened by jets of water playing through it, and by the melting of bags of ice suspended in the chamber below.

The rooms of the Wellington Club, Liverpool, are warmed and ventilated in nearly the same way. The air from without is first cleansed from all particles of coal dust, and other impurities, by being passed through water, and then brought to the right temperature by steam pipes in the air-chamber below. It is then forced into the room by a revolving fan through a band of minutely perforated zinc, which skirts the large apartments. Concealed in the ornamental work of the ceiling, are openings communicating with an air-chamber above, in which is a chimney shaft, and in the draft produced by a fire in this, the vitiated air is carried off so rapidly that the odor of a small quantity of rose-water poured into the air-chamber below, is, in a few seconds, perceptible in every part of the room.

The principles involved in the expensive modes of ventilation above described, can be carried out in any apartment heated by a furnace or other modes of warming pure air before it is introduced which will be treated of in speaking of the *temperature* of school rooms.

There is a mischievous error prevailing, that if a room is kept at a low temperature there is no need of ventilation. Dr. Alcott mentions the case of a teacher, who when asked if she did not find it difficult to keep her room ventilated, replied, "not at all, it is one of the coldest rooms in the city." The necessity of ventilation arises from he consumption of the oxygen and the generation and accumuation of carbonic acid principally in breathing, and both of these processes can go on and do go on, in a cold room, as well as in a warm one, if human beings are collected in it, and goes on rapidly and fatally according to the number of persons and the size and closeness of the apartment. Dr. Arnott, in his work on "warming and ventilating," mentions a striking instance of popular ignorance with respect to this subject, and of a mischievous practice founded upon that ignorance among some poor girls in Buckinghamshire, England, who gained their livelihood by lace-making. To save the expense of fire they were wont in winter to choose among the rooms belonging to their families, the smallest which would contain to the number of twenty or thirty of them, and then to congregate and keep themselves warm at their work by breathing. The atmosphere of the room, as might have been expected by any one acquainted with its constitution and the process going on, although unperceived by themselves, soon became exceedingly offensive to a stranger entering, as well as highly injurious to them. The pale faces, broken health and early deaths of many of these ignorant self-destroyers were the identical results, a little more remote, which are caused by the atmosphere of our school-rooms, churches, manufactories and other places where men, women or children, are crowded together. These results are quickened in an overheated atmosphere, because such air has less oxygen, and retains the impure gases longer. Still the scenes of death and misery in the Black Hole of Calcutta would have taken place, if the same prison-house had been in Greenland.

5. Temperature.

The means of producing, diffusing and duly regulating artificial heat in a school-room, is, in a climate like ours, another of the indispensable conditions of health, comfort and successful labor. To effect this, the structure must not be "a summer-house for winter residence," but be calculated to keep out the cold wind and especially to prevent its entering at cracks, and defects in the doors, windows, floors, and plastering, so as to fall suddenly and directly only on the feet, neck, or other sensitive and exposed portions of the body. Fuel of the right kind, in the right condition, in suitable quantity and in due season must be provided. The best modes of consuming it so as to extract its heat and diffuse it equally through all parts of the room and retain it as long as is safe, must be resorted to. The means of regulating it, so as to keep up a uniform temperature in different parts of the room, and to graduate it to the varying circumstances of a school at different periods of the day, and in different states of the weather, must not be overlooked.

The open stove with large pipe, not bending till the horizontal part is carried ten or twelve feet above the heads of the children, affords as effectual, economical and unobjectionable a mode of consuming the fuel and disseminating the heat as any stove of this kind. It is far superior in point of economy to the open fireplace, as ordinarily constructed, in which near seven eighths of the heat evolved ascends the chimney and only one eighth, or according to Rumford and Franklin, only one fifteenth is radiated from the front of the fire into the room. It has to some extent the cheerful light of the open fire, to which habit and association have attached us, and the advantages of the latter, in opening broadly near the floor, and thus drawing in the colder air with the carbonic acid in the current which goes to sustain the combustion and ascend the large pipe of the stove. Unless the common mode of constructing fireplaces and chimneys can be greatly improved, or the original *Franklin fireplace* or the *double fireplace* be substituted, there is no advantage in the open fireplace which cannot be secured in the large open stove. The original *Franklin stove*, or *fireplace* was constructed of cast iron, and by means of a circuitous chimney or smoke flue, which was surrounded and intersected by air passages, opening at one end out of doors, and at the other into the room, the heat of the fire was retained, and a current of fresh warm air was constantly flowing into the room. This is quite a different thing from the ordinary open fireplace. The *double fireplace* is a modification of Franklin's plan. It is made from any common fireplace by inserting within it another fireplace made of soap stone, leaving an empty space of about an inch in depth, between the two, so that when finished the back and sides may be hollow. This hollow space, communicates at one end with the open air by a pipe, and the other opens into the room, on the side of the chimney. In this fireplace the advantages of an open fire of wood or coa can be enjoyed at the same time a current of air is warmed ir the rear of the fire.

Various plans have been proposed and adopted, to make the common stove, whether close or open, serviceable in warming pure air before it is thrown into the room. Mr. Woodbridge in his essay on school-houses, describes one as follows:—the stove is inclosed on three sides in a case of sheet iron, leaving a space of two or three inches beneath and around the stove, and as it rises around it becomes warmed before it enters the room at the top of the case. The case is movable so as to allow of the cleaning out of any dust which might collect between it and the stove. Mr. Palmer in his Manual for Teachers, secures the same object by conducting the air from without, into a passage which traverses the bottom of the stove five or six times before it enters the room, and thus becomes warm.

In Millar's *patent ventilating school-house stove* the air is conducted from without, into a chamber below the fire-plate, and after circulating through pipes around the fire, escapes into the room. A more minute description will be given in the second part of this essay.

The same thing can be secured by a similar arrangement connected with stoves for burning arthracite coal. In the Olmsted stove, for instance, the pure air from without can be made to pass in contact with the exterior, as well as the interior surface of the radiators and thus be warmed before entering the room. This stove has an advantage, in admiting of the slow combustion of billets of wood in connection with nut or pea coal, and thus maintaining a fire which will keep up a uniform temperature of the proper degree at the cheapest rate. The large radiating surface, which is nothing more than prolonged pipe, conveniently arranged, imbibes and diffuses all the heat evolved by the combustion of the fuel, so that at the point where it enters the chimney, the heat of the pipe is scarcely perceptible.

The best mode, however, at the same time of warming and ventilating a school-room, especially if it is large, is by pure air heated in a stove or furnace placed in the cellar or a room lower than the one to be warmed. No portion of the room, or the movements of the scholars, or the supervision of the teacher, are encumbered or interrupted by stove or pipe. The fire in such places can be maintained without noise and without throwing dust or smoke into the room. The offensive odors and impurities of burnt air, or rather of particles of vegetable or animal matter floating in the air, are not experienced. The heat can be conducted into the room at different points, and is thus diffused so as to secure a uniform summer temperature in every part of it. A room thus heated, even without any special arrangements for this object, will be tolerably well ventilated, for the constant influx of warm pure air into the room will force that which is already in it out at every crack and crevice, and thus reverse the process which is ordinarily going on in every school-room. By an opening or rather several small openings into the ceiling, or a flue, which in either case should connect with the outer air, the escape of the impure air will be more effectually secured.

But whatever may be the mode of warming adopted, whether by open fireplace, or grate, stove for wood or coal, or furnace, the temperature of the room should be uniform, and of the proper degree in every part. Not a child should be exposed to sudden and extreme changes of temperature, or compelled when overheated, or at any time, to sit against an inlet of cold air, or, with cold feet. This last is a violation of an indispensable condition of health. To secure a uniform temperature, a thermometer will not only be convenient, but necessary. It cannot be ascertained, for different parts of a room or for thirty or forty persons, differently circumstanced as to heat or cold, or differently employed, some of whom are seated, some standing or changing their position from time to time, without some less variable and uncertain standard than the teacher's feelings. However anxious he may be to make every scholar comfortable, he cannot be conscious at all times of the differing circumstances in which they are placed. He is not exposed to the rush of cold air from a broken or loose window, or from cracks in the ceiling, or the floor. He is not roasted by a seat too near the stove. He is not liable to a stagnation of the blood in he feet from want of exercise or an inconvenient bench. Even though ne were capable of thus sympathizing with them, the temperature of the room after the fire is thoroughly going, and the doors closed, may pass gradually from 65° to 90° without the change becoming perceptible. Now though we may breathe freely in such an atmosphere, gradually heated, we cannot pass into the open air 40° or 50° colder, as would be the case on most winter days, and much less receive a current of such air on a portion, and a sensitive portion of the body, without great danger. With a thermometer in the room, the beginning and progress of such a change would be indicated, and could be guarded against.

In our arrangement for artificial warmth, especially in all stoves for burning anthracite coal, where intense heat is liable to be communicated to the iron surface, if we would preserve the purity of the atmosphere at all degrees of temperature, it is necessary to secure the presence of a certain quantity of moisture. The difference between winds blowing from different quarters, as to health and comfort, is principally owing to the proportion of moisture they contain. Whenever the air has less than its due proportion, it becomes powerfully absorbent of it in every thing with which it comes in contact, whether vegetable or animal. Hence the impression of burnt air, the disagreeable sensation of dryness on the surface of the body, and the delicate membrane of the throat, the shrinking and cracking of furniture, the blight and withering of plants, which are universally experienced in a dry and overheated apartment. Most of these and other effects may be avoided by not overheating the air, but not altogether. There is a difference in the moisture of the atmosphere at different times, without reference to artificial warmth, and however careful we may be to maintain a uniform low temperature in a school-room, we are liable to experience some of the inconveniences above referred to. These can be avoided, even where the room is overheated, by an evaporating dish supplied with pure water. The water should be frequently changed. The gathering and settling of dirt and other impurities in the vessel containing the water can be guarded against by closing the top except to admit a suspended linen or cotton cloth, which will absorb the water and give it out again from its exposed surface.

6. Seats and Desks for Scholars.

In the construction and arrangement of the seats and desks of a school-room, due regard should be had to the convenience, comfort and health of those who are to occupy them. To secure these objects, they should be made for the young and not for grown persons, and of varying heights, for children of different ages, from four years and under, to sixteen and upwards. They should be adapted to each other and the purposes for which they will be used, such as writing and ciphering, so as to prevent any awkward, inconvenient or unhealthy positions of the limbs, chest or spine. They should be easy of access, so that every scholar can go to and from his seat and change his position, and the teacher can approach each scholar and give the required attention and instruction, without disturbing any other person than the one concerned. They should be so arranged as to facilitate habits of attention, take away all temptation and encouragement to violate the rules of the school on the part of any scholar, and admit of the constant and complete supervision of the whole school by the teacher.

Each scholar should be furnished with a seat and desk, properly adapted to each other, as to height and distance, and of varying heights, (the seats from nine inches and a half, to fifteen and a half, with desks to correspond) for children of different age or size. The seat should be so made, that the feet of every child when properly seated, can *rest* on the floor, and the upper and lower part of the leg form a right-angle at the knee; and the back, whether separated from, or forming part of the adjoining desk behind, should recline to correspond with the natural curves of the spine and the shoulders. The seat should be made, as far as possible, like a convenient chair.

The desk for a single scholar should be, at least, two feet long (two and a half is better) by eighteen inches wide, with a shelf beneath for books, and an opening in the backside to receive a slate. The upper surface of the desk, except three or four inches of the most distant portion, should slope one inch in a foot. On the level portion, along the line of the slope there should be a groove to prevent pens and pencils from rolling off, and an opening to receive an inkstand. The top of the inkstand should be on a level with the desk, and be covered by a metallic lid. The end pieces or supporters of the desk should be so made as to interfere as little as possible with sweeping.

If the desk is made to accommodate two scholars on one seat, a partition, extending from the floor for four or five inches above the surface of the desk, should separate them, and if possible they should belong to different classes, so that one will be in his seat, while the other is at recitation.

The desk should not be removed from the seat either in distance or height, so far as to require the body, the neck or the chest to be bent forward in a constrained manner, or the elbow or shoulder blades to be painfully elevated whenever the scholar is writing or ciphering. These last positions, to which so many children are forced by the badly constructed seats and desks of our ordinary school-houses, have led not unfrequently to distortions of the form, and particularly to spinal affections of the most distressing character. Such marked results are principally confined to females of delicate constitutions and studious and sedentary habits. While boys and young men engage in active exercise and sport during the recess and at the close of the school, and thus give relief to the overstrained and unnaturally applied muscles, and restore the spring or elasticity to the cushion-like substance which gives flexibility to the spinal column; girls exercise less in the open air, indulge but little in those sports which give variety of motions to the joints and muscles, and are confined to duties and studies which require their being seated out of school hours too much and too long at any one time.

The effects of the posture above described, in writing or ciphering are increased and even induced by their being compelled to lean against the narrow edge of the writing desk, when their faces are turned towards the teacher. This edge comes against the weakest portion of the back, and the inconvenience or pain forces those exposed to it, to find relief by resting the elbows on the desk, and thus giving an unnatural elevation to the shoulder-blades—or if no support of the kind is provided, they lean against each other, support the back by closing the hands over the knee, or resort to some other awkward or unnatural position, which if long continued will cause more or less of structural deviation, amounting not unfrequently to positive disease or deformity.

Dr. Woodward in a communication appended to Mr. Mann's Report, remarks:—" High and narrow seats are not only extremely uncomfortable for the young scholar, tending constantly to make him restless and noisy, disturbing his temper and preventing his attention to his books; but they have also a direct tendency to produce deformity of his limbs. As the limbs of children are pliable or flexible, they are made to grow out of shape by such awkward and unnatural positions.

" Seats without backs have an equally unfavorable influence upon the spinal column. If no rest is afforded the backs of children while seated, they almost necessarily assume a bent and crooked position. Such a position often assumed and long continued, tends to that deformity which has become extremely common with children in modern times; and leads to diseases of the spine in innumerable instances, especially with delicate female children."

Dr. J. V. C. Smith, of Boston, in his Anatomical Class Book, says:—" There is a radical defect in the seats of our school-rooms. Malformation of the bones, narrow chests, coughs ending in consumption and death in middle life, besides a multitude of minor ills, have often had their origin in the school-room." Again, " To these wretched articles, viz. badly constructed seats and writing desks, are we to look in some measure for the cause of so many distortions of the bones, spinal diseases, chronic affections now so prevalent throughout the country."

Dr. Warren, in his admirable lecture before the American Institute of Instruction, in 1830, which should be in the hand of every teacher and parent, says:—" In the course of my observation, I have been able to satisfy myself that about one half the young females brought up as they are at present, undergo some visible and obvious change of structure; that a considerable number are the subjects of great and permanent deviations, and that not a few entirely lose their health from the manner in which they are reared." And among the causes which lead to such mournful results, he enumerates the unnatural elevation of the right shoulder, the habit of bending the neck, and the stooping posture of the body when engaged in writing, or similar exercises at school.

No child should under any circumstances be long, or frequently exposed to any one or all of these causes of discomfort, deformity or disease. Seats and desks can be as easily and cheaply made of different heights, and for convenient and healthy postures, as they are now, without reference to any such considerations. If desks must be attached to sides of the room, which is objectionable in respect to ease of supervision, habits of study, as well as the morals, manners and health of children, then let the seats be provided with a movable back like those in rail-road cars and in no case be made for more than two. The kind of back referred to, is cheap and convenient for desks constructed and arranged on any other plan. It not only affords a proper support to the back, but will allow of the scholars standing up behind he seat for reading or recitation, or even for a frequent change of position which is so much overlooked in schools, and by students of every grade. No position, if long continued, is more irksome or more unhealthy, or at least operates so insidiously, and yet directly to derange the circulation and other vital functions, as sitting, especially upright, or with the neck and chest bent forward. To young children, it is cruel in the extreme, and wars directly with all healthy and symmetrical growth, besides ruining the temper, and imparting a lasting distaste to study, the school-room, and the teacher.

Little children are made to suffer, and many of them permanently, from being forced to sit long in one position, without any occupation for mind or muscles, on seats without backs and so high that their feet cannot touch, much less rest on the floor. Nothing but the fear of punishment, or its frequent application, can keep a live child still under such circumstances, and even that, cannot do it long. Who has not an aching remembrance of the torture of this unnatural confinement, and the burning sense of injustice, for punishment inflicted for some unavoidable manifestation of uneasiness and pain! Even though the seats are as comfortable as can be made, young children cannot and should not be kept still upon them long at a time, and never without something innocent or useful to do, and under no circumstances, longer than twenty-five or thirty minutes in one position, nor so long at one study, and that with frequent and free exercise in the open air. To accomplish this, great and radical changes in the views and practice of teachers, parents and the community must take place. No where, in the whole department of practical education, is a gradual change more needed, or should be sooner commenced.

If school-houses are to consist of but one room for all the children, regard must be had to the varying circumstances of the winter and summer school. In the former, the larger and older children predominate, and in the latter, the younger and smaller, and yet in both, the younger and smaller are sadly neglected, not only in matters of instruction, but in physical comfort. In summer, they, or at least, a portion of them, are seated "beyond soundings," on seats intended and occupied by the older scholars in winter; and in winter, they are packed away on smooth, high, backless slabs, and in a roasting proximity to the fire. Now there is no way of remedying this state of things, but by having a school-room large enough to accommodate all who may attend, and to have seats and appropriate desks for all the children, be they young or old, large or small. In the winter, let so many of the seats and desks for the smaller children as are not wanted be removed to the attic, or the wood-room, and their places supplied by some for the older, and in the summer let this arrangement be reversed.

The most effectual way of securing appropriate accommodations for children of different age and size, is to have two or more school-rooms, one of which shall be for the younger, and be fitted up accordingly. At one end, with no windows in the wall, should be a platform of seats rising one above the other, on which the children can be arranged at suitable times, for inspection as to cleanliness, for manual exercise, and for all simultaneous exercises, such as singing, simple operations of mental arithmetic, reading of scriptural and other moral stories, and lessons on real objects, pictures and other visible illustrations. The gallery is an economical arrangement in respect to space and expense, and enables the children to fix their eye more easily on the teacher, and the teacher to observe, explain, be heard, and direct more perfectly every movement of the children, and both teacher and children, to profit by the great principle of social sympathy, and imitation. Along the sides of the room should be a passage at least two feet wide, and then a desk, so made as to hold a thin layer of sand, and receive a slate for each scholar, no matter how young. The center of the room should be unencumbered with fixtures of any kind, so as to allow of the arrangement of the school into drafts or classes, and the free movements of the children when necessary. Whatever may be the intellectual and moral exercises of schools for small children, they should be varied and in such a manner as to require frequent and varied physical movements—both change of position and place, from sitting to standing, from desk to gallery, marching, clapping of hands, and other exercises of the joints and muscles which shall bring them all into play, singing, &c. Even with this diversity of occupation in doors, young children, whose healthy and symmetrical growth is governed by the great laws of constant and cheerful motion, require gamboling, frolicsome exercises for ten or fifteen minutes, as often as every hour they are mentally occupied, in the open air, if it is pleasant, or in the woodshed or other covered building, in damp or rainy weather. A play-ground, safe from all exposure of the health and limbs of children, large enough to allow of trundling the hoop, and of free exercise of the limbs, supplied with a circular swing, &c., is an indispensable appendage to a school where children are to be reared with vigorous and symmetrical bodies

7. Arrangements for Teacher.

The arrangements for the teacher should be such, that he can survey the whole school at a glance, address his instruction, when necessary, to the whole school, approach each scholar in his seat without incommoding any other, and conduct the recitations most conveniently to himself, and with the least interference with the study of the school.

With this view, his seat and desk should be placed in front of the school on a raised platform; the aisles should be so arranged as to separate each range of the scholars' seats; and an open space, or appropriate seats, should be provided for the reciting classes, in front or the side of his desk; or what would be better, a recitation room opening from the platform, or else a special platform in the rear of the school.

The teacher's desk should be sufficiently large, and appropriately fitted up, to accommodate his books of reference and apparatus.

The recitation room, or place for recitation, wherever it may be, should be furnished with blackboards, stands for hanging maps and diagrams, and all appropriate apparatus.

If a platform or area for recitation is provided in the rear of the chool, the attention of the scholars while reciting will be less likely to be disturbed, as the ear only will be attracted by what is going on, and the teacher can overlook the school, while conducting the recitations.

The teacher should not, however, occupy any one position permanently, or the mischievous scholars will shape their devices for concealment accordingly, and a position in the rear of the school, except for convenience in recitation, is better calculated to detect than prevent transgression. The eye of the teacher, that great instrument of moral discipline, cannot invite confidence, or meet the answering confidence of the pupil.

8. Apparatus.

No school-room can be considered complete which is not provided with such fixtures, and means of visible illustration, as will aid the teacher in cultivating in his pupils, habits of correct observation, comparison, and classification, and in making the knowledge communicated by books orally, accurate, vivid and practical.

One blackboard, at least, is indispensably necessary. This should be so placed, as to be easily accessible, and in full view of the whole school. The larger it is, the more useful it can be made. The board should be free from knots, or cracks, well seasoned, smoothly planed, and then rubbed with sand-paper, and painted black, without varnish. On the lower side should be placed a trough to receive the chalk or crayon, tin or brass holders, (called port-crayons) a rubber of cloth, wash-leather, or sponge. If the board is broad, or in two or more parts, it should be kept from warping or opening by cleates of iron or wood on the back side or ends.

If there is but one blackboard, it should be movable, so as to be used in different parts of the room. For this purpose, it must be suspended on hooks, or rings inserted in the upper edge, or what is better, on a movable frame, like the painter's easel. It is better, and will add but little to the expense, to provide, in addition to the large one, directly back of the teacher, two or three smaller and portable ones. Every recitation room should be lined with black boards.

Each desk should be furnished with a slate, pencil holder and sponge. A slate to every scholar, young or old, is, if possible, more necessary, than a blackboard. It is a miserable economy to withhold slates from children on account of their liability to be broken. The saving in the wear and tear of books, effected by the use of slates, will more than pay for the latter, especially if they are set in a good oak frame, fastened tightly around the corners by a band of sheet iron, or even by cord or wire. The iron or wire, if used, should not project beyond the surface of the frame, or it will scratch the desk. The most appropriate place for the slate is an opening in the backside of the desk. The pencil holder can be made of brass or tin, about the size of a quill, with two slits at the end into which a short peice of pencil can be put. Without such a holder, no child should be allowed to use a short pencil. He will immediately acquire the habit of contracting his fingers around it, so as to unfit himself for holding a pen properly. If pencil holders are not provided, a long pencil should be, and the brittleness of the common slate pencil can be obviated by rolling it up in strong paper covered with paste. When dry, the paper and pencil can be shaped like an ordinary lead pencil.

With the blackboard and slate, there is no study from the simplest rudiments up to the highest department of science which cannot be illustrated and taught to better advantage, than without them, while there are some to whose attainment they are absolutely indispensable. It is painful to go into our schools, and see how many little children are trying to sit still, with no occupation for the hands, the eye, or the mind, who might be innocently and usefully employed, in a sand desk, or with a slate and pencil, in printing the alphabet, combining letters, syllables, or words, copying the outlines of angles, circles, solids, or maps, diagrams, real objects; thus acquiring knowledge as well as correctness of eye and rapidity of hand, which will be of great use afterwards in learning to write and draw with the pen on paper. It will be found invariably that children, who begin early with the use of the slate, and the blackboard, in writing, drawing, spelling, arithmetic, grammar, are more accurate, rapid and practical scholars than others much older and with better opportunities in other respects, who have not been accustomed to their use. The above articles of apparatus may be considered indispensable, and should not be left to the chance supply of parents. But there are other means in training the senses and forming correct elementary ideas which should be provided as far as practicable.

A clock, which strikes at stated intervals, is indispensable to a just distribution of the teacher's time and attention among the various classes and studies of the school, and may be made highly useful in imparting a correct elementary knowledge of the comparative lengths of different portions of time, from a second to a century, and so of the chronology of the human race.

The measure of an inch, foot, yard, and rod, marked off on the edge of the blackboard, will give a correct and visible standard of distance, to which all statements, or references in the lessons can be brought to the test.

The cardinal points accurately ascertained by the compass, painted on the ceiling, or on the teacher's platform, and associated by frequent references of the teacher, with the parts of the heavens in which the sun rises and sets, will be of incalculable service in the study of geography. In this connection, and as introductory to drawing, plans of the school-house, playground, village-green, district, town, and county, will lead children to an accurate conception of states, continents, the earth, and the system of which it forms a part. The ideas connected with the subjects last named, cannot be properly understood without a globe, tellurium, orrery and similar apparatus.

Counters, or flat pieces of wood about an inch long and half an inch wide, a numeral frame, real measures of every kind, linear, superficial, solid and liquid, weights, models and diagrams of the geometrical forms, and solids,—articles which the pupil can touch, see, examine, experiment with, copy on the slate or blackboard, will prove invaluable helps in teaching children to form correct elementary ideas of number, size, distance, form, and measurement.

The study of geography and history can be made far more useful and interesting by *pictures* representing the great curiosities of nature and art, views of cities, and other places memorable for great events, the manners, dress, edifices, ruins &c., peculiar to each country. One set of plates, could answer very well for all the schools of a society or town, and pass in succession through the several districts.

For the study of the natural sciences, and there is no study which can be made more useful or delightful in the hands of a judicious teacher, cheap collections of minerals, and specimens or drawings of plants and animals, would not only be useful but necessary. In this department the children could collect their own cabinets, and an interchange of specimens between the different districts and towns be effected. Some of the hot days of summer had better be spent in the fields, or the woods in search of the beautiful things which God has scattered over the earth and through it, with a teacher, who has a taste for natural science, than in the hot, unshaded school-house of many districts.

The Magic Lantern in almost any of its improved forms, and especially in Carpenter's, is accompanied with diagrams to illustrate astronomy, natural history, cities, landscapes, costumes, &c., which bring the objects and truths represented so vividly before the young, that they never can forget them.

The inefficiency of school education of every name, is mainly owing to the want of such cheap and simple aids as have been briefly alluded to above, and of methods of instruction based upon, and adapted to them, begun early and continued throughout the whole course. Hence much of the knowledge of early life is forgotten, and more of it lies in dead, useless, unassimilated masses, in the memory. It does not originate, or mould, or color the meditations of the closet, and is not felt in the labor of the field, the workshop, or any of the departments of practical life. The knowledge then found available is the result of self-education, the education attained after leaving school by observation, experience and reading. Under any opportunities of school education, this self-education must be the main reliance, and the great object of all regular school arrangements should be to wake up the spirit, and begin the work of self-culture as early and widely as possible.

9. Library.

The school-house is the appropriate depository of the district library, and a library of well selected books, open to the teacher, children, and adults generally of the district, for reference and reading, gives completeness to the permanent means of school and self-education, which can be embraced in the arrangement of a school-house.

The teacher should be able to extend his own acquaintance with the studies pursued, and to illustrate and explain any name, date, event, terms of art or science, or other allusion or question which might occur in the regular lesson, or which the natural curiosity of children, if encouraged, would suggest. Above all should he be furnished with the best books which have been published on education, and especially with that class which have special reference to the duties and labors of the school-room, and have been prepared by experienced and successful teachers.

Children, even the youngest, should be provided with such books, adapted to their age and capacity, as will invest their studies with new interest, help them to observe and understand what they see and hear by the road side, in the field and in their daily conversations, and form a high standard to aim at in manners, morals and intellectual attainments. Many an idle hour would thus be redeemed, and the process of self-culture be commenced, which would go on long after their school-life was ended.

The farmer, mechanic, manufacturer, and in fine, all the inhabitants of a district, of both sexes, and in every condition and employment of life, should have books which will shed light and dignity on their several vocations, help them better to understand the history and condition of the world, and country in which they live, their own nature, and their relations and duties to society, themselves and their Creator. All that is wanted to fill the community with diligent and profitable readers among all classes, is to gratify the natural curiosity of every child "to know," to convert that curiosity into a well regulated taste, and confirm that taste into a habit, by easy access to a library of appropriate books.

Without such books the instruction of the school-room does not become practically useful, and the art of printing is not made available to the poor as well as the rich. The rich can always command more or less of the valuable works which the teeming press of the day is throwing off, but the poor must depend for their reading, on such books as public libraries, easily accessible, or the benevolence of more favored individuals, may supply.

Wherever such libraries have existed, especially in connection with the advantages of superior schools, and an educated ministry, they have called forth talent and virtue, which would otherwise have been buried in poverty and ignorance, to elevate, bless, and purify society. The establishment of a library in every school-house, will bring the mighty instrument of good books to act more directly and more broadly on the entire population of a state, than it has ever yet done, for it will open the fountains of knowledge without money, and without price, to the humble and the elevated, the poor and the rich.

10. Yard and External Arrangements.

The external arrangement of a school-house, as connected with its attractiveness and convenience, and the health, manners, morals, love of study and proficiency of the pupils, must not be overlooked.

The building should not only be located on a dry, healthy and pleasant site, but be surrounded by a yard, of never less than half an acre, protected by a neat and substantial inclosure. This yard should be large enough in front, for all to occupy in common for recreation and sport, and planted with oaks, elms, maples, and other shady trees, tastefully arranged in groups, and around the sides. In the rear of the building, it should be divided by a high, and close fence, and one portion, appropriately fitted up, should be assigned exclusively for the use of the boys, and the other, for the girls. Over this entire arrangement, the most perfect neatness, seclusion, order and propriety should be enforced, and every thing calculated to defile the mind, or wound the delicacy or the modesty of the most sensitive, should receive attention in private, and be made a matter of parental advice and co-operation.

In cities and populous districts, particular attention should be paid to the playground, as connected with the physical education of children. In the best conducted schools, the playground is now regarded as the *uncovered* school-room, where the real dispositions, and habits of the pupils are more palpably developed, and can be more wisely trained, than under the restraint of an ordinary school-room. These grounds are provided with circular swings, and are large enough for various athletic games. To protect the children in their sports in inclement weather, in some places, the school-house is built on piers; in others, the basement story is properly fitted up, and thrown open as a playground; and in others, the wood, or coal shed is built large for that purpose. Under any circumstances the school-room should not be used for any other, than purposes of study and conversation.

An appropriate place for fuel should be provided, which, it may be well to remark, should be supplied of the right quality, in proper quantity, in due season, and in the right condition for being used.

Every school-house should have its own well, with suitable arrangements for drink, and for the cleanliness of the pupils.

A bell is always found an essential help in securing punctual attendance, and determining when the time of recess begins and ends.

III. PLANS OF SCHOOL-HOUSES.

In determining the details of construction and arrangement for a school-house, due regard must, of course, be had to the varying circumstances of country and city, of a large and a small number of scholars, of schools of different grades, and of different systems of instruction.

1. In by far the largest number of country districts as they are now situated, there will be but one school-room, with a smaller room for recitations and other purposes needed. This must be arranged and fitted up for scholars of all ages, for the varying circumstances of a summer and of a winter school, and for other purposes, religious and secular, than those of a school, and in every particular of construction and arrangement, the closest economy of material and labor must be studied. A union of two or more districts for the purpose of maintaining in each a school for the younger children, and in the center of the associated districts a school for the older children of all, or, what would be better, a consolidation of two or more districts into one, for these and all other school purposes, would do away with the almost insuperable difficulties which now exist in country districts, in the way of comfortable and attractive school-houses, as well as of thoroughly governed and instructed schools.

2. In small villages, or populous country districts, at least two school-rooms should be provided, and as there will be other places for public meetings of various kinds, each room should be appropriated and fitted up exclusively for the use of the younger or the older pupils. It is better, on many accounts, to have two schools on the same floor, than one above the other.

3. In large villages and cities, a better classification of the schools can be adopted, and, of course, more completeness can be given to the construction and arrangement of the buildings and rooms appropriated to each grade of schools. This classification should embrace at least three grades—viz. Primary, with an infant department; Secondary, or Grammar; Superior, or High Schools. In manufacturing villages, and in certain sections of large cities, regularly organized Infant Schools should be established and devoted mainly to the culture of the morals, manners, language and health of very young children.

4. The arrangement as to supervision, instruction and recitations, must have reference to the size of the school; the number of teachers and assistants; the general organization of the school, whether in one room for study, and separate class rooms for recitation, or the several classes in distinct rooms under appropriate teachers, each teacher having specified studies; and the method of instruction pursued, whether the mutual, simultaneous, or mixed.

Since the year 1830, and especially since 1838, much ingenuity has been expended by practical teachers and architects, in devising and perfecting plans of school-houses, with all the details of construction and fixtures, modified to suit the varied circumstances enumerated above, specimens of which, with explanations and descriptions, will be here given.

1. Plans of School-houses recommended by practical Teachers and Educators.

Plan, &c. recommended by Dr. Alcott, and by the American Institute of Instruction.

In 1830 the American Institute of Instruction offered a premium for the best Essay "*On the Construction of School-houses*," which was awarded in Aug. 1831, to Dr. William A. Alcott, of Hartford. The Prize Essay* was published in the proceedings of the Institute of the same year, together with a "*Plan for a Village School-house*," devised by a Committee of the Directors of the Institute.

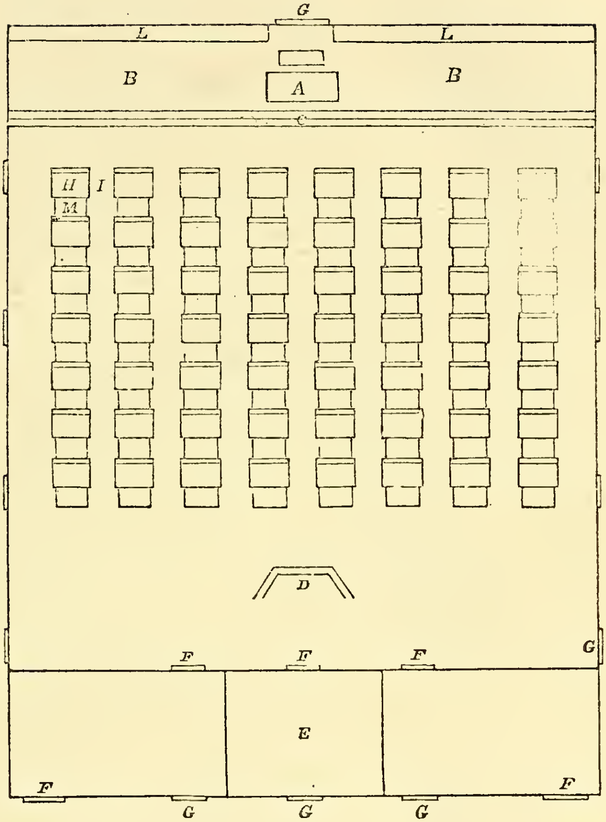
The plan of the school-room recommended by Dr. Alcott, although less complete in some of its details, is substantially the same as that recommended by Mr. Mann, and can be easily understood by reference to the cut of the latter on the opposite page. The room, to accommodate 56 pupils each, with a separate seat and desk, and from 8 to 16 small children with seats for two, should be 40 ft. long by 30 wide. The teacher's platform occupies the north end of the room, towards which all the scholars face when in their seats. Each scholar is provided with a seat and desk, (each 2 ft. by 14 inches,) the front of one desk constituting the back of the seat beyond. The top of the desk is level, with a box and lid for books, &c. The aisles on each side of the room, are 2 feet wide, and those between each range of seats and desk is 18 inches. A place for recitation 8 feet wide extends across the whole width of the room, in the rear, with movable blackboards. The room can be warmed by stove, placed as in the cut referred to, or by air heated by furnace or stove in the basement. The room is ventilated by openings in the ceiling. A thermometer, library, museum, &c., are to be furnished.

In the "*Plan for a village School-house*," the school-room is 48 ft. long by 35 wide, to accommodate eighty scholars with separate seats. The details of the arrangements are nearly the same as were at that date recommended for schools on the Lancasterian plan, and as are now recommended by the British and Foreign School Society—except that the floor of the room is level, and the seats are provided with backs. In the explanations accompanying the plan, the Directors recommend, that in villages and populous neighborhoods, the children be classified according to age and attainment into a series of schools, and that appropriate rooms for each school be provided.

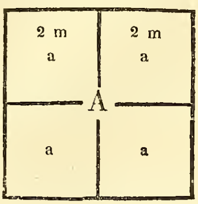
Plan recommended by Horace Mann.

In 1838, Mr. Mann submitted a Report on School-houses, supplementary to his "First Annual Report as Secretary of the Massachusetts Board of Education," which discusses the whole subject of school architecture with great fulness and ability. This document may be found entire in the Massachusetts Common School Journal, Vol 1., and nearly so, in the Connecticut Common School Journal, Vol. 1., and the New York District School Journal, Vol. 3. It fixed public attention on the defects of these edifices, and has led to extensive improvement all over that Commonwealth. During the five years immediately following its publication, over $516,000 were expended in the construction of 405 new houses, including land, fixtures, &c., and over $118,000, in the substantial repairs of 429 more. The larger portion of the first sum has been expended in the cities and large villages in the eastern part of the state, where may now be seen specimens of the best school-houses, and the best schools, in our country. The following plan embodies substantially the views submitted by Mr. Mann, in his Report.

* This Essay of Dr. Alcott was the pioneer publication on this subject. It was followed in 1833 by a "*Report on School-houses*" prepared by the Rev. G. B. Perry, and published by the Essex County Teacher's Association. This last is a searching and vigorous exposition of the evils resulting from the defective construction, and arrangements of school-houses, as they were at that date almost universally found.



A. Represents the teacher's desk. *B B*. Teacher's platform, from 1 to 2 ft. in height. *C*. Step for ascending the platform. *L L*. Cases for books, apparatus, cabinet, &c. *H*. Pupils' single desks, 2 ft. by 18 inches. *M*. Pupils' seat, 1 ft. by 20 inches. *I*. Aisles, 1 ft. 6 inches in width. *D*. Place for stove, if one be used. *E*. Room for recitation, for retiring in case of sudden indisposition, for interview with parents, when necessary, &c. It may also be used for the library, &c. *F F F F F*. Doors into the boys' and girls' entries—from the entries into the school-room, and from the school-room into the recitation room. *G G G G*. Windows. The windows on the sides are not lettered.



For section of seat and desk constructed after Mr. Mann's plan, see p. 47. To avoid the necessity of fitting up the same school-room for old and young, and the inefficiency of such country schools as we now have, Mr. Mann proposed in this Report a union, for instance of four districts which did not cover more than four miles square, and the erection of four primary school-houses, (a a a a) for the younger children of each district, to be taught by female teachers, and one central or high school, (A) for the older children of the four districts, taught by a well qualified male teacher. This plan is recommended for its wise use of the means of the districts, and the efficiency of the instruction given

Plans, &c., recommended by George B. Emerson.

The "School and Schoolmaster,"* contains a very valuable chapter on school-houses, by Mr. Emerson, the President of the American Institute of Instruction, illustrated by drawings, which, with the permission of the authors and publishers are introduced here. The whole chapter, as the production of one of the most eminent teachers and writers on education of the age, should be studied by every one who would become thoroughly acquainted with he subject. Most of his valuable suggestions are subjoined.

Situation.—So much do the future health, vigor, taste, and moral principles of the pupil depend upon the position, arrangement, and construction of the school-house, that everything about it is important. When the most desirable situation can be selected, and the laws of health and the dictates of taste may be consulted, it should be placed on firm ground, on the southern declivity of a gently sloping hill, open to the southwest, from which quarter comes the pleasantest winds in summer, and protected on the northeast by the top of the hill or by a thick wood. From the road it should be remote enough to escape the noise, and dust, and danger, and yet near enough to be easily accessible by a path or walk, always dry. About it should be ample space, a part open for a play-ground, a part to be laid out in plots for flowers and shrubs, with winding alleys for walks. Damp places, in the vicinity of stagnant pools or unwholesome marshes, and bleak hilltops or dusty plains, should be carefully avoided. Tall trees should partially shade the grounds, not in stiff rows or heavy clumps, but scattered irregularly as if by the hand of Nature. Our native forests present such a choice of beautiful trees, that the grounds must be very extensive to afford room for even a single fine specimen of each; yet this should, if possible, be done, for children ought early to become familiar with the names, appearance, and properties of these noblest of inanimate things. The border of a natural wood may often be chosen for the site of a school; but if it is to be thinned out, or if trees are to be planted, and, from limited space, a selection is to be made, the kingly, magnificent oaks, the stately hickories, the spreading beech for its deep mass of shade, the maples for their rich and abundant foliage, the majestic elm, the useful ash, the soft and graceful birches, and the towering, columnar sycamore, claim precedence. Next may come the picturesque locusts, with their hanging, fragrant flowers; the tulip-tree; the hemlock, best of evergreens; the celtis, or sweet gum; the nyssa, or tupelo, with horizontal branches and polished leaves; the walnut and butternut, the native poplar, and the aspen.

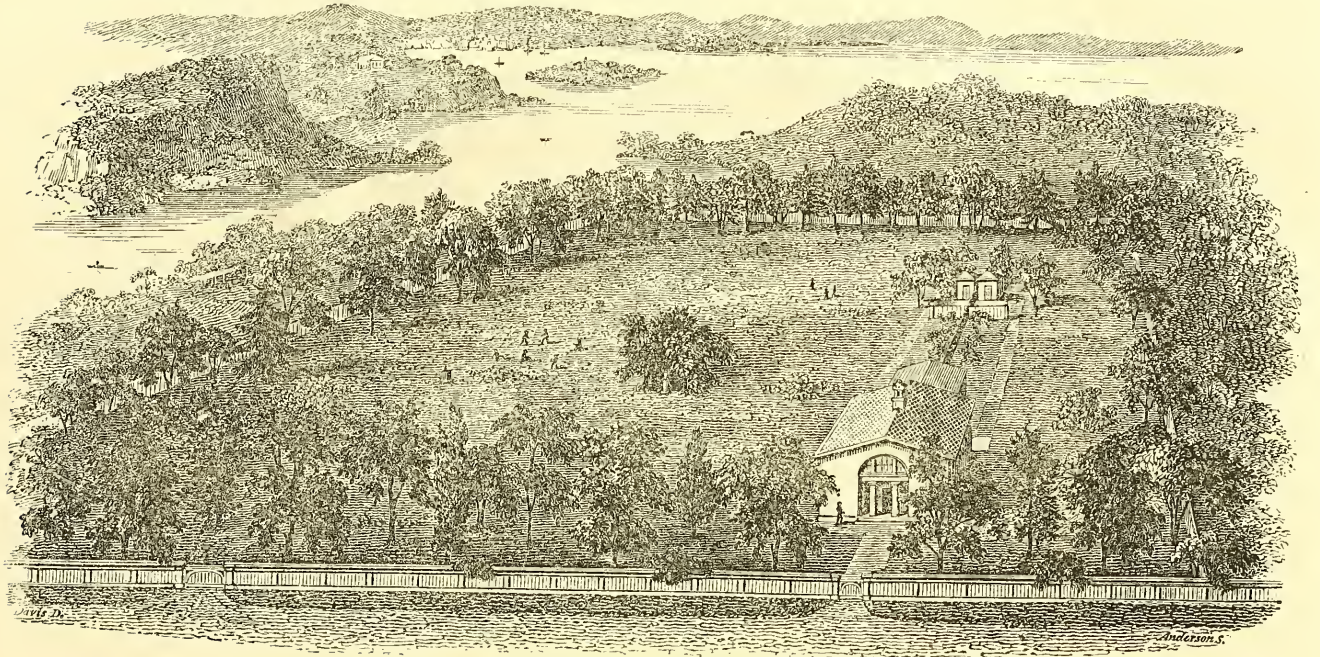
Of extremely beautiful American shrubs, the number is so great that I have no room for a list. What place intended to form the taste of the young, should be without the kalmias, rhododendrons, cornels, roses, viburnums, magnolias, clethras, honeysuckles, and spiræas? And whoever goes into the woods to gather these, will find a multitude of others which he will hardly consent to leave behind. The hilltop should be planted with evergreens, forming, at all seasons, a barrier against the winds from the north and east.

Of the flower plots, little need be said. They must be left to the taste of the teacher, and of cultivated persons in the district. I can only recommend our wild American plants, and again remind the reader, that there is hardly a

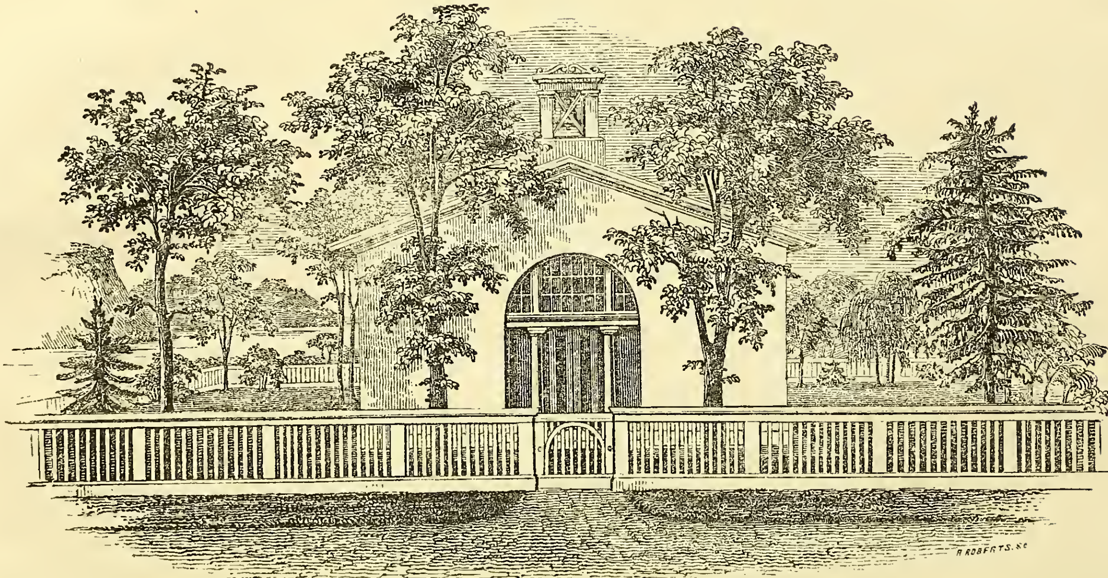
* The "*School and Schoolmaster,*" a Manual for the use of Teachers, Employers, Trustees, Inspectors, &c., &c., of Common Schools. Part I. By Alonzo Potter, D. D. Part II. By George B. Emerson. pp. 552. Harper & Brothers, 82 Cliff street, New York. Price, $1.

This excellent treatise, the most valuable contribution yet made to the educational literature of our country, was prepared and published originally at the expense of James Wadsworth, Esq., of Geneseo, N. Y., in 1842. By him a copy was presented to each of the 11,000 school districts of that state. Following this noble example, the Hon. Martin Brimmer, the present mayor of the city of Boston, caused to be printed, at his expense, such a number of copies as would supply one copy each to all the school districts, and one copy each to all the boards of school committee men, in Massachusetts.

The work should be scattered broadcast through every state in the Union. In large orders, or for gratuitous distribution, it can be had of the publishers at a very low rate.



Perspective of School-house, Outbuildings, and Grounds



Front Projection of a Schoolhouse with Trees, Shrubbery, &c.

country town in New York or New England, from whose woods and meadows a hundred kinds of flowers might not be transplanted, of beauty enough to form the chief ornament of a German or English garden, which are now neglected only because they are common and wild. Garden flowers need not be excluded; and if either these or the former are cultivated, the great object, to present something to refine and inform the taste, will be, in some degree, accomplished.

If proper inclosed play-grounds are provided, the master may often be present at the sports, and thus become acquainted with the character, of his pupils. If children are compelled to resort to the highway for their amusements, we ought not to wonder that they should be contaminated by the vices, brawlings, and profanities, which belong to frequenters of highways.

Size.—The room should be sufficiently large to allow every pupil, 1. to sit comfortably at his desk; 2. to leave it without disturbing any one else; 3. to see explanations on his lessons, and to recite without being incommoded or incommoding others; 4. to breathe a wholesome atmosphere.

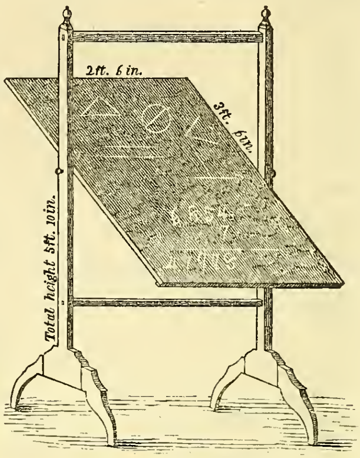
If the first three objects are fully provided for, the space on the floor will be sufficient. But to secure the advantage of an adequate supply of air, the room must be not less than 10, and, if possible, 12 or 14, feet high.

Arrangement.—For the accommodation of 56 scholars, so as to give ample room for moving, for recitations, and for air, the dimensions of the house should be 38 feet by 25, and 10 feet in height within. This will allow an entry of 14 feet by 7½, lighted by a window, to be furnished with wooden pegs for the accommodation of clothes; a wood-room, 10 feet by 7½, to serve also as an entry for girls at recess, or as a recitation room; a space behind the desks 8 feet wide, for fireplace, passage, and recitations, with permanent seats against the wall 10 or 11 inches wide; a platform, 7 feet wide, for the teacher, with the library, blackboards, globes, and other apparatus for teaching; the remaining space to be occupied by the desks and seats of the scholars. For every additional 8 scholars the room may be lengthened 2½ feet. The desks and seats for scholars should be of different dimensions. A desk for two may be 3½ or 4 feet long. If the younger children are placed nearest the master's desk, the desks in the front range may be 13 inches wide, the two next 14, the two next 15, and the two most remote 16, with the height, respectively, of 24, 25, 26, and 27 inches. The seats should vary in like manner. Those in the front range should be 10 inches wide, in the two next 10½, in the two next 11, in the two last 11½ or 12; and 13½, 14, 15, and 16 inches, respectively, high. All edges and corners are to be carefully rounded.

It is very desirable that the north end of the school-house be occupied by the master's desk; that this end be a dead wall; that the front be towards the south; and that the desks be so placed that the pupils, as they sit at them, shall look towards the north. The advantages of this arrangement are, 1. that the scholars will obtain more correct ideas upon the elements of geography, as all maps suppose the reader to be looking northward; 2. the north wall, having no windows, will exclude the severest cold of winter; 3. the scholars will, in this case, look towards a dead wall, and thus avoid the great evil of facing a glare of light; or, if a window or two be allowed in the north wall, the light coming from that quarter is less vivid, and, therefore, less dangerous, than that which comes from any other; 4. the door, being on the south, will open towards the winds which prevail in summer, and *from* the cold winds of winter.

If, from necessity, the house must front northward, the master's desk should be still in the north end of the room, and the scholars, when seated, look in that direction.

The end of the room occupied by the master should be fitted with shelves for a library and for philosophical apparatus and collections of natural curiosities, such as rocks, minerals, plants, and shells, for globes and for blackboards. The books, apparatus, and collections should be concealed and protected by doors, which may be made perfectly plain and without panels, so as to be painted black and serve as blackboards. They may be conveniently divided by pilasters into three portions, the middle one for books, the others for apparatus and collections. On one of the pilasters may be the clock; on the other a barometer and thermometer; on shelves in the corners, the globes, and over the library in the center, the study card. One of the pilasters may form part of the ventilating tube. The master's platform may be raised eight inches. For all these purposes, the space in front of the ranges of scholars' desks, should be not less than seven or eight feet wide; ten or twelve would be much better. The sides and front of this space hould be furnished with seats ten or eleven inches wide, for recitation. By means of a large movable blackboard, this space may be, in case of need, converted into two, so that two classes may recite at a time. In a school intended to accommodate more than 64 pupils, there ought also to be a space for recitation in the south end of the room, separable by movable blackboards into two.

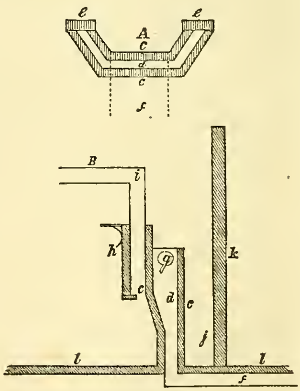


Movable Blackboard.

The entry should be lighted by a window, and be furnished with wooden or iron pins for the accommodation of hats, bonnets, and cloaks; and there should be a wood-closet large enough to contain two or three cords of wood, which may, if it is preferred, be used as a recitation room.

By making the ceiling of the entry and wood-closet only seven feet high, two commodious rooms for recitation may be formed above them, lighted from the window over the front door, and accessible by stairs from within the school-room.

Warming.—In a suitable position, pointed out in the plates, near the door, let a common brick fireplace be built. Let this be inclosed, on the back and on each side, by a casing of brick, leaving, between the fireplace and the casing, a space of four or five inches, which will be heated through the back and jambs. Into this space let the air be admitted from beneath by a box 24 inches wide and 6 or 8 deep, leading from the external atmosphere by an opening beneath the front door, or at some other convenient place. The brick casing should be continued up as high as six or eight inches above the top of the fireplace, where it may open into the room by lateral orifices, to be commanded by iron doors, through which the heated air will enter the room. If these are lower, part of the warm air will find its way into the fireplace. The brick chimney should



Fireplace.

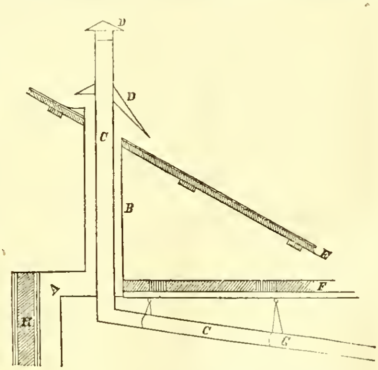
A. Horizontal section. B. Perpendicular section. *c*. Brick walls, 4 inches thick. *d*. Air space between the walls. *e*. Solid fronts of masonry. *f*. Air box for supply of fresh air, extending beneath the floor to the front door. *g*. Openings on the sides of the fireplace, for the heated air to pass into the room. *h*. Front of the fireplace and mantelpiece. *i*. Iron smoke flue, 8 inches diameter. *j*. Space between the fireplace and wall. *k*. Partition wall. *l*. Floor.

rise at least two or three feet above the hollow back, and may be surmounted by a flat iron, soap-stone, or brick top, with an opening for a smoke-pipe, which may be thence conducted to any part of the room. The smoke-pipe should rise a foot, then pass to one side, and then over a passage, to the opposite extremity of the room, where it should ascend perpendicularly, and issue above the roof. The fireplace should be provided with iron doors, by which it may be completely closed.

The advantages of this double fireplace are, 1. the fire, being made against brick, imparts to the air of the apartment none of the deleterious qualities which are produced by a common iron stove, but gives the pleasant heat of an open fireplace; 2. none of the heat of the fuel will be lost, as the smoke-pipe may be extended far enough to communicate nearly all the heat contained in the smoke; 3. the current of air heated within the hollow back, and constantly pouring into the room, will diffuse an equable heat throughout every part; 4. the pressure of the air of the room will be constantly outward, little cold will enter by cracks and windows, and the fireplace will have no tendency to smoke; 5. by means of the iron doors, the fire may be completely controlled, increased or diminished at pleasure, with the advantages of an air-tight stove. For that purpose, there must be a valve or slide near the bottom of one of the doors.

If, instead of this fireplace, a common stove be adopted, it should be placed above the air-passage, which may be commanded by a valve or register in the floor, so as to admit or exclude air.

Ventilation.—A room warmed by such a fireplace as that just described, may be easily ventilated. If a current of air is constantly pouring in, a current of the same size will rush out wherever it can find an outlet, and with it will carry the impurities wherewith the air of an occupied room is always charged. For the first part of the morning, the open fireplace may suffice. But this, though a very effectual, is not an economical ventilator; and when the issue through this is closed, some other must be provided. The most effective ventilator for throwing out foul air, is one opening into a tube which incloses the smoke-flue at the point where it passes through the roof. Warm air naturally rises. If a portion of the smoke-flue be inclosed by a tin tube, it will warm the air within this tube, and give it a tendency to rise. If, then, a wooden tube, opening near the floor, be made to communicate, by its upper extremity, with the tin tube, an upward current will take place in it, which *will always act whenever the smoke-flue is warm.*



[Scale 8 feet to an inch.]

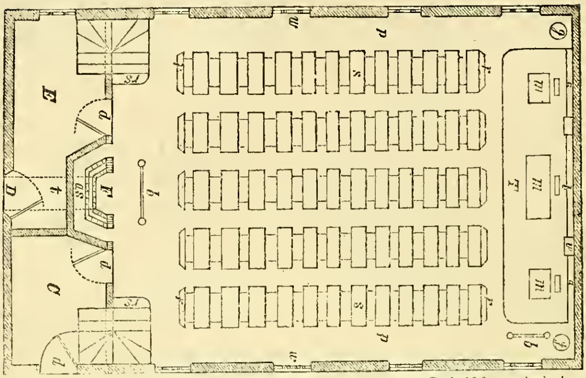
Ventilating Apparatus.

A. Air box, 1 foot square, or 24 inches by 6, covered by the pilaster, and opening at the floor, in the base of the pilaster. B. Round iron tube 15½ inches in diameter, being a continuation of the air box, through the center of which passes C. The smoke flue, 8 inches in diameter. D Caps to keep out the rain.

It is better, but not absolutely essential, that the opening into the wooden tube be near the floor. The carbonic acid thrown out by the lungs rises, with the warm breath, and the perspirable matter from the skin, with the warm, invisible vapor, to the top of the room. There both soon cool, and sink towards the floor; and both carbonic air and the vapor bearing the perspirable matter are pretty rapidly and equally diffused through every part of the room.

Seats and Desks.—Instead of a seat and desk for each pupil, Mr. Emerson recommends that two seats should be contiguous. In his drawings, the desk is perfectly level like a table, and the back to the seat is perpendicular.

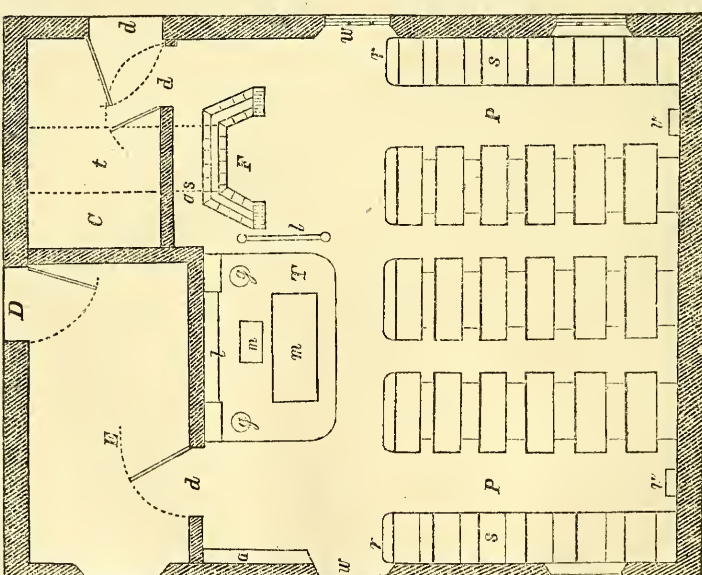
SCHOOL FOR ONE HUNDRED AND TWENTY PUPILS.



51 feet by 31 feet outside.] [Scale 16 feet to the inch.

D. Entrance door. E. Entry. F. Fireplace. C. Wood closet. T. Teacher's platform. *a.* Apparatus shelves. *t.* Air tube beneath the floor. *d.* Doors. *g.* Globes. *l.* Library shelves. *m.* Master's table and seat. *p.* Passages. *r.* Recitation seats. *s.* Scholars' desks and seats. *r s.* Stairs to recitation rooms in the attic. *v.* Ventilator. *w.* Windows. *b.* Movable blackboard. *a s.* Air space behind the fireplace.

SCHOOL FOR FORTY-EIGHT PUPILS.



24 feet by 28 feet outside.] [Scale 8 feet to the inch.

D. Entrance door. E. Entry. F. Fireplace. C. Wood closet, or recitation room T. Teacher's platform. *a.* Apparatus shelves. *t.* Air tube beneath the floor. *d.* Doors *g.* Globes. *l.* Library shelves. *m.* Master's table and seat. *p.* Passages. *r.* Recitation seats. *s.* Scholars' desks and seats. *v.* Ventilator. *w.* Windows. *b.* Movable blackboard. *a. s.* Air space behind the fireplace.

Plans, &c., of an Octagonal School-house.

Furnished for the "School and School-master," by Messrs. Town and Davis.

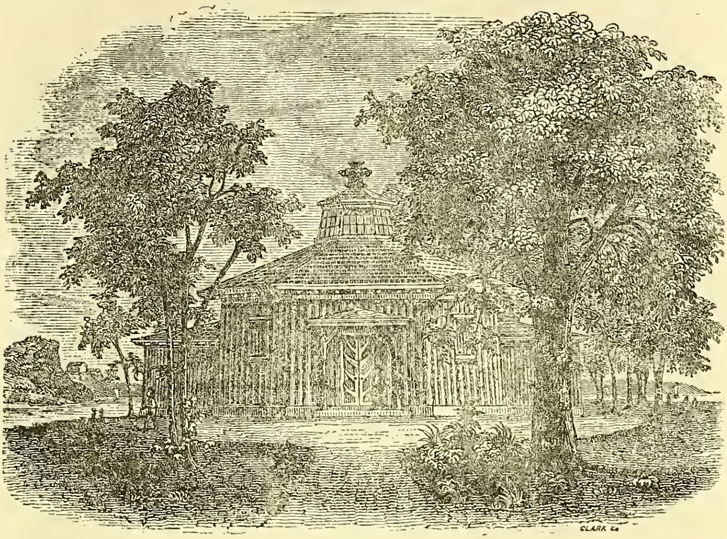


Fig. 1.

This design for a school-house intends to exhibit a model of fitness and close economy. The principles of fitness are, 1. *Ample dimensions*, with very nearly *the least possible length of wall* for its inclosure, the roof being constructed without tie beams, the upper and lower ends of the rafters being held by the wall plates and frame at the foot of the lantern. The ceiling may show the timber-work of the roof, or it may be plastered. 2. *Light, a uniform temperature, and a free ventilation*, secured by a lantern light, thus avoiding lateral windows (except for air in summer,) and gaining wall-room, for blackboards, maps, models, and illustrations. Side windows are shown in the view, and may be made an *addition* by those who doubt the efficiency of the lantern light. (The lantern is not only best for light, but it is essential for a free ventilation.) With such a light, admitted equally to all the desks, there will be no inconvenience from shadows. The attention of the scholars will not be distracted by occurrences or objects out of doors. There will be less expense for broken glass, as the sashes will be removed from ordinary accidents. The room, according to this plan, is heated by a fire in the center, either in a stove or grate, with a pipe going directly through the roof of the lantern, and finishing outside in a sheet-iron vase, or other appropriate cap. The pipe can be tastefully fashioned, with a hot-air chamber near the floor, so as to afford a large radiating surface before the heat is allowed to escape. This will secure a uniform temperature in every part of the room, at the same time that the inconvenience from a pipe passing directly over the heads of children, is avoided. The octagonal shape will admit of any number of seats and desks, (according to the size of the room,) arranged parallel with the sides, constructed as described in specification, or on such principles as may be preferred. The master's seat may be in the center of the room, and the seats be so constructed that the scholars may sit with their backs to the center, by which their attention will not be diverted by facing other scholars on the opposite side, and yet so that at times they may all face the master, and the whole school be formed into one class. The lobby next to the front door is made large, (8 by 20) so that it may serve for a recitation-room. This lobby

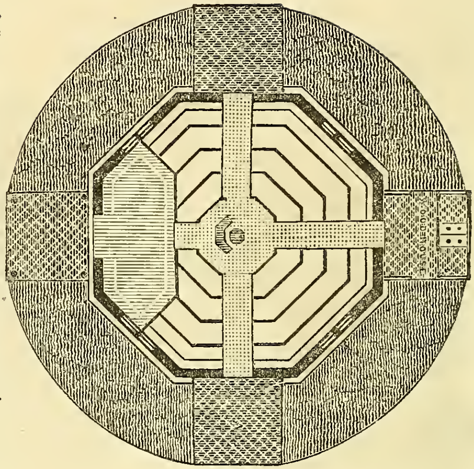


Fig. 2.

is to finish eight feet high, the inside wall to show like a screen, not rising to the roof, and the space above be open to the school-room, and used to put away or station school apparatus. This screen-like wall may be hung with hats and clothes, or the triangular space next the window may be inclosed for this purpose. The face of the octagon opposite to the porch, has a wood-house attached to it, serving as a sheltered way to a double privy beyond. This woodhouse is open on two sides, to admit of a cross draught of air, preventing the possibility of a nuisance. Other wing-rooms (A A) may be attached to the remaining sides of the octagon, if additional conveniences for closets, library, or recitation-rooms be desired.

The mode here suggested, of a lantern in the center of the roof for lighting all common school-houses, is so great a change from common usage in our country, that it requires full and clear explanations for its execution, and plain and satisfactory reasons for its general adoption, and of its great excellence in preference to the common mode. They are as follows, viz.:

1. A skylight is well known to be far better and stronger than light from the sides of the building in cloudy weather, and in morning and evening. The difference is of the greatest importance. In short days (the most used for schools) it is still more so.

2. The light is far better for all kinds of study than side light, from its quiet uniformity and equal distribution.

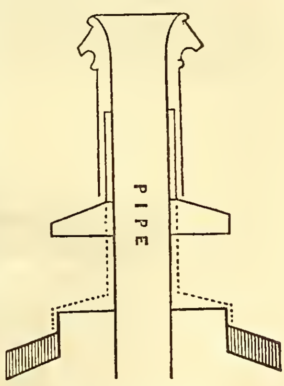
3. For smaller houses, the lantern may be square, a simple form easily constructed. The sides, whether square or octagonal, should incline like the drawing, but not so much as to allow water condensed on its inside to drop off, but run down on the inside to the bottom, which should be so formed as to conduct it out by a small aperture at each bottom pane of glass.

4. The glass required to light a school-room equally well with side lights would be double what would be required here, and the lantern would be secure from common accidents, by which a great part of the glass is every year broken.

5. The strong propensity which scholars have to look out by a side window would be mostly prevented, as the shutters to side apertures would only be opened when the warm weather would require it for air, but never in cool weather, and therefore no glass would be used. The shutters being made very tight, by calking, in winter, would make the school-room much warmer than has been common; and, being so well ventilated, and so high in the center, it would be more healthy.

6. The stove, furnace, or open grate, being in the center of the room, has great advantages, from diffusing the heat to all parts, and equally to all the scholars; it also admits the pipe to go perpendicularly up, without any inconvenience, and it greatly facilitates the ventilation, and the retention or escape of heat, by means of the sliding cap above.

Construction.—Foundation of hard stone, laid with mortar; the superstructure framed and covered with $1\frac{1}{4}$ plank, tongued, grooved, and put on vertically, with a fillet, chamfered at the edges, over the joint, as here shown. In our view, a rustic character is given to the design by covering the sides with slabs; the curved side out, tongued and grooved, without a fillet over the joint; or formed of logs placed vertically, and lathed and plastered on the inside. The sides diminish slightly upward. A rustic porch is also shown, the columns of cedar boles, with vines trained upon them. The door is battened, with braces upon the outside, curved as shown, with a strip around the edge. It is four feet wide, seven high, in two folds, one half to be used in inclement weather. The cornice projects two feet six inches, better to defend the boarding; and may show the ends of the rafters. Roof covered with tin, slate or shingles. Dripping eaves are intended, without gutters. The roof of an octagonal building of ordinary dimensions may with ease and perfect safety be constructed without tie beams or a garret floor (which is, in all cases of school-houses, waste room, very much increasing the exposure to fire, as well as the expense.) The wall-plates, in this case, become ties, and must be well secured, so as to form one connected *hoop*, capable of counteracting the pressure outward of the angular rafters. The sides of the roof will abut at top against a similar timber octagonal frame, immediately at the foot of the lantern cupola. This frame must be sufficient to resist the pressure inward of the roof (which is greater or less, as the roof is more or less inclined in its pitch,) in the same manner as the tie-plates must resist the pressure outward. This security is given in an easy and cheap manner; and may be given entirely by the roof boarding, if it is properly nailed to the angular rafters, and runs horizontally round the roof. By this kind of roof, great additional height is given to the room by *camp-ceiling;* that is, by planing the rafters and roof-boards, or by lathing and plastering on a thin half-inch board ceiling, immediately on the underside of the rafters, as may be most economically performed. This extra height in the center will admit of low side-walls, from seven to ten feet in the clear, according to the size and importance of the building, and, at the same time, by the most simple principle of philosophy, conduct the heated foul air up to the central aperture, which should be left open quite round the pipe of the stove, or open grate standing in the center of the room. This aperture and cap, with the ventilator, is shown by the figure adjoining, which is to a scale of half an inch to a foot. The ventilator is drawn raised, and the dotted lines show it let down upon the roof. It may be of any required size, say two feet wide and twelve inches high, sliding up and down between the stovepipe and an outward case, forming a cap to exclude water. This cap may be pushed up or let down by a rod affixed to the under edge, and lying against the smokepipe.

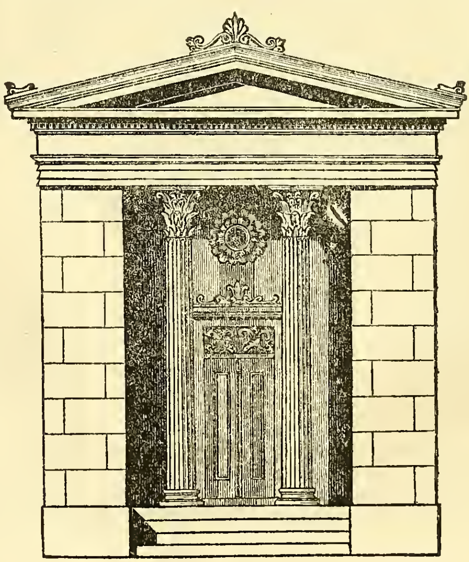


In the design given, the side-walls are ten feet high, and the lantern fifteen feet above the floor; eight feet in diameter, four feet high. The sashes may open for additional ventilation, if required, by turning on lateral pivots, regulated by cords attached to the edges above. The breadth of each desk is seventeen inches, with a shelf beneath for books, and an opening in the back to receive a slate. The highest desks are twenty-seven inches, inclined to thirty, and the front forms the back of the seat before it. The seat is ten to twelve inches wide, fifteen high, and each pupil is allowed a space of two feet, side to side.

For the sake of variety, we have given a design in the pointed style, revised from a sketch by ——, an amateur in architecture. Any rectangular plan will suit it; and the principles of light and ventilation dwelt upon in the description of the octagon design, may be adapted to this. The principal light

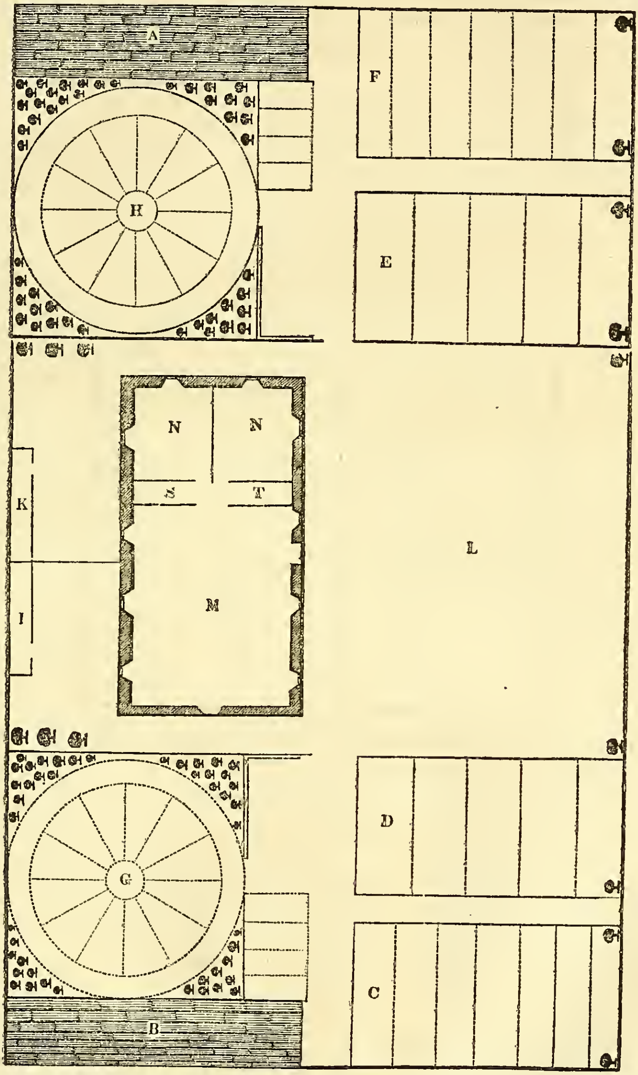
Fig. 3.

is from one large mullioned window in the rear end. The side openings are for air in summer—not glazed, but closed with tight shutters. The same ventilating cap is shown, and height is gained in the roof by framing with collar beams set up four or five feet above the eaves. The sides, if not of brick or stone, may be boarded vertically, as before described.



Plan of School-room and Grounds for a Village School.

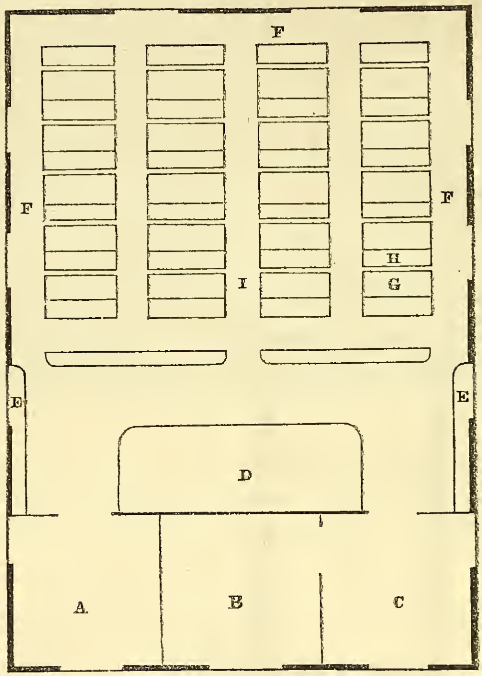
The following sketch by Dr. Dick, (author of *Mental Illumination*), of the plan and accommodations of a Village School is copied from the *Pennsylvania Common School Journal*, vol. 1, p. 120.



A. B—Covered walks for exercise in winter and rainy days. C. D. E. F—Plats for flowers, shrubs, evergreens, and a few forest trees. G. H—Circles with twelve compartments each, for a different class of plants. I. K—Yards divided with a wall, with suitable accommodations for either sex. L—Portion of ground, smoothed and graveled for play-ground, with circular swing, &c. M—Room, 50 by 30 feet, and 14 feet high. N. N.—Class-rooms, 18 by 15. S. T.—Closets for apparatus, &c.

Plan of District School-Room, recommended by Dr. A. D Lord, Columbus, Ohio.

The following plan and description are copied from the Ohio School Journal, Vol. II., edited by Dr. Lord, Superintendent of the Common Schools of Columbus, Ohio.



The building here presented should be 26 by 36 feet on the ground, or, at least, 25 by 35 feet inside. The plan is drawn on a scale of ten feet to the inch.

A C—Entries 8 feet square, one for each sex.

B—Library and apparatus room, 8 by 9 feet, which may be used for a recitation room for small sized classes.

D—Teacher's platform, behind which, on the wall, should be a blackboard 12 feet long by 5 feet wide.

E E E E—Recitation seats, those on the sides placed against the wall, those in front of the platform having backs and being movable.

F F F—Free space, at least two feet wide, next the wall on three sides of the room.

G—Desk, for two pupils, four feet long by 18 inches wide.

H—Seat, " " do " " 13 " "

I—Centre aisle two feet wide; the aisles on either side of this should be from 18 to 24 inches wide.

The area on either side and in front of the Teacher's platform, is intended for reading and spelling classes, and any other class exercises in which the pupils stand; and the space next the wall may be used to arrange the greater part of the school as one class in any general exercises requiring it.

Four windows are represented on each side of the house, and two on the end opposite the Teacher's stand. The door to the Library-room opens from one of the entries, and the room is lighted by a large window in the front end of the house.

Plan, &c., of School-rooms for Schools of different grades and different systems of instruction.

The plans and remarks for arranging school-rooms thus far, are more particularly applicable to comparatively small, or country schools, where the instruction and government is conducted by one teacher, with at most but one assistant. A few remarks explanatory of the terms used by writers on education, when speaking of systems of organization and instruction, may be useful to a full comprehension of the principles of arrangement embraced in the plans which follow.

1. The *individual* method is the practice on the part of the teacher, of calling up each scholar by himself for recitation, or giving instruction to each scholar in his seat, or calling up classes and hearing each scholar individually, which is practically the same thing. This method will answer a valuable end in a very small school, and must be introduced to some extent in our small country districts where there are children of every age, and in a great variety of studies, and of different degrees of proficiency in each study. It prevails, however, altogether too generally, even in larger districts which admit of a classification of children into schools of different grades, and of the children in each grade of schools. This classification is the first great step towards school improvement.

2. In the *simultaneous* method, the whole school, together, or in successive classes carefully arranged according to their intellectual proficiency, is instructed directly by the teacher. Questions and explanations are addressed to the whole school, or the whole class, as the case may be, and answers are given by all together, or by some one pointed out by the teacher, while all must show by some silent sign, there ability to do so. This method keeps every mind attentive, gives confidence to the timid, admits of the liveliness of oral and interrogative instruction, economizes the time and labor of the teacher, and enlists the great principle of sympathy of numbers engaged in common pursuit. The extent to which this method can be properly carried, will depend not so much on the size of the schools, as on the fact that the school is composed of children in the same studies, and of the same proficiency. This method ought not to exclude entirely individual instruction.

When the number of children increases beyond that which one teacher can conveniently instruct together, or in successive classes, he must adopt the monitorial, the mixed, or the Fächer system, for such classes as he cannot superintend or teach.

3. By the *monitorial* or *mutual* method, is understood the practice of employing the advanced pupils, and many of them very young, to assist in the supervision and instruction of the school, or of particular classes, as systematized by Mr. Lancaster, or Dr. Bell, and as pursued in the schools connected with the National, and the British and Foreign School Societies, England. This method, in different countries, on its first promulgation, attracted much of public favor, on account of its economy, especially in populous districts. In England it still receives the sanction of the two great Societies named above. In Germany it was never adopted in the public schools. In Holland it was tried, and abandoned, but not without modifying very materially the methods of instruction before pursued, and finally leading to the adoption of the *mixed* method. In the large cities of the United States, it was early adopted, but there is hardly a school in the whole country now conducted on the pure monitorial or Lancasterian system, although there are many so called. As pursued in the excellent schools of the New York Public School Society, it is nearly the mixed method as understood and practiced in Holland, and as recommended by the Committee of Council on Education in England.

With these modifications, and the limitation of the duties of the younger monitors to keeping the registers, heading the classes in marching to and from their class-rooms, or the playground, taking charge of books, &c., and in other matters of order and mechanical arrangements, the monitorial system might be advantageously adopted in schools of every grade, and of any system of instruction.

4. The *mixed* method, as the term is generally understood, is a modification of the simultaneous and monitorial system, in which the principal teacher, while he has the superintendence at all times of the whole school, and gives general instruction at certain hours, and in certain studies, to the whole school, as well as to particular classes, employs in the work of class instruction, assistants who are better instructed, and, as a general rule, are older than those employed as monitors under the Lancasterian system, and are not yet qualified to have the whole charge of a school. For example, in Holland, "every school produces two classes of assistants, who are most usefully and economically employed in aiding him in the management and instruction of the school, and may be called *pupil teachers* and *assistant teachers*. By *pupil teacher* is meant a young teacher, in the first instance introduced to the notice of the master by his good qualities, as one of the best instructed and most intelligent of the children; whose attainments and skill are full of promise; and who, having consented to remain at a low rate of remuneration in the school, is further rewarded by being enabled to avail himself of the opportunities afforded him for attaining practical skill in the art of teaching, by daily practice in the school, and by the gratuitous superintendence of his reading and studies by the master, *from whom he receives lessons on technical subjects of school instruction every evening*. He commonly remains in the school in the rank of pupil teacher from the age of 14 to that of 17, daily imbibing a more intimate acquaintance with school management, and all the matter of instruction in elementary schools, and he then proceeds, by attendance at a Normal school, or by further proficiency attained by his own exertions, to qualify himself to act as an assistant teacher. The assistant teacher prepared by these preliminary studies in the elementary Normal school commences his duties at 18 or 20 years of age.

Assistants thus reared in the atmosphere of schools are exceedingly preferable to the best instructed men who are not familiarized by daily habitude with the minutest details of school management. Such assistants constantly replenish the ranks of the teachers with men, all the hopes of whose youth have been directed towards success in the profession of a schoolmaster, and whose greatest ambition is to be distinguished by the excellence of their schools.

5. The *Fächer* system, as it is termed in Germany where it is most popular, consists in employing separate teachers for separate studies, or as we should apply it here, for distinct departments of government, and of instruction. This is the principle on which instruction in our colleges and most of our higher seminaries is given, and is in reality the mixed method carried to its highest perfection. The vital error in our common schools, as they are now organized, is the practice of employing one teacher for the government and instruction of fifty or sixty children of every age, of both sexes, in a great variety of studies, and in different stages of proficiency in each study. It is very rare to find a teacher with the varied qualifications, which success under these circumstances presupposes, while it is not very difficult to find a teacher with talent and experience sufficient to teach some one study, or a few cognate branches, as an assistant, acting under the general direction of a well qualified principal.

Any school organization and arrangements would be imperfect which did not include the systematic training and instruction of very young children, especially in cities and manufacturing villages. Whatever may have been done by others at an earlier date, it seems to be generally conceded now, that to Mr. Wilderspin belongs the credit of having reduced infant education to the science which it now is. It was unfortunate for the improvement of the quality of education given in our schools, that the infant school system was tried in this country, without a full comprehension of its legitimate principles, methods and end, and that the experiment was abandoned so hastily. Its partial and temporary success, however, led to the extension and improvement of our primary schools, and this circumstance renders the success of any well directed effort for their re-establishment more certain.

Plans, &c., for Schools on the Monitorial or Mutual System.

The "Manual of the System of Primary Instruction pursued in the Model Schools of the British and Foreign School Society," published in 1839, contains the following remarks on the arrangement for schools of mutual instruction connected with that Society.

The school-room should be a parallelogram, the length about twice the breadth.

The height of the walls should be proportioned to the length of the room, and may be vàried from 11 to 19 feet. It is recommended that the walls be worked fair and lime whitened, in order to give a neat and clean appearance, reflect light, and contribute to the preservation of health. As it is of great importance to admit as much light as possible into the school, there must be a considerable number of windows, each of which should be fixed in a wooden frame, and movable upon pins or pivots in the center, so that by drawing the upper part into the room, the school may be sufficiently ventilated in hot weather—a circumstance of the utmost importance to be attended to, as the health of the pupils in a great measure depends upon it.

The lower parts of the windows should be at least 6 feet from the floor, in order that the light may not be inconvenient, and the walls be at liberty for the reading lessons, &c., which are to be attached to it; if piers are required, they should be on the outside of the building.

There should be holes in the roof, or in the wall near it, to let foul air escape. This may be effected by a sufficient number of tubes so contrived that they can be opened or shut at pleasure, and at the same time fresh air be admitted from the outside of the building by tubes communicating with the lower part of the room.

All projections in the walls, as well as pillars to support the roof, ought to be avoided; for they interfere with the arrangement of the school, and obstruct the view of the master and of visiters. But if pillars are necessary, they should be placed at each end of the desks, but never in the middle of the room.

Roman Cement, cast into flags, and jointed with the same material, forms a good flooring; it is perfectly dry and durable, and emits but little sound.

In order that all the children may be completely seen by the master, it is of great importance that the floor should be an inclined plane, rising one foot in twenty from the master's desk, to the upper end of the room, where the highest or eighth class is situated.

At the lower end is the platform, elevated in proportion to the length of the room from 2 to 3 feet. The length and breadth of the platform must be in proportion to the size of the room.

The center of the platform is the place for the master's desk; and on each side there may be a small desk for the principal monitors.

The entrance door should be on the side of the platform, in order that visiters on entering the school, may have a commanding view of all the children at once.

Whatever be the size of the school-room, it may be sufficiently warmed by means of one or two stoves placed at the extremities of the apartment. But the most uniform and constant temperature is obtained by steam, when conducted along the lower parts of the room through pipes, or by heated air conveyed into the room through tubes communicating with a stove, which is surrounded by a close casing of iron, leaving a sufficient space for a current of fresh air to be brought in through a tube: this, coming in contact with the stove and the outside of the flue or iron chimney which passes through the casing, is heated, and may be discharged into the room by means of iron pipes. This method has been found to answer extremely well.

The middle of the room is occupied by the forms and desk, a passage being left between the ends of the forms and the wall, 5 or 6 feet broad, where the children form semicircles for reading.

The forms and desks must be fixed firmly in the ground; the legs or supports should be 6 inches broad and 2 inches thick, but cast iron legs are preferable, as they support the desk-board with equal firmness, occupy less room, and have a neater appearance; their number of course will be in proportion to the length of the forms. A form 20 feet long will require five, and they must be so placed, that the supports of the forms may not be immediately opposite to those of the desks; the corners of the desks and forms are to be made round, in order that the children may not hurt themselves.

The general rules for fitting up school-rooms are,—1. One foot for the space or passage between a form and the next desk.

2. Three inches for the horizontal space between a desk and its form.

3. Nine inches for the breadth of a desk, and six for the breadth of a form.

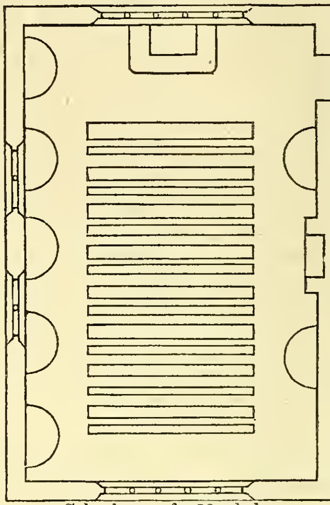
4. Twenty-eight inches for the height of a desk, and sixteen for the height of a form.

5. Eighteen inches in length of the desk for every child to occupy while seated upon his form.

6. From five to six feet for the passage between the walls and the ends of the forms and desks.

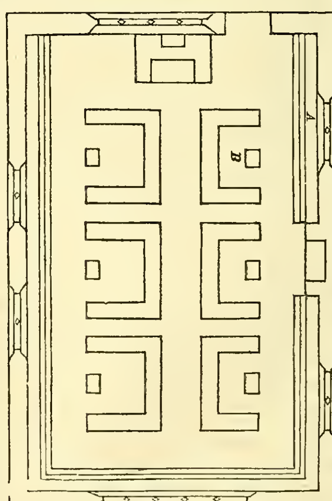
The semi-circles for the reading classes are formed opposite to the wall, and are marked by an incision in the floor.

Dimensions of school-rooms for 300 children, length, 62½ ft., breadth, 34 feet; for 200 do. 55 by 28; for 150 do. 52½ feet by 25.



School-room for 56 scholars.

The following suggestions are abridged from the "*General Observations on the construction and arrangements of school-rooms, &c.*," published by the National Society, London.



The form of the room should be oblong. If the room is built large to accommodate boys and girls together, it may be divided by a frame partition, made to slide upon rollers in an iron groove.

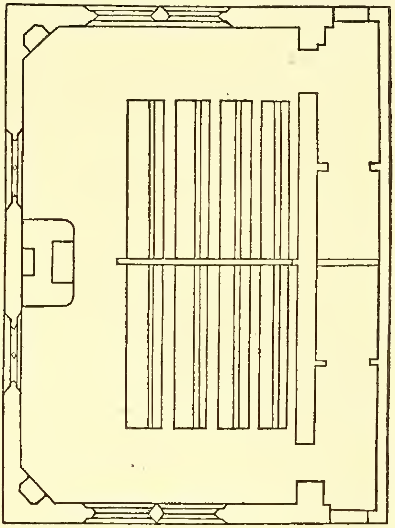
The superficial area should include 7 square feet for each child: hence, 50 children will require 350 ft; 80 do. 560 ft.; 100 do. 700 ft., &c.

The desks are generally attached to the wall, and consist of a horizontal ledge two or three inches wide to receive the inkstand, and an inclined plane ten inches wide, made to let down by hinges and movable brackets. The benches or forms are ten inches wide, and supported by standards of cast iron.

The benches for the classes in recitation, are arranged in the floor without desks. The floor is entirely level

PLANS, &c., FOR SCHOOLS ON THE MIXED AND FACHER SYSTEM.

The two plans on the preceding page, for schools of 56 children, arranged on the monitorial or mutual system, are taken from the "Minutes of the Committee of Council on Education, 1840, relative to Plans of School-houses." In each plan, given in the "Minutes," the arrangement of the school-room is delineated, 1. according to the system of *mutual instruction*, distinguishing, as above, that of the National Society from that of the British and Foreign School Society; and 2. according to the *mixed method*, in which a modification of the mutual system, through the agency of better instructed and paid monitors, or pupil teachers, is employed in combination with the simultaneous method. Thus, on the same sheet, with the school-room for 56 children on the mutual system, there is also the following plan on the *mixed* system.



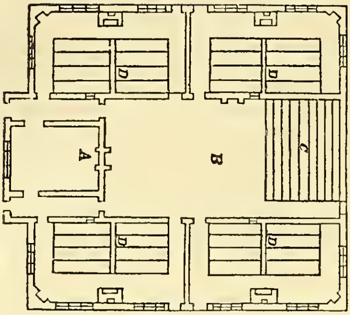
The school-room is 18 feet wide by 31 long, the space (20 feet by 12) occupied by the desks and seats being divided into two parts, one for boys and the other for girls, by a movable partition. The desks and benches are arranged on a series of platforms, rising each 6 inches above the preceding one. The school, if taught on the mixed method recommended would be divided into four classes, the boys of the first class occupying the first bench on one side, and the girls, do. on the other, &c., and employing one pupil teacher and four monitors. The teacher would give general instruction from the platform to the whole school, and hear any class separately, arranged in a circle around him. Two other classes might be heard in the entry, or class rooms attached. (The plan in this cut is modified slightly from the original inprint when it is connected with the dwelling house.)

The "Minutes" contain four *series of plans*, each presenting a different arrangement.

In the *first* series, there are five plans for schools varying from 30 to 56 scholars, each with the classes arranged and seated as above, and two of them presenting additional accommodations for an infant department, one of 20, and the other of 30 children.

In the *second* series, there is a separate range of desks for each class, with five varieties of arrangements, to accommodate 60 to 100 children, with a separate room for an infant school in two. In this series preference is expressed for the plan copied from the model school of the Normal School of Dejon. In this plan, the room is 56 feet by 16, divided into two apartments, each 28 by 16, one for 55 boys and the other for 55 girls. Each department is divided into three classes, one class occupying a group of desks, rising on platforms directly in front of the teacher, and the other two, one on the left, and the other on the right, so that they form a sort of amphitheater around the level portion of the floor occupied by the teacher. Each class can be taught separately, occupying its own group of desks, as arranged around the teacher's desk.

In the *third series* the accommodations ascend from 144 children, and 150 infants, to an indefinitely greater number, by a larger or smaller number of class-rooms arranged on each side of a central school-hall, which is lighted by sky-lights.

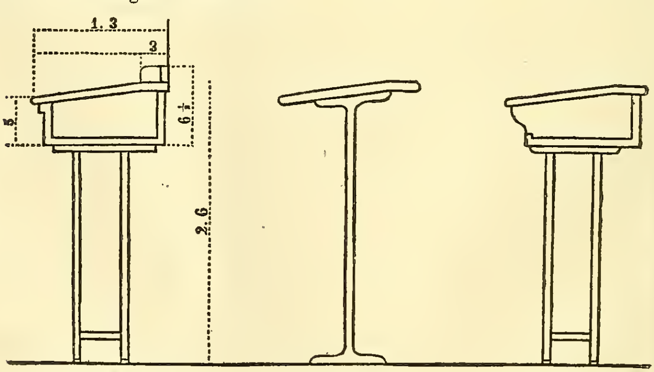


The following plan of a building exhibits the arrangement of a school for three hundred children, including one hundred and fifty in an infant school. A is a private room or study for the principal. B is the school hall (54 ft. by 27) for the assemblage of the whole school for morning and evening prayers, and other general exercises, and for the occupancy of the infant school, and C the gallery of the latter. D, D, D, D, are four class-rooms, (each 19 by 17) each again divided by a partition into two, so that both can be superintended by one assistant teacher, and one pupil teacher. Each subdivision of class-room will accommodate about 40 scholars each. The boys and the girls under eleven years arranged according to attainments, each on separate benches are taught together, while those over eleven years are taught separately in class-rooms appropriated to each. This arrangement affords greater facilities for giving to the instruction of the older children such a particular character as will prepare them for the application of their knowledge to the actual duties of life. Such knowledge must differ, in a class of boys, from that given in a class of girls.

In the *fourth series*, the same principles of arrangements are observed, except that the boys and girls occupy rooms on different floors.

In all of the plans recommended in the "Minutes," of the Committee, accommodations are provided for 1. the technical instruction of the children in classes carefully arranged according to their intellectual proficiency; 2. for the general instruction and exercises of the whole school; and, 3d, for the residence of the teacher. This last feature is common to almost all school houses in Europe, and the use of the same constitutes a part of the teacher's compensation. In the larger structures of Prussia and Saxony, there is an entire room appropriated to each class. Thus in a school-house for 600 children, at Berlin, there are eight rooms, and in these rooms the children are classed according to their ages, capacities and attainments. Eight masters are employed, besides auxiliary masters for special purposes; and two mistresses, for teaching at certain hours sewing and knitting to the girls.

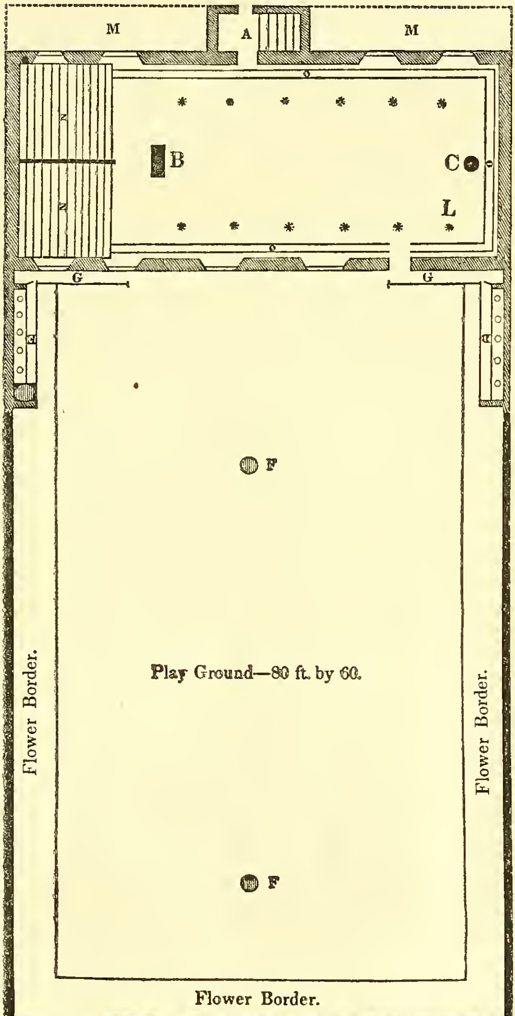
The "Minutes" contain many valuable suggestions respecting the location, ventilation, and warming of school-rooms, similar to what has been already printed. The following section exhibits three forms of desks. The standards are of wrought or cast iron.



Desk with Lid. Simple Desk. Desk with Shelf.

Plan, &c., of School-room and Grounds for an Infant School.

The following plan and explanations are condensed from a valuable manual for teachers in infant and primary schools, entitled "Infant Education," one of Chambers' Educational Course, published at Edinburgh, in 1840. It is nearly similar to the plan recommended by Mr. Wilderspin in his "Infant School System," and his "Education for the Young," and by Mr. Stow, in the "Manual on the Training System for Infant and Juvenile Schools."

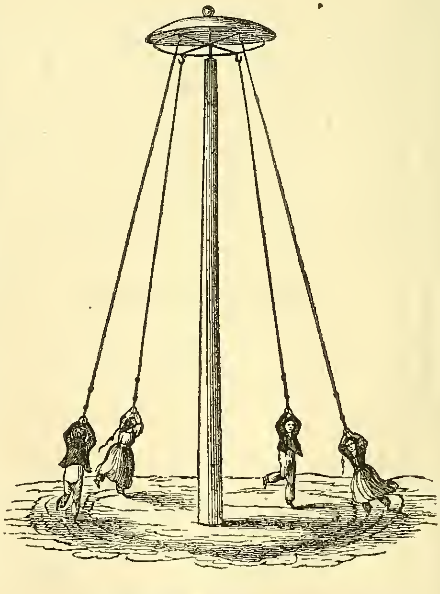


School-room, 60 feet long by 25 wide, and 18 feet high.

A. Porch and lobby, with stairs to the story above, if there should be a second story for a school for older pupils. The infant school should never be higher than the ground story. B. Movable rostrum, or small platform to hold one, two, or three children, when acting as general monitors to the whole school in the gallery. A low rail round it, will prevent them from falling from it. C. Stove, surrounded with a low rail.—(The room should be heated by a furnace.) N. Gallery, consisting of a series of steps the whole width of the room, each eight inches high, and 18 inches wide, divided in the center by a railing, one side for the boys, and the other for the girls. L. Lesson posts, to attach cards, &c. O. Seats round three sides of the room. M. Space for flowers and shrubbery protected by open fence. D. Boys', and C, Girls', water closet, on different sides of the play ground and concealed by a screen and shrubbery, entered by covered way G. F. Gymnastic swing posts.

The house should stand in a dry and airy situation, large enough to allow a spacious play ground. No pains should be spared on this principal and paramount department of a proper infant school. The more extensive the ground may be, the better; but the smallest size for 200 children ought to be 100 feet in length, by at least 60 in breadth. It should be walled round, not so much to prevent the children from straying, as to exclude intruders upon them, while at play: for this purpose, a wall or close paling, not lower than six feet high, will be found sufficient. With the exception of a flower border, from four to six feet broad all round, lay the whole ground, after leveling and draining it thoroughly, with small *binding* gravel, which must be always kept in repair, and well swept of loose stones. Watch the gravel, and prevent the children making holes in it to form pools in wet weather; dress the flower border, and keep it always neat; stock it well with flowers and shrubs, and make it as gay and beautiful as possible. Train on the walls cherry and other fruit trees and currant bushes; place some ornaments and tasteful decorations in different parts of the border—as a honeysuckle bower, &c., and separate the dressed ground from the graveled area by a border of strawberry plants, which may be protected from the feet of the children by a skirting of wood on the outside, three inches high, and painted green, all round the ground. Something even approaching to elegance in the dressing and decking of the playground, will afford a lesson which may contribute to refinement and comfort for life. It will lead not only to clean and comfortable dwellings, but to a taste for decoration and beauty, which will tend mainly to expel coarseness, discomfort, dirt, and vice, from the economy of the humbler classes.

For the excellent and safe exercise afforded by the *Rotary Swing*, erect, at the distance of thirty feet from each other, two posts or masts, from sixteen to eighteen feet high above the ground; nine inches diameter at the foot, diminishing to seven and a half at top; of good well-seasoned, hard timber; charred with fire, about three feet under ground, fixed in sleepers, and bound at top with a strong iron hoop. In the middle of the top of the post is sunk perpendicularly a cylindrical hole, ten inches deep, and two inches in diameter, made strong by an iron ring two inches broad within the top, and by a piece of iron an inch thick to fill up the bottom, tightly fixed in. A strong pivot of iron, of diameter to turn easily in the socket described, but with as little lateral play as possible, is placed vertically in the hole, its upper end standing 4 inches above it. On this pivot, as an axle, and close to the top of the post, but so as to turn easily, is fixed a wheel of iron, twenty-four inches diameter, strengthened by four

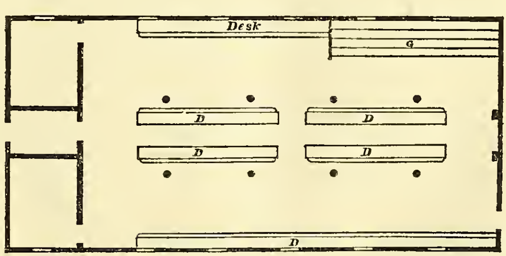


Rotary Swing.

spokes, something like a common roasting-jack wheel, but a little larger. The rim should be flat, two inches broad, and half an inch thick. In this rim are six holes or eyes, in which rivet six strong iron hooks, made *to turn in the holes*, to prevent the rope from twisting. To these hooks are fixed six well-chosen ropes, an inch diameter, and each reaching down to within two feet of the ground, having half-a-dozen knots, or small wooden balls, fixed with nails, a foot from each other, beginning at the lower extremity, and ascending to six feet from the ground. A tin cap, like a lamp cover, is placed on the top of the whole machine, fixed to the prolongation of the pivot, and a little larger than the wheel, to protect it from wet. To this, or to the wheel itself, a few waggoners' bells appended, would have a cheerful effect on the children. The operation of this swing must, from the annexed cut, be obvious. Four, or even six children, lay hold of a rope each, as high as they can reach, and, starting at the same instant, run a few steps in the circle, then suspend themselves by their hands, drop their feet and run again when fresh impulse is wanted ; again swing round, and so on. A child of three or four years old, will often fly several times round the circle without touching the ground. There is not a muscle in the body which is not thus exercised ; and to render the exercise equal to both halves of the body, it is important that, after several rounds in one direction, the party should stop, change the hands, and go round in the opposite direction. To prevent fatigue, and to equalize the exercise among the pupils, the rule should be, that each six pupils should have thirty or forty rounds, and resign the ropes to six more, who have counted the rotations.

Toys being discarded as of no use, or real pleasure, the only *plaything* of the playground consists of bricks for building, made of wood, four inches by two and one and a-half. Some hundreds of these, very equally made, should be kept in a large box in a corner of the ground, as the quieter children delight to build houses and castles with them ; the condition, however, always to be, that they shall correctly and conscientiously replace in the box the full complement or *tale* of bricks they take out ; in which rule, too, there is more than one lesson.

In a corner of the playground, concealed by shrubbery, are two water closets for the children, with six or eight seats in each ; that for the boys is separate from, and entered by, a different passage from that for the girls. Supply the closets well with water, which, from a cistern at the upper end, shall run along with a slope under all the seats, into a sewer, or a pit in the ground. See that the closets are in no way misused, or abused. The eye of the teacher and mistress should often be here, for the sake both of cleanliness and delicacy. Mr. Wilderspin recommends the closets being built adjoining the small class-room, with small apertures for the teacher's eye in the class-room wall, covered with a spring lid, and commanding the range of the place. There is nothing in which children, especially in the humbler ranks, require more training.



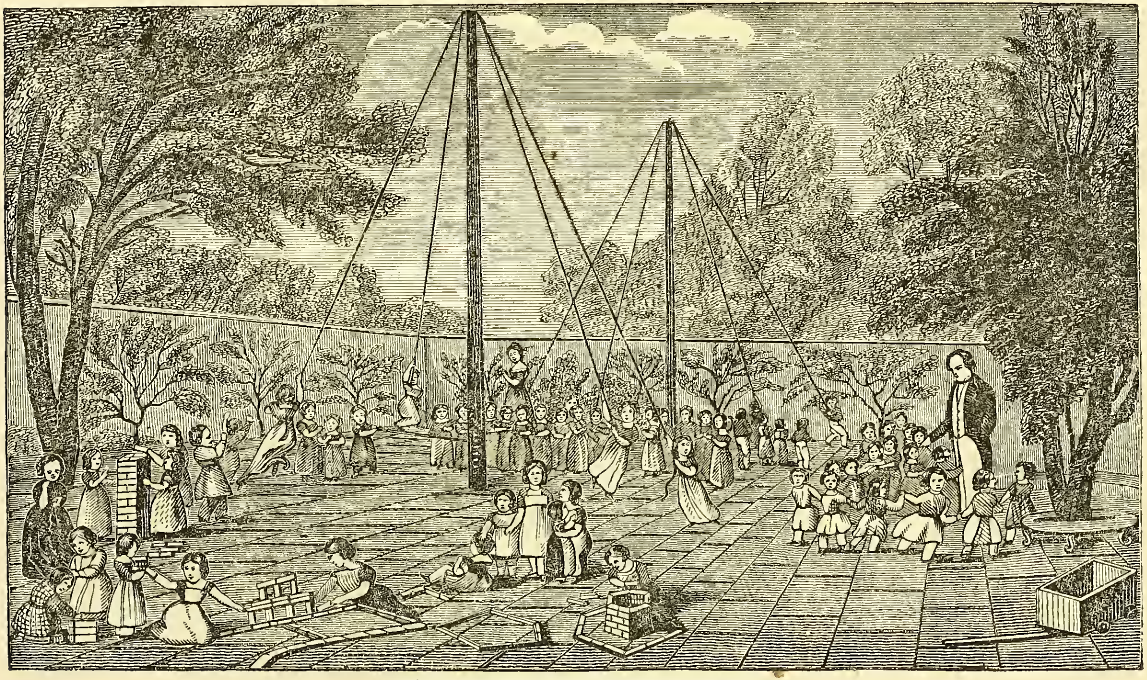
The annexed cut represents an infant school-room, modified in a few unimportant particulars, from the ground plan recommended by Mr. Wilderspin in his "*Early Education*," published in 1840. The original plan embraces a dwelling for the teacher's family, and two school-rooms, one for the boys and the other for the girls, each school having a gallery, class-room, and playground. The school-room is about 60 feet long by 38 wide, and the class-rooms each 13 ft. by 10. D. Desks and Seats. G. Gallery, capable of accommodating 100 children.

Play-Ground of an Infant or Primary School.

The following plan and description of a play-ground for an infant school, are copied from Wilderspin's "Early Education." Whatever may be thought of the methods of intellectual training recommended by this pioneer of the infant school system, no one can question the utility of his recommendation, for all schools for young children, of a retired, dry, and airy play-ground, furnished with the means of healthy and innocent recreation, and with flower-borders, shrubbery, and shade-trees, which the children must be taught to love and respect. The play-ground is the uncovered school-room of physical and moral education, and the place where the manners, dispositions, and personal habits of the young can be better trained than elsewhere. With them the hours of play and study, of confinement and recreation, must alternate more frequently than with older pupils.

This plate represents a well regulated play-ground, with all the necessary apparatus. It will be seen that there are two rotatory swings, one for the boys, the other for the girls. The girls are represented vaulting over a rope, which they sometimes do, as also do the boys. The boys are represented swinging in the usual way, without the vaulting rope. It will be seen that some of the children are represented as engaged in erecting their various buildings; some are building solid oblong pillars, others are busy erecting squares, others pentagons, others hexagons, and so on, as they may feel inclined. The play-ground is flagged, and a little cart is represented, to enable the children to take the wood bricks away, and place them in their proper places, as on no account are they to be left out, when the children are done with them. The fruit trees are represented round the wall: and above all, it should be observed, that the teachers are both represented as being with the children in the play-ground. This is absolutely essential, to prevent accidents, to attend to the moral and physical training, and, above all, to see that the children acquire habits of honesty and kindness to each other. It will also be seen that there is not a single child in the plate represented as being idle; they are all either doing, or watching others doing, which is invariably the case, unless he is indisposed or asleep. The pupils being supplied with the necessary articles for amusement, the teacher must not fail to remember that the choice is always left to the children. If they play at what they choose they are free beings, and manifest their characters; but if they are forced to play at what they do not wish, they do not manifest their characters, but are cramped and are slaves, and hence their faculties are not developed. It must also be remembered, that the children are to be taught to swing both ways. In the plate the children are represented as going with the right hand upwards; but to strengthen the left side of the body, the left hand should be above, and the children's faces turned the opposite way from that represented in the picture.

We should prefer to see as the teacher and presiding spirit, both in the school-room and play-ground, a devoted and accomplished female; one "in whose own heart Love, Hope, and Patience have first kept school," and whose lap seems always full of the blossom of knowledge and piety.

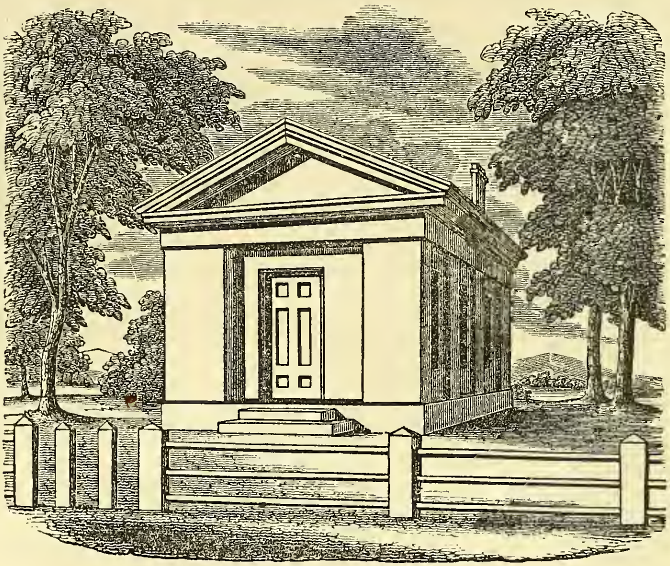


Play-Ground for an Infant or Primary School.

2. Plans and descriptions of School-houses recently erected.

The following school-houses are selected for representation and description, not because they are superior to all others, or are unexceptionable in every respect, but because the plans could be conveniently obtained, and in them all, the great principles of school-architecture are observed.

Plans, &c., of School-house, District No. 6, Windsor, Ct.

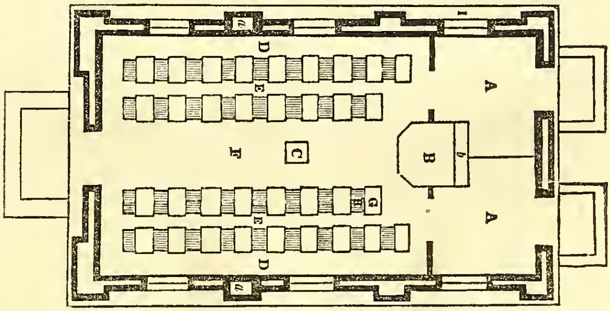


The building stands 60 ft. from the highway, near the center of an elevated lot which slopes a little to the south and east. Much the larger portion of the lot is in front, affording a pleasant play ground, while in the rear there is a woodshed, and other appropriate buildings, with a separate yard for boys and girls. The walls are of brick, and are hollow, so as to save expense in securing the antaes or pilasters, and to prevent dampness. This building is 33 ft. 6 inches long, 21 ft. 8 inches wide, and 18 ft. 9 inches high from the ground to the eaves, including 2 ft. base or underpinning.

The entries A A, one for boys and the other for girls, are in the rear of the building, through the woodshed, which, with the yard, is also divided by a partition. Each entry is 7 ft. 3 inches, by 9 ft. 3 inches, and is supplied with a scraper and mat for the feet, and shelves and hooks for outer garments.

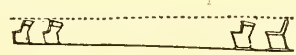
The school-room is 24 ft. 5 inches long, by 19 ft. 4 inches wide, and 15 ft. 6 inches high in the clear, allowing an area of 472 ft. including the recess for the teacher's platform, and an allowance of 200 cubic feet of air to a school of 36.

The teacher's platform B, is 5 ft. 2 inches wide, by 6 ft. deep, including 3 ft. of recess, and 9 inches high. On it stands a table, the legs of which are set into the floor, so as to be firm, and at the same time movable, in case the platform is needed for declamation, or other exercises of the scholars. Back of the teacher is a range of shelves *b*, already supplied with a library of near 400 volumes, and a globe, outline maps, and other apparatus. On the top of the case is a clock. A blackboard 5 ft. by 4, is suspended on weights, and steadied by a groove on each end, so as to admit of being raised and lowered by the teacher, directly in front of the book case, and in full view of the whole school. At the bottom of the blackboard is a trough to receive the chalk and the sponge, or soft cloth.

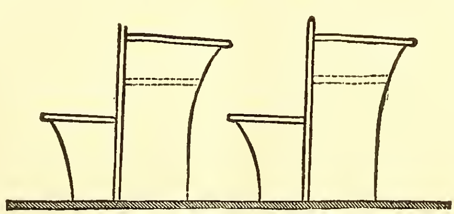


The passages D D, are 2 ft. wide, and extend round the room; E E are 15 inches, and allow of easy access to the seats and desks on either hand. F is 5 ft. 3 inches, and in the center stands an open stove C, the pipe of which goes into one of the flues, *a*. The temperature is regulated by a thermometer.

Each pupil is provided with a desk G, and seat H, the front of the former, constituting the back or support of the latter, which slopes $2\frac{1}{2}$ inches in 16. The seat also inclines a little from the edge. The seats vary in height, from $9\frac{1}{2}$ inches to 17, the youngest children occupying those nearest the platform. The desks are 2 ft. long by 18 inches wide, with a shelf beneath for books, and a groove on the back side *b*, (Fig. 4) to receive a slate, with which each desk is furnished by the district. The upper surface of the desk, except 3 inches of the most distant portion, slopes 1 inch in a foot, and the edge is in the same perpendicular line with the front of the seat. The level portion of the desk has a groove running along the line of the



Top of Desk.



Section of Seat and Desk.

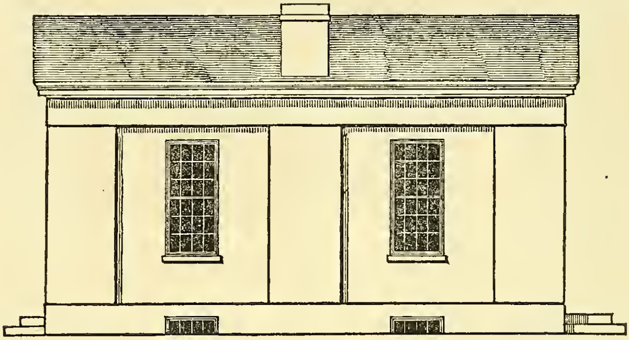
slope *a*, (Fig. 4) so as to prevent pencils and pens from rolling off, and an opening *c*, (Fig 8) to receive an inkstand, which is covered by a metallic lid.

The windows, I, three on the north and three on the south side, contain each 40 panes of 8 by 10 glass, are hung (both upper and lower sash) with weights so as to admit of being raised or lowered conveniently. The sills are three feet from the floor. Those on the south side are provided with curtains and blinds.

The proper ventilation of the room is provided for by the lowering of the upper sash, and by an opening 14 inches by 18, near the ceiling, into a flue, (Fig. 2.) *a*, which leads into the open air. This opening can be enlarged, diminished, or entirely closed by a shutter controlled by a cord.

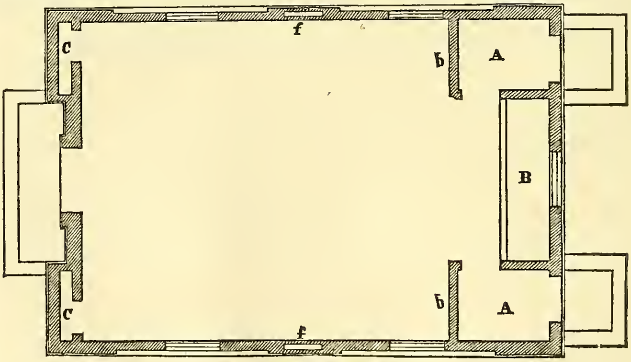
The sides of the room are ceiled all round with wood as high as the window sill, which, as well as the rest of the wood work of the interior, is painted to resemble oak.

The following cuts represent a modification of the Windsor plan, as prepared



Side Elevation.

for a Primary School in Hartford. The entries (A A) are smaller. The teacher's platform is at the end, so as to overlook both yards in the rear.



Ground Plan.

PLANS, &c., OF A SCHOOL-HOUSE IN WASHINGTON DISTRICT, HARTFORD, CT.

This house is calculated to accommodate at least one hundred children, divided into a lower and upper department. For the present, the basement is not fitted up, and the upper room is arranged for a school of at least sixty pupils, of the ordinary school age, and is recommended for country districts of that number of children.

The building stands back 24 feet from the highway, on a dry, pleasant site, and at a distance from any other building. The lot includes a quarter of an acre, and is divided in the rear into two yards, one for the boys, and the other for the girls.

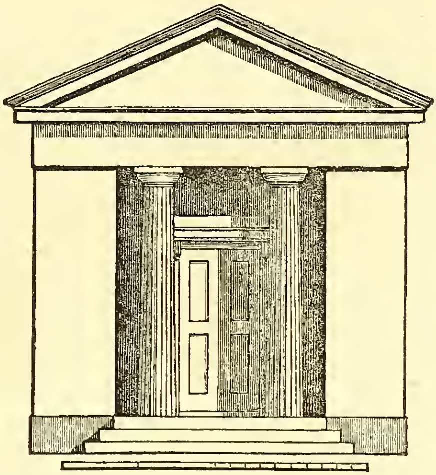


Fig. 1.

It is built of brick, with some reference to the laws of good taste, as well as comfort and convenience. The wood work of the interior is painted to resemble oak.

The exterior dimensions are 40 by 26 feet. The recess occupied by the columns is 4 by 8 feet; entry or lobby, (Fig. 2, A) is 8 ft. wide; the upper school-room is 30 by 25 feet, and 14 high in the clear; the space in front of the desk is 8 ft. 6 inches wide; the side aisles (C C) are 3 feet wide; the space in the rear (F) 4 feet wide, and the aisles between the desks (D D) each 2 feet 7 inches; each range of desks is 18 feet long by 4 feet wide.

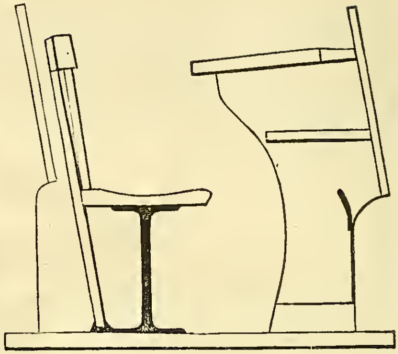
The entrance is in front into a lobby (A) one side of which (a) is appropriated to the girls and the other (b) to the boys, and each side is fitted up with shelves, (a a) and hooks for hats, and outer garments. Scrapers, (r r) mats, (t t) and a shelf (c) for pail, wash basin, towel, drinking cup, &c., are provided for the comfort and convenience of the children, and to enable the teacher to enforce habits of neatness, order and propriety.

There are three windows on the north, and three on the south side, each with 32 lights of 12 by 8 inch glass. These windows are inserted nearly 4 feet from the floor, are hung (both upper and lower sash) with weights, and provided with Venetian blinds.

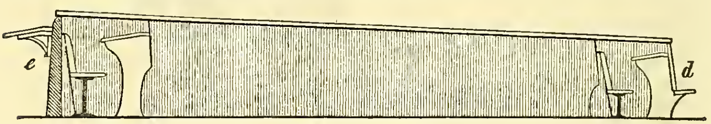
There is an opening near the floor, and another near the top of the room, into a flue (*i*) which leads into the open air. These openings can be enlarged, diminished, or entirely closed, at the discretion of the teacher. The windows can also be conveniently lowered or raised, both at the top and the bottom.

The room is warmed by a close wood stove, (S) the pipe from which is carried ten feet above the heads of the children into the smoke flue (*h*). The heat is regulated by a thermometer.

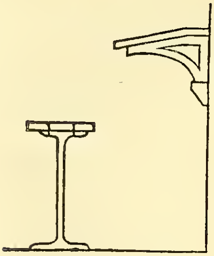
There are three ranges of seats and desks, capable of accommodating, when completed, 18 scholars each. In the first range the back seat is 18 inches high, and the desk, (the front edge) 29 inches from the floor, and the front seat 11 inches, and the corresponding desk, 23 inches; in the second, the same proportion is observed, except that the whole range is 1 inch lower, and the third, one inch lower than the second; i. e. the back seat of the third range is 16 inches, and the corresponding desk, 27 inches, and the front seat 9 inches, and the desk 21 inches from the floor. Each scholar is provided with a chair, (Fig. 3) detached from the desk behind, and fastened to the floor by an iron pedestal. Each range of desks is divided by a partition extending from the floor to four inches above the surface of the desk. This partition, to which the desks are attached, gives great firmness to each, and at the same time separates the scholars from each other, and economizes room. Each desk is two feet long, (it should be 2 ft. 6 inches) and from 13 to 18 inches wide,



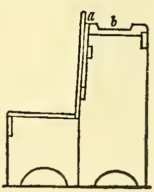
with a shelf beneath for books. The upper surface of the desk, except 3 inches of the most distant portion, slopes 1 inch in a foot. Along the edge of the slope and the level portion, is a groove, to prevent pens and pencils from rolling off, and in the level part an opening (b) to receive a slate, (and there should have been another (c) for the inkstand, with a butt or metallic lid to close over it. Each desk should also have a sponge, pen wiper, and pencil holder, (a tin tube,) attached to it.)



Range of Seats and Desks.



To accommodate six of the oldest and largest scholars in winter, a desk like a table leaf, will be attached to the highest end of each range (Fig. 2, 4, e e e) and to accommodate the same number of the smallest in summer, sand desks, (Fig. 5) can be placed at the lowest end (d d). The smaller children will ultimately be accommodated in the lower room.



The platform (B) for the teacher, occupies the space between the doors which open into the school-room, and is 9 feet long, 4 feet 6 inches wide, and 9 inches high. On it is a desk, (Fig. 2) 4 feet long by 2 feet wide, supported by two (v v) hollow pedestals, which will accommodate the books, &c., of the teacher. The lid of the desk is a slope, but can be supported by slides in the box of the desk so as to be a level. From the platform the teacher can conduct the instruction of his classes, arranged around it, or on either side, or in the area, (L) in the rear of the school, and at the same time have the rest of the school under his supervision.

Each desk is furnished with a slate of the best quality, and made strong by a band of iron over the corners fastened with screws. Behind the teacher, and in full view of the whole school, and accessible to the reciting classes, is a blackboard 9 feet long by 4 feet 6 inches wide, with a trough at

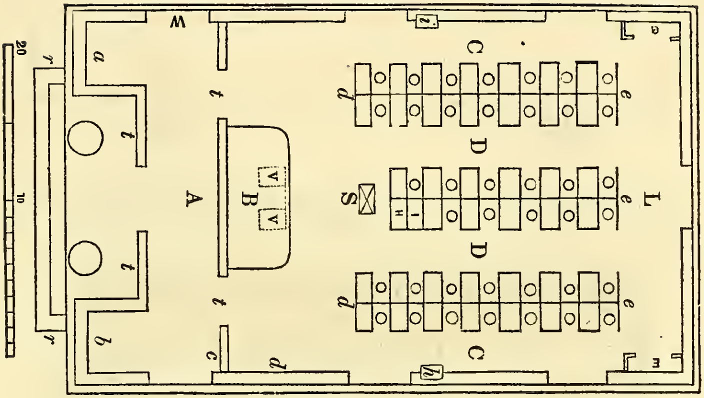


Fig. 2.

the bottom to receive the chalk or crayon, a sponge or soft leather. Over the black-board, are the printed and written alphabet, arithmetical and geo metrical figures, the pauses, &c., for copying or general exercise. Along the edge of the blackboard, the length of an inch, foot, yard, &c., are designated. Over the teacher's platform, on the ceiling, the cardinal points of the compass are to he painted. In a case (G) 4 feet wide, 15 inches deep, and 7 feet high, in the rear of the room, there is a terrestrial and celestial globe, an orrery, a set of geometrical solids, a set of alphabetical and drawing cards, arithmetical blocks, and a numerical frame, a model to illustrate cube root, a set of outline maps and historical charts, a movable stand to support maps, diagrams, movable blackboards, &c. On the western wall, on each side of the window, are the eastern and western hemispheres, each six feet in diameter. There are also maps of Connecticut, Massachusetts, and the United States, and Catherwood's plan of Jerusalem, together with maps illustrative of the history of the bible. An eight-day clock is also provided.

The library case (E) is of the same size as the apparatus closet, and contains already nearly 400 volumes.

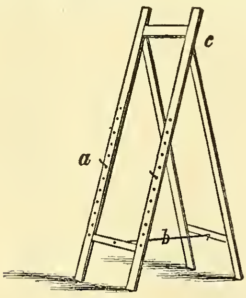


Fig. 6.

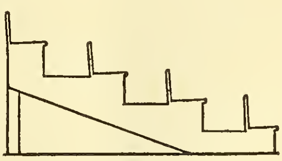


Fig. 7.

The movable stand for blackboard (Fig 6) is like a painter's easel. *a*. Pins on which the board rests. *c*. Hinge or joint to the supporting legs which are braced by hook *b*.

The primary department may be fitted up with a gallery, (Fig. 7) as is recommended by Mr. Wilderspin for infant schools, consisting of a series of seats, ascending from the floor. The first or lowest is 8 inches; each ascending, one being one inch higher than the next before it.

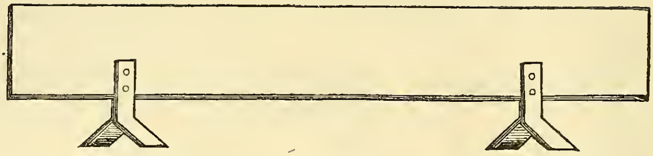


Fig. 8.

A cheap movable blackboard was made for the primary department as is represented in (Fig. 8,) and a movable bench, (Fig. 9) on which the

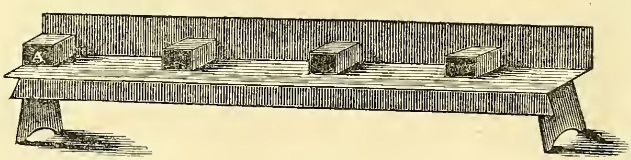


Fig. 9.

children are separated by a little compartment (A,) for books, which also serves as a support for the arms.

The blackboards are furnished with crayons prepared after directions, given by Prof. Turner, of the American Asylum for the Deaf and Dumb, as follows.

"Take 5 pounds of Paris White, 1 pound of Wheat Flour, wet with water, and knead it well, make it so stiff that it will not stick to the table, but not so stiff as to crumble and fall to pieces when it is rolled under the hand.

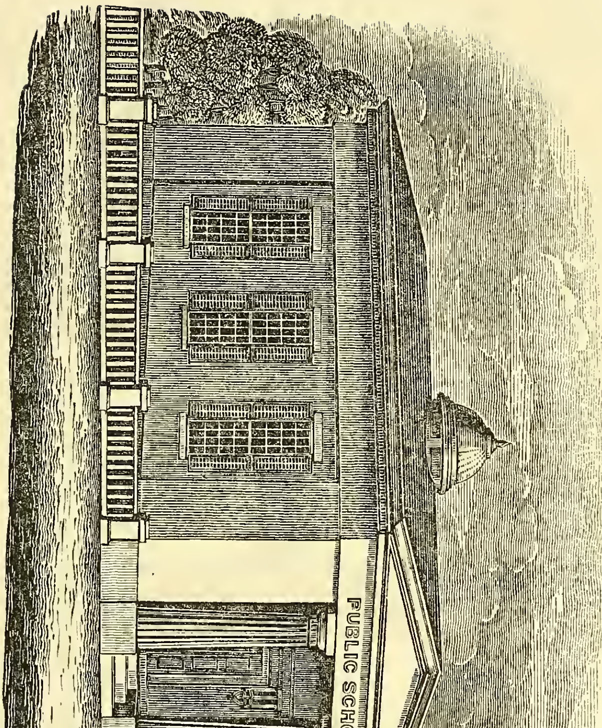
To *roll* out the crayons to the proper size, two boards are needed, *one*, to roll them *on*; the *other* to roll them *with*. The first should be a smooth pine board three feet long and nine inches wide. The other should also be pine, a foot long and nine inches wide, having nailed on the under side near each edge a slip of wood one third of an inch thick, in order to raise it so much above the under board as that the crayon when brought to its proper size. may lie between them without being flattened.

The mass is rolled into a ball and slices are cut from one side of it about one third of an inch thick; these slices are again cut into strips about four inches long and one third of an inch wide, and rolled separately between these boards until smooth and round.

Near at hand should be another board 3 feet long and 4 inches wide, across which each crayon, as it is made, should be laid, so that the ends may project on each side—the crayons should be laid in close contact and straight. When the board is filled, the ends should all be trimmed off so as to make the crayons as long as the width of the board. It is then laid in the sun, if in hot weather, or if in winter, near a stove or fire-place, where the crayons may dry gradually, which will require twelve hours. When thoroughly dry they are fit for use.

An experienced hand will make 150 in an hour. We sell them at 50 cents for a single hundred—and less by the quantity."

The Windsor and Washington District school-houses were constructed and fitted up in 1839—40, mainly after plans furnished by the Secretary of the Board of Commissioners of Common Schools of Connecticut, who was anxious to have one or two structures to which he could refer when lecturing and writing on the subject, as, in some respects, models of taste. comfort, and convenience, for a country school-house.



View of Whiting street Primary School, New Haven

Plan, &c., of High School, Middletown, Ct.

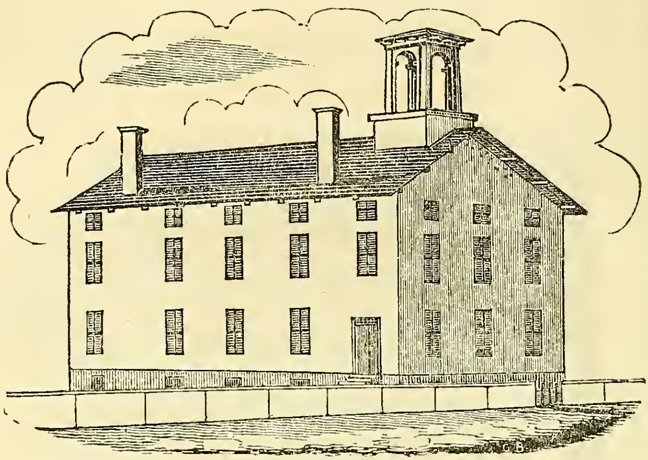


Fig. 1.

The High School building is located on Parsonage street, away from the business part of the city. The lot is 227 ft. on the street, by 200 ft. deep, and is divided into two equal parts, one of which is appropriated to the boys, and the other to the girls. The building stands near the center of the lot, east and west, and 12 feet from the street. The entrances are on the side next to the street.

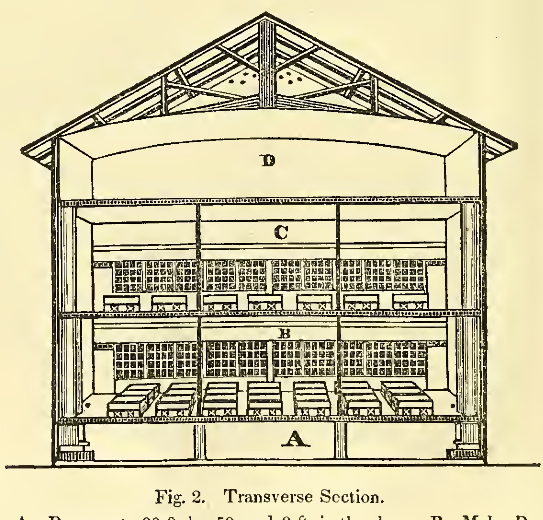


Fig. 2. Transverse Section.

A. Basement, 90 ft. by 50, and 9 ft. in the clear. B. Male Department, 50 ft. by 47, and 12 ft. high in the clear, with two recitation rooms 25 ft. by 12. C. Female Department, same dimensions as Male Department. D. Attic arched, appropriated for calisthenic exercises.

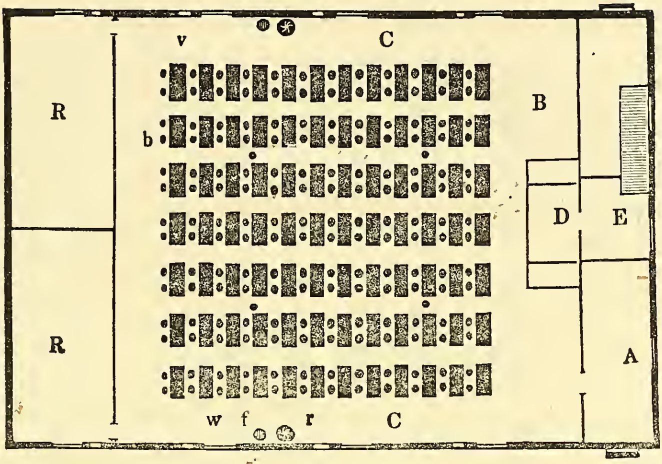


Fig. 3. Male Department.

The exterior dimensions of the building are 72 ft. by 54. It is two stories high, with a basement 9 ft. in the clear, and an arched attic, 6 ft. to the spring of the arch. The first story is occupied by the male department, and the second by the girls' department. The basement will be used as a play ground for the boys in wet weather, and the attic is appropriated for calisthenic exercises for the girls, and meetings of the whole school.

The lower school-room is 50 ft. by 47, and 12 ft. high in the clear, with two recitation rooms, each 25 ft. by 12. The entrance is from the East, near the end, into a lobby (A) 8 ft. wide, and fitted up with scraper, mats, hooks, &c. &c.

The desks are so placed, that the scholars face towards the teacher's platform, (D) which is against the northern partition, separating the school-room from the entry. The desks are placed in seven ranges, containing each 12 desks, each desk accommodating two scholars, and the front of one desk constituting the back of the preceding one. The seats and desks are painted green. Each range is separated from the other by an aisle 18 inches wide, and the whole body of desks is surrounded on three sides by an open space (C C) 6 feet wide.

On each side of the teacher's platform (D) there is a platform with an open space (B) in front, of 10 ft., of half the elevation, for two assistants. In the rear of the platform is a room (E) appropriated to the teacher.

The recitation rooms are separated from the school-room by a glass partition. Two sides of each is occupied by blackboards.

The school-rooms and recitation rooms are ventilated by openings at the top and bottom, into eight flues carried up in the wall into the space between the arch of the attic and the roof. This space communicates at all times with the open air by a grating at either end, (as indicated in Fig. 1 and 2.)

The school-room is heated by two furnaces in the basement, the hot air ascending through the openings (r r) into the lower room, and carried into the second story and attic, by conductors (f f.)

There are six large windows to the school-room, and one to each recitation room. The windows are protected by venetian blinds, which are never opened. The amount of light is graduated by opening or closing the slats.

The girls' school-room is on the second floor, and is, in every respect like the one below. Both rooms are well supplied with blackboards, an with a set of Mitchell's series of Outline Maps, and globes.

Plan and Description of Public School, No. 17, New York.

The following plans and explanation of a "Public School" and a "Primary School" are copied from the "Thirty-ninth Annual Report of the Trustees of the Public School Society of New York." The plans after which the school-houses of this Society were originally constructed, as well as the methods of instruction pursued in their schools, were adopted from those recommended by Joseph Lancaster, and the British and Foreign School Society. These plans and methods have been from time to time essentially modified, until they can no longer be characterized as Lancasterian or Monitorial, but the plans and methods of the Public School Society of New York. There are two grades of schools, the higher called the Public Schools, and the lower, called the Public Primary Schools. Those schools of the primary grade, which are in the buildings appropriated to the higher schools, are designated Primary Departments, to distinguish them from the Primaries taught in separate buildings. The system of instruction pursued in the Primary Departments was originally the Infant School system, and still retains many of the methods of that system. The school-rooms were, therefore, constructed and furnished in reference to simultaneous exercises of the whole school, to oral instruction with visible illustrations, and to physical movements of various kinds.

Public School, No. 17, is in 13th Street, between the 7th and 8th Avenues, on the centre of a lot of ground 100 feet front and rear, by 103½ feet deep. The main building is 42 feet front, and 80 feet deep; the stair building (in the rear,) is 21 by 14 feet. The main building is 49 feet high, from the pavement to the eaves. The first story of the front of the main building is of brown stone, polished, as is also the bases and caps of the pilasters. The walls are all of brick (including the front fences); the front being of (what are called) Philadelphia pressed bricks; the front cornice is of wood, and painted white.

The windows of the lower story, contain each 30, and the two upper stories each 40 panes of glass, 12 by 10 inches: the sashes are all hung with weights and cords, so that they may be raised or lowered at pleasure.

The rooms are all wainscoted, as high as the window sills: the wainscoting, doors, and desks are all grained in imitation of oak: the doors, window casings, and sashes are painted white. The rooms are ventilated by means of six blinds, 2 by 3 feet, being placed in the ceiling between the timbers, and two or three bricks being left out opposite the blinds, in the outside walls.

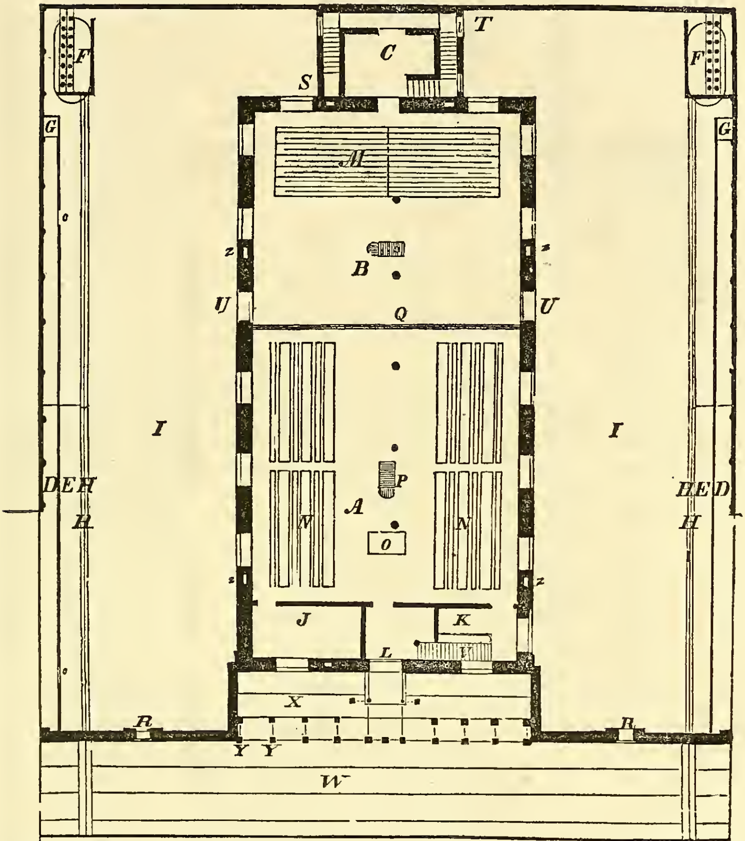
The first story is 11 feet 6 inches high in the clear, and is occupied as a Primary Department, for both boys and girls, and contains seats for 150 children in the Front Room, (marked A on Fig. 1,) and 200 on the Gallery, (marked M on Fig. 1); making in all 350 seats in this department.

The second story is occupied as the Girls' department; the room is 15½ feet high in the clear, and contains seats for 252 scholars.

The third story is occupied as the Boys' department; the room is 16½ feet high in the clear, and contains seats for 252 scholars; making in all 854 seats in the building, exclusive of the seats in the recitation rooms.

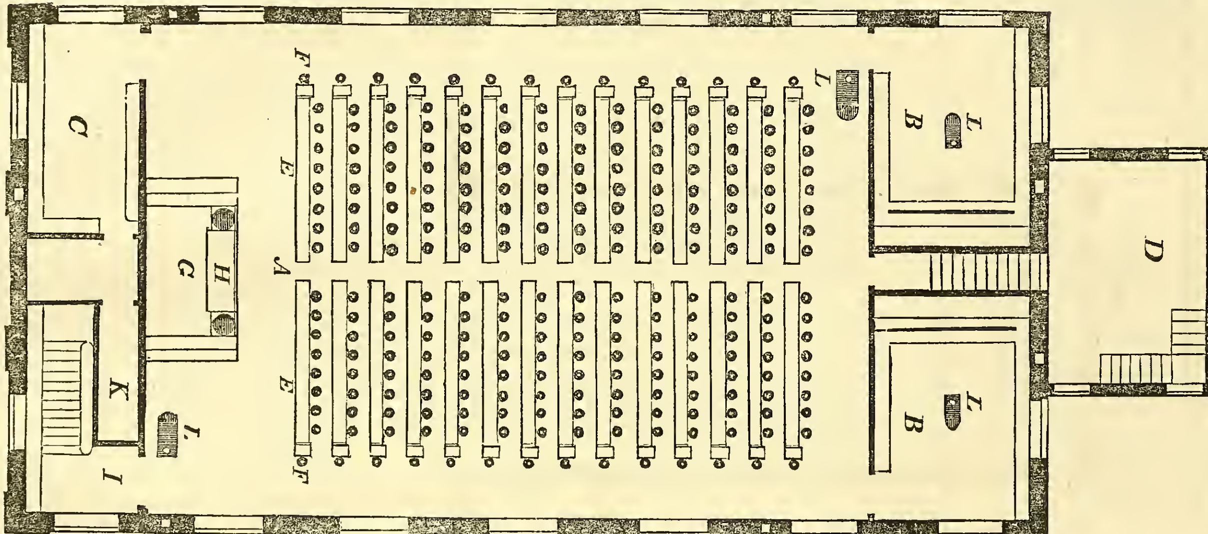
The steps in the stair building, by which the scholars enter and retire from school, are of blue stone, 3 inches thick by 12 inches wide, and are expected to last as long as any part of the building. This method was adopted to avoid the necessity of putting in new steps every few years, (which has heretofore been necessary where wooden steps have been used,) and also to lessen the noise consequent on a great number of children going either up or down wooden steps, at the same time; thus far the experiment has succeeded admirably, and is now adopted for both Public and Primary Schools.

Fig 1. Ground plan of Primary Department, yards, &c.



A—Primary School room 39 by 38 feet.
B—Infant do do 39 by 30 feet.
C—Room for brooms, pails, &c.
J—Boys' ward-robe, $16\frac{1}{2}$ by 8 feet.
K—Girls' do $12\frac{1}{2}$ by 8 feet.
M—Gallery, 32 by 11 feet—Seats for 200 children.
N, N—Desks, each $16\frac{1}{2}$ feet long.
O—Teachers' table.
L—Main entrance.
R, R—Entrance to the yard.
U, U do to Primary department.
V—Stairs to Girls' and Boys' do.
S—Scholars' entrance—Boys' do.
T do do Girls' do.
Q—Sliding doors—28 by $9\frac{1}{2}$ feet.
P, P—Stoves.
Z, Z—Flues for stove pipes.
I, I—Play ground, 102 by 26 feet; paved with brick. F, F—Privies, 12 by 8 feet. G, G—Boxes for sand—3 by $2\frac{1}{2}$ feet.
D, D—Wood-houses—83 by $2\frac{1}{2}$ feet, and $6\frac{1}{2}$ feet high; the front of which is made of hemlock strips, 4 by 2 inches, set perpendicularly 2 inches apart, to al low a free circulation of air.
E, E—Roof of wood-houses—projecting $3\frac{1}{2}$ feet beyond the front of the houses; forming a shelter for the scholars in stormy weather.
H, H—Gutters of blue stone to conduct the waste water from the wood houses and yards to the street.
X—Court Yard—$8\frac{1}{2}$ wide; blue stone flagging. Y, Y—Stone foundation blocks, to which the iron railing in front is secured.

Fig. 2. Ground Plan of the Boy's Department, or third story.



A—School room—55 by $38\frac{1}{2}$ feet.
B, B—Recitation rooms—17 by 13 feet; seats for 50 scholars.
C— do do $16\frac{1}{2}$ by 8 feet; seats for 25 scholars.
D—Receiving room, and scholars' entrance; this room is furnished with a sufficient number of cloak and hat hooks, to accommodate all the scholars, in each department.
I—Front entrance and stairway.
K—Book Closet.
L, L, L, L—Stoves.
G—Platform, raised 1 foot 9 inches above the floor.
H—Teachers' Desk, with a shelf at each end for globes.
E, E,—Scholars' Desks; each 12 feet 8 inches long—19 inches for each scholar.
F, F—Monitors' stations.

The front of the teachers' desk, toward the scholars, is formed by a blackboard 3 feet wide, and extending the whole length of the desk.

Plan &c., of Primary School, New York.

The main building is 25 feet front, by $62\frac{1}{2}$ feet deep: the stair building is 27 feet by 11 feet 8 inches. The main building is placed 6 or 8 feet from the line of the street, according to the depth of the lot. The walls above the ground are built entirely of brick. The roof is of tin; and the gutters of copper. The lower doors and windows have iron bars inserted, for safety, and to admit a free circulation of air in the summer, but are closed with sashes in the winter.

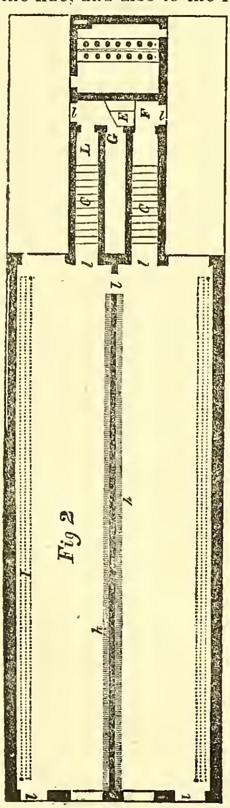
Fig. 1. Ground plan of first story, or play-ground.

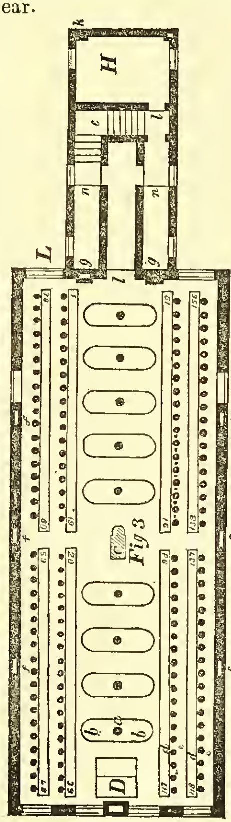
This story is $7\frac{1}{2}$ feet in the clear, with a partition wall through the middle to give separate play-grounds for the boys' and girls' schools. This wall is 8 inches thick; and about $2\frac{1}{2}$ feet of the upper part is open work for ventilation.

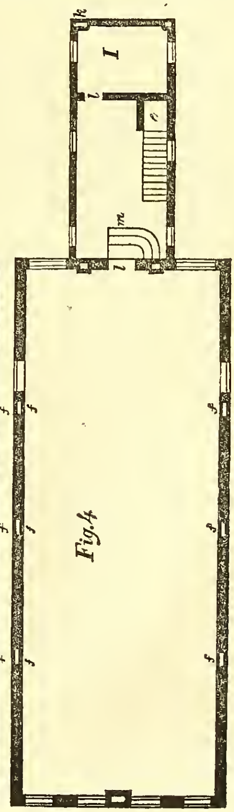
C, C — Stairways. L, F — Places for pine (kindling) wood — under stairs. E.—Sand box for both departments. h, h—Piles of wood about $4\frac{1}{2}$ feet high. I, I—Lines on which the scholars are marshaled, previous to entering school. l, l, l—Doors.

Fig. 2 and 3. Ground plan of boys' and girls' department, each 60 by 32.

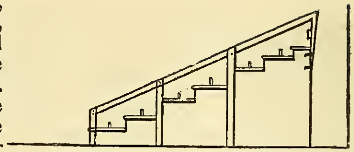
D—Teachers' platform and table, (movable rollers.) d, d—Desks for scholars—the black dots are iron chairs. a—Cast iron lesson stands—on which two lesson boards are hung, to accommodate classes standing on the line b, b. H—Class Room. g, g, g—Flues, or chimnies, for stove pipes. f, f, f, &c.—Air flues, or recesses for ventilation, extending from the 2d story to the garret. C—Stove—the pipes extend from the stove to the front into the flue, and also to the rear.



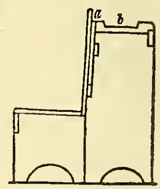




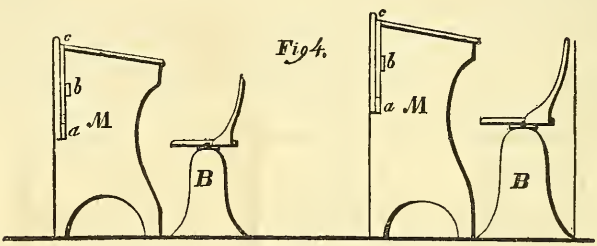
The gallery consists of 7 seats, varying in height from 7 to 9 inches, each seat 20 feet long, and provided with a support for the back. These seats will accommodate 200 children. The whole is set $2\frac{1}{2}$ feet from the wall, and is left open beneath—the space being used as a wardrobe for the youngest children.



The youngest class is provided with a desk, having a trench (*b*) painted black to contain a thin layer of sand, in which to trace letters, and rude attempts at imitating forms. Each child has a slate, and there is an opening in the top of the desk (*a*) to receive it when not in use.



Since the erection of this school-house some modifications have been made in the construction of the desks and seats. Instead of the long bench for 10 or 12 pupils, each pupil has a chair similar to those represented below.

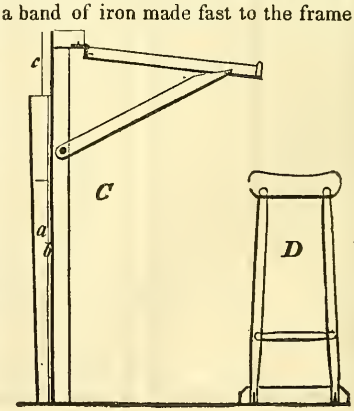


The desks are $10\frac{1}{2}$ inches wide; and the uprights, or legs, are cut out on the edge towards the chair. The highest desk is 1 foot 7 inches on the lowest side; the lowest 1 foot 5 inches. The chairs are 12 and 10 inches. The seat of the chair is about 8 inches wide, and is intended to be set so that the front of the seat and the edge of the top of the desk, shall be perpendicular, one with the other, so that the scholars may sit erect, and receive the benefit of the back of the chair while writing.

The desks (Fig. 2.) are each for eight scholars and vary in height—the highest, which are most distant from the teacher, being on the lower edge 26 inches from the floor, and requiring a seat $17\frac{1}{2}$ inches; and the lowest being nearest the teacher, being 17 inches and requiring a seat 10 inches from the floor. Each desk has an appropriate place for an inkstand, books, pen, pen-wiper, pencil, and slate for each scholar. The slates are of the best quality, bound over the corners with a band of iron made fast to the frame

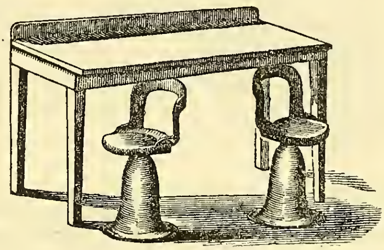
The seats are stools, without backs—all belonging to one desk, being attached to a plank, which can be moved, although it is ordinarily made fast to the floor. There is sufficient space between each stool, and between each range of stools and the adjoining desk, to allow a scholar to leave or take his seat without disturbing any other.

The monitors' seat and desk (F) are elevated about five inches above the rest, so as to command a view of each range of scholars' seats and desks. The top of the monitors' desk is hung with hinges, and supported by a movable brace.



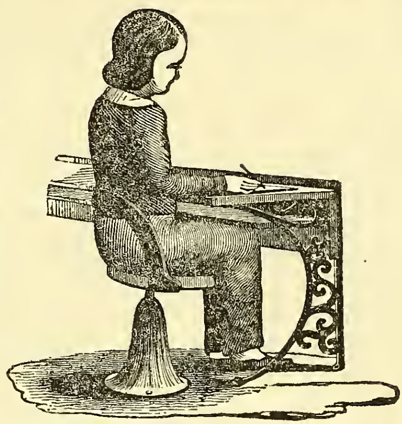
The attention of the Trustees and especially of a committee having charge of this subject, having been recently called to the importance of having some support provided for the backs of the older as well as the younger scholars, has resulted in the introduction of *Mott's patent revolving cast-iron chair* into several of the new Primary Schools, and into one of the Public Schools.

The chairs, except the seat, are made of cast iron, and are so constructed, that the seat and back may be turned round, while the bottom being screwed fast to the floor, remains stationary.



The height of the lower part of the top of the desk, is just equal to the highest part of the back of the chair, so as to allow it to pass under.

The front edge of the seat is in a perpendicular line with the edge of the top of the desk, so that the scholar is required to sit erect, when engaged in writing or studying, and the same time that part of his back which requires support is fully in contact with the chair.



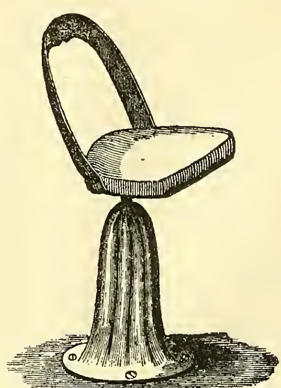
These chairs are made of four sizes as follows—

No 1	is 10	in. high,	and requires	a desk		17	in.
" 2	" 12	"	"	"	"	19½	"
" 3	" 14	"	"	"	"	22	"
" 4	" 16	"	"	"	"	24	"

These chairs are considered so exactly suited to the wants of the children, both as it regards ease in sitting, and in maintaining order while taking, or leaving their seats, that the Committee on Primary Schools have concluded to recommend them wherever new desks are needed.

J. L. Mott, 264 Water-street, has for sale *cast iron lesson stands*; and *cast iron standards* or end pieces for school desks of four different sizes; and school stoves of various patters.

The chair and standard have been recently introduced into many public and private schools in the city of New York and other places.



The following remarks are from the "*Report of the Primary School Committee to the Board of Trustees of the Public School Society of New York, on the use of* SEATS WITHOUT BACKS:—

"On inquiry of the female teachers, several of the oldest and most experienced among them say, that instances of curved spine are often perceived among their scholars. Individual members of this Board have noticed similar instances; and it deserves to be mentioned, that a highly respectable and intelligent foreign gentleman, who is deeply interested in the cause of education, on a late visit to one of our schools, expressed his surprise on perceiving how large a proportion of the girls were round-shouldered and stooping in their figure."

* * * * * * *

"1st. It is a matter of notoriety to the medical profession, that, until about thirty or forty years ago, spinal curvatures were very little known. It is only since "the schoolmaster has got abroad,"—only since so great and universal an impulse has been given to education, that these cases have become sufficiently numerous to attract the particular attention of medical men. There is now to be found a distinct class of practitioners, and of machinists, who live and thrive by the treatment of spinal injuries.

2d. A large proportion of these cases can be distinctly traced to causes connected with school education. Among the illiterate in all countries, these injuries are scarcely known. They occur most frequently in schools where females are much confined to a sitting posture, with but a scanty allowance of those robust and active exercises which impart power to the muscular system, and invigorate the general health.

It should be here explained, that the trunk of the body is sustained in its erect position, solely by the action of muscles. Young and growing females who are but feebly endowed with muscular strength, experience such a sense of weariness in sitting upright, as to be induced, from necessity, to drop the body into a variety of curvatures; and one particular curve becoming habitual and long persisted in, finally ends in permanent deformity. The influence of exercise in preventing the evil, is precisely that which it has on the arm of a blacksmith; it augments the bulk, and redoubles the power of the muscles, and gives greater firmness and security to the joints.

3d. In all large cities there are many children, who, from infancy, are strongly predisposed to these affections, owing to a constitutional feebleness of muscle, or an unhealthy condition of the bones or joints. These require every precaution, during the course of their education, to prevent deformity.

Supposing the females attending our schools to be liable to spinal injuries, are these injuries owing to the use of seats without backs? The answer must be, that they are instrumental in causing them, just so far as they place the scholar under the necessity of seeking relief in the crooked and unhealthy attitudes into which she throws her body. Another question of similar import, is this:—*Would seats with back-supports tend to prevent these injuries?* A similar answer must be given. Such seats would act as a preventive, just in proportion as they removed the temptation and the necessity for indulging in injurious flexures of the body. When we see, as we often may, a girl of rapid growth, of yielding joints, and of feeble muscles, propping the weight of her body on her elbows, or, by way of change, bringing her sides alternately to rest on the desk before her, can we doubt for a moment, that, with a back-support, she would run less risk of injury to her figure? And in regard to those children, before alluded to, as having a natural predisposition to spinal distortions, seats of this kind would be indispensable to their safety."

Mott's School Chair and Desk.

The following minute description of Mott's Patent Revolving Pivot Chair, and cast iron Scroll Stanchions for School Desks, is gathered from a circular of the patentee:

The seat of the chair is of wood: all the other parts, of cast iron. The desk stanchions are adjusted to the height of the chair—in the following scale, viz:

No. of the Chair.	Height of Chair Seat.	Height of front edge of Desk.	Width of Desk.	Length of Desk room for each scholar; (not less.)	Distance between the rows of Desks.
1	10 Inches.	17 Inches.	12 Inches.	17 Inches.	20 Inches.
2	12 "	19 "	12 "	18 "	22 "
3	14 "	22 "	14 "	20 "	24 "
4	16 "	24 "	15 "	22 "	25 "

The *first column* denotes the *number* of the chair, as also the number of the desk stanchions.

Second column, the height of the seat from the floor.

Third column, the height of the front edge of the desk from the floor.

Fourth column, the width of the top of the desk. The slope of the desk should rise 1¼ inch to the foot; the larger desks having 2½ to 3 inches level on top to accommodate inkstands.

Fifth column, the length of desk room required for each scholar. It should not be less than here given.

Sixth column, the distance that should be allowed between the desks, from the back of one to the front edge of the other. This space will allow a passage between the chair and the next rear desk. The number of scholars at a desk need not be limited.

The position of each chair, when screwed to the floor, should have two-thirds of the allotted desk room to the right of its centre, and be so near that the back of the chair, in its revolution, will barely clear the desk. By placing the chair as described, the body of the child is brought in close proximity to the desk, causing the back of the person to rest, at all times, and under all circumstances, against the back of the chair. By a happy combination of the chair and the height of the desk, the children readily assume a *position* that is most convenient and conducive to their ultimate health, preventing those awkward habits so frequently acquired at school, and which are always so annoying to teachers. So uniform is the effect produced, that the back of the heads of twenty children, seated at a desk, will not vary one inch from a straight line. A distinguished literary lady, visiting one of the New York Public Schools, observing this uniformity in the position of the children when seated, inquired of the female teacher, how she managed to keep them so. She answered, she did not know; she believed the one adopted it because the other did. The fact is, it was owing to the chair and desk.

The chairs are made lower than usual, so that the feet of the scholar may rest upon the floor, and the muscles of the thigh do not tire by pressing hard upon the front edge of the seat. Fashion has had more influence in fixing the height of our chairs, than ease or convenience. The ladies are the best judges of such matters. When *they* order a sewing or a rocking chair, the direction is, make it *low*.

The following testimony was furnished by an eminent physician of New York, who has taken a lively interest in the progress of schools. He says the advantages of this chair are:—

1st. That it gives an easy and firm support to the muscles of the back; so uniform and agreeable that the posture of sitting never becomes painful, even though continued longer than is ever required in school.

2d. It thus effectually prevents that unequal and irregular action of the muscles on either side of the spine, which, in delicate children, is likely to result from the habit of sitting upon a bench or stool without a back, and which has often produced in such children a curvature of the spine, and other deformities.

3d. Its rotary or revolving motion affords opportunities for that kind and degree of exercise, even in the sitting posture, which is a salutary part of physical education.

4th. Its permanent fixedness on the floor upon a pedestal, secures its proper proximity to the desk in front, and guards against the leaning or reclining position which results from a movable bench, stool or chair, which may be nearer to the desk at one time than at another, and which has been found wearisome to children, and otherwise detrimental to both their comfort and health.

5th. It admits of being adapted to the size and height of children, the seat being higher or lower, and its relation to the desk in front, varied as the children are larger or smaller. In every school there may be sufficient diversity in these particulars to enable the judicious teacher to select seats for every scholar which shall be found convenient and comfortable, changing them as often as circumstances may require.

Simple as the chair may appear, it is the result of many experiments and much time. It was first thought that an ordinary rotary chair would answer the purpose; but it was found that on account of its back, the chair, when allowed to revolve, could not be placed sufficiently near to the desk, to afford the desired support to the back of the scholar. To ascertain the proper height of the chair, a large number of children were measured; to arrive at that of the desk, the length of arm from elbow to shoulder was taken, as it was thought that this might be a guide. The length differing to the extent of an inch and a half in children of the same stature, resort was had, in connection therewith, to the distance of sight. Upon experiment, it was found that when the desks were low, the back of the child was too much curved; when high, the body was too erect—a medium height was selected.

The chief peculiarity in the desk is, that in the place of straight wooden legs, there are substituted curved cast iron stanchions; the obvious advantages of which are, that they occasion no interference with the movements of the scholar seated opposite or near to them.

Two stanchions are necessary for a single desk. Two, also, will support a desk of sufficient length to accommodate three scholars; three, to accommodate six scholars; four, nine scholars; and so on for a greater number.

The expense of fitting up a room with this chair and desk, in the city of New York, varies from $1 50 to $2 00 a scholar, aside from the putting up of the desks.

Although we think very highly of these chairs in some respects, we have serious objections to the shape and material of the iron back piece. This is too low, and not shaped to give the requisite support to the back when fatigued from an upright or any other position, long continued. Children, thinly clad, and of delicate constitution, must experience inconvenience, and be exposed to more serious consequences, from the rapid conduction of heat from the body, and especially from the spinal column, coming as the iron support does, across the small of the back. We can see no objection to attaching an ordinary shaped chair seat and back to the revolving pedestal. Indeed, school chairs of this last description are manufactured by Mr. Mott, when ordered.

Since the above paragraph appeared in the first edition of this work, Mr. Mott informs us that he has modified the pattern of the back of his chair to obviate the objections therein made. The back piece is to be carried higher, and the iron is to be covered with cloth or felt. The seat is also to be covered with a stuffing of felt.

Mr. Mott has also added another size, both of his chair and scroll stanchions for desks, so as to accommodate better the oldest class of scholars in our public schools.

Public School Society of New York.

Prior to 1805, the only schools in the city of New York which partook at all of the character of public schools, were one established by the "Female Association for the Relief of the Poor," in 1802, and those sustained by different religious denominations for the gratuitous education of the children of their own members. These were few, feebly sustained, and the course of instruction altogether inadequate.

In April, 1805, on the petition of De Witt Clinton and other individuals, a "free school" was incorporated by the legislature for the education of children who did not belong to, and were not provided for by any religious society. This school was organized in May, 1806, and taught on the plan then recently originated by Joseph Lancaster.

In 1808, the institution was enlarged by the legislature under the name of the "Free School Society of the City of New-York," and the city corporation presented a site for a school-house, and entrusted to its keeping the education of the children of the alms-house.

In 1809, the first edifice was completed and dedicated to its future purposes in an address by De Witt Clinton, the president of the society.

In 1815, the society received its quota ($3,708) of the first apportionment of the State Fund for the support of Common Schools.

In 1821, a committee of the society were instructed to correspond with distinguished educators, in Europe and the United States, for information on the subject of schools, and especially the education of the poor. This step resulted in some modifications of the plans of the society, and the methods of instruction in the schools.

In 1828, the first primary school was opened in the Duane street building, on the plan of the infant schools, which had been introduced into the large cities of the United States, under voluntary efforts. The result was favorable. It drew off the younger scholars from the other schools in the same building, and facilitated the instruction and government in both classes of schools. This school was for a time under the joint management of the society and a committee of ladies from the infant school society. At this time, Mr. Samuel S. Seton was employed by the society as an agent to visit the families of the poor, to make known the benefits of the schools and secure the punctual attendance of delinquent scholars. This step led to a knowledge of various abuses, and the introduction of several improvements. Mr. Seton has since acted as the Agent of the Society, and in this capacity has given unity to all of the operations of the several committees of the Board.

In 1828–29, the schools of the public school society were placed more on the basis of "Common Schools"—open to all, not as a matter of charity, but of right, and supported in part like other great public interests, by a general tax. This tax was *one eightieth of one per cent.*, and was the first tax raised by the city of New York, for the support of Common Schools; the memorial by which the attention of the Common Council was called to the subject was signed principally by the wealthiest citizens.

In the winter of 1832 a large committee on the part of the society, was appointed to examine into the condition of the schools, and propose such modification and improvement, as might be considered judicious. To aid the committee with the experience of other cities, two of their number were deputed to visit Boston and examine the school system and schools of that city. This committee reported certain modifications, which were concurred in by the board. These modifications were the establishment of primary schools, under female teachers, for the elementary classes, with some simple apparatus for visible illustration; an extension of the studies in the upper public schools, so as to embrace astronomy, algebra, geometry, trigonometry, and book-keeping; an increase of the salaries of teachers, the substitution of assistant teachers for certain class recitations and reviews, and the opening of recitation rooms for this purpose; the more extended use of blackboard, maps, globes, and other apparatus; and the establishment of evening schools for apprentices, and such as leave school at an early age.

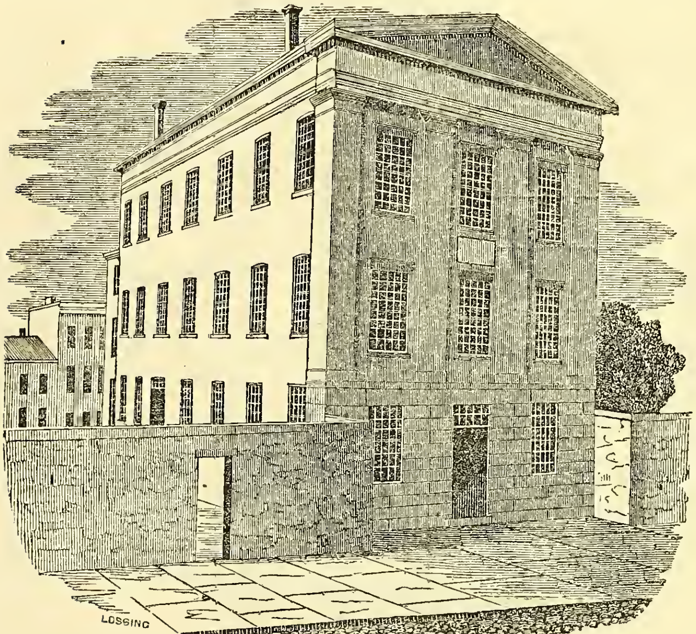
In 1834, owing to the increase of the primary schools, a school was opened for the benefit of those who were employed as monitors in that class of schools. This plan has been extended so as to embrace such pupils of the older class of the upper schools, as from their peculiar taste, industry and proficiency, could be recommended as monitors or teachers. While in these normal schools, they are denominated "cadets," and such as are properly qualified are promoted to the station of monitors, under pay, and so on to "passed monitors," from which class the assistant teachers are to be selected. These schools now embrace two hundred pupils, under the charge of nine teachers, and have already furnished the schools with a number of teachers.

In 1836, owing to a want of one or more high schools in the system, a number of scholarships in Columbia College and the University, with their preparatory schools, were opened by those having the management of these institutions, for such scholars of the public schools as were advanced to the limit of the instruction there provided. In 1841–2, similar privileges were opened in the Rutgers Female Institute, for a certain number of girls.

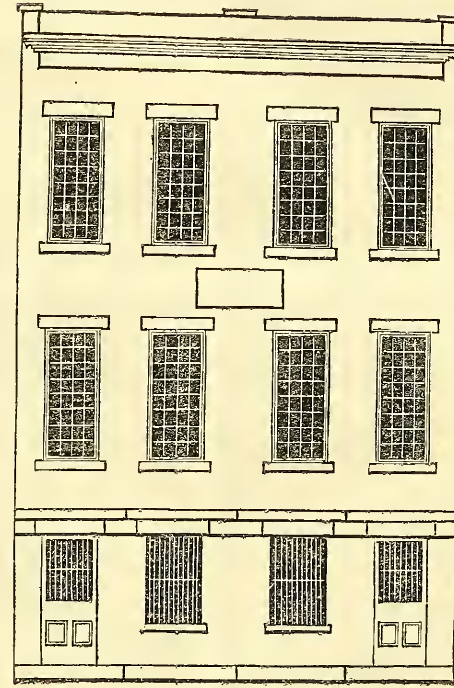
In 1842, an act passed the legislature which altered very essentially the system of public schools in the city of New York, by providing for the appointment of School Commissioners in the several wards, who together constitute a Board of Education.

In 1844, Mr. Josiah Holbrook's system of scientific exchanges and a plan of oral instruction in the natural sciences, were introduced into the schools of the Society. The teachers were authorized to allow the pupils to occupy a limited portion of time weekly in preparing specimens of writing, mapping and drawing, with a view to the exchanging of such specimens for those of other schools in this and other states. These exchanges of the results of mental and artistical labors on the part of the pupils, have excited a most healthful rivalry, greatly favorable to the development of their mental faculties, while its moral influences have been decidedly good. Not the least among its benefits has been the cultivating of a taste for the art of drawing, so necessary and useful a part of common school education, particularly in those pupils designed for mechanical pursuits. Connected with the operations here alluded to, was a plan of instruction by short oral lectures on the natural sciences, from objects collected and placed in the school cabinets by the pupils themselves, formed into associations or "school lyceums." The combined operations of these simple but effective plans, has already been productive of sensible improvement in the schools, and its benefits thereby extended to others. As an evidence that this new plan of operations has excited renewed interest in the pupils for their own improvement, and an increased local attachment to their schools, it may be stated, that by the voluntary agency of the pupils themselves, the spontaneous efforts of these "school lyceums" and "scientific exchanges," some of the schools have thus acquired extensive cabinets of minerals, and other natural objects, with much valuable philosophical apparatus for carrying out this useful plan of public instruction.

In 1845, two hundred volumes of carefully selected books were added to the Libraries of all the Public Schools of the Society, for the use of the pupils.



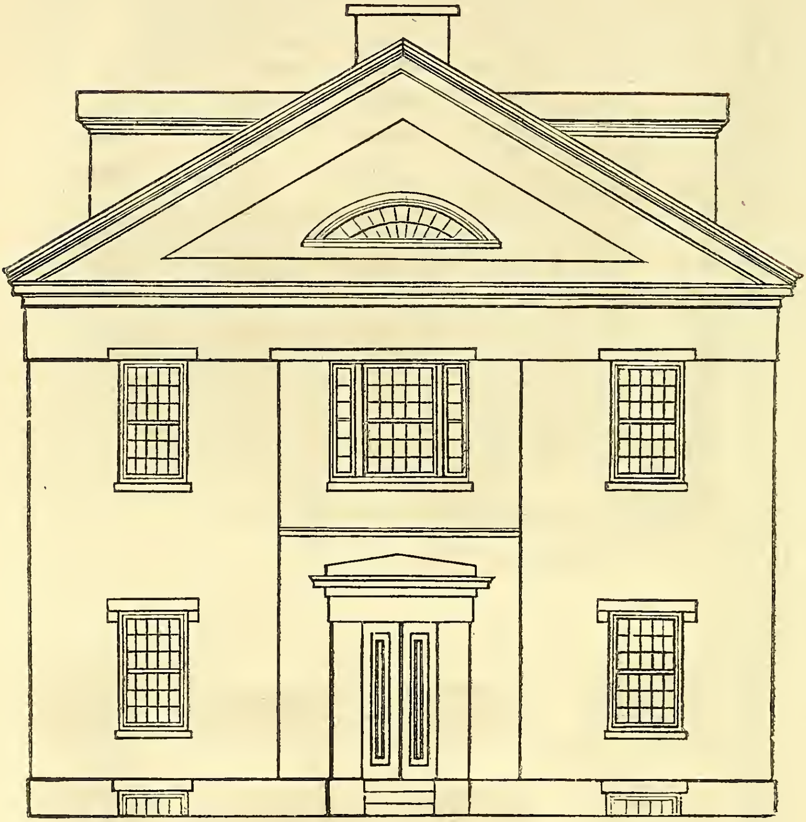
Public School-House—No. 17.
Located on 13th street, between the 7th and 8th Avenues.



Primary School-House.—Front Elevation.

Plans, &c. of High-School, Lowell.

Fig. 1.—End Elevation.



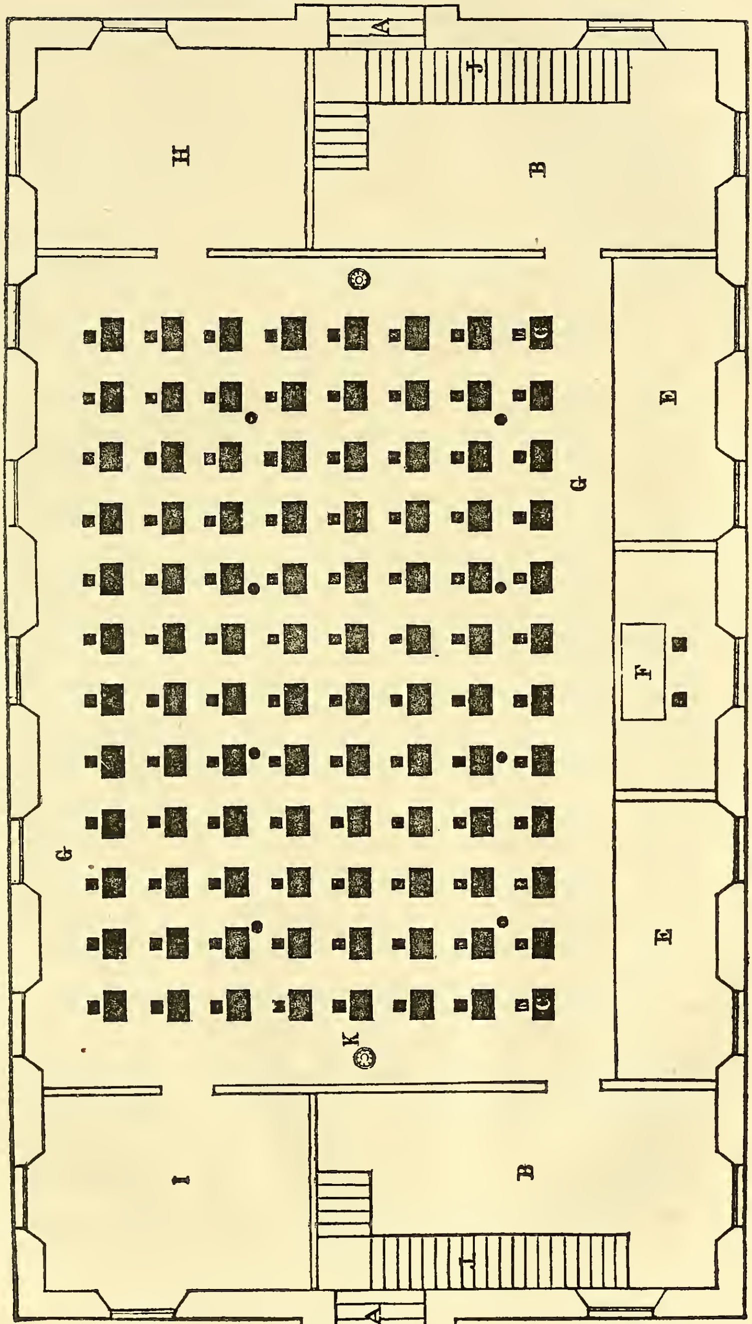
The house stands in the centre of a lot extending from Ann to Kirk street, furnishing separate entrances, yard, and play-ground for each sex.

The house is of brick, 84 feet by 48, with two stories, each 14½ feet in the clear, one for the male and the other for the female department, and an attic, which is arched and fitted up for a writing department.

A, A, entrances at the ends. B, B, entries, provided with hooks, &c. for hats, bonnets, and outer garments. Cb, Cb, single desks and seats. E, E, Teacher's platform, 6½ feet wide, raised 6 inches above the floor. F, Teacher's desk. G, G, aisles, nearly 4 feet in width, all around the school-room. H, room for library, apparatus, &c., 18½ by 12½ feet. I, recitation-room, 18½ by 12½ feet. J, J, stairways to the second story. K, hot air pipe from furnace.

The rooms are heated by furnaces in the cellar, and ventilated by four openings in the ceiling, 8 inches by 16, which are carried out in flues built for this purpose in the chimneys. Each pupil has an area on the floor of more than 14 square feet.

Fig. 2.—Lower School Room.



Plan, &c., of East School, Salem, Mass.

The lot on which the house stands extends from Essex street to Bath street.—There is a sufficient passage-way on each side of the house, and access from each street. The north end faces the common, which affords the most ample play-ground, always open.

The exterior dimensions of the building are 136 by 50 ft. The school-rooms are 65 by 36 ft. and 15 ft. high, each: the space in front of the desks, 65 by 4 ft. 6 inches; the space occupied by the desks, 59 by 25 ft.; the space in rear of the desks, 65 by 6 ft. 6 inches; the floor of which is raised 8 inches above the floor of the rooms; the side aisles are 3 ft., and all the other aisles 18 inches in width.

The desks are so placed that the scholars sit with their faces towards the partition which separates the school-room from the recitation rooms, the light being thus admitted in their rear and on one side.

The desks are 4 ft in length, and of four sizes in width, the two front ranges being 16 inches, the two next 15, the two next 14, and the two next 13. The desks are also of four sizes in height; the two front ranges being, on the lower side, 27 inches, the two next 26, the two next 25, the two next 24.

The desks in each school-room are placed in ranges, each range containing eleven desks, and each desk being fitted for two scholars; so that 176 scholars may be received in each department, or 352 in the whole school. The desks are constructed like tables, with turned legs, narrow rails, inclined top and a shelf beneath. The legs and rails are of birch, stained and varnished, and the tops of cherry, oiled and varnished. The legs are secured in the floor by tenons. The tables of the teachers are constructed and finished like the desks of the scholars.

The chairs are also of four sizes; those in the two front ranges being 12 by 12½ inches in the seat, (i. e. extreme width, the sides being of the usual shape of chairs,) and 16 inches in height, and those in the succeeding ranges being reduced in height in proportion to the desks, and also varying proportionally in the dimensions of the seats.

The chairs are constructed with seats of bass wood, and cherry backs; the seats and backs hollowed, and the seats resting on wooden pedestals, secured to the floor by tenons and screws.

Upon the front edge of the raised platform, in the rear of the desks, settees are placed, which are of the same length as the desks, and are placed in corresponding positions, with intervening spaces in continuation of the aisles. The settees are placed with the back towards the desks, and are designed exclusively for the use of classes attending reviews before the principals. The settees in width and height correspond to the largest size of chairs, and are constructed of the same materials, and finished in the same style.

In the center and at the extremities of the range of settees, are placed tables, (of 4 by 2 ft. 6 inches, oval shape,) which are occupied by the assistants, during general exercises, when the station of the principal is in front of the desks, the middle one being used by the principal when attending reviews.

Each recitation room (18 by 10 ft.) is appropriated to a single course of study, as marked upon the plan, and is therefore used exclusively by one assistant. Three sides of the room are appropriated to seats, being lined with cherry wood, (oiled and varnished) to a height reaching above the heads of the scholars. The lining is projected at the bottom, so as to furnish inclined backs to the seats, which are constructed of cherry wood, 13 inches in width, 2 inches thick, with hollowed top and rounded edge, supported on turned legs, the height being 15¼ inches from the top of the seat to the floor. The fourth side of the room, opposite the window, is occupied by a blackboard of 3 ft. in width, which extends across the space upon each side of the door.

All the spaces between the doors and windows upon the four sides of the school-rooms are occupied by blackboards. In the spaces between the windows upon the rear, recesses have been constructed, which are fitted with book-shelves, and are closed by means of covers in front, which are raised and lowered by weights and pulleys. These covers are blackboards, and are so finished as to represent sunken panels. Drawers are constructed beneath the blackboards to receive the sponges, chalk, &c.

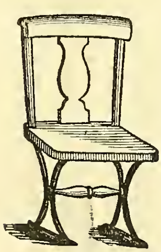
Circular ventilators are placed in the ceiling of each school-room and recitation room ; three in each school-room of 3 ft. in diameter, and one in each recitation room of 2 ft. in diameter. These ventilators are solid covers of wood, hung with hinges, over apertures of corresponding size, and raised or lowered by means of cords passing over pulleys, through the ceiling into the room below, the cords terminating in loops, which are fastened to hooks in the side of the room. When the ventilators are raised, the impure air escapes into the garret, the ventilation of which is also provided for by means of the circular windows in the gable ends, which turn on pivots in the center, and are opened or shut by cords passing over pulleys in the same manner as the ventilators.

Each school-room is warmed by a furnace, placed directly under the center of the space in front of the desks, the hot air ascending through a circular aperture of 2 ft. in diameter, which is represented upon the plan. The smoke-pipe, (of galvanized iron) is conducted upward through the center of this aperture, and thence, after passing a considerable distance into the school-room, through one of the recitation rooms into the chimney, which is built in the center of the front wall. The recitation rooms are warmed by means of apertures at the top and bottom respectively of the partitions which separate them from the school-rooms, which being open together, secure a rapid equalization of temperature in all the rooms. These apertures are fitted to be closed, with revolving shutters above, and shutters hung on hinges below.

In the partition wall between the school-rooms, is a clock having two faces, and thus indicating the hour to the occupants in each room. The clock strikes at the end of each half hour. In the ante-rooms, (marked F, F, on the plan Fig. 1) are hooks for caps, overcoats, &c. In each of these rooms, also, there is a pump and sink.

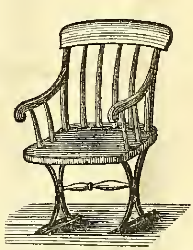
In the *lower story*, there are two primary school-rooms $36\frac{1}{2}$ ft. by $24\frac{1}{2}$ ft., each seating 60 children. Each child has a chair firmly fixed to the floor, but no desk. In the rear there is an appropriate shelf for books, for each pupil, numbered to correspond with the number on the chair. In front of the school, there is a blackboard occupying the distance between the doors, and a desk, at which the several classes stand in succession, and copy appropriate exercises on the slate from the blackboard.

For this school-house, with all its completeness of arrangements and regulations, the city of Salem is indebted mainly to the indefatigable exertions of the late Mayor, the Hon. Stephen C. Phillips. During the three years of his administration, every school-house was repaired or rebuilt, and all the schools brought under an admirable system. On leaving his office, in 1842, he gave to the city for school purposes, his salary for three years, amounting to $2,400, which has been applied to repairing and refurnishing the High School building, which is now a monument of his taste and munificence.



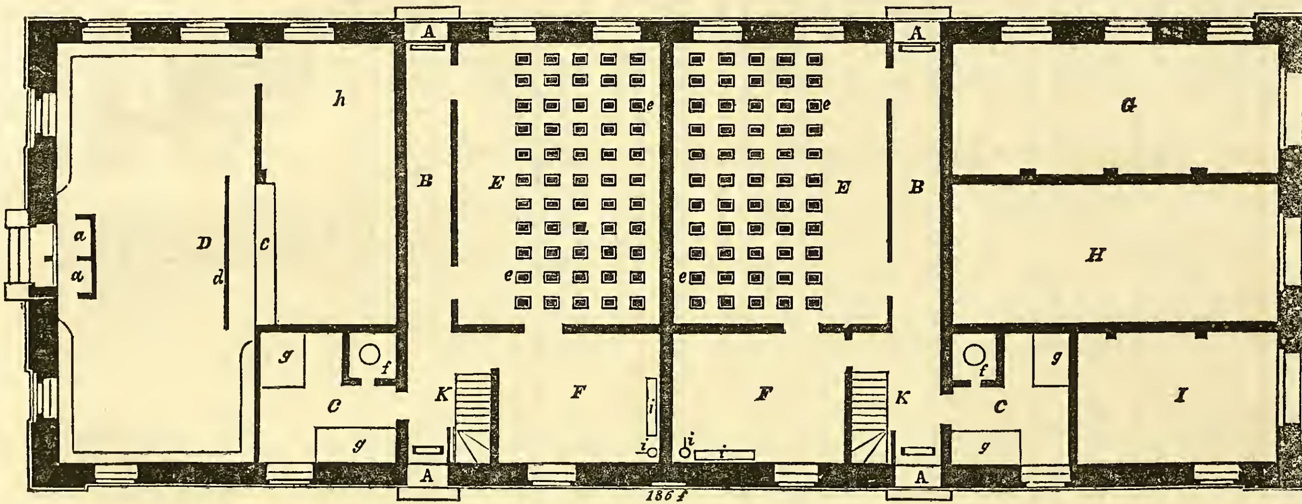
High School Chair.

The High School, and one of the new primary schools, are furnished with "Kimball's Improved School Chair," which for strength, comfort, and style of finish, is superior to any other now before the public.



Primary School Chair

FIGURE 1 EAST SCHOOLHOUSE, SALEM. *First Story.* [Scale 1-20 inch to a foot.]

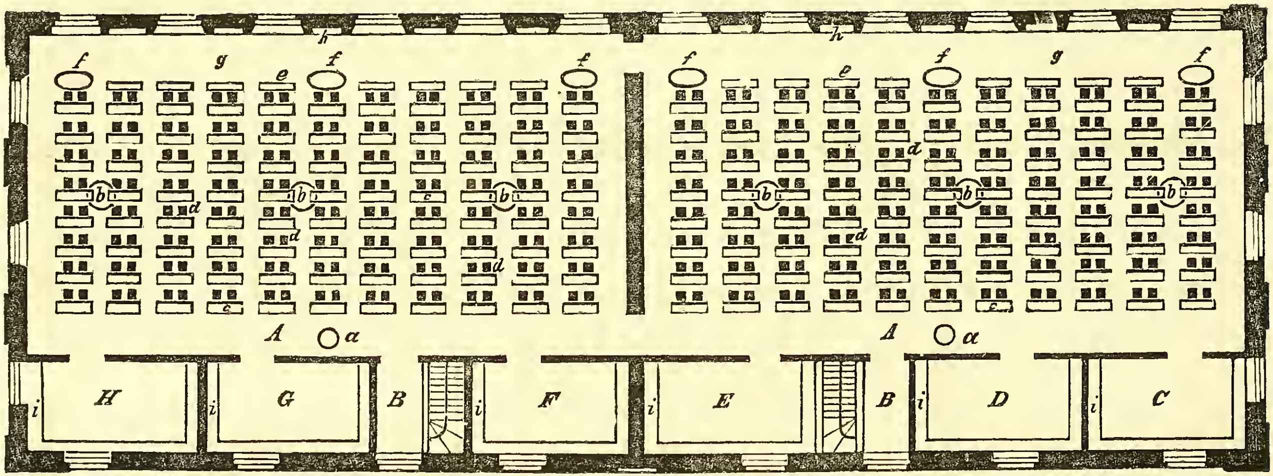


A, A, A, A—School entrances.
B, B—Passages, 5 feet wide.
C, C—Furnace and fuel rooms, 15 by 13 feet.
E, E—Primary schools, 36.6 by 24.3 feet.
e, e—Seats in primary schoolrooms.

F, F—Ante-rooms, 15 by 19 feet.
K, K—Stairs to second story.
f, f—Furnaces.
g, g—Fuel and ash bins.
i, i, i, i—Pumps and sinks.

The other apartments in the lower story are occupied for various city purposes, which is is unnecessary here to specify.

FIGURE 2. EAST SCHOOLHOUSE, SALEM. *Second Story.* [Scale, 1-20 inch to a foot.]



A, A—Schoolrooms, 65 by 36 feet each.
B, B—Entries and stairs from the first story.
C—Recitation room for reading, first course, 17 by 10 feet.
D— " " " grammar, " 18 by 10 "
E— " " " reading, second course, 19 by 10 feet.
F— " " " arithmetic, " 19 by 10 "
G— " " " geography, 18 by 10 feet.
H– ' " " arithmetic, first course, 17 by 10 feet

a, a—Hot air entrances.
b, b, &c.—Ventilators, 3 feet diameter, in the upper ceilings of the rooms.
c, c—Desks.
d, d—Seats.
e, e—Settees.
f, f, &c.—Tables for teachers.
g, g—Platform, raised 8 inches above floor of rooms
h, h—Recesses, containing books.
i, i—Seats occupying three sides of recitation rooms

Description of Latin and English High Schools, Salem.

The interior of this building is fitted up in a style of ornamental and useful elegance which has no parrallel in this country.

The Latin School is believed to be the first Free School established in the United States, and probably in the world, where *every person* within certain geographical limits, and possessing certain requisites of study, has an equal right of admission, free of cost. It was founded in 1637, and has continued without interruption, giving a thorough preparation to students for college, to the present day. The English High School was established in 1827.

The walls of the Latin Grammar School are enriched and adorned with inscriptions in the Greek and Latin language and character. These are not merely apothegms of wisdom, but mementoes of duty; they are fitted to inspire the pupils with noble sentiments, and are the appropriate "*Genius of the Place.*"

The interior of the English High School is adorned in a manner no less appropriate and useful.

In the center of the ceiling is the circle of the zodiac, 29 feet in diameter. The ventilator, $3\frac{1}{2}$ feet in diameter, represents the sun, the spots being designated upon the nucleus in conformity to the latest telescopic observation. The divergence of the solar rays is also fully exhibited. The earth is represented in four different positions, indicating the four seasons. The moon also is described in its orbit, and its position so varied as to exhibit its four principal changes. The globular figure of the earth is clearly shown, and lines are inscribed upon it representing the equator, tropics, and polar circles. The hour lines are also marked and numbered. The border of the circle represents upon its outer edge the signs of the zodiac, with their names, and within, the names of the months. The signs are divided into degrees, and the months into days, both of which are numbered. The thirty-two points of the compass are marked upon the inner edge, the true north and magnetic north both correctly indicated,—the variation of the needle having been ascertained by a recent series of observations.

The circle of the zodiac, as thus described, being enclosed within a square panel, the exterior spaces in the four angles are filled up as follows:

The western angle exhibits the planet Saturn, with his rings and belts, as seen through a telescope, and his true size in proportion to the sun, supposing the circle of the zodiac to represent the size of the sun. The eastern angle exhibits Jupiter, with his belts, of a size similarly proportionate. The other primary planets and the moon are described according to their relative sizes, in the southern angle. In the northern angle is a succession of figures, designed to represent the varying apparent size of the sun, as seen from the different planets. In the ceiling there are also two oblong panels, one towards the western, the other towards the eastern extremity. The western panel contains a diagram, which illustrates, by their relative position, the distance of the several planets, primary and secondary, from the sun, which is placed at one end of the panel. The several planets are designated by their signs, and the figures, placed opposite to each, show how many millions of miles it is distant from the sun. The satellites of the Earth, Jupiter, Saturn, and Herschel, are described as revolving in their orbits around their respective primaries. The eastern panel contains a diagram, which illustrates the theory of the solar and lunar eclipses. The moon is represented in different parts of the earth's shadow, and also directly between the earth and the sun.

Upon the four sides of the room, in the space above the windows and doors, eight panels are described, containing as many diagrams, which illustrate successively the following subjects:—

1. The different phases of the moon. 2. The apparent, direct, and retro grade motions of Mercury and Venus. 3. The moon's parallax. 4. The commencement, progress, and termination of a solar eclipse. 5. The diminution of the intensity of light, and the force of attraction in proportion to the increase of the squares of distance. 6. The transit of Venus over the sun's disc. 7. The refraction of the rays of light by the atmosphere, causing the sun, or other celestial bodies, to appear above the horizon when actu-

ally below it. 8. The theory of the tides, giving distinct views of the full and neap tide, as caused by the change of position and the relative attraction of the sun and moon.

The two small panels over the entrance doors represent, respectively, the remarkable comets of 1680 and 1811, and the theory of cometary motion as described in the plates attached to Blunt's "Beauty of the Heavens."

The diagram in the large panel upon the north side of the recitation platform represents the relative height of the principal mountains and the relative length of the principal rivers on the globe. The mountains and rivers are all numbered, and scales of distance are attached, by which the heights and lengths can be readily ascertained. The relative elevation of particular countries, cities and other prominent places, the limits of perpetual snow, of various kinds of vegetation, &c., are distinctly exhibited. This diagram is a copy of that contained in Tanner's Atlas.

The diagram in the corresponding panel on the south side of the recitation platform represents a geological section, the various strata being systematically arranged and explained by an index.

The space between the windows upon the north and south sides of the room are occupied by inscriptions in which the diameter, hourly motion, sidereal period, and diurnal rotation of the several primary planets and the earth's moon, are separately stated, according to calculations furnished for the purpose by Professor Peirce, of Cambridge. The hourly motion and sidereal period of the four asteroids are also stated in corresponding inscriptions upon the western side. The diameter and rotation of the sun are inscribed upon the edge of the circular recess beneath the ventilator.

Over the frontispiece, which surmounts the recess upon the teacher's rostrum, is a beautifully executed scroll bearing the inscription,

"ORDER IS HEAVEN'S FIRST LAW."

This motto may be regarded as equally appropriate, whether viewed as explanatory of the celestial phenomena which are figured upon the walls, or as suggesting the principle which should guide the operations of the school.

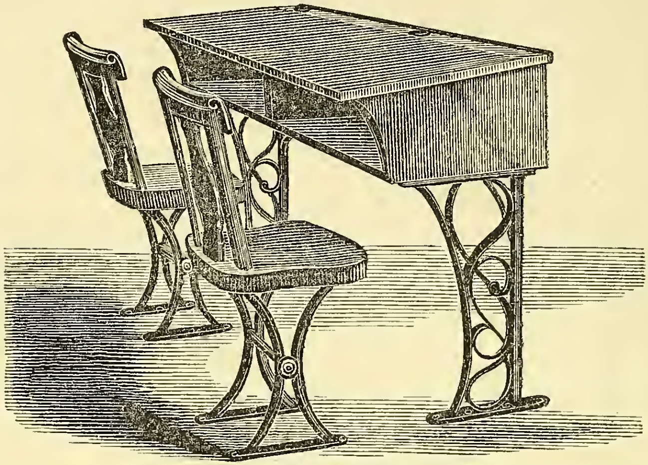
The clock is placed within the recess, upon the wall of which the course of studies prescribed for the school, and arranged into two divisions, is conspicuously inscribed.

Many of the charity schools of Holland contain paintings of no inconsiderable excellence and value. In Germany, where every thing, (excepting war and military affairs,) is conducted on an inexpensive scale, the walls of the school-rooms were often adorned with cheap engravings and lithographs, of distinguished men, of birds, beasts, and fishes ;—and, in many of them, a cabinet of natural history had been commenced. And throughout all Prussia and Saxony, a most delightful impression was left upon my mind by the character of the persons whose portraits were thus displayed. Almost without exception, they were likenesses of good men rather than of great ones,—frequently of distinguished educationists and benefactors of the young, whose countenances were radiant with the light of benevolence, and the very sight of which was a moral lesson to the susceptible hearts of children.

In the new building for the "poor school" at Leipsic, there is a large hall in which the children all assemble in the morning for devotional purposes. Over the teacher's desk, or pulpit, is a painting of Christ in the act of blessing little children. The design is appropriate and beautiful. Several most forlorn-looking, half-naked children stand before him. He stretches out his arms over them, and blesses them. The mother stands by with an expression of rejoicing, such as only a mother can feel. The little children look lovingly up into the face of the Saviour. Others stand around, awaiting his benediction. In the back-ground are aged men, who gaze upon the spectacle with mingled love for the children and reverence for their benefactor. Hovering above is a group of angels, hallowing the scene with their presence.—*Mr. Mann's Seventh Annual Report.*

Kimball's Improved School Chairs and Desk.

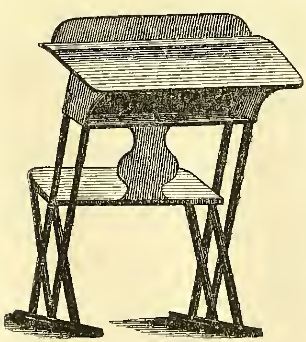
"These Chairs combine strength, comfort, and style of finish. They are made of different heights, varying from eight to sixteen inches, and for Primary as well as for Grammar and District Schools.



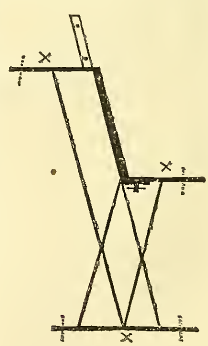
The School Desks are made of Pine, Cherry, or Black Walnut, and of heights to correspond with the chairs. The iron supporters are firmly screwed to the floor, and are braced in such a manner that there is not the least motion."

The above extracts are taken from the Circular of James Kimball, 109 or 127 *Essex Street, Salem, Mass.*

The cuts below represent a view of the desk and seat, and of the frame



for the same, used in the high school for girls in Newburyport, Mass. The frame is cast iron, to which the seat and desk is attached by screws. The frame is strengthened by a brace extending from each side below the seat.



Normal Schools, or Teachers' Seminaries.

Before presenting plans of the Normal School-houses recently erected in Massachusetts,—the first erected in this hemisphere,—we propose to give a brief sketch of the history of Normal Schools in this country and in Europe, with references to books* in which a minute account of the organization of particular schools can be found.

By a Normal† School, or Teachers' Seminary, is meant an institution for the training of young men and young women who aim to be teachers, to a thorough and practical knowledge of the duties of the school-room, and to the best modes of reaching the heart and intellect, and of developing and building up the whole character of a child. It aims to do for the young and inexperienced teacher, all that the direction and example of the master-workman, and all that the experience of the workshop do for the young mechanic—all that the naval and military schools do for those who lead in any capacity in the army or navy—all that the law school, or the medical school, or the theological seminary do for the professions of law, medicine, or theology. In every department of mechanical, artistic, or professional labor, the highest skill is attained only after long and appropriate training under wise superintendence; and the Normal School aims to impart this previous training by providing a thorough course of instruction, under competent teachers, with reference to teaching the same things to others. This course of instruction involves the whole art of teaching—a knowledge of human nature, and of a child's nature in particular—of the human mind, and especially of a child's mind, and of the order in which its several faculties should be called into exercise; of the best motives by which good habits of study can be cultivated in the young; of the arrangement and classification of scholars, and of the best means and appliances for securing obedience and order, and keeping alive an interest in the daily exercises of the school. And this art of teaching must be illustrated and exemplified by those who are to apply it, in a model school. The idea of such a school is not a mere speculation of ardent benevolence—it is an existing reality in this country as well as in Europe.

The first school specially destined for educating the teacher in the principles and practice of his profession, was instituted by Franke, in connection with his Orphan House, at Halle, in 1704. Previous to this date, lectures on the art of teaching were delivered in connection with the higher seminaries of education, at Gotha, Wesel, and Brunswick.

In 1735, the first regular seminary for teachers in Prussia was

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* See Catalogue of Books on Education, p. 286.

† The word *normal* is derived from the Latin, *norma*, signifying a *square*, an instrument used by builders, a *rule*, a *pattern*, a *model*. In the adjective form, *normalis* signifies *right by the square, pattern, or model*. As applied to a school for teachers, the word normal means a model school for teachers, an institution where correct principles of teaching are taught, and where the art of teaching is exemplified in correct practice.

established in Pomerania, and the second at Berlin, in 1748, by Hecker, a pupil of Franke. By a royal ordinance in 1752, Frederic 2d enjoined that all vacancies in the country schools on the crown lands, in certain sections of his kingdom, should be supplied by pupils from Hecker's Seminary. The King at the same time allowed an annual stipend for the support of twelve alumni of this establishment, a number which in 1788 was raised to sixty. In 1773, the schools established at Rekahn, in Brandenburg, became the model schools to which young men resorted from every part of Germany to be trained in the principles and practice of primary instruction. Prior to 1800, there were but six of these institutions in Prussia. But it is the pride and glory of this monarchy, that in periods of the greatest national distress and disaster, when the armies of France were desolating her fields, occupying her citadels, and diverting her revenues, the great work of improving her schools was never lost sight of. The establishment of teachers' seminaries still went forward; that at Konigsburg in 1809, at Branersburg in 1810, and at Breslau in 1812. But not content with establishing these seminaries at home, the most promising young teachers were sent into other countries to acquire a knowledge of all improvements in the science and art of education.

Normal Schools were introduced into Hanover in 1757; into Austria in 1767; into Switzerland in 1805; into France in 1808; into Holland in 1816; into Belgium in 1843, and into England in 1842.

In Prussia and most of the German States, there are now enough of these institutions to supply the demand for teachers in the public schools. Saxony, with a population less than that of the State of New York, supports five Normal Schools, and Saxe-Weimar, with a population less than that of Connecticut, supports two. Prussia, with a population of fourteen millions, has at this time forty-nine seminaries, in which there are nearly three thousand teachers. At the end of three years after leaving the seminary, the young teachers return for a re-examination.

In Great Britain, after years of strenuous effort on the part of the friends of popular education, the importance of Normal Schools as the chief means for improving the qualifications of teachers, has been recognized by the Government. The Training School at Chelsea, (called St. Mark's College,) under the management of the National Society, the Normal and Model School of the British and Foreign School Society, the Battersea Training School, and the Model School of the Infant School Society in England, the Model School of the National Board for Ireland, the Normal Schools at Edinburgh and Glasgow in Scotland, are all aided out of the annual parliamentary grant for education.

In this country, the claims of these institutions were first distinctly presented by Rev. Thomas H. Gallaudet, of Hartford, Conn., in 1825, and by James G. Carter, of Lancaster, Mass., in a series of essays on the subject, and by William Russell, of Boston, in the Journal of Education for 1826. One fact is certain, the improvement of schools in every country has followed hand in hand with the establishment, multiplication, and improvement of Normal Schools.

New York State Normal School.

The history of the efforts to secure a professional education and training for the teachers of common schools in the State of New York, is full of instruction and encouragement to those who are laboring in the same direction in other States. Among the earliest and most earnest advocates of legislative provision on this subject, stands the name of De Witt Clinton. In his message to the Legislature in 1819, Governor Clinton remarks:

"The most durable impressions are derived from the first stages of education; ignorant and vicious preceptors and injudicious and ill-arranged systems of education must have a most pernicious influence upon the habits, manners, morals and minds of our youth, and vitiate their conduct through life." In 1820, he used the following language: "The education of youth is an important trust, and an honorable vocation, but it is too often committed to unskillful hands. Liberal encouragement ought to be dispensed for increasing the number of competent teachers." In 1825, after speaking of the cause of education generally, the Governor says: "In furtherance of this invaluable system, I recommend to your consideration the education of competent teachers," &c.

In his message to the Legislature, at the opening of the session of 1826, he thus adverts to the subject of the proper preparation of common school teachers:

"Our system of instruction, with all its numerous benefits, is still, however, susceptible of improvement. Ten years of the life of a child may now be spent in a common school. In two years the elements of instruction may be acquired, and the remaining eight years must either be spent in repetition or idleness, unless the teachers of common schools are competent to instruct in the higher branches of knowledge. The outlines of geography, algebra, mineralogy, agricultural chemistry, mechanical philosophy, surveying, geometry, astronomy, political economy and ethics, might be communicated in that period of time, by able preceptors, without essential inteference with the calls of domestic industry. The vocation of a teacher in its influence on the character and destiny of the rising and all future generations, has either not been fully understood, or duly estimated. It is, or ought to be, ranked among the learned professions. With a full admission of the merits of several who now officiate in that capacity, still it must be conceded that the information of many of the instructors of our common schools does not extend beyond rudimental education; that our expanding population requires constant accession to their numbers; and that to realize these views, it is necessary that some new plan for obtaining able teachers should be devised. I therefore recommend a seminary for the education of teachers in those useful branches of knowledge which are proper to engraft on elementary attainments. A compliance with this recommendation will have the most benign influence on individual happiness and social prosperity."

And again, in his message in 1828, Governor Clinton urges the subject on the attention of the Legislature.

"It may be taken for granted, that the education of the body of the people can never attain the requisite perfection without competent instructors, well acquainted with the outlines of literature and the elements of science." He recommends with this view, "a law authorizing the supervisors of each county to raise a sum not exceeding $2000, provided that the same sum is subscribed by individuals, for the erection of a suitable edifice for a Monitorial High School, in the county town. I can conceive of no reasonable objection to the adoption of a measure so well calculated to raise the character of our school masters, and to double the powers of our artizans by giving them a scientific education."

In 1826, Hon. John C. Spencer, from the Literature Committee of the Senate, to whom the message of Governor Clinton for that year had been referred, made a report, recommending among other plans for the improvement of common schools, that the income of the "Literature Fund" be divided among the academies of the State, *not* in reference to the number of *classical students* in each, but "to the number of persons instructed in each, who shall have been licensed as teachers of common schools by a proper board." He thus introduces the subject:

"In the view which the committee have taken, our great reliance for nurseries of teachers must be placed on our colleges and academies. If they do not answer this purpose, they can be of very little use. That they have not hitherto been more extensively useful in that respect is owing to inherent defects in the system of studies pursued there. When the heads of our colleges are apprised of the great want of teachers which it is so completely in their power to relieve, if not supply, it is but reasonable to expect that they will adopt a system by which young men whose pursuits do not require a knowledge of classics, may avail themselves of the talent and instruction in those institutions, suited to their wants, without being compelled also to receive that which they do not want, and for which they have neither time nor money."

"In 1827, Mr. Spencer, from the same Committee, reported a bill entitled 'An act to provide permanent funds for the annual appropriation to common schools, to increase the Literature Fund, and to promote the education of teachers,' by which the sum of $150,000 was added to the Literature Fund. And the Regents of the University were required annually to distribute the whole income of this fund among the several incorporated academies and seminaries, which then were or might thereafter become subject to their visitation, 'in proportion to the number of pupils instructed in each academy or seminary for six months during the preceding year, who shall have pursued classical studies, or the higher branches of English education, or both.' In the report accompanying this bill, which, on the 13th of April, became a law, the committee expressly observe, that their object in thus increasing this fund is 'to promote the education of young men in those studies which will prepare them for the business of instruction, which it is hoped may be accomplished to some extent, by offering inducements to the trustees of academies to educate pupils of that description.' 'In vain will you have established a system of instruction; in vain will you appropriate money to educate the children of the poor, if you do not provide persons competent to execute your system, and to teach the pupils collected in the schools. And every citizen who has paid attention to it and become acquainted practically with the situation of our schools, knows that the incompetency of the great mass of teachers is a radical defect which impedes the whole system, frustrates the benevolent designs of the Legislature, and defeats the hopes and wishes of all who feel an interest in disseminating the blessings of education.' 'Having undertaken a system of public instruction, it is the solemn duty of the Legislature to make that system as perfect as possible. We have no right to trifle with the funds of our constituents, by applying them in a mode which fails to attain the intended object. Competent teachers of common schools must be provided; the academies of the State furnish the means of making that provision. There are funds which may be safely and properly applied to that object, and if there were none, a more just, patriotic, and in its true sense, popular reason for taxation cannot be urged. Let us aid the efforts of meritorious citizens who have devoted large portions of their means to the rearing of academies; let us reward them by giving success to their efforts; let us sustain seminaries that are falling into decay; let us revive the drooping and animate the prosperous, by cheering rays of public beneficence; and thus let us provide nurseries for the education of our children, and for the instruction of teachers who will expand and widen and deepen the great stream of education, until it shall reach our remotest borders, and prepare our posterity for the maintenance of the glory and prosperity of their country.' "

The legal provision for the better education of teachers rested on this basis until 1834, when an act was passed, by which the surplus income of the Literature Fund over twelve thousand dollars was placed at the disposal of the Regents of the University, to be by them distributed to such academies, subject to their visitation as they might select, and to be *exclusively devoted to the education of teachers for the common schools*, in such manner and under such regulations as they might prescribe.

In pursuance of the provisions of the act of 2d of May, 1834, authorizing the Regents of the University to apply a part of the income to the Literature Fund to the education of common school teachers, a plan was reported on the 8th of January, 1835, by Gen. Dix, from the committee appointed for that purpose, to the Regents with the view of carrying into effect the intention of the act. This plan was approved and adopted by the Regents; and one academy was selected in each of the eight Senate districts, charged with the establishment of a Department specially adapted to the instruction of teachers of common schools. To support these departments, each academy received from the Literature Fund, a sufficient sum to procure the necessary apparatus for the illustration of the various branches required to be taught; the sum of $191 to be appropriated to the enlargement of the academical library; and an annual appropriation of $400 to meet the increased expense which might devolve upon the institution in consequence of the establishment of the teachers' department.

In his annual Report for 1836, the Superintendent (Gen. Dix,) again adverts to the fact, that in the adoption of this system 'the Legislature has merely provided for the more complete execution of a design long entertained, so far as respects the employment of the academies for this purpose. The propriety of founding separate institutions," he continues, 'upon the model of the seminaries for teachers in Prussia, was for several years a subject of public discussion in this State. It was contended, on the one hand, that such institutions would be more likely to secure the object in view; and on the other, that it might be as effectually and more readily accomplished through the organized academies.' After again referring to the act of April 13, 1827, he concludes:

" Thus although the plan of engrafting upon the academies, departments for the preparation of teachers, may not have been contemplated at the time, yet this measure is to be regarded only as a more complete development of the design of the Legislature in passing the act referred to."

" By the 8th section of the act of April 17, 1838, appropriating the income of the United States Deposite Fund to the purposes of education,

&c., the sum of $28,000 was directed to be annually paid over to the Literature Fund, and apportioned among the several academies of the State; and by the 9th section, it was made the duty of the Regents of the University 'to require every academy receiving a distributive share of public money, under the preceding section equal to seven hundred dollars per annum, to establish and maintain in such academy, a department for the instruction of common school teachers, under the direction of the said Regents, as a condition of receiving the distributive share of every such academy.' Under this provision eight academies, in addition to those designated specially for this purpose by the Regents, established departments for the education of teachers.

Desirous of knowing the practical operation of the departments thus organized, the superintendent (Mr. Spencer) during the summer of 1840, commissioned the Rev. Dr. Potter of Union College, and D. H. Little, Esq. of Cherry-Valley, to visit these institutions, and report the result of their examinations to the department, accompanied by such suggestions as they might deem expedient. Prof. Potter in his report, after enumerating the various advantages and defects which had presented themselves to his observation in the course of his examination, observes in conclusion:

'The principal evil connected with our present means of training teachers, is, that they contribute to supply instructors for *select* rather than for common schools; and that for want of special exercises, they perform even that work imperfectly. I would suggest whether some means might not be adopted for training a class of teachers, with more especial reference to country common schools, and to primary schools in villages and cities; teachers whose attainments should not extend much beyond the common English branches, but whose minds should be awakened by proper influence; who should be made familiar by practice with the best modes of teaching; and who should come under strong obligations to teach for at least two or three years. In Prussia and France, normal schools are supported at the public expense; most of the pupils receive both board and tuition gratuitously; but at the close of the course they give bonds to refund the whole amount received, unless they teach under the direction of the government for a certain number of years. That such schools, devoted exclusively to the preparation of teaching, have some advantages over any other method, is sufficiently apparent from the experience of other nations: and it has occurred to me that, as supplementary to our present system, the establishment of one in this State might be eminently useful. If placed under proper auspices and located near the Capitol, where it could enjoy the supervision of the Superintendent of Common Schools, and be visited by the members of the Legislature, it might contribute in many ways to raise the tone of instruction throughout the State.'

From an examination of these reports, the Superintendent comes to the conclusion that 'these departments ought not to be abandoned, but sustained and encouraged, and the means of establishing a large number in other academies provided. They, with the other academies and colleges of the State, furnish the supply of teachers indispensable to the maintenance of our schools.' He recommends 'the extension of the public patronage to all the academies in the State, to enable them to establish teachers' departments; and in those counties where there are no academies, the establishment of normal schools.' 'One model school or more,' he thinks, 'might be advantageously established in some central parts of the State, to which teachers, and those intending to be such, might repair to acquire the best methods of conducting our common schools.'

By a resolution adopted by the Regents of the University, on the 4th of May of the same year, eight additional academies were designated for the establishment and maintenance of teachers' departments; and the appropriation to each of the institutions in which such departments had been organized by the Regents, reduced to $300 per annum. At this period, including the academies which were required, under the act of 1838, to maintain such departments in consequence of the receipt of a specified portion of the Literature Fund, the number of academies in which departments for the education of teachers were organized was twenty-three, and the number of students taught in them about six hundred."

The above facts and extracts have been principally gathered from a "Report of the Committee on Colleges, Academies, and Common Schools," to the House of Representatives in 1844, of which Mr. Hulburd, of St. Lawrence, was chairman, and the author of the able document referred to. The Committee, on passing to the consideration of a State Normal School, remark:

"From this recapitulation, it will appear that the principal reliance of the friends and supporters of the common schools, for an adequate supply of teachers, has, from a very early period, been upon the academies; that the inability of the latter to supply this demand, induced, in 1827, an increase of $150,000 of the fund, applicable to their support; and this for the express purpose of enabling them to accomplish this object; that the Regents of the University, the guardians of these institutions, characterized this increase of the fund as an unwonted and "extraordinary" act of liberality on the part of the State towards them; explicitly recognized the condition, or rather the avowed *expectations* on which it was granted; accepted the trust, and undertook to perform those conditions, and to fulfill those expectations; that, to use the language of one of the superintendents, 'the design of the law was not sustained by the measures necessary to give it the form and effect of a system;' that to remedy this evil, one academy was specially designated in each Senate district with an endowment of $500 to provide the necessary means and facilities of instruction, and an annual appropriation of $400, for the maintenance of a department for the education of teachers; and soon afterwards the sum of $28,000 added to the Literature Fund from the avails of the U. S. Deposite Fund, while eight additional academies were required to organize and maintain similar departments; that, finally, the number of these departments was augmented to twenty-three, and every exertion put forth to secure the great results originally contemplated in their establishment; and that in the judgment of successive superintendents of common schools, the Regents of the University and the most eminent and practical friends of education throughout the state, these institutions, whether considered in the aggregate or with reference to those specially designated, from time to time, for the performance of this important duty, of supplying the common schools with competent teachers, have not succeeded in the accomplishment of that object. Having, therefore, to revert again to the language of the superintendent before referred to, 'proved inadequate to the ends proposed,' may not now '*a change of plan* be insisted on without being open to the objection of abandoning a system which has not been fairly tested?' And have the academies any just reason to complain, if they are not longer permitted to enjoy undiminished the liberal appropriations conferred upon them by the State *for a specific object;* an object which they have not been able satisfactorily to accomplish?"

This committee having satisfied themselves that all former legislation on this subject was inadequate, and having examined, by a sub-committee, the Normal Schools of Massachusetts, and inquired into their operation in other countries, recommended the establishment of a Normal School at Albany, "for the education and training of teachers for common schools," and that the sum of $9,600 for the first year, and $10,000 annually for five years thereafter, in appropriations for its support. This recommendation was adopted by an almost unanimous vote.

This institution is required to be located in the county of Albany; and is to be under the supervision, management and direction of the Superintendent of Common Schools and the Regents of the University, who are authorized and required "from time to time to make all needful rules and regulations; to fix the number and compensation of teachers and others to be employed therein; to prescribe the preliminary examination, and the terms and conditions on which pupils shall be received and instructed therein—the number of pupils from the respective cities and counties, conforming as nearly as may be to the ratio of population—to fix the location of the said school, and the terms and conditions on which the grounds and buildings therefor shall be rented, if the same shall not be provided by the corporation of the city of Albany; and to provide in all things for the good government and management of the said school." They are required to appoint a board, consisting of five persons, including the Superintendent of Common Schools, who are to constitute an executive committee for the care, management and government of the school, under the rules prescribed by the Board of Regents. Such executive committee, are to make full and detailed reports from time to time to the Superintendent and Regents, and among other things to recommend such rules and regulations as they may deem proper for said schools.

The superintendent and Regents are required annually to transmit to the Legislature an account of their proceedings and expenditures, together with a detailed report from the executive committee, relating to the progress, condition, and prospects of the school.

The city of Albany tendered the use of a suitable building, free of rent, for the use of the institution, and the school was organized and commenced the business of instruction in December, 1844, under the charge of David P. Page, Esq., of Newburyport, Mass., as Principal.

The following members composed the Executive Committee, under which the institution was organized: Hon. *Samuel Young*, State Superintendent, Rev. *Alonzo Potter*, D. D., Rev. *Wm. H. Campbell* *Gideon Hawley* and *Francis Dwight*, Esqrs.

The following account of the State Normal School is copied from the ANNUAL CIRCULAR of the Executive Committee, for 1847.

"The Normal School for the State of New York, was established by an act of the Legislature in 1844, 'for the instruction and practice of Teachers of Common Schools, in the science of Education, and in the art of Teaching.' Its sole object is to improve the teachers of Common Schools; and the course of study and conditions of admission have been adopted with reference to that object.

Each county in the State is entitled to send to the School a number of pupils, (either male or female,) equal to twice the number of members of the Assembly in such county. The pupils are appointed by the county and town superintendents at a meeting called by the county superintendent for that purpose. This meeting should be held and the appointment made at least two weeks before the commencement of each term, or as soon as information is received as to the number of vacancies. A list of the vacancies for each term will be published in the District School Journal, as early as the number of such vacancies can be ascertained,—usually before the close of the former term.

Pupils once admitted to the school will have the right to remain until they graduate; unless they forfeit that right by voluntarily vacating their place, or by improper conduct.

COURSE OF STUDY. The following is the course of study for the school; and a thorough acquaintance with the whole of it, on the part of the male pupils, is made a condition for graduating:

1. Orthography, *Normal Chart.* 2. Analysis of Derivative Words. 3. Reading and Elocution. 4. Writing, Geography and Outline Maps, (with map drawing.) 5. English Grammar, (with Composition.) 6. History of United States. 7. Human Physiology. 8. Mental Arithmetic. 9. Elementary Arithmetic. 10. Higher Arithmetic. 11. Elementary Algebra. 12. Higher Algebra. 13. Geometry, Six Books. 14. Plane Trigonometry. 15. Land Surveying. 16. Natural Philosophy. 17. Chemistry, (with experimental lectures.) 18. Intellectual Philosophy. 19. Moral Philosophy. 20. Constitutional Law, with select parts of the Statutes of this State, most intimately connected with the rights and duties of citizens. 21. Rhetoric, *Lectures.* 22. Theory and Practice of Teaching, *Lectures and Experimental School.* 23. Mathematical Geography, Use of Globes, and Elements of Astronomy, *Lectures.* 24. Lessons in Drawing and Vocal Music, to be given to all.

The same course of study, omitting the Higher Algebra, Plane Trigonometry and Surveying, must be attained by females as a condition of graduating.

N. B. Any of the pupils who desire further to pursue mathematics, can be allowed to do so after completing the above course of study.

QUALIFICATION OF APPLICANTS. Females sent to the school must be sixteen years of age, and males eighteen.

The superintendents, in making their appointments, are urged to pay no regard to the political opinions of applicants. The selections should be made with reference to the *moral worth* and abilities of the candidates. Decided preference ought to be given to those, who, in the judgment of the superintendents, give the highest promise of becoming the most efficient teachers of common schools. It is also desirable that those only should be appointed who have already a good knowledge of the common branches of study, and *who intend to remain in the school until they graduate.*

ENTRANCE. All the pupils, on entering the school, are required to sign the following declaration:

'*We the subscribers hereby* DECLARE, *that it is our intention to devote ourselves to the business of teaching district schools, and that our sole object in resorting to this Normal School is the better to prepare ourselves for that important duty.*'

As this should be signed in good faith on the part of the pupils, they should be made acquainted with its import before they are appointed. It is expected of the superintendents, that they shall select such as will sacredly fulfill their engagements in this particular.

Pupils on entering the school are subjected to a thorough examination, and are classified according to their previous attainments. The time required to accomplish the course will depend upon the attainments and talents of the pupil, varying from *one* to *four* terms. *Very few*, however, can expect to graduate in one term.

PRIVILEGES OF THE PUPILS. All pupils receive their tuition free. They are also furnished with the use of text-books without charge; though if they already own the books of the course, they would do well to bring them, together with such other books for reference as they may possess. Moreover, they draw a small sum from the fund for the support of the school, to defray in part their expenses.

It is proposed to apportion the sum of $1,700 among the 256 pupils, who may compose the school during the next term. 1. Each pupil shall receive three cents a mile on the distance from his county town to the city of Albany. 2. The remainder of the $1,700 shall then be divided equally among the students in attendance.

The following list will show how much a student of each county will receive, during the ensuing term:

Albany, $2.41; Allegany, $10.09; Broome, $6.76; Cattaraugus, $11.17; Cayuga, $7.09; Chautauque, $12.49; Chemung, $8.35; Chenango, $5.41; Clinton, $7.27; Columbia, $3.28; Cortland, $6.67; Delaware, $4.72; Dutchess, $4.66; Erie, $10.93; Essex, $6.19; Franklin, $8.77; Fulton, $3.76; Genesee, $9.73; Greene, $3.43; Hamilton, $4.87; Herkimer, $4.81; Jefferson, $7.21; Kings, $6.97; Lewis, $6.28; Livingston, $9.19; Madison, $5.44; Monroe, $8.98; Montgomery, $3,61; New-York, $6.85; Niagara, $10.72; Oneida, $5.29; Onondaga, $6.40; Ontario, $8.26; Orange, $5.44; Orleans, $10.12; Oswego, $7.21; Otsego, $4.39; Putnam, $5.59; Queens, $7.63; Rensselaer, $2.59; Richmond, $7.32; Rockland, $6.07; Saratoga, $4.78; Schenectady, $2.86; Schoharie, $3.07; Seneca, $7.54; St. Lawrence, $8.59; Steuben, $8.89; Suffolk, $9.16; Sullivan, $5.80; Tioga, $7.42; Tompkins, $7.31; Ulster, $4.15; Warren, $4.27; Washington, $3.85; Wayne, $7.84; Westchester, $6.46; Wyoming, $9.85; Yates, $7.96.

It is proper to state, that if the number of pupils is less than 256, the sum to be received will be proportionately increased. The above schedule shows, therefore, the minimum sum to be received by each pupil. His apportionment cannot be less than as above stated, and it may be more.

This money will be paid at the *close of the term.*

APPARATUS. A well assorted apparatus has been procured, sufficiently extensive to illustrate all the important principles in Natural Philosophy, Chemistry, and Human Physiology. Extraordinary facilities for the study of Physiology are afforded by the Museum of the Medical College, which is open at all hours for visiters.

LIBRARY. Besides an abundant supply of text-books upon all the branches of the course of study, a well selected miscellaneous library has been procured, to which all the pupils may have access free of charge. In the selection of this library, particular care has been exercised to procure most of the recent works upon Education, as well as several valuable standard works upon the Natural Sciences, History, Mathematics, &c. The State library is also freely accessible to all.

TERMS AND VACATIONS. The year is divided into two terms, so as to bring the vacations into April and October, the months for holding the Teachers' Institutes. This also enables the pupils to take advantage of the cheapness of traveling by the various means of water communication in the State, in going to and from the school.

The SUMMER TERM commences on the FIRST MONDAY IN MAY, and continues TWENTY WEEKS, with an intermission of one week from the first of July.

The WINTER TERM commences on the FIRST MONDAY IN NOVEMBER, and continues TWENTY-TWO WEEKS, with an intermission from Christmas to New Year's day inclusive.

PROMPT ATTENDANCE. As the school will open on Monday, it would be for the advantage of the pupils, if they should reach Albany by the Thursday or Friday preceding the day of opening. The Faculty can then aid them im securing suitable places for boarding.

As the examinations of the pupils preparatory for classification will commence on the first day of the term, it is exceedingly important that all the pupils should report themselves on the first morning. Those who arrive a day after the time, will subject not only the teachers to much trouble, but themselves also to the rigors of a private examination. After the first week, no student, except for the strongest reasons, shall be allowed to enter the school.

PRICE OF BOARD. The price of board in respectable families, varies from \$1.50 to \$2.00, exclusive of washing. Young gentlemen by taking a room and boarding themselves, have sustained themselves at a lower rate. This can better be done in the summer term.

The ladies and gentlemen are not allowed to board in the same families. Particular care is taken to be assured of the respectability of the families who propose to take boarders, before they are recommended to the pupils.

EXPERIMENTAL SCHOOL. Two spacious rooms in the building are appropriated to the accommodation of the two departments of this school. These two departments are under the immediate supervision of the Permanent Teacher, who is a graduate of the Normal School.

The object of this school is to afford each Normal Pupil an opportunity of practising the methods of instruction and discipline inculcated at the Normal School, as well as to ascertain his 'aptness to teach,' and to discharge the various other duties pertaining to the teacher's responsible office. Each member of the graduating class is required to spend at least two weeks in this department

In the experimental School there are ninety-three pupils between the ages of six and sixteen years. FIFTY-EIGHT of these are free pupils. The free seats will be hereafter given exclusively to fatherless children, residing in the city of Albany. This is in consideration of an appropriation by the city to defray in part the expense of fitting up one of the rooms of the school. The remaining THIRTY-FIVE pupils are charged \$20 per year for tuition and use of books. This charge is made merelv to defray the expense of sustaining the school."

State Normal Schools in Massachusetts.

The following brief account of the history and organization of the State Normal Schools, in Massachusetts, is copied from the "Tenth Annual Report of the Secretary of the Board of Education."

"In a communication made by the Secretary of the Board of Education to the Legislature, dated March 12, 1838, it was stated that private munificence had placed at his disposal the sum of ten thousand dollars, to be expended, under the direction of the Board of Education, for qualifying teachers for our Common Schools, on condition that the Legislature would place in the hands of the Board an equal sum, to be expended for the same purpose.

On the 19th of April, of the same year, resolves were passed, accepting the proposition, and authorizing the Governor, with the advice and consent of the Council, to draw his warrant upon the treasurer for the sum o. ten thousand dollars, to be placed at the disposal of the Board for the purpose specified in the original communication."

The following is a copy of the Resolve and of the Report of the Committee on the subject:

"The Joint Committee, to whom was referred the communication of the Hon. Horace Mann, Secretary of the Board of Education, relative to a fund for the promotion of the cause of popular education in this Commonwealth, and also the memorial of the Nantucket County Association for the promotion of education, and the improvement of schools, and also the petition and memorial of the inhabitants of the town of Nantucket, on the same subject, having duly considered the matter therein embraced, respectfully report,

That the highest interest in Massachusetts is, and will always continue to be, the just and equal instruction of all her citizens, so far as the circumstances of each individual will permit to be imparted; that her chief glory, for two hundred years, has been the extent to which this instruction was diffused, the result of the provident legislation, to promote the common cause, and secure the perpetuity of the common interest; that for many years a well-grounded apprehension has been entertained, of the neglect of our common town schools by large portions of our community, and of the comparative degradation to which these institutions might fall from such neglect; that the friends of universal education have long looked to the Legislature for the establishment of one or more seminaries devoted to the purpose of supplying qualified teachers, for the town and district schools, by whose action alone other judicious provisions of the law could be carried into full effect; that at various times, the deliberation of both branches of the General Court has been bestowed upon this, among other subjects, most intimately relating to the benefit of the rising generation and of all generations to come, particularly when the provision for instruction of school teachers was specially urged on their consideration, in 1827, by the message of the Governor, and a report thereupon, accompanied by a bill, was submitted by the chairman, now a member of the Congress of the United States, following out to their fair conclusions, the suggestion of the Executive, and the forcible essays of a distinguished advocate of this institution at great length, published and widely promulgated; that although much has been done within two or three years, for the encouragement of our town schools by positive enactment, and more by the liberal spirit, newly awakened in our several communities, yet the number of competent teachers is found, by universal experience, so far inadequate to supply the demand for them, as to be the principal obstacle to improvement, and the greatest deficiency of our republic; that we can hardly expect, as in the memorials from Nantucket is suggested, to remove this deficiency even in a partial degree, much less to realize the completion of the felicitous system of our free schools, without adopting means for more uniform modes of tuition and government in them, without better observing the rules of prudence in the selection of our common books, the unlimited diversity of which is complained of throughout the State, and that these benefits may reasonably be expected to follow from no other course than a well-devised scheme in full operation, for the education of teachers; that the announcement, in the communication recently received from the Secretary of the Board of Education, of that private munificence, which offers $10,000 to this Commonwealth, for removal of this general want, at least in the adoption of initiatory measures of remedy, is received by us with peculiar pleasure, and, in order that the General Court may consummate this good, by carrying forward the benevolent object of the unknown benefactor, the committee conclude, with recommending the passage of the subjoined resolutions.

All which is respectfully submitted,

JAMES SAVAGE, per order.

RESOLVES

RELATIVE TO QUALIFYING TEACHERS FOR COMMON SCHOOLS.

Whereas, by letter from the Honorable Horace Mann, Secretary of the Board of Education, addressed, on the 12th March current, to the President of the Senate, and the Speaker of the House of Representatives, it appears, that private munificence has placed at his disposal the sum of ten thousand dollars, to promote the cause of popular education in Massachusetts, on condition that the Commonwealth will contribute from unappropriated funds, the same amount in aid of the same cause, the two sums to be drawn upon equally from time to time, as needed, and to be disbursed under the direction of the Board of Education in qualifying teachers for our Common Schools; therefore,

Resolved, That his Excellency, the Governor, be, and he is hereby authorized and requested, by and with the advice and consent of the Council, to draw his warrant upon the Treasurer of the Commonwealth in favor of the Board of Education, for the sum of $10,000, in such installments and at such times, as said Board may request: *provided*, said Board, in their request, shall certify, that the Secretary of said Board has placed at their disposal an amount equal to that for which such application may by them be made; both sums to be expended, under the direction of said Board, in qualifying teachers for the Common Schools in Massachusetts.

Resolved, That the Board of Education shall render an annual account of the manner in which said moneys have been by them expended."

"The Board, after mature deliberation, decided to establish three Normal Schools; one for the north-eastern, one for the south-eastern, and one for the western part of the State. Accordingly, one was opened at Lexington, in the county of Middlesex, on the 3d day of July, 1839. This school, having outgrown its accommodations at Lexington, was removed to West Newton, in the same county, in Sept., 1844, where it now occupies a commodious building.

The second Normal School was opened at Barre, in the county of Worcester, on the 4th day of September, 1839. This school has since been removed to Westfield, in the county of Hampden, both on account of the insufficiency of the accommodations at Barre, and because the latter place is situated east of the centre of population of the western counties.

The third school was opened at Bridgewater, on the 9th day of Sept., 1840, and is permanently located at that place.

For the two last-named schools, there had been, from the beginning, very inadequate school-room accommodations. In the winter of 1845, a memorial, on behalf of certain friends of education in the city of Boston and its vicinity, was presented to the Legislature, offering the sum of five thousand dollars, to be obtained by private subscriptions, on condition that the Legislature would give an equal sum, for the purpose of erecting two Normal School-houses; one for the school at Westfield and one for that at Bridgewater. By resolves of March 20, 1845, the proposition of the memorialists was accepted and the grant made; and by the same resolves it was ordered, 'that the schools heretofore known as Normal Schools, shall be hereafter designated as State Normal Schools.'

The school at West Newton is appropriated exclusively to females; those at Bridgewater and Westfield admit both sexes.

Among the standing regulations adopted by the Board, for the government of the State Normal Schools, are the following—most of which were adopted in the beginning, and have been constantly in force; only a few modifications, and those very slight ones, having since been introduced:

Admission. As a prerequisite to admission, candidates must declare it to be their intention to qualify themselves to become school teachers. If they belong to the State, or have an intention and a reasonable expectation of keeping school in the State, tuition is gratuitous. Otherwise, a tuition-fee is charged, which is intended to be about the same as is usually charged at good academies in the same neighborhood. If pupils, after having completed a course of study at the State Normal Schools, immediately engage in school keeping, but leave the State, or enter a private school or an academy, they are considered as having waived the privilege growing out of their declared intention to keep a Common School in Massachusetts, and are held bound in honor to pay a tuition-fee for their instruction.

If males, pupils must have attained the age of seventeen years complete, and of sixteen, if females; and they must be free from any disease or infirmity, which would unfit them for the office of school teachers.

They must undergo an examination, and prove themselves to be well versed in orthography, reading, writing, English grammar, geography and arithmetic.

They must furnish satisfactory evidence of good intellectual capacity and of high moral character and principles.

Examinations for admission take place at the commencement of each term, of which there are three in a year.

Term of Study. At West Newton and Bridgewater, the minimum of the term of study is one year, and this must be in consecutive terms of the schools. In regard to the school at Westfield, owing to the unwillingness of the pupils in that section of the State to remain at the school, even for so short a time as one year, the rule requiring a year's residence has been from time to time suspended. It is found to be universally true, that those applicants whose qualifications are best, are desirous to remain at the school the longest.

Course of Study. The studies first to be attended to in the State Normal Schools, are those which the law requires to be taught in the district schools, namely, orthography, reading, writing, English grammar, geography and arithmetic. When these are mastered, those of a higher order will be progressively taken.

For those who wish to remain at the school more than one year, and for all belonging to the school, so far as their previous attainments will permit, the following course is arranged:

1. Orthography, reading, grammar, composition, rhetoric and logic.
2. Writing and drawing.
3. Arithmetic, mental and written, algebra, geometry, book-keeping, navigation, surveying.
4. Geography, ancient and modern, with chronology, statistics and general history.
5. Human Physiology, and hygiene or the Laws of Health.
6. Mental Philosophy.
7. Music.

8. Constitution and History of Massachusetts and of the United States.
9. Natural Philosophy and Astronomy.
10. Natural History.
11. The principles of piety and morality, common to all sects of Christians.
12. THE SCIENCE AND ART OF TEACHING WITH REFERENCE TO ALL THE ABOVE NAMED STUDIES.

RELIGIOUS EXERCISES. A portion of the Scriptures shall be read daily, in every State Normal School.

VISITERS. Each Normal School is under the immediate inspection of a Board of Visiters, who are in all cases to be members of the Board of Education, except that the Secretary of the Board may be appointed as one of the visiters of each school.

The Board appoints one Principal Instructor for each school, who is responsible for its government and instruction, subject to the rules of the Board, and the supervision of the Visiters. The Visiters of the respective schools appoint the assistant instructors thereof.

To each Normal School, an Experimental or Model School is attached. This School is under the control of the Principal of the Normal School. The pupils of the Normal School assist in teaching it. Here, the knowledge which they acquire in the science of teaching, is practically applied. The art is made to grow out of the science, instead of being empirical. The Principal of the Normal School inspects the Model School more or less, daily. He observes the manner in which his own pupils exemplify, in practice, the principles he has taught them. Sometimes, all the pupils of the Normal School, together with the Principal, visit the Model School in a body, to observe the manner in which the teachers of the latter, for the time being, conduct the recitations or exercises. Then, returning to their own school-room, in company with the assistant teachers themselves, who have been the objects of inspection, each one is called upon to deliver his views, whether commendatory or otherwise, respecting the manner in which the work has been performed. At this amicable exposition of merits and defects, the Principal of the Normal School presides. After all others have presented their views, he delivers his own; and thus his pupils, at the threshold of their practice, have an opportunity to acquire confidence in a good cause, of which they might otherwise entertain doubts, and to rectify errors which otherwise would fossilize into habit.

The salaries of the teachers of the State Normal Schools are paid by the State."

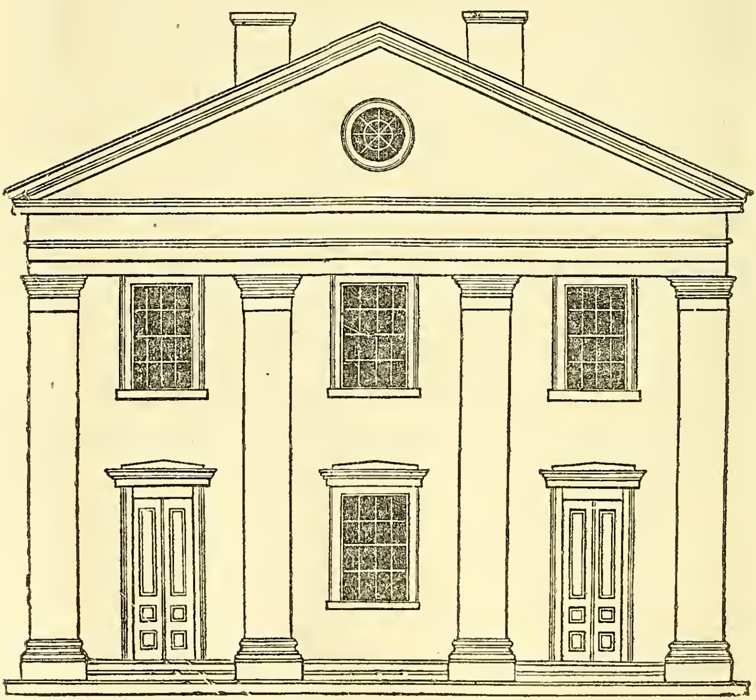
Plans and Descriptions of the Massachusetts Normal School-Houses.

The following plans and descriptions are copied from the "Tenth Annual Report of the Secretary of the Massachusetts Board of Education," with the permission of the Hon. Horace Mann, by whose indefatigable labors these institutions were founded, seconded as his efforts were by the munificent donation of the sum of ten thousand dollars, from the Hon. Edmund Dwight, of Boston.

These buildings were erected partly out of the contribution of $5000, subscribed originally by the friends of Mr. Mann, as a testimony of their esteem for his public services, and, at his suggestion, invested in this way—thus converting these edifices into the monuments of their generosity, and of his self-sacrifice.

Bridgewater State Normal School-House.

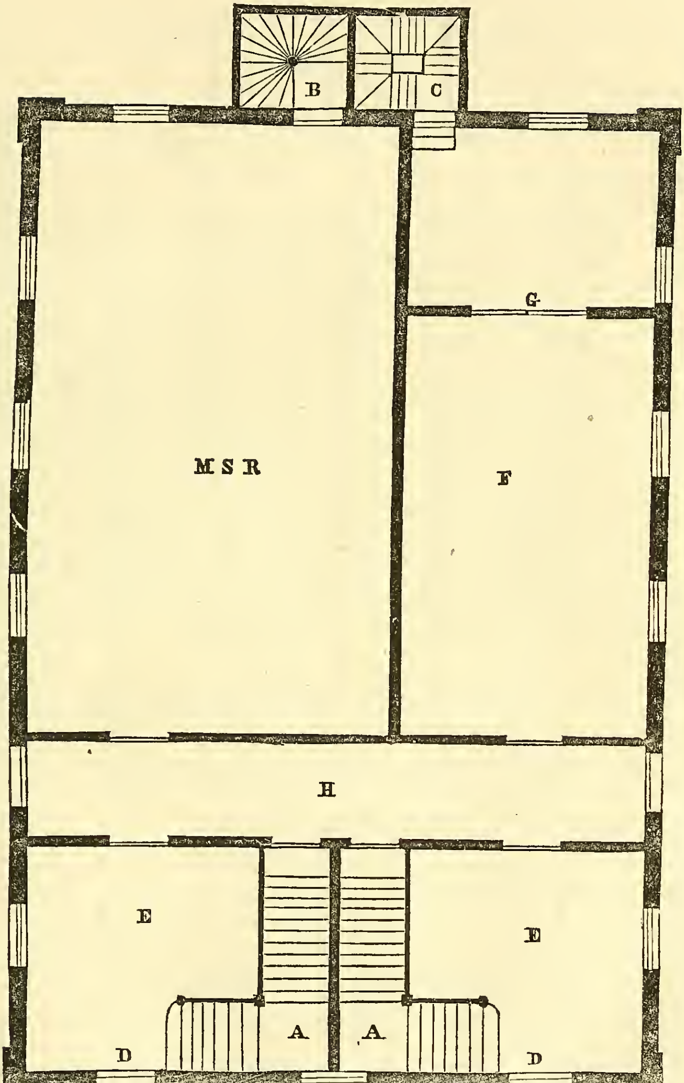
Fig. 1.—Front Elevation.



This edifice is constructed of wood, and is sixty-four feet by forty-two, and two stories in height. The upper story is divided into a principal school room, forty-one feet by forty and two recitation-rooms each twenty feet by twelve, and is designed for the Normal School. The lower story is fitted up for a Model School.

BRIDGEWATER STATE NORMAL SCHOOL-HOUSE.

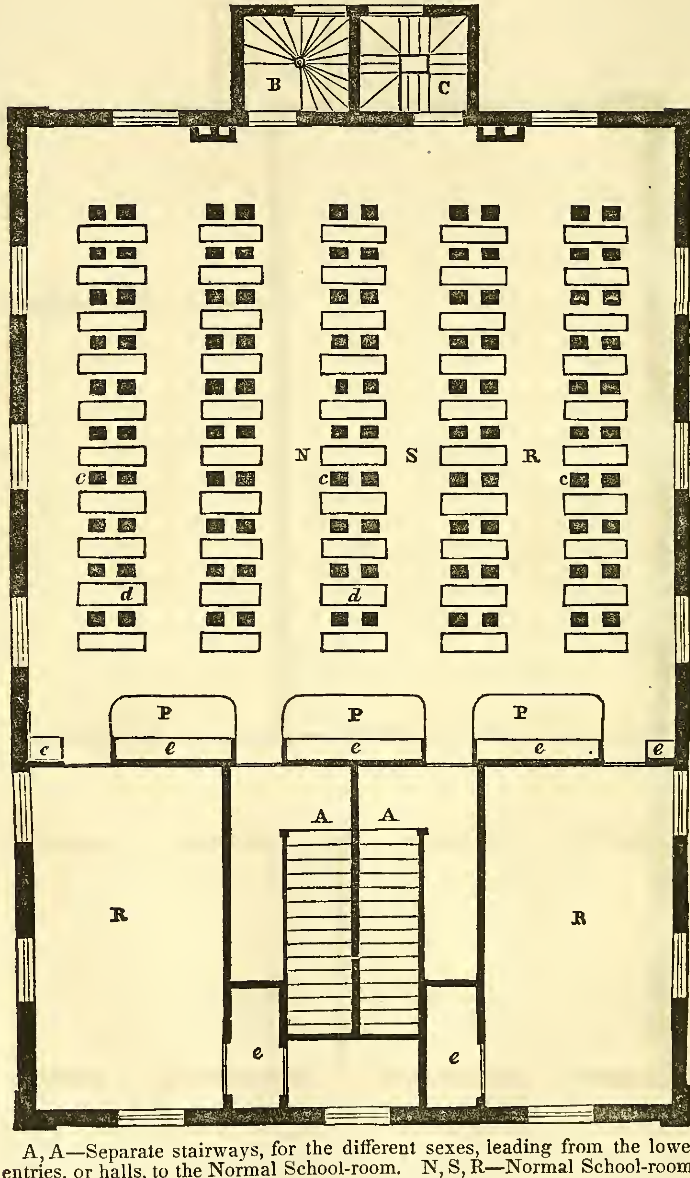
Fig. 2.—LOWER STORY.



D, D—Doors, one for males, the other for females. E, E—Hall-entries, into which the doors D, D open, 19 feet by 15. A, A—Stairways, leading from the entries to the Normal School-room. M, S, R—Model School-room, 40 feet by 24, with single seats and desks. H—Entry-way, 6 feet 8 inches wide, for Model School scholars. At each end of this entry is an outside door, for the entrance of the Model School scholars—a separate entrance for each sex. G, F—Laboratory and chemical room, or lecture-room, connected by folding doors. The two rooms 40 feet by 16. B, C—Back stairways.

Bridgewater State Normal School-House.

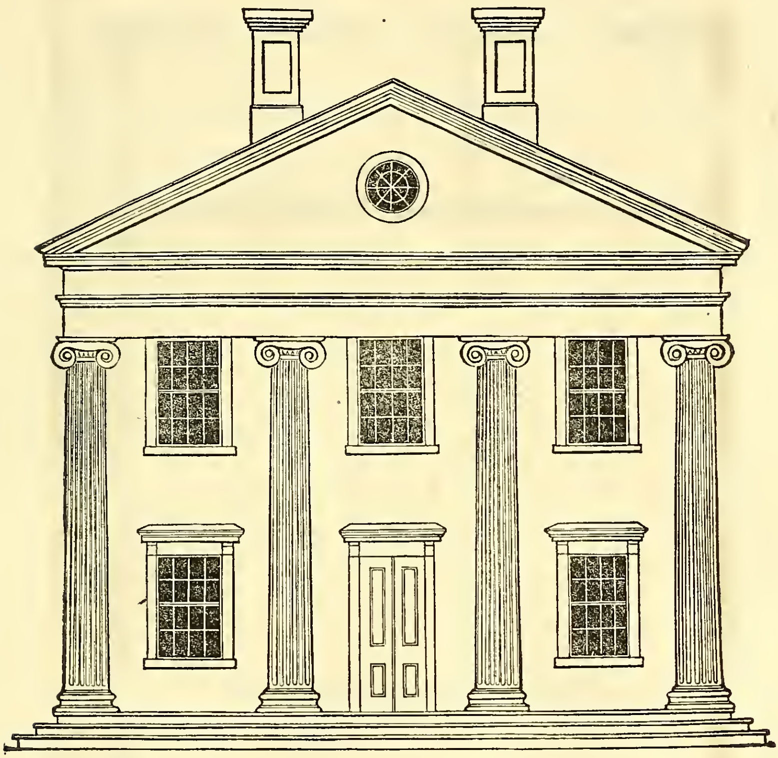
Fig. 3.—Upper Story.



A, A—Separate stairways, for the different sexes, leading from the lower entries, or halls, to the Normal School-room. N, S, R—Normal School-room 41 feet by 40. c, c, c—Single seats. d, d—Double desks. P, P, P—Teachers' platform. e, e, e, e, e—Behind the platform are recesses in the partition for a library. e, e—Between R, R, are closets for apparatus. R, R—Recitation-rooms, 22 feet by 12. B, C—Back stairways.

Westfield State Normal School-House.

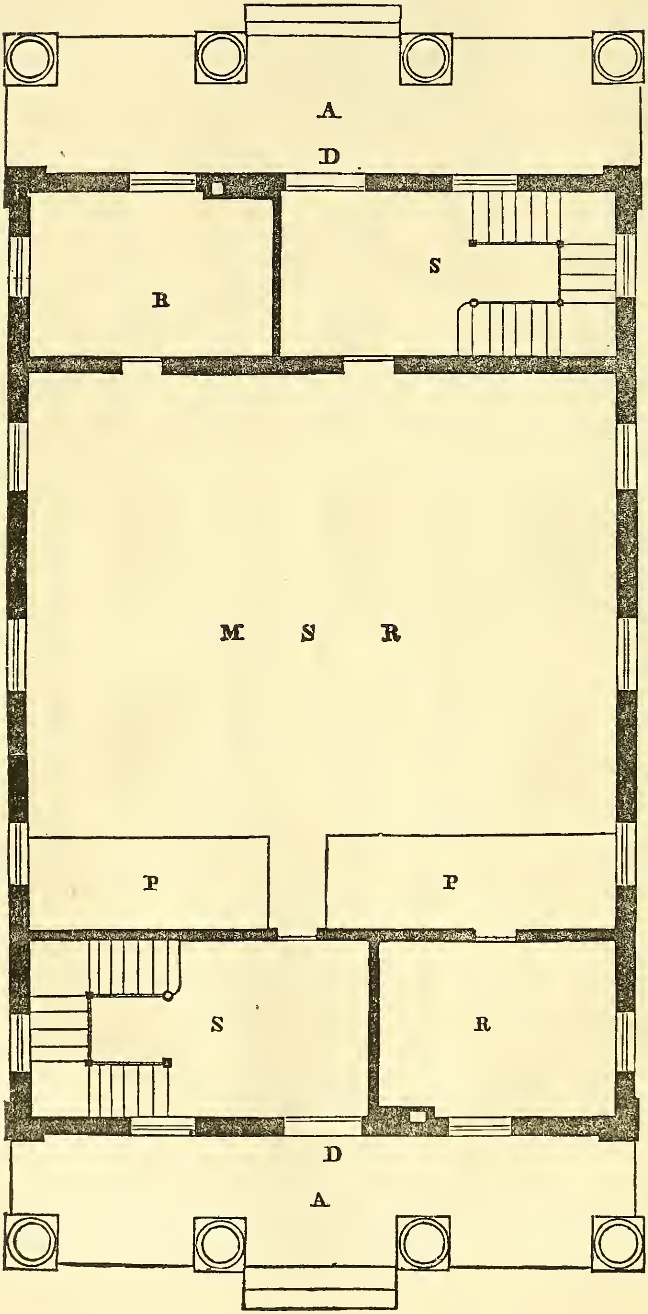
Fig. 4.—Front Elevation.



This edifice is of brick, of the size of sixty-two feet by forty feet, with a portico of eight feet at each end of the building, and is two stories in height. The Normal School-room is about forty feet square, and is provided with two recitation-rooms. The first story is fitted up with a room large enough to accommodate a Model School, which is composed of the children of one of the districts in the town of Westfield, the district having paid the sum of $1500 towards the erection of the building, and being obligated to pay an agreed proportion of the expenses of fuel, instruction, &c

WESTFIELD STATE NORMAL SCHOOL-HOUSE.

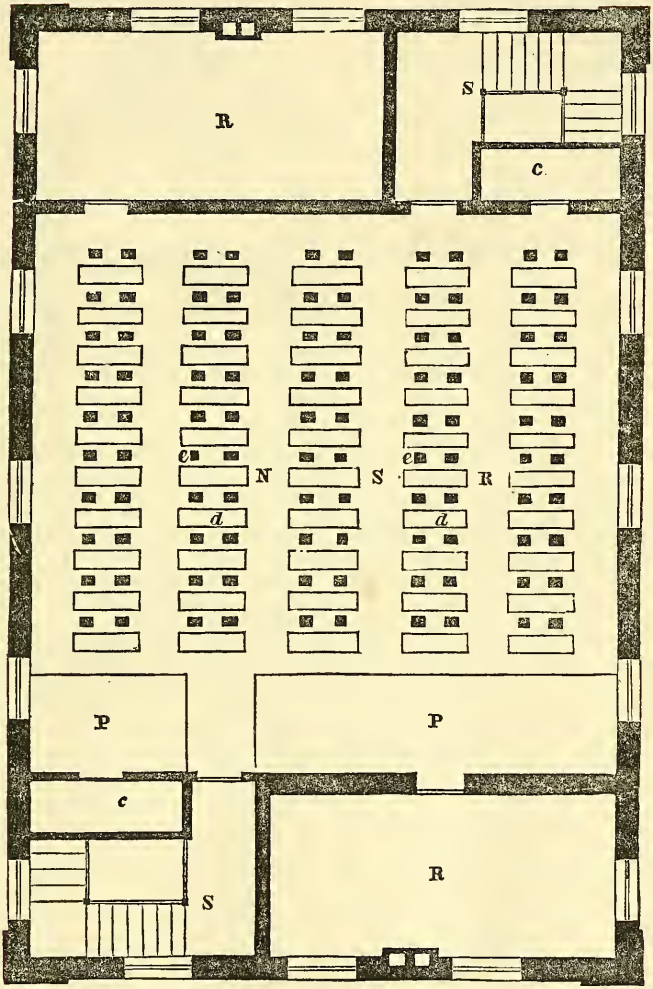
Fig. 5.—LOWER STORY.



A, A—Portico of 40 feet by 8, at each end. D, D—Doors, one for males, the other for females. S, S—Entries and stairways, leading to Normal School-room. M, S, R—Model School-room, 38 feet by 37, with single seats and desks. P P—Teachers' platform. R, R—Recitation-rooms, one $15\frac{1}{2}$ feet by 11, the other 17 feet by 11.

Westfield State Normal School-House.

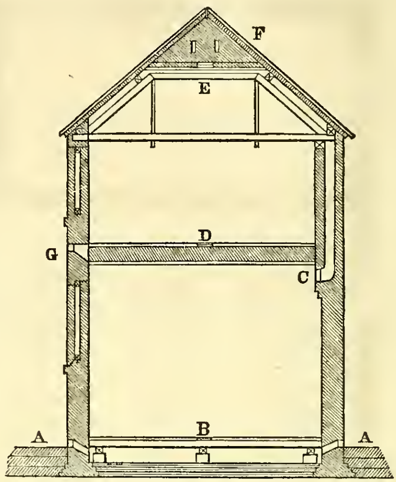
Fig. 6.—Upper Story.



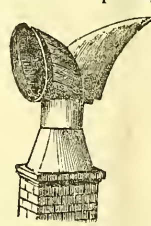
S, S—Stairways, leading from entry to Normal School-room. N, S, R—Normal School-room, 38 feet by 37. e, e—Single seats. d, d—Double desks. P, P—Platform, with recesses in the partition behind for a library. c, c—Closets for apparatus. R, R—Recitation-rooms, one 22 feet by 11, the other 22 feet by $10\frac{1}{2}$.

Hints respecting Ventilation.

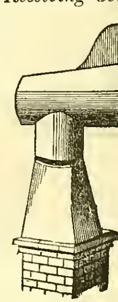
The annexed section exhibits the mode recommended in the "Minutes of the Committee of Council (England) on Education," for regulating a supply of fresh air, and providing for the escape of that rendered unfit for respiration in school-houses with two stories. A, A and G are gratings communicating by a passage through the external wall into a space under the floor, by which cold pure air enters at B and D through valvular openings in the floors into each apartment respectively. The extent of these openings can be enlarged or diminished or entirely closed at any time by turning the valve or register with which each opening should be furnished. At C and E the impure air can be allowed to escape through valvular openings in or near the ceiling; from the lower apartment, by means of a flue in or along the wall into the open space between the upper ceiling and roof; and from the upper apartment directly into the same space. At F are air grates in the ends of the building through which the warm impure air escapes.



The mode of ventilation, above described and illustrated, can be improved by introducing the pure cold air from the atmosphere above the building by one of *Mott's Receiving Cowls* placed on the top of a recess of four or six inches made in the wall if built of brick, or of a flue or pipe extending from the floor to the roof, and discharging it into the room by a valvular opening in the floor. The escape of impure air can be hastened by placing one or more of *Mott's Exhausting Cowls* on a ventilating flue or flues, leading directly from each apartment above the roof or from the attic, into which the impure air has been discharged. The flues or recess, both for introducing pure air, and discharging that which has become impure should have two openings into the room, one near the ceiling and the other at the floor. These flues can be constructed without any additional cost for mason work, by leaving a recess of 4 inches (in a 12 inch wall) by 20 inches, and continuing it through the coping on which the cowl is placed. The furring for the lath being 1 inch, leaves a flue of 100 square inches. The beams, floor, and ceiling will complete the flue. If the room is warmed by one or more stoves, the cold air should be introduced within a few inches of the bottom of the stove. The openings into the flues should be furnished with valves or doors, and should be managed so as to admit the pure cold air to the most heated part of the room, and effect the escape from that part of the room where the air is most impure. This will vary with the mode of heating the room, whether by fireplace, stove, or furnace; and from summer to winter. The openings for the escape of the vitiated air should be so placed as to cause the pure air warmed by contact with the stove, or flowing in from a furnace below, to traverse the whole apartment.

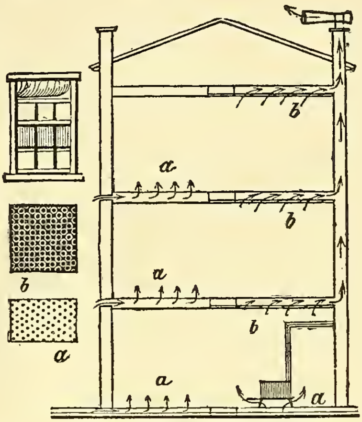


Receiving Cowl.



Exhausting Cowl.

The annexed section of one of the Primary School buildings of the Public School Society of New York, exhibits the mode of introducing fresh air from out of doors, beneath the stove, (*a a a*,) and the egress of the impure air through openings in the ceiling (*b b b*). Thus a current of pure air is caused to flow through the apartment. The combined effect of the two, is represented to be a sufficient ventilation of the building where this mode has been adopted, especially when aided by *Mott's Exhausting Cowl* on the top of the ventilating flue.



The flues under the floor and over the ceiling are covered with cast iron plates about twelve inches square, of a light casting, and full of small holes; those in the floor plates being less than an eighth of an inch diameter, to spread the current of fresh air as it enters the apartment. The holes in the ceiling plates are from one fourth to three eighths of an inch in diameter, to facilitate the escape of the impure air.

The school-rooms of the Public School Society are generally warmed by wood stoves, which are cast with thick plates, so as not to become easily over-heated.

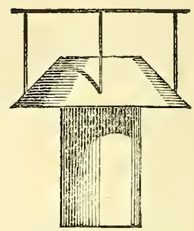
The result of an experiment in one of the Primary Schools, to heat by wood in a furnace, showed that this is not as economical a mode of warming these apartments as by wood in stoves, although it is stated that "the ventilation, it must be confessed, is more efficient"

In most of the school-rooms, the ingress of fresh air is secured by lowering the upper sash, as is exhibited in the side drawing.

Method of Ventilation, by Frederick Emerson.

Another method of ventilating buildings has been recently invented by Mr. Frederick Emerson, of Boston, which is acquiring very general use in that city and its vicinity. In the complete arrangement of his plan, Mr. Emerson employs two ventilators,—an *Ejector* and an *Injector*,—one to withdraw the impure air, and the other to introduce fresh air. These ventilators are not dependent on a vane, but perform their office without changing position, whatever may be the direction of the wind, even if it be inclined or vertical, and however fitful its changes. It is the peculiar character of these ventilators, that distinguishes his plan, and for them he has obtained letters patent.

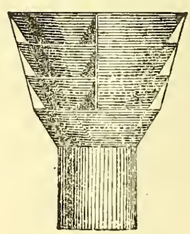
The Ejecting Ventilator consists of a frustrum of a cone attached to the top of a tube, open in its whole extent, and surmounted by a fender, which is supported upon rods, and answers the double purpose of keeping out the rain, and of so directing and turning a blast of wind upon the structure, as that in whatever direction it falls, the effect, that of causing a strong upward draft, will be very uniform and constant.



Ejecting Ventilator.

Each of these ventilators is fixed upon the upper end of a tube or ventiduct, that projects through the roof of the building into the open air, and extends downward into the room to be ventilated. The ventiduct of the Ejector is constructed on one side of the room, opposite the side in which the stove or other means of warming is placed, and extends from the ceiling to the floor. In this ventiduct there are two apertures —one at the ceiling and the other at the floor—for the escape of air. The aperture at the floor is twice as great as that at the ceiling; and the sum of the area of the two apertures is equal to the area of the ventiduct.

The ventiduct of the Injector leads into the warm-air chamber of a ventilating stove, or into a furnace; so that, in the cold season, the fresh air becomes warm before it enters the room.



Injecting Ventilator.

The Ejecting ventilator, without the Injector, will, in general, be found sufficient to ventilate a school-room. It should, however, be used in connection with a ventilating stove or furnace, through which the quantum of warm air admitted into the room is equal to the quantum of air withdrawn from the room. Mr. Emerson insists on the admission of warm air into a school-room, as indispensable to its safe ventilation; and he enforces his views on this point, by refusing to allow his ventilators to be put upon any school-house that is not, by some means, supplied with fresh warmed air. He objects to the use of all such stoves and furnaces as emit their heat through *red-hot* iron, and recommends that, where anthracite coal is used, the stove or furnace in which it is burned, be lined with brick or stone.

The size of the ventilators is made to correspond to the capacity of the room. A room containing fifty scholars is found to require an Ejecting ventilator whose tube is *fourteen* inches in diameter. A room for one hundred scholars requires the tube to be *eighteen* inches; and a room for two hundred scholars requires it to be *twenty-four* inches.

The mode of using Mr. Emerson's Ejecting and Injecting Ventilators, is illustrated on page 158 of this Essay, and described in the extracts from the "Final Report of the Committee on Ventilation" in the public schools of Boston.

Methods of Ventilation and Warming, recently introduced into the School-Houses of Boston.

In February, 1846, the School Committee of Boston appointed Dr. Henry G. Clark, E. G. Loring, Esq., and Rev. Charles Brooks, a Committee "to consider the subject of ventilation of the school-houses under the care of this Board, and to report at a future meeting some method of remedying the very defective manner in which it is now accomplished." The Committee were further "authorized to ventilate any three school-houses, in such manner as they may deem expedient." Under these instructions, the Committee visited, and carefully examined all the school-houses under the care of the Board, and instituted a variety of experiments, for the purpose of determining on the best method of ventilation, to be generally introduced. In December, 1846, this Committee made a Report, for a copy of which we are indebted to the author, Dr. Clark, by whose agency and ingenuity mainly, these great improvements, both in ventilation and warming, hereafter detailed, have been introduced into the Public Schools of Boston. We are also indebted to Dr. Clark for the use of the cuts by which this Report, and a subsequent Report, are illustrated. We shall extract largely from these valuable documents, with the permission of the author. It will be seen that the views here recommended are substantially the same with those presented under the head of Ventilation, in this Treatise.

"Your Committee desire to call the attention of this Board, chiefly to the consideration of such general and well established Physiological and Philosophical principles, as have a distinct and intimate relation to the subject of this Report, and may be useful in its elucidation.

In doing this, there are two things of which they hope to satisfy the Board.

First. The necessity of a system of ventilation, which shall furnish, for all the pupils in the Public Schools of Boston, at all times, an abundant supply of an atmosphere entirely adapted, in its purity and temperature, to the purposes of respiration.

Secondly. The entire failure of the measures heretofore adopted to accomplish this desirable end.

The function of Respiration, is that process, by whose agency and constant operation, atmospheric air is admitted to the internal surface of the lungs, and there brought into close contact with the blood, for the purpose of effecting certain changes in it, which are essential to the continuance of life, and to maintain the integrity of the bodily organs. During this process, the atmosphere is constantly losing its oxygen, which is carried into the circulation, while, at the same time, it is becoming overcharged with the carbonic acid gas, which is continually thrown off from the lungs by respiration. This effete and deadly poison spreads itself rapidly into all parts of the room.

'M. Lassaigne has shown, by a series of investigations, that, contrary to a common opinion, the air in a room which has served for respiration without being renewed, contains carbonic acid alike in every part, above as well as below; the difference in proportion is but slight; and, where appreciable, there is some reason to believe that the carbonic acid is in greater quantity in the upper parts of a room. These experiments establish the very important fact, that all the air of a room must be changed, in order to restore its purity.'*

Dr. Wyman makes the following remarks on this point: 'Although carbonic acid is a much heavier gas than atmospheric air, it does not, from this cause, fall to the floor, but is equally diffused through the room. If the gas is formed on the floor without change of temperature, this diffusion may not take place

*Silliman's Journal for September, 1846.

rapidly. In the celebrated *Grotto del Cane*, carbonic acid escapes from the floor, and rises to a certain height, which is pretty well defined to the sight on the walls; below this line, a dog is destroyed, as if in water; above it, he is not affected. An analysis of the air above and below a brazier has been made, and it was found equally contaminated,—the former containing 4.65 per cent., and the latter 4.5 per cent. of carbonic acid.

'From the experiments of M. Devergie, who has devoted much attention to the poisonous effects of these gasses, it appears, that the heat disengaged from the combustion of charcoal, produces an equable mixture at all elevations in the apartment; and this state of things continues *as long as the room remains warm;* but after twelve hours or more, the carbonic acid sinks, and while that near the ceiling contains only a seventy-eighth, that near the floor contains nearly four times as much, or a nineteenth.' (*See Prac. Trea.* p. 77.)

If further proof be needed, to establish this position, we have other testimony. During respiration, a considerable quantity of vapor is discharged from the lungs. With regard to this, Mr. Tredgold says: 'if the air did not contain this mixture of vapor, it would not rise when expelled; and we have to admire one of those simple and beautiful arrangements, by which our all-wise Creator has provided against the repeated inhalation of the same air; for a mixture of azote, carbonic acid gas, and vapor, at the temperature it is ejected, is much lighter than common air even at the same temperature. Hence, it rises with such velocity, that it is entirely removed from us before it becomes diffused in the atmosphere. But as all gaseous bodies and vapors intimately mix when suffered to remain in contact, we see how important it is that ventilation should be continual; that the noxious gasses should be expelled as soon as generated; and that the ventilation should be from the upper part of a room.' (*See Tredgold on Warming, &c.*, p. 70.

If, to the foul effluvia ejected from the lungs, and accumulating in an apartment as badly ventilated as one of our school-rooms, be added the fouler matter thrown into the air from the insensible perspiration of so many individuals, many of whom are of uncleanly habits in person and apparel, it is apparent, that, in a very limited period of time, the air, in a perfectly close room, would become so entirely unfit for respiration, that, to all who were exposed to its influence, submersion in water could not be more certainly fatal.

The terrible effects of continued exposure to carbonic acid gas in a concentrated form, have been graphically described by Howard, in his account of the Black Hole of Calcutta. Of one hundred and forty-six persons, shut up in this place for only ten hours, without any other means of ventilation than one small opening, but twenty-six were found alive, when it came to be opened; and most of these suffered afterward from malignant fevers.

The fainting of feeble persons in crowded assemblies, and the asphyxia, so often produced in those who descend into deep wells without suitable precaution, are familiar examples of the same noxious effects of this poison.

In has been usually estimated, that every individual, by respiration, and the various exhalations from the body, consumes or renders unfit for use, at least from four to five cubic feet of air per minute. This is probably a low estimate; but authors of good repute differ considerably on this point. Mr. Tredgold's remarks, in this connection, are interesting and pertinent. 'The Physiological Chemists,' says he, 'have placed in our hands a more accurate means of measuring the deterioration of air in dwelling rooms, than by the best eudiometer; for they have shown, by repeated experiments on respiration, that a man consumes about thirty-two cubic inches of oxygen in a minute, which is replaced by an equal bulk of carbonic acid from the lungs. Now, the quantity of oxygen in atmospheric air is about one fifth; hence it will be found, that the quantity rendered unfit for supporting either combustion or animal life, by one man, in one minute, is nearly one hundred and sixty cubic inches, by respiration only. But a man makes twenty respirations in a minute, and draws in and expels forty inches of air at each respiration; consequently, the total quantity contaminated in one minute, by passing through the lungs, is eight hundred cubic inches.'* The other sources of impurity, which should be considered, will increase the estimate to the amount above stated. The amount of vapor discharged from the lungs, and thus added to the impurities of the air, is said to exceed six grains per minute. It has also been shown

*Tredgold on Warming, &c., p. 69

that air, which has been some time in contact with the skin, becomes almost entirely converted into carbonic acid.

In estimating the amount of fresh air to be supplied, we ought not merely to look at what the system will tolerate, but that amount which will sustain the highest state of health for the longest time. Dr. Reid recommends at least ten cubic feet per minute, as a suitable average supply for each individual; and states that his estimate is the result of an 'extreme variety of experiments, made on hundreds of different constitutions, supplied one by one with given amounts of air, and also in numerous assemblies and meetings, where there were means for estimating the quantity of air with which they were provided.' (*Illustrations of Ventilation*, p. 176.)

These calculations refer to adults; but the greater delicacy of the organization of children, and their feebler ability to resist the action of deleterious agents, together with their greater rapidity of respiration, demand for them at least an equal supply. Proceeding upon this basis, and multiplying the amount required per minute, by the minutes of a school session of three hours, we have eighteen hundred cubic feet for each pupil, and for two hundred and fifty pupils—the average maximum attendance in one of our large school-rooms,—450,000 cubic feet, as the requisite quantity for each half-day. The rooms contain about 22,500 cubic feet only: so that a volume of air, equal to the whole cubic contents of each room, should be supplied and removed, in some way, ten times every three hours, in order to sustain the atmosphere in them at a point which is perfectly wholesome and salubrious. For such a purpose, the present means are so entirely inadequate, that it was found that the air of a room became tainted in ten or fifteen minutes. In ordinary cases, four per cent. of the air expelled from the lungs is carbonic acid. The presence of five or six per cent. will extinguish a lamp, and with difficulty support life. It is therefore certain, that the air would become deprived of all its best properties in one school session.

Le Blanc,—who examined many public and private buildings, in France and elsewhere,—speaking of the Chamber of Deputies, where sixty-four cubic feet of fresh air *per minute*, were allowed to each individual, states, that of 10,000 parts escaping by the ventilator, twenty-five were carbonic acid; while the quantity of this gas ordinarily present in the atmosphere, is but $\frac{4}{10000}$. Dr. Reid states, that he never gave less than thirty cubic feet of air a minute, to each member of the House of Commons, when the room was crowded; and once he introduced, for weeks successively, sixty cubic feet a minute, to each member.

The very earliest impressions received by your Committee, in their visits to the school-houses, satisfied them of their lamentable condition in regard to ventilation. In some of them, they found the air so bad, that it could be perceived before reaching the school-rooms, and in the open entries; and the children, as they passed up and down the stairs, had their clothes and hair perceptibly impregnated with the fœtid poison. And these circumstances existed in houses, where the open windows testified, upon our entrance, that the Masters had endeavored to improve the atmosphere by all the means placed at their disposal. To this custom,—*that of opening windows in school hours*,—the Instructors are compelled to resort, for relief; and this expedient, certainly, is the lesser of two very great evils. Your Committee found in their visits to the school-houses, during the severest days of last winter, that no school-room had less than three, and that more than half of them had at least seven windows open for the admission of pure air. Yet this dangerous and injurious practice only mitigates the evils of bad air, by creating others. It produces colds and inflammatory complaints, and the air still remains impure, offensive, and highly deleterious; sufficiently so, to affect the delicate organization of childhood, to blight its elasticity, and destroy that healthful physical action, on which depends the vigor of maturer years.

We have already referred to some of the more violent and sudden effects of exposure to air highly charged with these noxious gasses. There are others, which are more remote, and, to a superficial observer, less noticeable. But they are not, therefore, of less importance. The grave consequences of a long-continued exposure to an atmosphere but a little below the standard of natural purity, although not immediately incompatible with life, can hardly be over-stated. These effects are often so insidious in their approach, as hardly to attract notice; they are therefore the more necessary to be provided against in advance.

Children, confined in the atmosphere of these schools, soon lose the ruddy and cheerful complexions of perfect health which belong to youth, and acquire the sallow and depressed countenances which might reasonably be expected in over-worked factory operatives, or the tenants of apartments unvisited by the sun or air. We noticed in many faces, also, particularly towards the close of a school session, a feverish flush, so bright that it might easily deceive an inexperienced eye, and be mistaken for a healthy bloom. Alas! it was only a transient and ineffectual effort of nature to produce, by *overaction*, those salutary changes which she really wanted the *power* to accomplish.

The condition of the pupils, depressed as they are by these influences, is constantly demanding increased exertions from their Instructors, while the requirements of the age place the standard of education at an elevation sufficiently difficult of access under the most favorable circumstances.

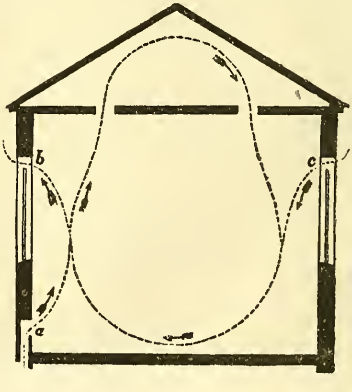
Your committee are satisfied, therefore, that the present state of the school-houses daily impairs the health of the pupils and Instructors, and the efficiency of the schools for the purposes of instruction. That its continuance will produce, not only immediate discomfort and disease, but, by its effect on the constitutions of the children, who must pass in them a large portion of those years most susceptible to physical injury, will directly and certainly reduce the amount of constitutional vigor hereafter to be possessed by that large mass of our population, which now and hereafter is to receive its education in these schools.

Although the atmosphere in the different school-houses varied very much in particular cases, either owing to the time of the visits, or from the amount of attention and intelligence of the Masters, yet in none of them was it at all satisfactory; not one of them was furnished with any useful or systematic means of ventilation. Every one, in order to be kept in a tolerably comfortable condition in this respect, required the frequent and laborious attention of the Instructors, and often to a degree which must have seriously interfered with their legitimate duties.

All of the rooms are provided with registers, in or near the ceiling, ostensibly for the purpose of discharging the foul air, but which your Committee believe to be almost entirely useless. The openings through the roof into the open air, where they exist, are so small, as to be quite inadequate to relieve the attics; so that the bad air must accumulate there, and, after becoming condensed be gradually forced back again, to be breathed over by the same lungs which have already rejected it. The condition of the apartments, after undergoing a repetition of such a process, for any length of time, can easily be imagined."

A reference to the subjoined diagram will explain at once the present state of the Ventilation of the School-Houses.

a. Heated air from furnace.
b. Hot air escaping through open window.
c. Cold air entering through open window.



It may be a matter of surprise, to some, perhaps, that the subject of ventilating our school-rooms has not long ago received the consideration necessary to remedy, or even to have prevented altogether, the evils of which we at present complain. But these evils have not always existed. It should be recollected, that the stoves and furnaces now in common use, are of comparatively modern date; and moreover, that the ample fireplaces, which they have displaced, always proved perfectly efficient ventilators, although, it is true, somewhat at the expense of comfort and fuel. But in closing the fireplaces, and substituting more economical methods of warming, evils of far greater magnitude have been entailed upon us.

It is evident, that, in order to carry into operation any complete system of ventilation, there must be connected with it some apparatus to regulate the temperature of the air to be admitted, as well as to ensure its ample supply. Your committee have accordingly examined, with much care, this part of the subject. A majority of the buildings are furnished with 'hot-air furnaces,' situated in the cellars; the remainder with stoves, placed in the school-rooms themselves. Most of the furnaces possess great heating powers,—indeed much greater than is necessary, if the heat generated by them were properly economized, or could be made available;—but, as now constructed, they are almost worse than useless, consuming large quantities of fuel, and, at the same time, so overheating the air which passes through them, as to deprive it of some of its best qualities, and render it unsuitable for respiration. It is difficult to define, with precision, and by analysis, the changes which take place in air subjected to the action of metallic surfaces, at a high temperature. The unpleasant dryness of the air can be detected, very readily, by the senses; and the headache, and other unpleasant sensations, experienced by those who breathe such an atmosphere, would seem to prove a deficiency of oxygen and electricity. The rapid oxydation and destruction of the ironwork of the furnaces themselves, also tends to confirm this supposition.

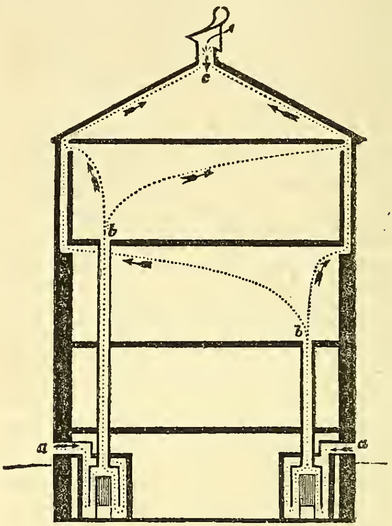
It has been ascertained, by repeated examinations, that the temperature of the air, when it arrives at the rooms, is often as high as 500° and 600° Fahrenheit. Of course, it is entirely impossible to diffuse air, thus heated, in the parts of the room occupied by the pupils. Much of it passes rapidly out of the windows, which may be open; the rest to the ceiling, where it remains until partially cooled, gradually finding its way down by the walls and closed windows, to the lower parts of the room. The consequences are, that, while much more caloric is sent into the apartment than is requisite, many of the pupils are compelled to remain in an atmosphere which is at once cold and stagnant.

The source of the cold air for supplying the furnaces, is not always free from objection; some being drawn from the neighborhood of drains, cesspools, &c. This is a radical defect, as it must inevitably affect the whole air of the building. The boxes, which admit the cold air to the furnaces, are much too contracted; some of them being only a few inches square, when their capacity ought to be nearly as many feet. The air enters the 'cold-air' chamber of the furnace, at its top, whence it is intended to be carried down between thin brick walls, (which *should be cold*, but which are often heated to 300° Fahrenheit,) to the lower part of the furnace, and thence into the 'hot-air' chambers, and so on to the rooms above. It is obvious that the 'hot-air' chamber must be heated to a temperature far beyond that of the 'cold-air' chamber, in order to compel the air, against its own natural tendencies, to pass into it with any velocity or volume, and the very attempt to accomplish this, almost defeats itself; as, by driving the fire for this purpose, the 'cold-air' chamber becomes still hotter, so that at last the contest is decided only by the greater calorific capabilities which the iron plates possess over the brick wall. At any rate, the temperature of the iron is frequently raised to a *red* and even a *white heat*, by running the furnaces in the ordinary way. This soon destroys them, and they require consequently to be frequently renewed. In addition to all this waste of fuel and material, the folly of attempting, in any way, to warm school-rooms whose windows are freely opened to the admission of an atmosphere, at the low temperature of our winter climate, may well claim a passing notice.

The following diagrams will exhibit the mode in which the two houses already referred to, are now ventilated.

PLAN OF THE VENTILATION OF THE ELIOT SCHOOL-HOUSE.

a. a. Cold air channels to furnaces.
b. b. Heated air.
The arrows show the currents of air from the furnaces to the outlet at the roof.
c. Gas burner.



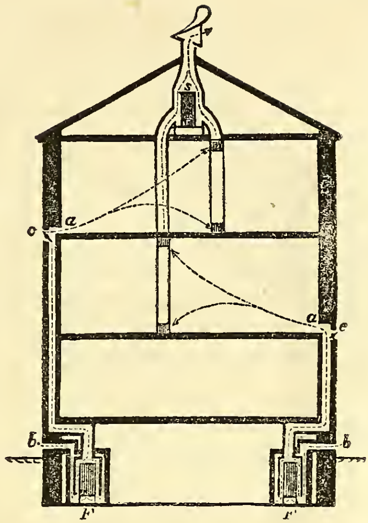
This house was entirely without any external opening through the roof. The other arrangements in it presented nothing peculiar. The 'exits and the entrances' were all as deficient in capacity as usual. The first care was to perforate the roof. This was accordingly done, and an opening of sufficient size made to carry a turn-cap of two and a half feet in diameter in its smallest part. The cold-air shaft, with an area of only one hundred and forty square inches, was enlarged so as to measure six hundred, or about four times its former size. The necessary repairing of one furnace, gave us an opportunity to enlarge its air-chamber very considerably. Water, for evaporation, was placed within a chamber of the furnace. The registers in the rooms opening into the attic, being below the ceiling, were raised to the highest point, and increased in size.

Although we think the want of connection of the cowl at the roof with the registers from the rooms by closed tubes, a decided disadvantage, we were satisfied, on the whole, with the results; as the alterations gave great relief. These changes were made during the month of February, 1846, and the only inconvenience suffered during the winter, was the occasional rise of the temperature to five or ten degrees beyond the desired point. The atmosphere has lost its bad odor almost entirely, and is of course much more agreeable. A gas burner has lately been placed in the throat of the ventilator, for use when extra power is needed.

PLAN OF THE VENTILATION OF THE ENDICOTT SCHOOL-HOUSE.

This house, as well as the preceding, was heated by furnaces in the cellar, one for each room. Its ventilating flues were arranged in a better manner than usual, opening into little separate chimneys which pierced the roof near the copings. But they had proved to be insufficient, both on account of their size and situation. They were also affected sensibly by down-gusts, which completely reversed their action in certain states of the atmosphere and wind.

a. a. Currents of heated air passing to the ventilating flues.
b. b. Cold air channels.
c. c. Cold air valves opening upon the hot-air currents.
F. F. Furnaces.
S. Stove in ventilator in the attic.



After enlarging the cold-air shaft to a proper size, it was thought best, (as the hot-air pipe passed through the brick wall, so that it could not easily be altered,) to make an opening through the outer wall directly behind the register which delivered the hot-air into the room. An aperture of sixteen inches square, commanded by a revolving damper, was therefore cut. It has been found to answer exceedingly well; as we now get a much larger volume, of more temperate and purer air.

For the delivery of the bad air, the following arrangements were adopted. Large wooden boxes, or air-shafts, were carried from the floor of each story into the attic, where they communicate, by closed metal pipes of the same size, with a tin cylinder, three feet in diameter, which is continued to the roof, terminating there in a large cowl. There are openings, at the top and bottom of each room, into the ventilating shafts, which can be used separately, or together, as the state of the atmosphere requires.

An air-tight coal stove, placed within the drum, in the attic, completes the apparatus. This has been only recently constructed; but from results already produced, there is no doubt of its entire ability to accomplish all that is desirable.

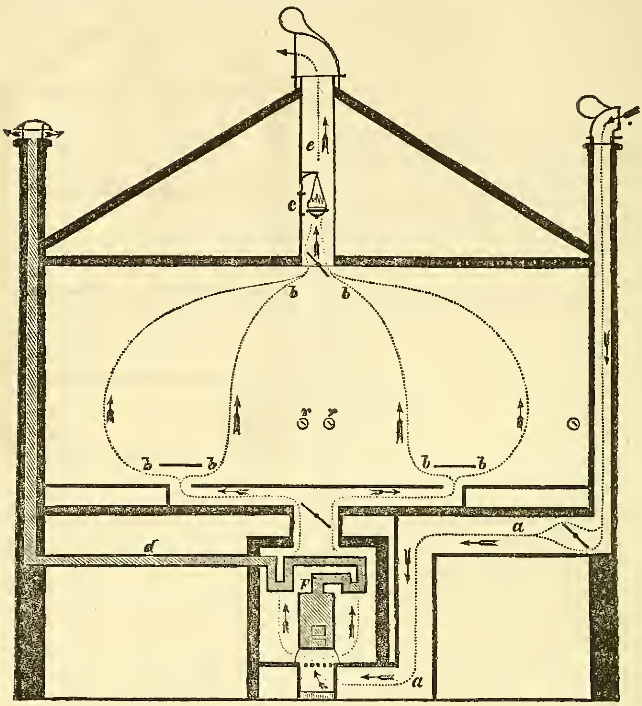
The same general statements which have been made with regard to the Grammar School-houses, will apply to the Primary School-houses. They are undoubtedly in as bad a condition, to say the least; and from their smaller capacities in proportion to the number of pupils which they contain, require particular attention.

For ventilation of these, and the Recitation rooms, which resemble them in structure and size, your Committee recommend the use of the double fireplace* or the Ventilating Stove, which will be hereafter described. If the latter be used, ventilating flues, opening at the ceiling, must be carried out of the roof.

It only remains for your Committee to describe, more particularly, the system of ventilation which they consider to be, in its general features, best adapted for the school-houses under the care of the Board. Much of it has already been anticipated in other parts of this Report; and the following plan will show, at a glance, better than any description can do, its particular features.

* See page 38 of this Essay for a diagram and description.

DIAGRAM SHOWING THE BEST GENERAL PLAN FOR WARMING AND VENTILATING THE GRAMMAR SCHOOL-HOUSES.



a. a. Cold-air channel, three feet in diameter, opening underneath the Furnace.

F. Furnace, three feet in diameter in a brick chamber ten feet square. The walls twelve inches thick.

d. Smoke flue, surmounted with Mr. Tredgold's chimney top.

b. b. b. b. Currents of warmed air, passing from the furnace, through a main flue of four feet in diameter, which supplies two branch flues. From these the air is diffused into all parts of the room, by means of the tablets which are placed over the mouths of the registers.

e. The ventilating shaft, two and a half feet in diameter, into which the foul gasses are collected, and from which they are finally discharged into the open air.

c. An Argand Lamp, to be lighted from the attic.

r., r. r. Registers, by means of which the whole circulation is controlled.

The Committee recommend attention to the following *general rules for Ventilation and Warming.*

1. The air must be taken from a pure source. The higher parts of the building are the best, as thereby all impurities, which often contaminate air taken from near the surface of the ground, are avoided.

2. In order to ensure a constant and abundant supply, the air shaft must be surmounted with a cowl or hood of some kind, with its mouth turned *towards the wind.*

3. The fresh air should in all cases be carried entirely beneath the furnace.

If the cellar is wet and the situation low, the underground culvert or channel should be of brick, laid in cement.

4. The furnace chamber should be so large that it can be entered at any time, without the necessity of taking down walls, for the purpose of repairs, or to observe the temperature. A large earthen pan for the evaporation of water should never be omitted. This should be kept always perfectly clean, and the water required to be frequently changed.

5. A thermometer should be constantly at hand, and the *temperature in the warm-air chamber should never be allowed to exceed that of boiling water.* A still lower temperature is often desirable. If this point is secured, the hot air can be conducted with perfect safety under floors, or into any part of the building, for its better diffusion.

6. The openings for the admission of the warm air into the rooms, should be as numerous as possible. The long platform occupied by the teachers, by being perforated in front for its whole length, would be an excellent diffusing surface.

7. Openings of ample size must be made in the highest points of the ceiling, to be connected at the top of the roof with a turn-cap or louvre, the former being always surmounted with a vane. It is better that the ceiling should be perforated at its centre, and there is no objection to running the ventilating shaft, at first, horizontally, if the perpendicular and terminal portion of it is of considerable length.

8. *It is highly important to have a power of some sort, within the apparatus at its top*, for the purpose of compelling constant action, and of increasing the force of the apparatus, whenever the state of the weather, or the crowding of the room, render it necessary.* For this purpose, the most convenient and economical means are furnished by a gas burner, an Argand lamp, or a stove; and one of these should be in constant readiness for use, when neither the velocity of the wind, or the low temperature of the external atmosphere are sufficient to produce the desired effect.

9. All the openings and flues for the admission of pure air, and the discharge of the foul air, should be of the *maximum* size; that is, they should be calculated for the *largest numbers* which the apartment is ever intended to accommodate.

10. Valves must be placed in all the flues, and so arranged as to be easily regulated without leaving the rooms into which they open.

11. The best average temperature for school-rooms, is from 64° to 68° Fahrenheit; this range including that of the healthiest climates in their best seasons.

For the purpose of summer ventilation, and for occasional use in moderate weather, fireplaces of good size should be constructed in all the new houses, at least. They should always be double, and furnished with large air chambers, which communicate with the open air. When not in use, they must be closed with tight boards or shutters, as they would otherwise interfere with the regular ventilation.

With these arrangements, intelligently controlled by the Teachers, your Committee believe that an atmosphere will be secured which will be perfectly agreeable and salubrious; which will lighten the labors of the Teachers, and promote the comfort, health, and happiness, of the thousands of children who are daily congregated in our Public Schools."

This Report was received, and the same Committee were "directed to adapt to each school-room such apparatus, if any, as may be required to secure to them proper ventilation in winter and summer, and to make such alterations and arrangements of the furnaces as may be required." To be able to execute this order, the Committee applied to the City Authorities for an appropriation of $4,000, which was readily granted, after an examination by a Joint Committee of the Board of Aldermen and Common Council, of the school-houses in which the improved ventilating apparatus had been introduced. The following is an extract from the Report of the Joint Committee:

* This in practice has not been found *necessary*, although it may be sometimes.

"In order to be fully satisfied, the Committee visited the Endicott School, where the apparatus was in operation. The day was exceedingly wet and disagreeable, and yet the air of the rooms was found in an unobjectionable condition. The masters fully sustained the representations of the petitioners; and from their statements, as well as from their own observations, the Committee were satisfied of the beneficial effects of said apparatus.

In order, however, to have a more full investigation of the matter, the Committee, on a subsequent day, visited the Johnson School and the Boylston School. The day was dry and cold, and they found the air in the Johnson School in a tolerably good condition. This is a girls' school; and it is well known that the pupils in such schools are neater, and attend in cleaner and more tidy apparel, than the pupils in the boys' schools.

In the Boylston School, however, the Committee found the air very disagreeable and oppressive; and they could not but feel the importance of executing some plan of relief."

If the Committee of Ways and Means,—or whatever the money-compelling power may be called—in every city, and town, and district, would satisfy themselves by actual examination, of the necessity of a more perfect system of ventilation in all school-rooms, or in all public halls where a large number of human beings are congregated for a considerable length of time, and where fires or lamps are burning, a reform would be speedily introduced in this respect.

With the means thus placed at their disposal, the Committee applied themselves diligently to the duty of ventilating the school-houses—and at the close of the year, they had the satisfaction of announcing in their Final Report, "that the Grammar School-houses of Boston are now in a better condition in respect to their ventilation, than any other Public Schools in the world." The Committee thus sum up the results of their labors.

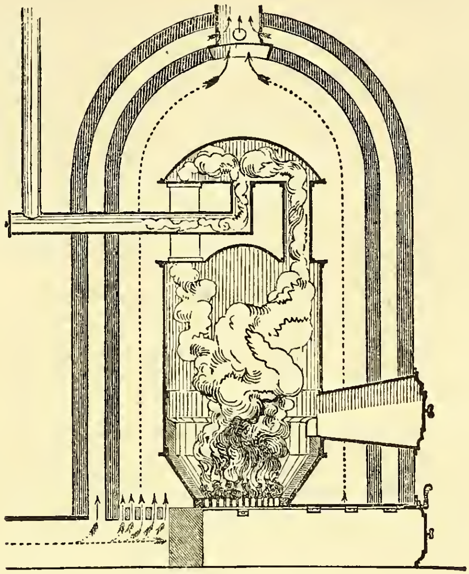
"The diversity of arrangement and the modifications in our plans which we have been compelled by circumstances to adopt, have had their advantages, and enabled us to arrive at the best results, and to satisfy ourselves entirely in regard to the particular *set of apparatus* which we can recommend with confidence for future use as decidedly the most effective and convenient. We have therefore furnished drawings and specifications of the set of apparatus which we recommend.

Chilson's Furnace.

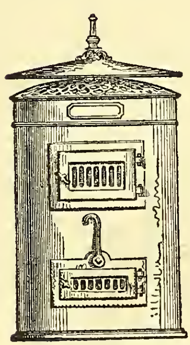
Your Committee have made themselves acquainted not only with all the Furnaces which have been manufactured in this place, and its neighborhood, but with all those which have been exhibited here recently. Most of them show much ingenuity of contrivance and excellence of workmanship; but are all, so far as we can judge, inferior in many respects, to the one invented by Mr. Chilson, a model and plans of which we now exhibit, and recommend as superior to all others.

It is simple in its structure, easily managed, will consume the fuel perfectly, and with a *moderate* fire. It is fitted for wood or coal. The fire place is broad and shallow, and is lined with soapstone or fire-brick, which not only makes it perfectly safe and durable, but modifies very materially the usual effect of the fire upon the iron pot.

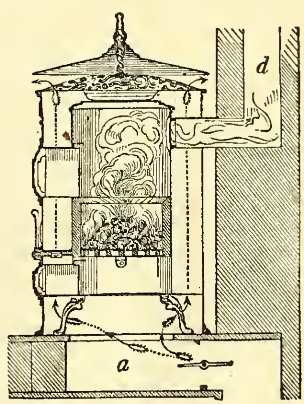
The principal radiating surfaces are wrought iron, of a suitable thickness for service, while at the same time the heat of the smallest fire is communicated immediately to the air chamber. The mode of setting this Furnace we consider essential; more especially the plan of admitting the air to the furnace at its lowest point, as it then rises naturally into the apartments above. This process commences as soon as the temperature is raised even a single degree. The outer walls remain cold; the floor above is not endangered, and the whole building is rapidly filled with an atmosphere which is at once salubrious and delightful.



Section of Chilson's Furnace.



Elevation.



Section.

VENTILATING STOVE.

For the houses which we found without the Hot Air Furnaces, as also for the Recitation and other single rooms, the invention of a Stove which shoul answer the same purpose became essential. One was therefore contrived; and having been found in its earlier and ruder forms to be of great utility, it has since been improved in its appearance, as well as in the convenience of its management.

These Stoves are composed of two cylinders, the *inner* containing a fire chamber, which is lined with soap-stone or fire brick, while the *outer* constitutes a chamber for warming the air, which is introduced into it beneath the inner cylinder, from an air box directly connected with the external atmosphere.

They possess the following advantages:—

1. They are in fact *furnaces*, having distinct and capacious air chambers.
2. They insure, when properly set, that *supply of fresh air* which is *indispensable to the proper ventilation* of any apartment.
3. The Regulating Distributor, which is movable or fixed, as may be desired, determines with great accuracy the amount and temperature of the admitted air.
4. The outer cylinder is never hot enough to burn the person or clothing, or to be uncomfortable to those who are situated in its immediate vicinity.
5. They are constructed with the utmost regard to efficiency, durability, compactness, and neatness of appearance.

These Stoves have been furnished to the Schools whenever your Committee have required their use, and at manufacturers' prices, without any profit whatever to the inventor and patentee.

They may be used with advantage in the largest rooms, when the cellars are unfit for Furnaces, or when it is preferred to have the fire in the room itself. The Johnson, Wells, Hawes, and Winthrop School-houses are warmed entirely by them.

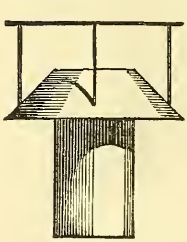
The discharging ventiducts have been made in various ways; some of wood, some of metal, and others of 'lath and plaster.' Some have opened at the ceiling only, and in but one part of the room, while others have been equally divided at opposite sides of the apartment. Our rule is this:—If the Heating Apparatus is at one end of an oblong room, the ventiduct is placed at the opposite. If the stove or furnace flue is at the middle of the longest side, the ventiducts are placed at each end, and are of course reduced to one half the size of the single one.

The *best* manner of constructing them is shown by the drawing, *Fig.* 1, and described on the following page.

There is great economy in carrying the boxes to the floor in all cases. In this way the room can be kept warm and the air pure in the coldest and most windy days.

The registers at the top and bottom can be used separately or together, as may be desired.

It is necessary and advantageous to apply some kind of cap or other covering upon the ventiducts where they terminate above the roof. It is necessary as a protection from the rain and the down blasts of wind, and it is also very advantageous to be enabled in this way to avail ourselves of the power of the wind to create an active upward current. We used at first the turncap or cowl invented by Mr. Espy, and with satisfactory results. It is undoubtedly the best movable top known; but is noisy, and somewhat liable to get out of working order. These objections to the movable tops have long been known, and various stationary tops have been invented, and have been partially successful. An improved Stationary Top, or Ejecting Ventilator, as it is called, has been invented during the past year by Mr. Emerson. It is shown in the drawing, and consists of the frustrum of a cone attached to the top of a tube, open in its whole extent, and surmounted by a fender which is supported upon rods, and answers the double purpose of keeping out the rain and of so directing or turning a blast of wind upon the structure, as that in what-

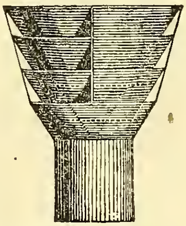


Ejecting Ventilator.

ever direction it falls, the effect, that of causing a strong upward draft, will be very uniform and constant.

Being satisfied that this Stationary Ejector possessed all the advantages of the best tops hitherto known, without the disadvantages of either of them, we bave adopted it for several of the houses last ventilated, and find it in all respects satisfactory. We therefore recommend it for general use.

The Injector may generally be dispensed with, but in situations unfavorable for introducing air, it may be sometimes found convenient, or even necessary. [Mr. Emerson recommends the use of the Injector, whenever a ventilating stove or furnace is used, so as to secure the admission of a quantity of pure air, warmed by the heating surfaces of the stove or furnace, equal to the quantity of air rendered impure by respiration withdrawn by the Ejector. He refuses to allow his ventilators to be placed upon any school-house which is not supplied with fresh warm air.]



Injecting Ventilators.

Ventiducts.

The discharging ventiducts should be situated at the part of the rooms most distant from the stove or register of the furnace, and should always, if possible, be constructed in or upon an *interior* wall or partition, and an outer brick wall must, if possible, be avoided. They should be made of thoroughly seasoned sound pine boards, smoothed on the inner sides, and put together with two-inch iron screws. The outside finish may be of lath and plaster, or they may be projected backwards into a closet or entry, as shown in Figure 3. They must be carried entirely to the floor, and should be fitted at the top and bottom with a swivel blind, whose capacity is equal to that of the ventiduct into which it opens. This blind may be governed by stay rods or pulleys. The elevation gives a view of the ventiducts for a building of three stories, and shows the best mode of packing them, so as to avoid injuring the appearance of the rooms.

These ventiducts must be *kept entirely separate* to the main discharger at the roof, as any other arrangement would impair or destroy their utility.

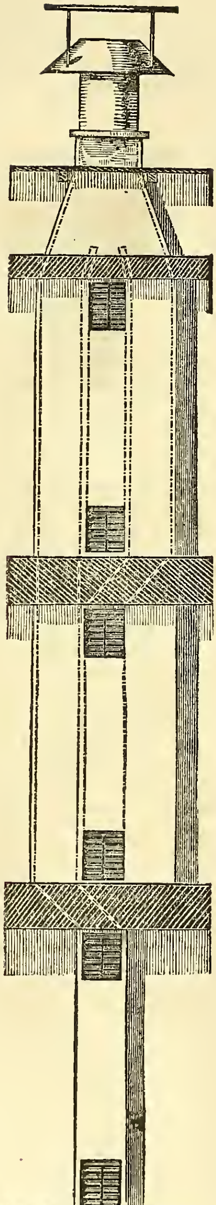
The size of the ventilators and ventiducts must correspond to the capacity of the room, and the number it is intended to accommodate.

A room containing sixty scholars is found to require a discharging duct of fourteen inches in diameter. A room for one hundred scholars requires the tube to be eighteen inches; and a room for two hundred scholars requires it to be twenty-four inches.

The *fresh air ventiducts should exceed in capacity* those for carrying off the impure air by about *fifty per cent.;* so that there will then always be a surplus or plenum supply, and the little currents of cold which press in at the crevices of the doors and windows will be entirely prevented.

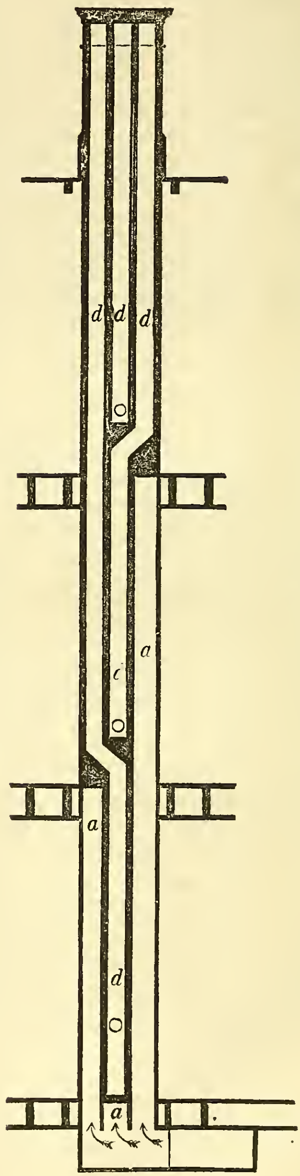
The section shown in Fig. 3 exhibits a very convenient mode of bringing the cold air to the ventilating stoves in a three story building in connection with the smoke flues.

FIGURE 1.



Elevation of Ventiducts.

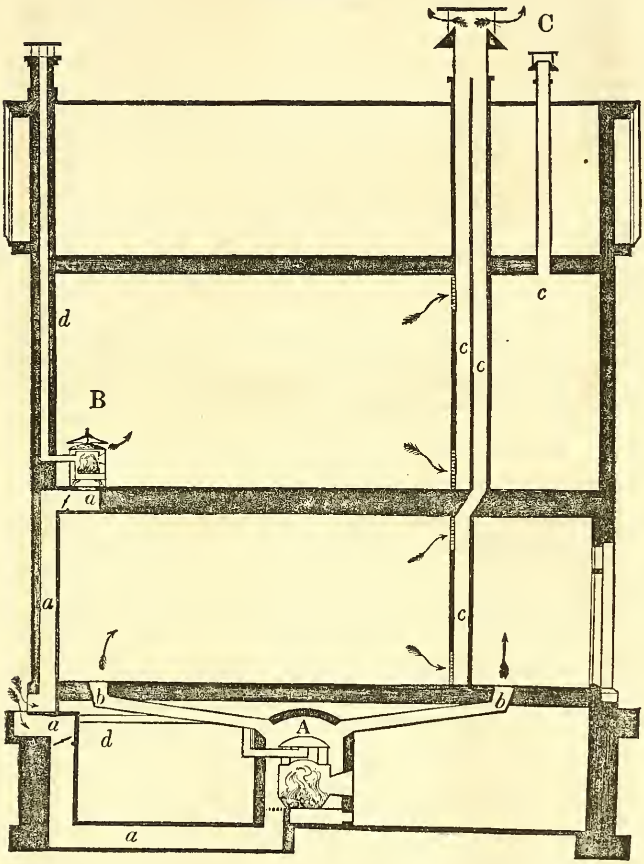
FIGURE 2.



a. Cold air ducts.
d. Smoke flues

The following section, (Fig. 3,) and plans (Fig's. 4 and 5,) exhibit at one view an example of a building of two stories warmed and ventilated by the apparatus and in the manner recommended.

FIGURE 3.

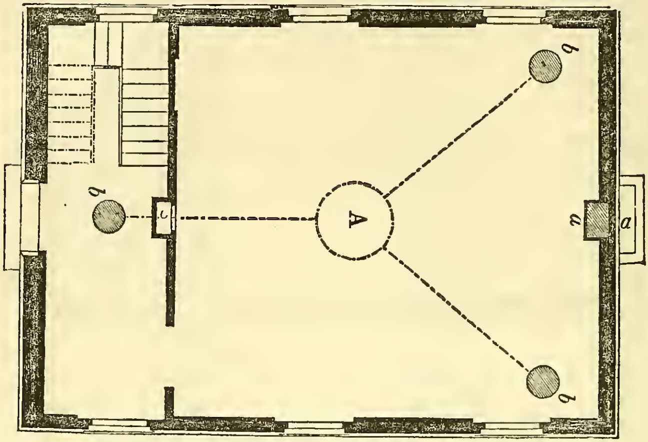


A. Chilson's Furnace.
B. The Boston School Stove.
C. Emerson's Ejector.
a. Cold or fresh air ducts.
b. Warmed air ducts.
c. Impure air ducts.
d. Smoke flues.

The letters on the plans correspond to those in the section.

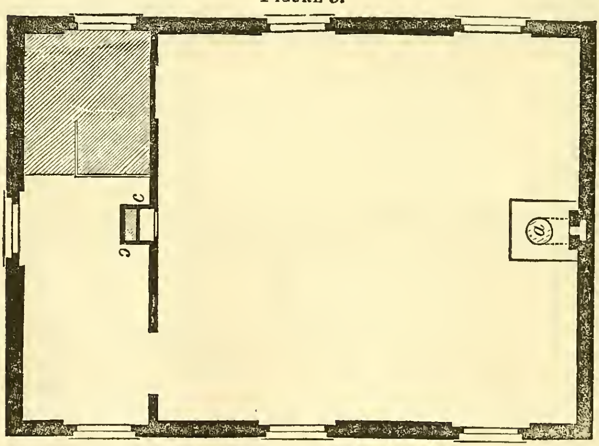
Plans of First and Second Floors.

FIGURE 4.



First Floor.

FIGURE 5.



Second Floor.

A. Furnace. a. a. a. Fresh air ducts. b. b. b. Warm air registers. c. c. c. Impure air ducts.

The modes of ventilation and heating above described and illus trated, were unanimously approved by the school committee, and recommended to the city government, for introduction into the school-houses which may be hereafter erected.

The Committee append to their Report directions for the management of the Stoves, Furnaces and Ventiducts, to which they request the attention of the masters of the Public Schools, in conformity to the rule of the Board, which requires their attention to the Ventilation of the School-houses under their care.

Rules relative to the use of the Stoves, Furnaces and Ventilators.

1. *To kindle the fire.*—Close the upper, and open the lower registers of the ventiducts; close the upper door of the stove or furnace and open the lower door; place the cover of the stove one or two inches up.
2. *After the room becomes warm*—Raise the cover of the stove three or five inches; close the lower door of the stove and open the upper door; open the registers of the ventiducts about half their width.
3. *If the room become too warm*—Open the registers full width, and raise the cover of the stove high up, keeping the upper door of the stove or furnace open, and the lower door closed.
4. *If the room become too cool*—Close the upper registers, (for a short time only;) close the upper door of the stove and open the lower door; drop the cover down within two inches of the sides.
5. Never close the top of the stove entirely down, while there is any fire therein.
6. At night, on leaving the room, let the cover of the stove down within one inch of the sides; close the lower door, and open the upper one; place all the registers open about half their width.
7. Fill the water basins every morning, and wash them twice a week.

The fires should be kept, if possible, through the night, by covering the coal. The coal to be white ash.

Construction of Ventiducts.

Since the first edition of this work was published, the following note has been received from Dr. Clark, in relation to the structure of the discharging ventiducts.

Boston, Feb. 12th, 1849.

Henry Barnard, Esq.:

My Dear Sir,—Will you allow me to ask your attention to a single matter relating to ventilation? I refer to the construction, situation, and proper materials of the ventiducts which are intended to carry off the foul air. In almost all instances within my knowledge, excepting in the buildings in this place, which have been ventilated within two or three years past, these discharging ducts are made of *brick* or stone, being often, therefore, also built in the outer wall. If there is any peculiar advantage in our school-house ventilation, its success is very much owing to the manner of locating and constructing these same ejecting ventiducts.

The brick ducts always operate *downwards;* that is to say, the air has a constant *tendency to fall* in them, and they will never "draw" in the proper or *upward* direction, with the best turncap or top known, unless there is a high wind, or unless *artificial* power, such as a *fire*, or a fan wheel be put in requisition. Now the contrary is the fact with the thin *wooden, or lath-and-plaster, interior ventiduct.* The current is always in the right or *upward* direction. They are warmed to the *temperature of the room*, and when provided with a proper top will operate *in all seasons.* Although the currents will *vary* in power and rapidity, yet, while almost all our ventiducts are provided, and should be, with means of heating by lamps or otherwise, I believe they have scarcely had occasion to light them. So that any impressions formed in relation to this part of the subject from the English, and particularly the French methods of ventilating school-houses, when the brick flues are always used, must be entirely erroneous. The days in which the fires in the French flues *would be forgotten* and omitted, or *be permitted to go out*, would far exceed the number of those in which our ventiducts would not act in the most perfect manner *without any power at all.*

I would not have troubled you, but that I know this point, from much practical experience, to be worthy of especial attention, and in case you should publish a new edition of your work on school-houses, I hope it may be considered.

I am, dear sir,

Yours very truly,

HENRY G. CLARK

Ventilation of Buildings.

The ventilation of buildings in relation to public health in large towns is now attracting much attention in England. The following valuable suggestions are taken from a recent work, published in London, by John Murray, entitled, "*A guide to the proper regulation of buildings in towns as a means of promoting and securing the health, comfort and safety of the inhabitants,*" by William Hosking. In the chapter preceding that from which these extracts are taken, the author discusses the subject of drainage, and as ventilation as applied to buildings implies both the means of admitting and of compelling the entrance of fresh air, and the means of escape and of compelling the exit of spent or otherwise foul air from any building, and from the several apartments with which a building may be divided, the importance of a system of drainage, or the removal of all such matters as are offensive to any sense, or capable of, under any circumstances to which they may be exposed, of causing annoyance and injury, is readily understood.

Perfect scavengering is the first essential to cleanliness, and to the protection of the air from pollution in and about buildings, the excreta arising in which are dejected into dry sand or gravel; whilst the soil-drainage of buildings will not supersede the necessity of scavengering, nor, having regard to the wholesomeness of the locality, ought it to be preferred to the dry cesspool, where the dry cesspool is available to the effect already indicated, unless provision be first made for scouring the contents away, and for removing directly to the upper air the gases which they will evolve in their psssage.*

Doors and windows ought not to be taken into consideration in connection with the ventilation of buildings; they are provided for facility of ingress and egress to and within the building, and for admitting light to the several apartments, and cannot be applied to promote ventilation in the seasons, and under the circumstances, which make ventilation most highly desirable. It is not enough, indeed, to set a window or a door open to admit fresh air into an otherwise unventilated apartment, even when windows and doors can be properly set open. The air must be drawn in, or it must be pressed in, and in either case there must be a way of escape for that which the apartment had previously contained; and as two opposite currents of the same kind of fluid can hardly pass one another in the same orifice, the ventilation of an apartment—that is, the establishment of a current of air through it—can only be properly effected by the establishment of opposite currents through different orifices. In this manner it will be found that a fire-place, with an open flue from it leading to the outer air, will act in concert with an open window, by allowing an up-draught to be fed by the window, or by permitting a down-draught, according to the state of the atmosphere and the direction of any currents of wind, or as there may or may not be a fire in the chimney, or heat affecting its flue from fire in another chimney. But the state of the atmosphere is uncertain, currents of winds are unsteady and changeable, and, moreover, open windows are seldom consistent with fires as sources of warmth, and the common domestic focal fire may not, therefore, be relied upon as a means of ventilating an apartment in connection with open windows. Moreover, one-third of the life of civilized man is passed in apartments within buildings, under circumstances which, for the most part, preclude open windows, and render fires either inconvenient or unnecessary as a source of warmth. One-third of the lives of three-fourths of the people of England is passed, however, in rooms which have no chimney at

* In coal countries, where ash and cinder arise in large quantities in even the poorest dwellings, and go to the ash-pit or dust-bin with animal and vegetable refuse, &c., the injury to the air of the locality from defective scavengering is not so great as in London, and other towns where coal is dear.

all, or of which the chimney opening has a board before it, and of which the doors and windows are all shut as closely as the occupiers can shut them. In the cases of the few who may indulge in bed-room fires in the winter, or of those who will open a bed-chamber window an inch or two in the summer, the former allow the fire to divide with them the pent-up air of the apartment, and the latter shut down the register-flap, or put up the chimney-board, to prevent the circulation, which the state of the atmosphere or of the wind might bring about.

But although, between the focal fire which compels air to enter, and the chinks and crannies by which, when doors and windows are shut, the air is compelled to pass, some amount of ventilation is obtained in the customary day-rooms, it is mainly through the lower parts of a room, and to the height of the chimney-opening, that any change is really effected; and even this amount of ventilation is not obtained without exposing the occupiers of the room to cold draughts; whilst in summer time, when the air of an apartment is sought to be changed by opposite open windows, the occupiers are exposed to draughts which are often as much more dangerous, as they are more agreeable, than the cold draughts which the fire compels in the winter.

Fire-places and their flues, and doors and windows, may, therefore, be fully provided in any building, and to every apartment of a building, and the building, and its apartments remain wholly unventilated in the proper sense of the term, which—it may be repeated in another form—consists in the continued flow into the building, and into its apartments, of fresh air, in a state to be agreeable as it regards temperature, and in a manner which shall not constitute a sensible current, and the consequent ejection from the building of spent or otherwise deteriorated air, and this at all times and seasons. But air is an inert body, and will not move either into or out of an apartment, unless something be done to induce movement; but it yields ready obedience to any action that does not seek to compress it, and responds freely to any endeavour to draw it. It will neither enter a close room, unless way is first made for it by the exit of what may be there already; nor will it submit, without resistance, to be pressed into a close room, but it will follow in at one opening if air be drawn out at another, or it will enter and drive out what might be already in possession of the inclosed space with the slightest possible force; that is to say, the way out being as large as the way by which the air is pressed in.

Some power must, therefore, be employed aud applied to secure the movement of air, necessary, in the first place, to the ventilation of a building or of an apartment, and irrespective of the condition of the air as to temperature; and the power employed should be certain and constant. But there is no power placed at our disposal that can be relied upon as certain and constant, without involving labor, that is to say, expense; whilst the purpose under consideration is one, of which the people generally do not see the necessity so clearly, nor feel so acutely, as to induce them to be at charges to promote it.

People, who would revolt at the idea of drinking out of the same cup or glass with a stranger, or even with a guest, suffer no annoyance from, and feel no disgust at, inhaling what has already passed through the lungs of those who may be shut up in a room with them, however close the room may be, and whether the room be an apartment of a dwelling-house, a shop, a chapel, a church, or a theatre.

Another phase of foulness as it regards ventilation is found in the practice of the tobacco-smoker, whom fastidiousness would prevent from taking up a cigar that had been between the lips of another; but who seems to be unconscious that, although the expired air of untainted breath may rise as it passes the lips, the air comes dense, and tainted with a nauseous odour, out of his mouth, and, refusing to rise, is perforce inhaled by whoever may follow the same way; the squeamishness being exercised in his own favor, and the grossness to the loathing of his neighbors.

But although power, involving expense in its establishment, maintenance, and application, is necessary to effect the proper and complete ventilation of any buildings used for the purposes of habitation in civilized life, a much greater approach to ventilation than is generally attained may be made without the additional expense which the employment of a certain and constant power would impose, if advantage were taken of the agencies which nature provides without charge, and of those which are commonly established and maintained for other purposes. The agencies provided by nature, available towards the ventilation of buildings, consist in the difference in density of the atmosphere at different temperatures, and in the force of the wind: the one always, to some extent, available, as between the inside and outside of a building: and the other only available when it is in force, at which time, however, it is liable to act with more than the desired effect, if the means of its application be adapted to render its services of use when it acts but slightly. These agencies being taken together, however, and aided rather than checked, as they would be according to the common practice, by the heat from the flues of the fires which are to be found in every dwelling-house, at least, to a greater or less extent, all the year round, will be found to do much if properly applied to ventilation in most ordinary cases.

Let every fire-place be connected with the outer air by a flue, tube, or other means of communication in the wall, or through or under the floor, opening out at the lowest level above ground and admitting the air behind the range or stove, or rather behind the faces or cheeks which may be made to form a coffer about the fire-box or grate, shut off at the top by a metal plate, or by the boiler if it be a range, or by tiles set to that effect; and make openings through the faces or cheeks at the level of the hearth to let in air before the fire, and so that the fire may be fed with air which it will compel to enter, and be spared the task of checking the desired up-draught in whatever flue or flues may be provided to carry off the foul or spent air from the apartment, or from the inside of the house generally. If the air so delivered by the special provision made for every fire, is in sufficient quantity—that is to say, if the way for it be large enough, and it ought for the purpose to be equal in area in its transverse section to the register-way over the fire—there will be no draughts in the room when the doors and windows are shut, although the wind may force currents if the joints be badly made; and, moreover, the air admitted to feed the fire will take up warmth enough from the grate, in passing behind and about it, not to be disagreeable if it escape into the room and be felt, nor detrimental to the purposes of a fire used for cooking.

The fires being thus provided with air for the purposes, as well as with vents for the products, of combustion, will make no demand for air upon those vents—that is to say, upon their own smoke-flues, but, on the contrary, send a stronger draught up them. In such case the chimney-flue may be made the means of removing the spent air from the room itself by an opening made under the ceiling into the flue. But, it may be said, there will be an effective up-draught only when there is a fire burning in the grate—and that is true, and therein the operation is defective for the full purposes of ventilation; and, it may be added, that it does not yet appear in what manner the room itself is to be supplied with the air which, when spent, will be drawn into the flue by the up-draught, occasioned by the combustion going on in the grate when there is a fire. And to supply the deficiency in this respect without resorting to the clumsy, dirty, and uncomfortable practice of letting cold air in behind and under the skirtings of a room, the current of sweet air coming in by a flue or tube, and delivering itself behind and about the grate, may be made to do the double duty of feeding the fire and supplying the room for the purposes of respiration.

It has been said that the inlet for fresh air to the fire should be equal in area to the area of the register opening, and a register is almost essential, over the fire; but a supply by such an inlet will be in excess of the demand of combustion in the grate, inasmuch as the register opening must be always large enough to carry off the smoke, or steam rather, which coal, when it first reaches the fire, throws off; and although this should be followed by a full body of air, much of what the fire would draw in will pass up the flue unconsumed, when the simple purposes of combustion alone have to be supplied. The register-flap will admit, therefore, of being partially closed during the long intervals between the coalings of a fire, and the fresh and tempered air emerging from the openings through the cheeks of the grate will enter the room to supply the place of what the chimney-flue is drawing off by the orifice under the ceiling. By this simple process, and with most inexpensive mechanical arrangements, every room in which a fire is employed may be pleasantly and most wholesomely fed with air, and be, to a great extent, really and effectually ventilated so long as a fire is employed.

So long as the up-draught is certain, that is, as long as a fire is burning in the grate below, and the fire is well supplied with air, there will be no danger of anything coming down the flue. But inasmuch as the flue is a smoke-flue, and to prevent any down-draught from dislodging the soot, and driving it through the orifice into the apartment, it is necessary to apply some simple self-acting valve which shall close the orifice to the slightest pressure from the side toward the flue, and open it to an equally slight pressure on the side of the apartment.

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Power may be applied in the ventilation of buildings, either—as already remarked—by forcing in the fresh air, or by drawing out the spent air, and a light and simple pump of not more than a turnspit power will suffice to ventilate almost any building of average size, to the extent of establishing an equable and sufficient current of air through it; so that, whether the pump be worked by direct or by reversed pumping action, there be both an inlet and an outlet fully equal to the capacity of the pump, the outlet at least being not liable to be acted upon by any currents of wind. Thus, if there be an apparatus for warming air, it should be placed at a low level, in free communication with the outer air, which should be warmed in its way into the building, and the warmed air passing freely into the building, a pump applied to a lift-case, or other tube or flue opening to the interior at a high level diagonally opposite to the inlet, and worked there, the whole of the air in the building, so far as it is exposed to the current, may be changed in a time that can be calculated, the fresh warm air taking the place of what is removed—that is, if all the other inlets besides that for the warmed air be closed, and the warming apparatus and its means of warming be sufficient; and, in like manner, in the season when it is not necessary to warm the air before it is admitted, the same action will change the air and cause substitution of fresh for foul, though the ways in may be greatly increased by opened windows and doors. Conversely, the power may be applied at the inlet for the warmed air, when the reversed action of the pump will throw air in; there being, as a matter of course, a way out provided; when the spent air, meeting with no sensible resistance, will pass off by such outlet, and so thorough ventilation will be effected.

It may not be out of place to remark that many churches are supplied with a certain and constant power, so placed for the most part, with reference to the body of the church, as not only to offer itself, but to offer itself in the most convenient place for the purpose of promoting the effective ventilation of the building whenever its services may be required. Church clocks have, or ought to have, power beyond their ordinary work, to overcome the effect of the highest wind upon the hands, so that every church clock may be supposed able to spare power enough to work, at sufficient speed, the light pumps necessary in any case to draw off the spent air from the body of the church. And the church clock is placed in the tower, and the tower rises so much above the body of the church, that it may be most easily made to act as the ventilating flue to the church. Thus, in winter-time the withdrawal of the cold air by pumps in the tower, fitted into flue-like lift-cases and geared to the clock, will give the warming apparatus, which ought perhaps to be diagonally opposite, or thereabouts, to the outlet into the tower, the means of warming the church in a much shorter time than when it has to act upon the confined and inert body of cold air which the church may have contained; inasmuch as the pumps would, in withdrawing the cold air, compel the fresh air, tempered by the warming apparatus, to supply its place; and this operation being effected before the services commence, the church would not be felt by the assembling congregation to be either cold or close, and the ventilating process continuing, the spent air would be removed as it arose, and its place being supplied by fresh and tempered air for respiration, the faintness and weariness which so often distress a congregation in a close unventilated church would never be felt: nor would the operation be less beneficial in summer-time, when the horizontal flaps to the half-hopper windows of churches stand, without such operations, unavailingly open, as the cooler outer air cannot rise to flow over the hoppers, even if it could make its way in against the pent-up air already inclosed. But the pumps in the clock-tower, worked by the clock, summer as well as winter, and drawing the spent and heated air out from under the roof or ceiling of the church, would compel the outer air to supply its place within the church, by whatever ways it may be found in any case most to the comfort of the congregation to open for its admission.

A knowledge of the organization of the Public Schools of Boston, is necessary to a ready understanding of the plans of the new school-houses recently erected in that city,—especially of the new Grammar school-houses. For this reason, and for general information, we have drawn up the following sketch of the system.

System of Public Instruction in Boston, Mass.

The system of Public Instruction in Boston, as it now stands, embracing Primary, Grammar, and High Schools, is the growth of more than two centuries. The germ of the whole system is to be found in the vote of the town by which "Brother Philemon Purmont was intreated to become school-master for the teaching and nurturing of children with us," and the first records of the town contain a sum voted for the "maintenance of a free school-master." By the Act of the General Court passed 1647, "to the end that learning should not be buried in the graves of our forefathers," every town having one hundred householders was required to maintain a "free grammar school; the master whereof being able to instruct youth so far as they may be fitted for the university." In that year the present Latin School was founded, but was known as the Grammar School till 1713, when it took the name of the South Latin School,—a new Grammar school having been established in that year, called the North Latin School, and now known as the Eliot school.

In 1684, a class of free schools called writing schools were founded, to teach children to "read and write." Of this class there were four in 1785.

In 1789, the schools were remodeled. One (the North) of the Latin Schools were discontinued, and "reading schools" (now known as departments under the Grammar master) were established in separate departments from the "writing schools;" and the whole placed under the direction of a School Committee chosen annually by the town. Previous to this, the schools were under the inspection of the Selectmen, "and of such gentlemen of liberal education, together with the reverend ministers" as should be appointed for the purpose.

In 1812, a separate school for colored children was established, and called the Smith School.

In 1818, the School Committee were instructed by a vote of the town to appoint three persons from each ward, whose duty it was made collectively, to provide instruction for children between the ages of four and seven years, out of the sum of $5000, appropriated for the purpose for that year. This was the origin of the Primary Schools of Boston, and of this class of schools in this country. Previous to this date, no child could be sent to the Grammar schools, until he could read the English language.

In 1821 the English High School for boys was begun, and its success was such, as to lead to the establishment in 1825 of the High School for girls. This last school was discontinued in a few years. Its place is in part supplied by allowing the girls to remain two years longer than the boys in the Grammar school. But the fact that near two-thirds of all the scholars in the private schools are females, shows that there is a deficiency in the system of public schools in reference to female education.

In 1828 ten schools, one in each primary district, were designated to receive children who were over seven years, and were not prepared for the Grammar schools.

The following is the organization of the Public Schools, as gathered from the Rules and Regulations published in 1848.

ORGANIZATION OF THE SYSTEM.

All the schools of the city are under the superintendence of a Board, or General School Committee, consisting of the Mayor, the President of the

Common Council, and twenty-four persons, annually elected in each ward of the city.

The Board meet for organization in January, and regularly on the first Tuesday of February, May, August and November. In January there are appointed a Primary School Committee, consisting of a suitable number of gentlemen; a sub-committee of visitation, of five members for the Latin and English High Schools respectively, and of three for each of the Grammar schools; a committee on books, of five members; a committee on music, of three members; a committee of conference with the Primary school committee, of three members—and a committee on school-houses, to consist also of three members.

The Primary school committee have the exclusive management of the Primary schools, organize by themselves with their own sub-committees, and fill any vacancy which may occur during the year.

The sub-committee of visitation must examine the classes in their respective schools at least once each quarter of the year, and visit them at least once a month, and report in writing to the quarterly meeting of the Board. This committee decide who are to receive the six medals in their respective schools, purchased out of the fund left for that purpose by Franklin; take cognizance of any difficulties in the school, or respecting it; supply vacancies temporarily in the office of teacher, and generally take good care of their respective schools.

The committees of examination must visit all the schools for which they are appointed, in May, June or July, and critically examine all the pupils of the first class, in all the branches taught therein, and report to the board; and after their report has been accepted, it shall be printed and distributed to every family in the city.

Besides the specific duties assigned to each member on the several sub-committees, each member must consider it his duty to watch over all the public schools. to attend the visitations, exhibitions and examinations.

All the instructers are elected annually in August, and their salaries fixed for the year. In case of a vacancy, notice must be given in the newspapers, and application to the committee must be made in writing by the candidates.

PRIMARY SCHOOLS.

There are now 161 Primary schools for children over 4 and under 8 years of age. Each school receives an average of fifty children of both sexes, and are taught by female teachers.

In these schools, the alphabet, pronouncing and spelling words, numeration and combination of numbers, the stops and marks, mental arithmetic and reading, are attended to. On Tuesday and Friday instruction is given to such as come prepared for it in needle-work. Oral instruction, and exercises on the slate and blackboard constitute a part of the daily exercises. The health and physical comfort of the pupils receive special attention. For this purpose there are three recesses of ten minutes each, every half day. When the weather, or the arrangements of the building will not admit of out-door exercises, various gymnastic exercises are gone through with in doors. The ventilation of the rooms is now made an object of special attention.

In these schools the stimulus of rewards and prizes is applied—ten dollars being annually appropriated to each school for this purpose.

At the age of 7, every pupil, who can spell correctly, and read fluently receives a certificate of recommendation to one of the Grammar schools. If not prepared for the Grammar school, the pupil is sent to what may be termed the intermediate school of the district.

The city in reference to this class of schools is divided into a convenient number of districts. Each school is under the special charge of one person, and the schools of the district are under the supervision of a board, composed of the committee of each school. Each member must visit his own school once a month, and all the schools in his district at least once a year. The first classes in all the schools of a district are examined together, by a committee of the Primary school committee semi-annually at one place.

The Primary School Board, composed of all the members appointed by the School Committee, meet for organization in February, and appoint a President, Secretary, an Executive Committee, and a committee on school-houses, and on school-books.

The Executive Committee attend to the semi-annual examinations of the schools of each district, and report on their condition, and suggest plans of improvement. They hold also semi-annual meetings of all the Primary school teachers.

Grammar Schools.

The following are the names, situation and date of the establishment of the several Grammar Schools.

1. *Eliot School*,	North Bennet St.	For Boys,	1713
2. *Adams School*,	Mason St.	For Boys,	1717
3. *Franklin School*,	Wnshington St	For Girls,	1785
4. *Mayhew School*,	Hawkins St.	For Boys,	1803
5. *Hawes School*,	South Boston,	For Boys nnd Girls,	1811
6. *Smith School*,	Belknap St.	For Boys and Girls,	1812
7. *Boylston School*,	Fort Hill,	For Boys and Girls,	1819
8. *Bowdoin School*,	Myrtle St.	For Girls,	1821
9. *Hancock School*,	Between Richmond and Prince sts.	For Girls,	1822
10. *Wells School*,	McLean St.	For Girls,	1833
11. *Johnson School*,	Tremont St.	For Girls,	1836
12. *Winthrop School*,	East St.	For Girls,	1836
13. *Lyman School*,	East Boston,	For Boys and Girls,	1837
14. *Endicott School*,	Cooper St.	For Boys nnd Girls,	1840
15. *Mather School*,	South Boston,	For Boys and Girls,	1843
16. *Brimmer School*,	Common St.	For Boys,	1844
17. *Phillips School*,	Pinckney St.	For Boys,	1844
18. *Otis School*,	Lnncuster St.	For Boys and Girls,	1844
19. *Dwight School*,	Concord St.	For Boys and Girls,	1844
20. *Quincy School*,	Tyler St.	For Boys,	1847

Children who can read fluently easy prose may be admitted into the Grammar and Writing Schools at the age of eight years. They must be examined by the grammar master. Children above eight years of age, although not possessing the necessary qualifications, may be admitted by a special permit from the Sub-Committee of the school, and children of the age of seven years may be admitted when they shall satisfactorily appear, on examination by the grammar master, to be otherwise qualified for admission; but no pupil can be admitted to the Grammar Schools from the Primary Schools, without a permit from a member of the Primary School Committee.

Boys are not permitted to retain their place in these schools beyond the day of the next annual exhibition, after they have arrived at fourteen years of age, unless by special leave from the Sub-Committee. Girls are allowed to attend these schools until the next annual exhibition, after they shall have arrived at the age of sixteen.

In these schools are taught the common branches of an English education. They are organized on three different plans.

First Plan. In the Eliot, Adams, Franklin, Boylston, Bowdoin, Hancock, Wells, Mather, Brimmer, Phillips and Otis Schools, there are two halls, occupied by two departments, one of which is a Grammar and the other a Writing School. The pupils are organized in two divisions. While one division attends the Grammar, the other attends the Writing School. Thus the two departments exchange pupils half daily. In the Grammar department, the pupils are taught chiefly Spelling, Reading, English Grammar, Geography, and History; and in the Writing department, Writing, Arithmetic, Algebra, Natural Philosophy, and Drawing.

Second Plan. In the Hawes, Johnson, Winthrop, Lyman, and Endicott Schools, there are two departments, entirely distinct, each under the control of separate instructers.

Third Plan. The Mayhew, Dwight, Quincy, and Smith Schools, are each under the charge of one head master, who has the direction of the whole course of education.

In the schools on the first plan, for boys exclusively, each department is instructed by a master, an usher, and a female assistant. In the schools on the first plan, for girls exclusively, each department is instructed by a master and three female assistants. In the mixed schools on the first plan, each department is instructed either by a master, an usher, and one female assistant, or by a master and three female assistants, at the option of the Sub-Committee.

In the schools on the second plan, each department is instructed by a master and three female assistants.

The schools on the third plan are each instructed by a master, a submaster, an usher, and three female assistants.

Each school or department is allowed a teacher for every fifty-five pupils on the register, and an additional female assistant may be appointed whenever there are thirty scholars above the complement for the teachers already in the school or department; and whenever the number of pupils on the register is reduced to thirty less than such complement, one female assistant is removed from such school or department.

Pupils in the schools on the first plan shall attend equally in both departments, unless specially permitted by the Sub-Committee to attend generally or exclusively in one.

Each school or department of a school is divided into four classes, subject to such sub-divisions as the master may judge expedient.

The order of attendance in the schools on the first plan, where both sexes attend, is as follows:—On the first week after the summer vacation, the boys attend the Grammar School, and the girls the Writing School in the morning; and the boys attend the Writing School and the girls the Grammar School in the afternoon. The week following, the order is reversed, and this alternation continues through the year; the weeks of vacation not being counted.

In the schools on the first plan, where only one sex attends, each of the four classes is divided into two divisions, nearly equal in numbers, and the order of attendance is as follows:—On the first week after the summer vacation, the first divisions attend the Grammar School and the second divisions the Writing School in the morning; and the second divisions attend the Grammar School and the first divisions the Writing School in the afternoon. The week following the order is reversed, and this alternation continues through the year, the weeks of vacation not being counted. In the schools on the second and third plans, the order of attendance and the sub-divisions of the classes are arranged by the Sub-Committees of such schools, upon consultation with the instructers.

English High School.

This school is situated in Bedford street. It was instituted in 1821, with the design of furnishing the young men of the city, who are not intended for a collegiate course of study, and who have enjoyed the usual advantages of the other public schools, with the means of completing a good English education. Here is given instruction in the elements of mathematics and natural philosophy, with their application to the sciences and the arts, in grammar, rhetoric, and belles lettres, in moral philosophy, in history, natural and civil, and in the French language. This institution is furnished with a valuable mathematical and philosophical apparatus, for the purpose of experiment and illustration.

The instructors in this school are, a master, a sub-master, and so many assistants as shall give one instructor to every thirty-five pupils, but no additional assistant. It is allowed for less than twenty-one additional pupils. It is a necessary qualification in all these instructors, that they have been educated at some respectable college, and they shall be competent to instruct in the French language.

No boy can be admitted as a member of this school, under the age of twelve years.

The pupils are arranged in divisions, corresponding to their respective degrees of proficiency. It is made the duty of the master to examine each division as often as may be consistent with the attention due to those under his immediate instruction.

Individuals are advanced according to their scholarship, and no faster; and none are permitted to remain members of the school longer than three years.

Each class, or section, is occasionally reviewed in its appropriate studies; and, once a quarter, there is a general review of all the previous studies.

Latin Grammar School.

This school is situated in Bedford street. It was instituted about the middle of the 17th century. The Latin Grammar School and the English High School, complete the system of public education, enjoyed alike by all classes in this city.

In the Latin Grammar School the rudiments of the Latin and Greek languages are taught, and scholars are fully qualified for the most respectable colleges. Instruction is also given in Mathematics, Geography, History, Declamation, and English Composition.

The instructors in this school are a master, a sub-master, and so many assistants as shall give one instructor to every thirty-five pupils, but no additional assistant is allowed for less than twenty-one additional pupils.

It is a necessary qualification in all the instructors of this school that they have been educated at some respectable college.

The regular course of instruction continues five years, and no scholar can enjoy the privileges of this school beyond that term, unless by leave of the Sub-Committee.

These schools are justly the pride and boast of the city; and the sentiment with which they are universally regarded is beautifully embodied in the following extract from an address by George S. Hillard, Esq.

The schools of Boston are the best jewels in her crown. If I were asked by an intelligent stranger to point out to him our most valued possessions, I would show to him—not our railroads, our warehouses, filled with the wealth of all the earth, our ships, our busy wharves and marts, where the car of commerce is ever "thundering loud with her ten thousand wheels," but I would carry him to one of our public schools, would show him its happy and intelligent children, hushed into reverent silence at their teacher's word, or humming over their tasks with a sound like that of bees in June. I would tell him that here was the foundation on which our material prosperity was reared, that here were the elements from which we constructed the State.

Here are the fountains from which flow those streams which make glad our land. The schools of Boston are dear to my heart. Though I can have no personal and immediate interest in them; though no child on earth calls me father; yet most gladly do I contribute to their support, according to my substance; and when I see a father's eyes filled with pleasant tears as he hears the music of his child's voice linked to some strain of poetry or burst of eloquence, I can sympathize in the feeling in which I cannot share. May the blessing of Heaven rest upon our schools. They are an object worthy of all efforts and sacrifices. We should leave nothing undone which may tend to make them more excellent and more useful. For this, we should gather into our own stores all the harvest of experience which have been reaped from other soils. The present is an age of progress. The claims of humanity are now beginning to be heard as they never were before. The movements in favor of Peace, of Anti-Slavery, of Temperance, of Education, of Prison Discipline, all spring from the same root— a sense of sympathy and brotherhood. Is it too much to say that the dawn of a new day is reddening the tops of the mountains? Higher yet may that light ascend, till its golden shafts have pierced the deepest valleys of ignorance and sin! Let us not stand idly on the brink, while the tide of improvement sweeps by us, but boldly launch our bark upon the stream.

We live in a community ready to discern and to do that which is right. It should be a source of gratitude to us that our lot is cast on a spot, where every good and worthy faculty may find appropriate work to do. When I behold this city that we love, seated upon her triple throne of hills with her mural crown of spires and domes glittering in the smokeless air, when I remember how much of that which embellishes and dignifies life is gathered under those roofs, I feel that he has not lived in vain who has contributed, even in the smallest measure, to the happiness and prosperity of Boston. And how can we do this more effectually than by watching over her schools,—by making them as nearly perfect as human institutions can be? For this object let neither wealth nor toil be spared. Here are fountains of life; as they are, so will its issues be. The child is father to the man. Make our schools all that they can be, and all that they should be, and we shall give to the prosperity of our beloved city a permanence like that of moral truth. It will become an inevitable necessity, like that which compels the heart of man to love what is lovely, and venerate what is venerable.

The original cost of the public school-houses, exclusive of the amount expended from time to time for alteration or repairs, of rebuilding when destroyed by fire, exceeds $1,000,000.

The following table exhibits the expenditures for school-houses and other school purposes, by the City of Boston, for the last ten years ending in May, 1848. We are indebted to Joseph W. Ingraham, Esq., who knows the history and statistics of the public schools of Boston by heart, for these statistics.

	Grammar Schools.	Primary Schools.	Total for all the Schools.
For new houses, rents, and repairs,	$602,720 97	$236,026 10	$838,747 07
Fuel,	27,622 12	20,864 27	48,486 39
Furniture,	17,589 96	10,825 32	28,415 28
Salaries of Teachers,	857,824 91	293,986 45	1,151,811 36
Incidentals,	26,238 24	6,613 67	32,851 91
Total,	$1.531,996 20	$568,315 81	$2,100,312 01

The following are the items of expenditures for public schools for the year ending May 1, 1848.

	Grammar Schools.	Primary Schools	Total for all the Schools.
For new houses, rents, and repairs,	$165,987 58	$52,848 71	$218,836 29
Fuel,	4,381 27	4,896 74	9,277 95
Furniture, and Apparatus,	4.439 46	3,584 08	8,023 54
Salaries,	114,925 80	47,950 64	162,876 44
Incidentals,	2,228 75	763 83	3,092 59
Total,	$291,962 86	$110,044 00	$402,966 81

The above tables do not include the expenditures for the support of the House of Reformation for Juvenile offenders, which is a part of the educational system of the city.

It is to be feared there are not many communities, even in New England, where the Chief Magistrate, elected annually by the people, would have the courage to utter the following noble sentiments, spoken by Mayor Quincy, at the dedication of the Quincy Grammar School-house, June 26, 1848.

As Chairman of the "City Fathers," he did not hesitate to stand there and tell the tax-paying community that they had, in this manner, just expended $200,000 of their money; and he was confident the question would not be asked, Why spend so much? Why spend more for popular education in the city of Boston, than is expended in the whole of Great-Britain?

He said, if but once in a century, a little being should be sent into this world, of most delicate and beautiful structure, and we were told that a wonderful principle pervaded every part of it, capable of unlimited expansion and happiness, capable of being fitted to associate with angels and becoming the friend of God: or if it should receive a wrong bias, of growing up in enmity against him, and incurring everlasting misery, could any expense of education which would contribute to save from such misery and elevate to such happiness, be too much? But, instead of one such little being, 24,000 were now entrusted to the care of the "City Fathers," and their education, in this world, will determine their future destiny,—of companionship with angels, or with the degraded wretched, enemies of God.

If the community had no responsibility in the matter, how, he asked, could it spend money better than in educating these children? But they would soon control the affairs of Boston, and, to a great extent, of the Commonwealth. Nor would their influence stop here. "No man liveth for himself" Each of these children would form a centre of widening influence, whose circumference might yet embrace millions of minds, and extend through unnumbered centuries.

Here, unlike other countries, every restraint to individual elevation is thrown off. All have the most perfect liberty that can be enjoyed, without infringing upon the rights of others. How important then, that each child should be educated to understand his rights, and the principles and habits of *self-Government.*

We are all, said he, in a partnership, and if one of these little partners suffers in his character, the whole community suffer in consequence.

He believed that nearly half of the 400 boys in that school were not Americans. Many of their parents were not fitted for the duties of a Republic. But these children, educated side by side with our own, would learn self-government, and be trained to become worthy citizens of this free country.

It seemed, he said, the design of Providence to mix races; and this influx of foreigners might constitute the very elements necessary to give to American character its highest excellence. Standing on such a moral elevation, as Boston did, they felt it a duty to provide for the education of all, and thus present to the whole country, *models* of popular education.

His policy would ever be to inquire, not how little would do in appropriations for educational purposes; but *how much could be judiciously and economically expended?* And he believed the general voice of the citizens of Boston, would continue to sustain this policy.

The liberality with which public schools are fostered in Massachusetts is not confined to Boston, and the large towns, as will appear from the following tables, compiled from the *School Returns* for 1844–45, and first published in this form in *Educational Tract, No.* 3.

No state in the Union,—no country in the world can show returns for the same number of towns, which argue so favorably for the condition and improvement of common schools, as does Table No. 1, which exhibits the condition of the common schools in several important particulars, in *twenty-nine towns*, which rank highest among the three hundred and eight towns in the state.

TOWNS.	COUNTIES.	POPULATION.	VALUATION.	Rank of Towns in the State, and in the County, according to the amount raised *by tax*, for each person between the ages of 4 and 16 years, including only wages of teachers, and fuel. Amount.	No. of persons between 4 and 16.	Amt. for each person between 4 & 16	Rank in State.	Rank in Co.	Number of Scholars of all ages, in all the Schools. In Summer.	In Winter.	Average wages paid to Teachers, per month, including value of Board. Males.	Females.
Somerville, ...	Middlesex, ...			$2,400	314	$7 64	1	1	309	340	$36 66	$17 03
Brookline, ...	Norfolk, ...	1,365	$743,963	1,900	279	6 86	2	1	214	193	49 00	15 62
Boston, ...	Suffolk, ...	93,383	109,304,218	124,968	18,478	6 76	3	1	15,520	15,520	100 14	20 83
Chelsea, ...	Do.	2,390	695,781	4,900	860	5 58	4	2	723	796	46 67	17 11
Medford, ...	Middlesex, ...	2,478	1,095,195	3,284	591	5 56	5	2	496	496	51 53	12 15
Brighton, ...	Do.	1,425	458,485	2,000	361	5 54	6	3	353	355	48 16	14 68
Charlestown, . .	Do.	11,484	4,033,176	14,000	2,750	5 09	7	4	2,514	2,514	75 00	14 84
N. Braintree, . .	Worcester, ...	752	385,722	800	166	4 82	8	1	171	210	24 50	12 29
Dedham, ...	Norfolk, ...	3,290	1,218,548	3,750	779	4 81	9	2	560	686	36 78	16 53
Lowell, ...	Middlesex, ...	20,790	10,160,652	22,896	4,867	4 70	10	5	4,107	4,008	49 24	16 79
Watertown, ...	Do.	1,810	976,835	2,200	470	4 68	11	6	351	352	39 08	16 00
Milton, ...	Norfolk, ...	1,822	663,247	2,000	439	4 56	12	3	381	386	33 26	18 00
Dorchester, ...	Do.	4,875	1,691.245	5,500	1,216	4 52	13	4	1,010	1,098	36 45	16 53
Roxbury, ...	Do.	9,089	3,257,503	11,375	2,534	4 49	14	5	1,793	1,836	66 94	17 99
Nantucket, ...	Nantucket, ...	9,012	6,074,374	8,275	1,900	4 35	15	1	1,443	1,443	62 50	16 66
Worcester, ...	Worcester, ...	7,497	3,696,004	8,972	2,290	4 35	16	2	2,166	2,332	38 58	16 14
Newton, ...	Middlesex, ...	3,351	897,255	3,125	733	4 26	17	7	595	686	43 29	20 59
Weston, ... :	Do.	1,092	386,494	1,050	250	4 20	18	8	199	270	36 50	15 56
Dover, ...	Norfolk, ...	520	192,309	450	120	4 19	19	6	70	115	24 87	10 33
W. Cambridge, . .	Middlesex, ...	1,363	472,423	1,600	386	4 14	20	9	323	401	33 70	12 75
Hull, ...	Plymouth, ...	231	58,124	130	32	4 06	21	1	36	42	20 00	8 00
Waltham, ...	Middlesex, ...	2,504	1,069,171	2,681	668	4 01	22	10	638	628	42 00	14 09
New Bedford, . .	Bristol, ...	12,087	6,049,520	13,000	3,281	3 96	23	1	2,030	2,071	66 66	18 27
Cambridge, ...	Middlesex, ...	8,409	4,479,501	10,337	2,619	3 95	24	11	2,111	2,038	55 07	18 36
Stoneham, ...	Do.	1,017	217.960	1,000	255	3 92	25	12	256	193	32 50	14 86
Boxborough, . . .	Do.	426	144,665	400	103	3 88	26	13	98	139	25 22	10 50
Salem, ...	Essex, ...	15,082	10,218,109	15,276	4,000	3 82	27	1	2,385	2,385	65 74	13 03
Concord, ...	Middlesex, ...	1,784	608,649	2,000	525	3 81	28	14	469	513	30 71	11 81
Lexington, ...	Do.	1,642	561,549	1,400	371	3 77	29	15	317	326	35 40	28 16
Sherburne, ...	Do.	995	318,462	925	245	3 77	30	16	202	270	28 12	12 23

TOWNS.	COUNTIES.	POPULATION.	VALUATION.	Rank of Town in the State, and in the County, according to the Amount raised *by tax*, for each person between the ages of 4 and 16 years, including only wages of teachers, and fuel: Amount.	No. of persons between 4 and 16.	Amt. for each person between 4 & 16.	Rank in State.	Rank in Co.	Number of Scholars of all ages, in all the Schools. In Summer.	In Winter.	Average Wages paid to Teachers, per month, including value of Board: Males.	Females.
Wareham,	Plymouth,	2,002	$588,290	$900	630	$1 43	280	20	435	474	$26 71	$12 59
Chatham,	Barnstable,	2,334	285,962	1,000	699	1 43	281	10	534	683	28 10	11 26
Granville,	Hampden,	1,414	289,889	600	421	1 42	282	16	270	300	20 26	11 33
Savoy,	Berkshire,	915	120,311	400	283	1 41	283	18	244	269	19 43	10 26
Norton,	Bristol,	1,545	578,670	600	426	1 41	284	19	376	418	24 03	11 41
Pelham,	Hampshire,	956	160,695	400	285	1 40	285	23	219	315	18 88	8 55
Dennis,	Barnstable,	2,942	423,279	1,200	857	1 40	286	11	722	813	25 96	9 44
Dalton,	Berkshire,	1,255	270,299	400	217	1 38	287	19	217	234	21 25	9 83
Southbridge,	Worcester,	2,031	553,021	800	586	1 37	288	55	390	531	22 50	10 91
W. Springfield,	Hampden,	3,626	964,317	1,400	1,030	1 36	289	17	680	880	21 75	11 41
Clarksburg,	Berkshire,	370	56,219	200	147	1 36	290	20	120	152	16 75	9 11
Lanesborough,	Do.	1,140	350,024	400	295	1 36	291	21	171	184	19 10	12 57
Carver,	Plymouth,	995	192,694	400	295	1 36	292	21	253	248	26 66	10 83
Truro,	Barnstable,	1,920	130,491	850	625	1 36	293	12	409	581	25 63	12 32
Lee,	Berkshire,	2,428	474,761	896	657	1 35	294	22	522	539	24 00	12 75
Williamstown,	Do.	2,153	547,740	900	668	1 35	295	23	455	484	19 07	9 95
Gt. Barrington,	Do.	2,704	625,025	1,100	826	1 33	296	24	480	615	20 41	12 99
Harwich,	Barnstable,	2,930	238,932	1,325	992	1 33	297	13	736	887	23 21	10 21
Shutesbury,	Franklin,	987	177,954	400	303	1 32	298	24	265	313	19 11	8 79
Florida,	Berkshire,	441	68,406	200	151	1 32	299	25	135	165	15 66	9 12
Tisbury,	Dukes,	1,520	330,613	600	453	1 32	300	3	178	241	13 09	13 00
Hancock,	Berkshire,	922	317,950	300	231	1 30	301	26	79	188	18 55	11 50
Lenox,	Do.	1,313	310,978	500	388	1 29	302	27	263	322	19 50	12 66
Buckland,	Franklin,	1,084	159,844	390	312	1 25	303	25	211	271	16 74	8 69
Leverett,	Franklin,	875	162,473	345	276	1 25	304	26	221	326	18 30	9 98
Mt. Washington,	Berkshire,	438	52,126	155	124	1 25	305	28	102	113	16 75	8 33
Adams,	Do.	3,703	773,929	1,468	1,175	1 25	306	29	810	755	17 21	11 34
Richmond,	Do.	1,097	231,147	250	242	1 03	307	30	137	172	22 00	12 00
Southwick,	Hampton.	1,214	297,411	00	365	46	308	18	262	309	18 35	10 15

TABLE, *showing the Population, Valuation, &c., of the different Counties, with the Aggregate of the State.*

COUNTIES.	Population.	Valuation.	Number of Public Schools.	Number of Scholars of all ages, in all the Schools. In Summer.	In Winter.	Number of persons between 4 and 16 years of age in the Counties.	Average length of the Schools. Mos. Days.	Number of Teachers, including Summer and Winter Terms. Males.	Females.	MALES. Average wages paid per month, including value of Board.	FEMALES Average wages paid per month, including value of Board.	Rank of each County according to the Amount of money raised by taxes, for the support of Schools, including only the wages of teachers, board, and fuel.	Sum for each child between 4 and 16 years of age.	For 1844—45.	Amount contributed for board and fuel.
Suffolk, - -	95,773	$110,000,000 00	154	16,256	16,316	19,338	11.27	122	401	$73 40	$18 97	$129,868 00	$6 92	1	$90 00
Essex, - -	94,987	31,110,204 00	311	18,752	18,797	26,581	8.27	258	443	30 37	11 87	67,700 37	2 54	6	121 00
Middlesex,	106,611	37,592,082 00	435	24,287	26,064	28,114	8.12	330	661	32 28	13 66	102,100 07	3 65	3	158 59
Worcester,	95,313	29,804,316 00	577	21,163	26,392	25,897	5.23	438	742	24 54	11 53	59,806 18	2 34	8	1,445 43
Hampshire,	30,897	7,298,351 00	219	6,436	6,969	8,379	6.20	143	291	20 71	10 96	18,033 52	2 21	9	4,730 46
Hampden,	37,366	10,188,423 71	221	7,428	9,261	10,281	7.25	158	315	19 77	10 60	20,014 60	2 13	10	6,193 37
Franklin, -	28,812	6,548,694 00	255	6,558	8,288	8,149	6	143	361	19 49	10 37	14,820 63	1 88	12	5,642 30
Berkshire, -	41,680	9,546,926 76	261	8,544	9,639	11,453	7. 9	197	346	19 20	10 96	17,202 88	1 57	14	9,629 03
Norfolk, -	53,140	15,522,527 00	210	11,335	12,280	14,299	9	167	302	32 87	14 37	46,935 83	3 35	4	90 00
Bristol, - -	60,165	19,493,685 84	276	10,526	13,462	17,154	6.21	211	346	28 52	13 23	41,200 63	2 43	7	3,213 00
Plymouth, -	47,373	10,694,719 00	264	9,991	11,463	12,915	7.18	189	314	26 86	12 15	32,705 31	2 60	5	2,411 39
Barnstable,	32,548	4,896,683 00	162	5,951	8,943	9,387	7. 8	138	179	28 11	12 22	15,693 00	1 76	13	2,613 45
Dukes, - -	3,958	1,107,343 00	19	519	660	1,107	4.19	17	17	30 89	15 63	2,200 00	1 99	11	- -
Nantucket,	9,012	6,074,374 00	15	1,443	1,443	1,900	12	12	56	62 50	16 66	8,275 00	4 35	2	- -
Total, - 14	737,700	$299,878,329 31	3382	149,189	169,977	194,984	7.25	2,523	4,774	32 11	13 08	576,556 02	2 99		36,338 02

The Returns for 1845 show that there are in the different counties 66 incorporated Academies, with an average attendance of 3939 scholars; and 1167 unincorporated Academies, Private Schools, and Schools kept to prolong summer Schools, with an average attendance of 28,762 scholars. In the first-named class, the aggregate amount paid for tuition is $51,264 07; and in the second, $236,768 09.

Plans and Description of a Primary School-house, Boston.

Three new Primary School-houses were erected in Boston, in 1847, under the direction of, and on plans furnished by, Joseph W. Ingraham, Esq., Chairman of the Executive Committee of the Primary School Board, and Chairman of their Committee on School-houses. Mr. Ingraham is also a member of the Massachusetts Board of Education. He has devoted himself assiduously, and without compensation, for upwards of twenty-five years, to the Primary Schools of Boston, and the cause of Education generally; and no one is better acquainted than he with what the wants and conveniences of both pupils and teachers require in edifices for this class of schools. The following very minute description and plans were kindly furnished, on application, by him. The plans are copied from those appended to his Address at the Dedication (March 27, 1848) of one of the School-houses,—that in Sheafe street. They will be found worthy the attention of all who are interested in school architecture. The distinguished Secretary of the Massachusetts Board of Education, (Mr. Mann,) who was present at the dedication of this building, in his remarks at the subsequent dedication of another School-house in Boston, referred to *this* as "perfect of its kind," and said it "might well be called the *model* School-house of the State, and in School-houses Massachusetts was a model for the world." The teachers in one of these buildings, after having occupied their rooms for five months, say they "cannot imagine any improvement that can be made."

The City of Boston is so compact, and land is so very expensive, that it is difficult to procure sufficient space for playgrounds and other conveniences; but the Schoolhouses erected during the past year, (1847,) are better provided for, in this respect, than any others in the City.

There were three Schoolhouses erected during the year 1847, on plans devised and furnished by Mr. Ingraham, the Chairman of the Primary School Committee on Schoolhouses. The general features of each are the same, differing only in consequence of the size and location of the lots on which they are erected.

These Schoolhouses are believed to possess greater conveniences, for the comfort and happiness of both teachers and scholars, than any others ever before constructed. In planning them, several objects were had in view. Among these, were,

The desire to allow to each scholar sufficient space, and have the rooms perfectly heated and ventilated, so that no one should suffer from want of room, or comfortable and pure air:

To have all the light in the Schoolrooms come in from one side, and that at the backs of the scholars, to prevent the detrimental effects of *cross*-lights, which are very injurious to the eyes of young children when in a forming state:

To give suitable space, on the walls, for the display of maps, charts, pictures, &c., and provide sufficient recitation-rooms, closets, cabinets, and other necessary conveniences:

To have a separate entrance for each school:

To so arrange the usual out-door conveniences, that the scholars should not have to go out of doors in stormy weather, or down stairs, to gain access to them, and at the same time, by removing them from the play-ground, to obviate the objections which have been made, by some teachers, to having both sexes in the play-ground at the same time, during the recesses:

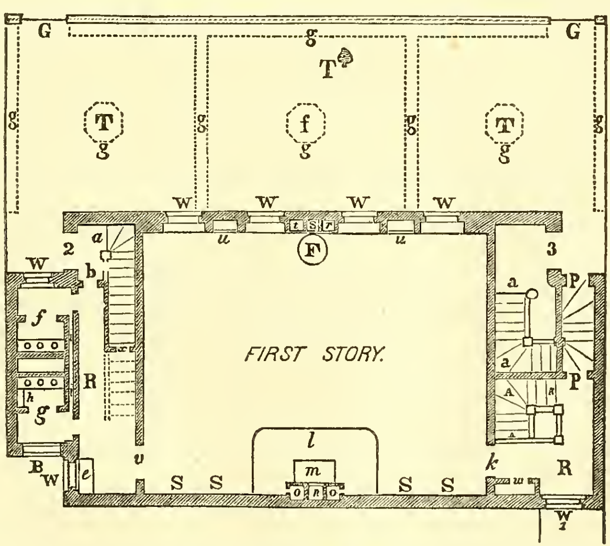
And, while securing these *necessary* advantages, to allow no violation of architectural propriety or symmetry. It is believed that all these objects have been attained.

The Schoolhouse, to which the following description and plans more particularly refer, is situated in Sheafe street, at the north part of the City, and on the slope of Copp's Hill, famed in our Revolutionary history. It occupies a space of twenty-six by fifty-three feet, exclusive of the play-ground in front, between it and the street, which is sixteen by fifty-three feet. This front is hardly long enough. Sixty feet would have been much better. The main building is twenty-six by forty-four feet; and there are projections at each end,—one on the west, four and a half by sixteen and a half feet, containing the privies, and one at the east end, three and a half by twenty-one and a half feet, in which is the passage from the lower schoolroom to the play-ground.

The building is three stories in height. Each story contains a Schoolroom, Recitation-rooms, Closets, Entries, and Privies, and is finished twelve feet high, in the clear. Each Schoolroom is lighted by four windows, which are all on one side. The first floor is set eighteen inches above the ground at the front of the building. The Cellar is finished seven and a half feet high, in the clear; and its floor is on a level with the surface of the ground at the back of the building, where is the entrance-door to the first story.

The Schoolrooms in the first and second stories are thirty feet in length, by twenty-two feet and four inches in width, and contain six hundred and seventy square feet of floor. That in the third story is thirty-two feet in length, by twenty-two feet and nine inches in breadth, and contains seven hundred and thirty square feet of floor. Thus allowing from ten to twelve or thirteen square feet of floor, and one hundred and fifty cubic feet of air, to each scholar.

The following diagram will show the arrangement of the ground-floor, with the Play-ground in front.



Scale 16 feet to the inch.

The following references will apply to the ground-plan of each of the three stories.

1, Entrance to First Story, by a door under the window W, the back part of the building being eight feet lower than the front.

2, 3, Entrance-doors to the Second and Third Stories.

A, A, A, Stairs to First Story, from the Entrance-door 1.

B, Blinds in Boys' Privies.

F, Fireplace or Furnace-flue, or Stove, when one is used instead of a Furnace.

G, G, Entrance-gates to Second and Third Stories. The Iron Fence extends the whole length of the front on the street, broken only by these two gates.

R, R, Recitation-rooms, or spaces used for that purpose. In the *first story*, that on the right being the entrance-passage to the schoolroom, and that on the left, the passage to the Second Story.

S, S, S, S, Large Slates, measuring four by two and a half feet, affixed to the walls, instead of Blackboards.

T, T, T, Trees in Play-ground. That near the fence, is an old horse-chestnut tree.

U, Umbrella stands. The place of those of the *second story* only are shown. In the other stories, they are also in the entrance-passages.

W, W, Windows.

a, Stairs to Second Story.

b, *b*, *b*, In *second story*, Entry, and place for Boys' Clothes-hooks, also used as a Recitation-room. In *third story*, place for Clothes-hooks.

c, In *second story*, Door into the Recitation-room where are the Sink and Girls' Clothes-hooks. In *third story*, Door into Recitation-room where is the Brush Closet and entrance to Girls' Privy.

d, *d*, *d*, In *second story*, Girls' Clothes-hooks.

e, Sinks.

f, Privy for Girls. *g*, Privy for Boys. *h*, Trough in ditto.

i, *i*, Space between the walls of the Privies and main building, for more perfect ventilation, and cutting off of any unpleasant odor. [This space is here too much contracted, on account of the want of room. It would be much better, if greatly increased.]

k, Entrance-door to Schoolroom, through which, only, scholars are allowed to enter. In *third story*, the passage from the stairs to the Entrance-door is through the Recitation-room.

l, Teachers' Platforms, six feet wide and twelve feet long, raised seven inches from the floors.

m, Teachers' Tables.

n, Ventiduct. That for each room is in the centre of that room. These are better shown in the diagram representing the Ventilating arrangement, (p. 183.)

o, *o*, Closets, in the vacant spaces on the sides of the Ventiducts, in the First and Second Stories. In *first story*, they are on each side of the Ventiduct; in *second story* only on one side. In the *third story*, there are of course none. See the diagram of the Ventilating arrangement, (p. 183.)

p, *p*, Ventiducts for other rooms. In plan of *second story*, *p* shows the position of the Ventiduct for first story. In *third story* plan, *p p* show the positions of those for both the lower stories.

q, *q*, *q*, Childrens' chairs, arranged in the *second story*. Their form is represented in another diagram, (p. 181.)

r, *s*, *t*, Hot-air Flues from the Furnace, Cold-air Flues if Stoves are used, and Smoke Flues. These will be better understood by a reference to the diagram explanatory of the Chimney Pier, (p. 182.)

u, *u*, Cabinets for Minerals, Shells, and other objects of Natural History or Curiosity.

v, Door of Recitation-room. In *first story*, this door leads to the entry in which are the Sink, Brush-Closet, entrance to the Privies, and passage to Second Story. In *second story*, it leads to the Recitation-room where is the Teacher's Press-closet; and in the *third story*, to that in which are the Sink, entrance to the Privies, and Stairs to the Attic.

w, Teacher's Press-closet, fitted with shelves and brass clothes-hooks.

x, Closet for Brooms, Brushes, Coalhods, &c. That for the *first story* is under the Second-Story stairs.

a, a, a, Stairs to the Third Story.

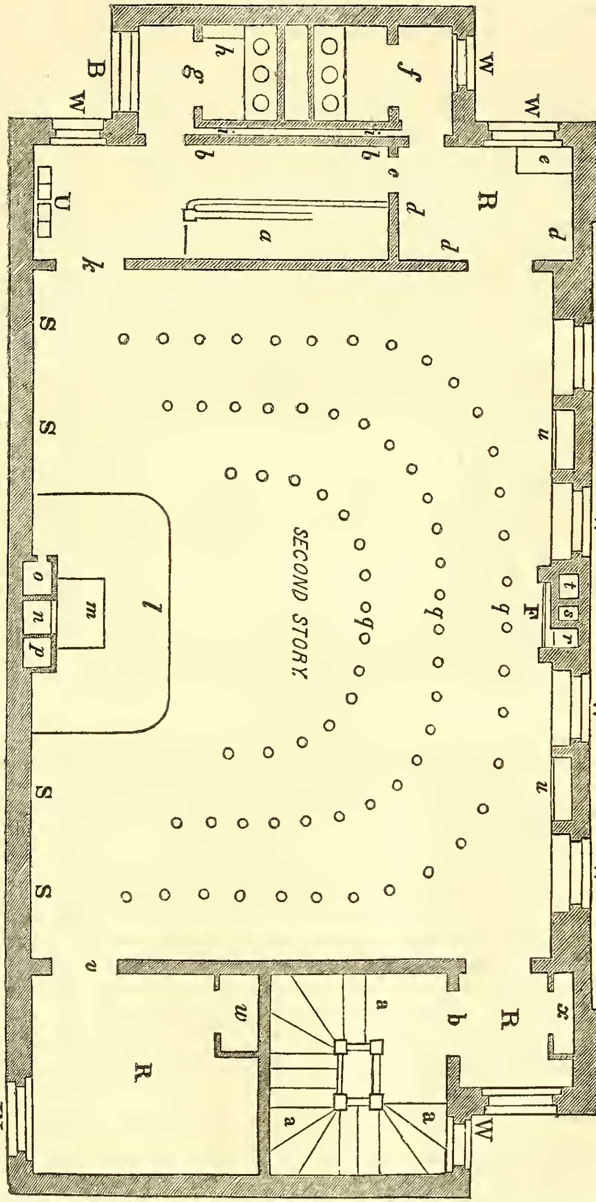
b, b, Doors connecting First and Second, and Second and Third Stories.

f, Place for Fountain, in the centre of the Play-ground.

g, g. g, Grass-plats, or Flower-beds.

p, Passage from the First-Story Schoolroom to the Play-ground.

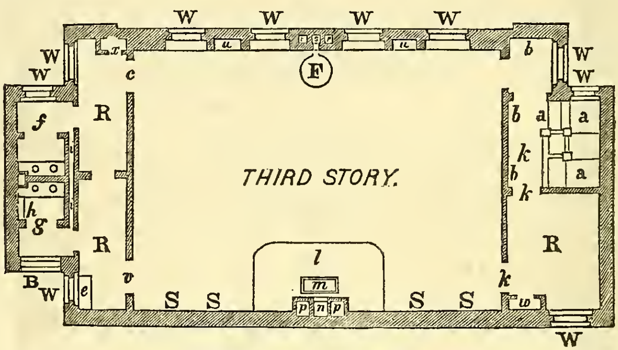
The Plan of the *second story*, on the next page, is drawn on a larger scale, for greater convenience in showing all the arrangements. The references on this diagram are more copious and minute than on either of the others.



Scale 8 feet to the inch.

The building fronts nearly N. N. E., and of course all the light comes into the Schoolrooms from the North. At the same time, in order to secure the benefit of the winds that prevail in Summer, and the admission of "a streak of sunshine," which adds so much to the cheerfulness of any room, and particularly of a schoolroom, there are windows in the back or southerly wall, opening into the recitation-rooms or entries, through which, and the entrance-doors, the sunlight finds its way into each schoolroom. The Neapolitan proverb, "Where the sun does not come, the physician must," has not been lost sight of; though it must be confessed that we have not been able to pay so much attention to it as would be desirable.

The next diagram, which is on the same scale with the first, will show the arrangement of the *third story*, which differs from the first and second in having a larger schoolroom, and more space for recitation-rooms; less space being occupied for stairways than in the other stories. The partitions at the ends are set one foot each way nearer to the ends of the building, making the Schoolroom thirty-two feet in length, while the others are only thirty.

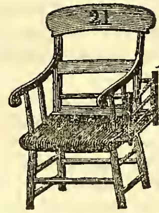


Scale 16 feet to the inch.

It will be seen, that the ends of the building are cut off from the schoolrooms, by entries, stairways, recitation-rooms, &c., and the back and end walls are left blank, for convenience in displaying Maps, Charts, Pictures, &c., and for the large Slates, used instead of Blackboards. As ample provision, as was practicable, has been made for recitation-rooms, closets, and other necessary conveniences.

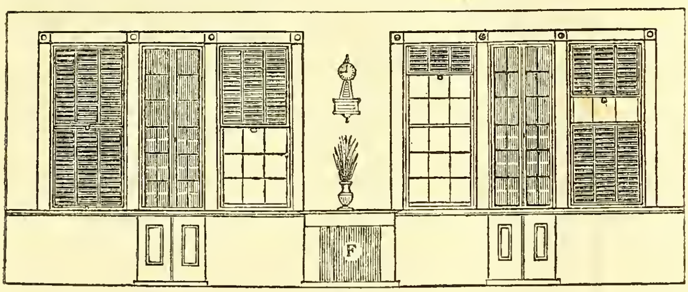
It will be seen, from the Plans of the different Stories, that the Entrance-door (k) to each Schoolroom is in that part of the partition nearest to the back walls; so that, on entering the room, the Teacher's Platform is directly before the scholar or visiter. This Platform is six feet wide and twelve feet long, and is raised seven inches above the floor, that being a sufficient height to give the Teacher a full view of the whole school. In the transverse-sectional elevation, (p. 184,) the raised Platform is shown at P.

On this Platform, is a Table, (m,) instead of a Desk, that being the more convenient article for the Teacher's use. On it, are constantly kept, in full view of the scholars, The Laws of the School,—the *Holy Bible*, the Rule and Guide of Life, the Moral and Religious Law; the *Dictionary*, the Law of Language, the Authority for Orthography and Orthoepy; and the *Rules and Regulations of the Committee*. These should be always on every Teacher's table or desk, and should be frequently appealed to. On this Table, also, are the Record Book of the School, Ink-standish, Table Bell, and other necessary articles.



In front of the Teacher's Platform, and facing it, arranged in a semi-circular form, as shown at *q q q*, in the Plan of the Second Story, are the Seats for the scholars. These are comfortable and convenient Arm-chairs, of which the annexed diagram shows the form. Each has a rack at the side (A) for convenience in holding the books or slates of the scholars. These chairs were the contrivance of Mr. Ingraham, and were introduced by him into the Primary Schools, in 1842, since which time, the Primary School Board have recommended their introduction into all their schools, in preference to any other seats, and about one hundred and thirty of the one hundred and sixty schools are now supplied with them. They are *not* fastened to the floor, but can be moved whenever necessary; and this is found to be a great convenience, and productive of no disadvantage. They have been strongly recommended by the Committees on School and Philosophical Apparatus, at the Exhibitions of the Massachusetts Charitable Mechanics' Association, in 1844 and 1847, and premiums were awarded for them in both those years.

The following diagram is an elevation of the Front wall of the Schoolroom, as seen from the Teacher's Platform. It is on the same scale with the preceding Plan of the Second Story,—eight feet to the inch.



Each Schoolroom is lighted by four windows; and in the central pier, between the windows, are the Cold-air and Chimney Flues, or the Furnace Flues. The Fire-place, or Furnace Flue, is represented at F, as in the preceding Plans of the different Stories. The arrangement of the Flues, in this pier, will be seen in the next diagram.

On the mantel-piece, over the Furnace Flue, is, in one room, a Vase of Native Grasses, or Flowers, and in the others, ornamental Statues, or Statuettes, furnished by the Teachers. Above this, suspended on the pier, is the Clock.

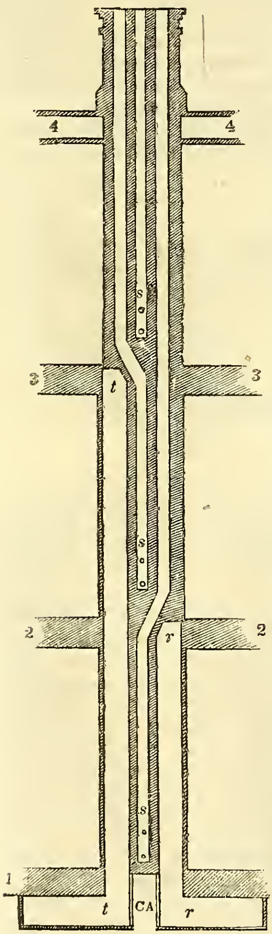
Between the other windows, are Cabinets, for the reception of Minerals, Shells, and other objects of Natural History or Curiosity. Their location is seen at *u u*, in the Plans of the respective Stories. There are two of these Cabinets in each Schoolroom, between the windows, above the skirting, and as high as the windows, with double sash-doors, of cherry-wood, hung with brass hinges, fastened with thumb-slides and locks, and fitted with rosewood knobs. There are twelve shelves in each, six of them being inclined, with narrow ledges on each, to prevent the specimens from rolling off. Immediately below them are small Closets, with four shelves in each, and double doors, hung and fastened in the same manner as the sash doors.

The Blinds of the Second Story, represented in this diagram, are framed, two parts to each window, and are hung with weights and pulleys, in the same manner as the window sashes. They run up above the tops of the windows, and behind the skirting of the next story above, in close boxes, and have rings on the bottom rails, to draw them down. In this elevation, they are shown in different positions. The windows in the First Story are fitted with Venetian Blinds, and those in the Third Story with Inside Shutter-Blinds.

All the window-stools are wide, and contain Vases of Native Grasses, or Flowers.

Particular attention has been given to the mode of Heating and Ventilating these buildings; and provision has been made for a copious and constant supply of fresh air, from out-of-doors, which is so introduced, that it is sufficiently warmed before it enters the Schoolrooms.

The Sheafe-street building is heated by one of Chilson's largest-sized Furnaces; though it was originally constructed with a view to using Dr. Clark's excellent Ventilating Stoves, as in the other two buildings.*



Scale 10 feet to the inch.

The accompanying diagram shows the arrangement of the Cold-air and Smoke Flues, as arranged for the Stoves. It will be well to examine it in connection with the transverse-sectional elevation, (p. 184,) and the Floor Plans of the different Stories, (pp. 177, 179, 180.)

1, 2, 3, Floorings of the First, Second, and Third Stories. 4, Roof.

CA, Cold-air Flue for First Story, which delivers the air from without, under the Stove, as shown at C A, in the transverse-section, (p. 184,) and at F, in the floor-plans.

r, *r*, Cold-air Flue for Second Story, which empties into the box under the Stove, at CA, in the Second Story of the transverse-sectional elevation. It corresponds to *r*, in the Floor Plans of the *first* and *second stories*.

t, *t*, Cold-air Flue for Third Story, which empties into the box CA, under the Stove of that Story, as seen in the transverse-sectional elevation, and at F, in the Floor Plan. It corresponds to *t*, in the Floor Plans.

These Cold-air Ducts are twelve by eighteen inches, *inside*, and are *smoothly* plastered, throughout. This is hardly large enough, however.

s, *s*, Smoke Flues. That of First Story corresponds to *s*, in the floor plan of *first story*, and to *r*, in those of the *second* and *third*. That of Second Story corresponds to *s*, in *second-story* Plan, and to *t*, in *third-story* Plan. That of Third Story corresponds to *s*, on the Plan of that Story.

These Smoke Flues are eight inches square, *inside*, and are *smoothly* plastered, throughout. That of each Story commences in the centre of the pier in the room to which it belongs.

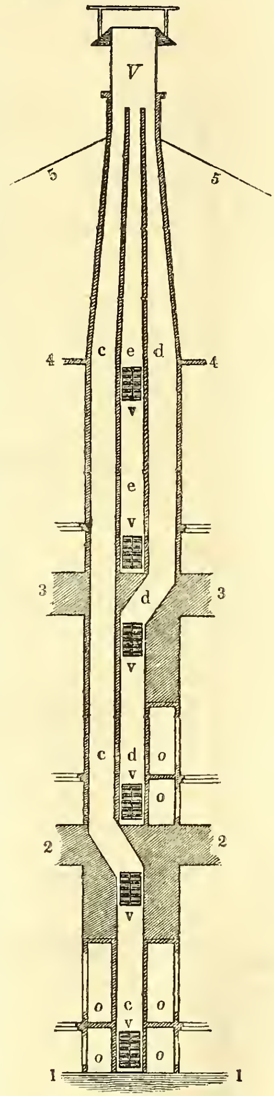
[The pier in which these Cold-air Ducts and Smoke Flues are placed, is wider than the piers between the other windows, in order to allow sufficient width to the Ducts. It must be at least six feet.]

It will be seen, from the transverse-sectional elevation, (p. 184,) (the Smoke Flue in which is represented as continuous, it not being practicable to show the bends,) as well as from the Plans of each Story, that the arrangements for Ventilation are directly opposite the Chimney Flues. The Ventiducts are contained in the projecting pier back of the Teachers' Platforms and Tables shown at *l*, *m*, in the Floor Plans.

It has already been stated, that particular attention has been paid to the

* Descriptions and Plans of this Furnace and Stove will be found on page 155

mode of Ventilation; and it is believed that the system, if not perfect, is better adapted to its purpose than any other. The Ventiduct for each room is of sufficient size for the room; and the three are arranged as shown in the next diagram. It will be seen, that the Ventiduct for each room is in the centre of the pier, thus avoiding any unsymmetrical or one-sided (and of course unsightly) appearance.



Scale 10 feet to the inch.

1, 2, 3, 4, Floorings of the First, Second, and Third Stories, and Attic. 5, Roof.

c, c, c, Ventiduct of First Story, commencing in the centre of the pier. Between the ceiling of this room and the floor of the Second Story, this flue is turned to the left, and then continues in a straight line to the Attic, where it contracts and empties into the Ventilator *V*, on the Roof.

d, d, d, Ventiduct of Second Story, also commencing in the centre of the pier, and turning to the right, between the ceiling of the Second and floor of the Third Story, whence it is continued to the Attic, and empties into the Ventilator *V*.

e, e, Ventiduct of Third Story, also emptying into *V*.

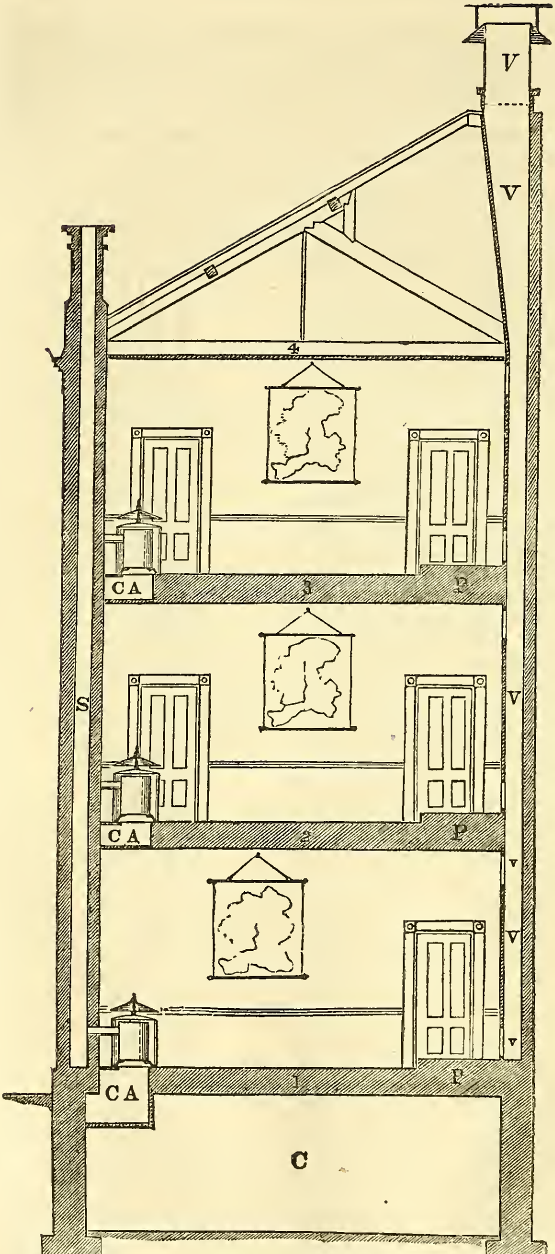
These Ventiducts are made of thoroughly seasoned pine boards, smooth on the inside, and put together with two-inch screws. Each, as will be seen, is placed in the centre of the room to which it belongs. They are *kept entirely separate from each other*, through their whole length, from their bases to the point where they are discharged into the Ventilators on the Roof. Each is sixteen inches square *inside*, through its whole length to the Attic, where, as will be seen by the diagram, each is made narrower as it approaches its termination, till it is only eight inches in width, on the front, the three together measuring twenty-five inches, the diameter of the base of the Ventilator on the roof. As they are contracted, however, in this direction, they are gradually enlarged from back to front, so that each is increased from sixteen to twenty-four inches, the three together then forming a square of twenty-five inches, and fitting the base of the Ventilator into which they are discharged. The increase in this direction will be better seen in the Elevation on p. 184, where V V represents one Ventiduct, continued from the lower floor to the Ventilator.

V, Ventilator, on the Roof, into which the three Ventiducts from the schoolrooms are discharged. This is twenty-five inches in diameter.*

v, v, Registers, to regulate the draught of air through the Ventiducts. There are two of these in each Ventiduct, — one at the bottom, to carry off the lower and heavier stratum of foul air, which always settles near the floor; and the other near the ceiling of the room, for the escape of the lighter impure air, which ascends with the heat to the top of the room. Each of these Registers has a swivel-blind, fitted with a stay-rod, and may be easily opened or closed by the Teacher.

o, *o*, Closets. The Ventiduct of each Story being in the centre of the projecting pier, affords room for Closets, on each side in the First Story, and on one side in the Second Story, as shown at *o o*. There are four in the First Story, two above and two below the wainscot. In the Second Story, there are two only, one above and the other below the wainscot; the other side of the pier being occupied by the Ventiduct of the First Story. In the Third Story there are of course none.

* A description, and larger plans, of this Ventilator, are given on page 144.



1, 2, 3, 4, Floorings of the First Second, and Third, Stories, and the Attic.
C, The Cellar.
C A, Cold-air Boxes, opening under the Stoves.
S, Smoke Flue.
P, Teachers' Platforms.
V, Ventiduct, emptying into the Ventilator on the Roof.
v, v, Ventiduct Registers.
V, Ventilator.

Scale 10 feet to the inch.

This plan of arranging the Heating and Ventilating apparatus has been adopted by the Committee on Ventilation of the Grammar School Board;* but as their plans and diagrams were taken from Mr. Ingraham's first draughts, before his final arrangement was decided upon, they are not so complete as these.

The preceding diagram gives a transverse-sectional elevation of the building.

It has already been stated, that the children are seated with their backs to the light, and their faces towards the Teacher's Table and the wall above and on either side of it. On this wall, and also on the two end walls, (as shown in the transverse-section,) are suspended Maps, Charts, and Pictures, not only for ornament, but for the communication of instruction. Vases of Flowers and Native Grasses ornament the window-stools and the Teachers' Tables; and Statuettes and other useful ornaments and decorations are placed in various parts of the rooms: so that whatever meets the eyes of the children is intended to convey useful and pleasing impressions, encouraging and gratifying the love of the beautiful, and combining the useful with the agreeable. The Cabinets of Minerals, Shells, and other objects of Natural History and Curiosity, add much to the interest and beauty of the rooms.

On the back wall, on either side of the Teacher's Platform, at S S S S, are four large Slates, in cherry-wood frames, each two and a half by four feet, used instead of Blackboards. These Slates are far preferable to the *best* Blackboards, and cost about the same as common ones. The Teachers greatly prefer them to Blackboards. In using them, slate pencils are of course employed, instead of chalk or crayons, and thus the dust and dirt of the chalk or crayons,—which is not only disagreeable to the senses, but deleterious to health, by being drawn into the lungs,—are avoided. These Slates may be procured in Boston, of A. Wilbur.

Each School has convenient Recitation-rooms; though, in consequence of the space occupied by the stairs to the Second and Third Stories, the lower Story is not so conveniently accommodated, in this respect, as could be desired. It has, however, two good Entries, which are used for this purpose. In the Second and Third Stories, there are three of these rooms, of which much use is made. Their location is shown in the Floor Plans.

In these ante-rooms, are Closets for Brooms, Brushes, and other necessary articles of that description, and also Press-closets, furnished with shelves and brass clothes-hooks, for the Teachers' private use. In these, also, are Sinks, furnished with drawers and cupboards, pails, basins and ewers, mugs, &c. Pipes leading from the Sinks, convey the waste water into the Vaults; and in a short time, the waters of Lake Cochituate will be led into each Story.

Each School has its own separate entrance; so that they will not interfere with each other. And each is provided with sufficient conveniences in its entry, for hanging the clothing of the pupils, thus avoiding the necessity of its ever being brought into the Schoolroom. Each has also two Umbrella-stands in its entry.

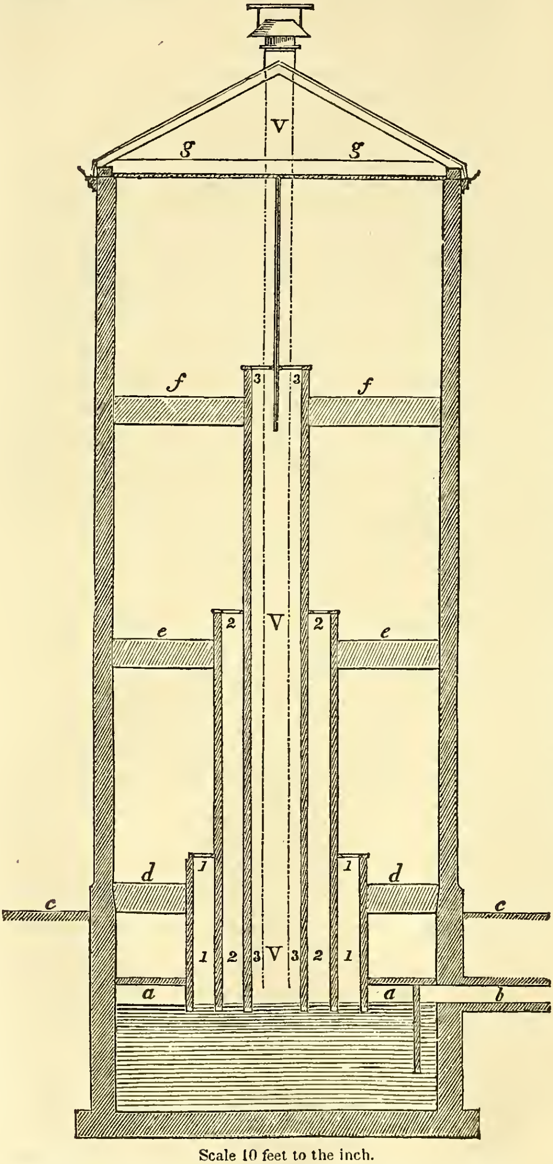
In the Cellar, are placed the Furnace, and necessary conveniences attached to it, with Bins for coal and wood. Also two Rain-water Butts, one at each end, which receive all the water from the Roofs. Being connected with each other, by leaden pipes, under ground, the water in both stands at the same level; and a pipe, leading from the top of one of them into the Vault, prevents their ever running over.

The Cellar is paved with brick, and is convenient for a play-room, when the weather is too stormy for the children to go out of doors at recess-time.

Instead of having the usual out-door conveniences in the yard, they are here connected with the entries of the respective schoolrooms, so that no child has to go into the open air, except for play in recess-time, or to go

* See a notice of their plans on page 158.

home. This is considered a very great convenience, and a matter of the highest importance.



a, *a*, Surface of tne water in the Sesspool.
b, Outlet to the common sewer.
c, *c*, Surface of the ground outside the building.
d, *d*, Floors of First Story, of stone.
e, *e*, Floors of Second Story.
f, *f*, Floors of Third Story.
g, *g*, Attic.
1, 2, 3, Seats and Wells of First, Second, and Third, Stories.
V, V, V, Ventiduct, ten inches square *inside*, extending from within one foot of the surface of the water in the Sesspool, to the Ventilator on the roof. Its sides are represented by the dotted lines

Scale 10 feet to the inch.

The preceding transverse-section will show the peculiar arrangement of the Privies to the different stories, and the manner in which all unpleasant consequences or inconveniences are, it is believed, effectually guarded against.

By the Plans of the different Stories, it will be seen, that the Privies are in a Projection on the western end of the building, the wall of which is separated from that of the main building, by the space *i i*, this space being four inches between the walls, and extending from the floor of the First Story to the Attic. The doors leading from the entries are kept closed, by strong springs; and at B, in the southern wall, is a Blind, through which the air constantly passes into this space, and up to the Attic, whence it is conveyed in a tight box to the Ventilator on the Roof. Except in very cold or stormy weather, the window in the northern side is kept open, (the outer blinds being closed,) and thus the whole of the Projection is cut off from the main building by external air. The space between the Projection and the main building is not, however, so great as it would have been made, had there been more room.

It will be seen, that there is a distinct Well to each Privy, separated from the others by a brick wall ending *below* the surface of the water in the sesspool. Of course, the only odor that can possibly come into either of the apartments, must come from the well of *that* apartment, there being no communication with any other, except through the water. And as every time it rains, or water is thrown in from the sinks, the water in the sesspool will be changed, and washed into the common sewer, it would seem that no danger of unpleasant odor need be feared. When the City water is carried to every floor of the building, the conveniences for frequently washing out the sesspool will be greatly increased.

There are two apartments on each floor; one for the girls, at *f*, and another for the boys, at *g*. In the latter, is a trough, (*h*,) with a sesspool, and pipe leading into the well, under the seat. There is no window in the boys' apartment, but merely the blind, B, which extends from the floor to the ceiling. The girls' apartment, being in the front part of the Projection, is provided with a window similar to the others, and outside blinds.

Each apartment is fitted with pine risers, seats, and covers. The covers are hung with stout duck or India-rubber cloth, instead of metal hinges, which would be liable to corrode, and are so arranged that they will fall of themselves, when left. The edges of the cloth are covered with narrow slats. There is a box for paper in each apartment. The whole finish is equal to that of any other part of the building.

The interior plastering of all the walls of the building is hard-finished, suitably for being painted.

All the Rooms, Entries, Stairways, and Privies, are skirted up as high as the window-stools, with narrow matched beaded lining, gauged to a width not exceeding seven inches, and *set perpendicularly*.

The interior wood-work of the lower Schoolroom, as well as the interior of all the Closets and Cabinets, is painted white. The skirting of the Second Story is of maple, unpainted, but varnished. All the rest of the inside wood-work is painted and grained in imitation of maple, and varnished. The outside doors are painted bronze. The blinds are painted with four coats of Paris green, and varnished.

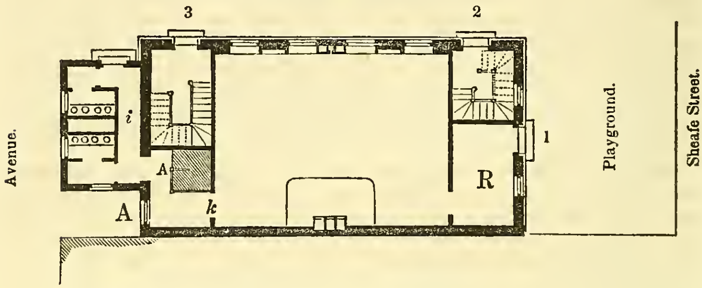
In some other schoolrooms in the City, the interior wood-work,—even of common white pine,—has been left unpainted, but varnished, with a very good effect; and it is contemplated to have some of the new Schoolhouses soon to be erected, finished in the same way. White pine, stained with asphaltum, and varnished, presents a beautiful finish, and is cheaper than painting or graining.

In the angles formed by the meeting of the walls with the ceiling of each room, and entirely around the room, are placed rods, fitted with moveable rings, for convenience in suspending maps, charts, and pictures, and to avoid the necessity of driving nails into the walls.

It has been stated, above, that the space between the Privies and the main building, in the Sheafe street Schoolhouse, is not so great as is desirable, nor as it would have been, had there been more room. In the Schoolhouse in Tremont street, erected at the same time with that in Sheafe street, there being sufficient room for the purpose, the Projection containing the Privies is nine and a half by twelve feet, and the wells of the Privies are seven feet from the wall of the main building.

The following Plans were prepared for a new arrangement of the Sheafe street Schoolhouse, when it was contemplated to occupy a space eighty feet in depth, extending from Sheafe street to the Avenue in the rear. In these Plans, the Projection for the Privies is about ten by sixteen feet; and the entrance to each of the Privies is six feet from the wall of the main building, and separated from it by three doors. This gives them as much space, and separates them as much from the main building, as is needed.

Plan of First Story. Scale 24 feet to the inch.

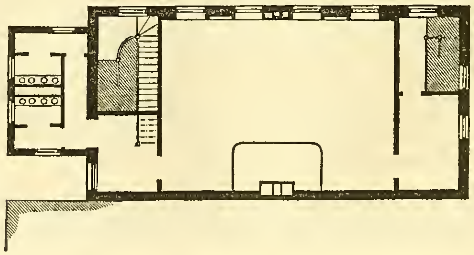


It will be seen, from this Plan, that the building was to have an end fronting on Sheafe street, (from which it was to be set back nineteen feet,) and a side looking into two of the Playgrounds, each of which was to be twenty-seven by thirty feet. The nineteen feet between the building and the street, and on a line with the building, the whole extent of the fifty-three feet on Sheafe street, was to form a third Playground.

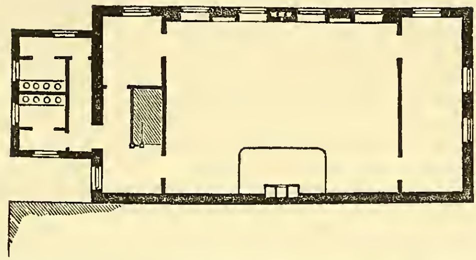
It has already been mentioned, that the ground at the rear of the building, on the Avenue, is eight feet lower than at the front, on Sheafe street; and the scholars of the lower room were to enter, as they do now, from the Avenue, by a door under the window A, and pass to their schoolroom up the stairs A, through the door *k*. Their Playground was to have been at the front end, on Sheafe street, to which they were to pass through the Recitation-room R, and out by the door 1. The space between the Privies and the main building, which is a three-feet passage, is shown at *i*, as in the former Plans, pp. 177, 179, 180.

The Entrance-doors for the second and third stories are shown at 2, 3.

Plan of Second Story.



Plan of Third Story.



In other respects, these Plans present some improvement over that of the present building in Sheafe street, which is only forty-four feet in length, while that proposed in these Plans is fifty feet. This, of course, allows more space for the stairways, Recitation-rooms, &c.

These three Plans will be easily understood, by comparing them with those on pp. 177, 179, 180, 181, which are there fully explained.

Some persons, perhaps, may think that ornaments and decorations, such as have been here described, are not *necessary* in a Schoolhouse; though none, we presume, will think them out of place. Why should not the places, where both Teachers and children spend so large a portion of their time, be made as pleasant and attractive as possible? The Schoolroom is the Teacher's parlor and drawing-room; and should always, not only be neat and tidy, but exhibit evidences of good taste and useful ornament. Why should blank and naked walls, presenting a cold and cheerless aspect, unrelieved by a single pleasant spot or speck of verdure, be the only or principal objects to meet the eyes of the young inmates of these establishments, who are here to receive those *first impressions*, which, as they are the most lasting, and indeed almost indelible, should always be useful, and promotive of some useful purpose? Everything which will give to young persons "a perception of *the Beautiful*," is of great value; and everything that can be done to render the interior of our schoolrooms pleasant and attractive, is of importance. "Why," says Mrs. Sigourney, in a valuable Essay 'On the Perception of the Beautiful,' "why should not the interior of our schoolhouses aim at somewhat of the taste and elegance of a parlor? Might not the vase of flowers enrich the mantelpiece, and the walls display, not only well-executed maps, but historical engravings or pictures? and the bookshelves be crowned with the bust of Moralist or Sage, Orator or Father of his Country? Is it alleged that the expense, thus incurred, would be thrown away, the beautiful objects defaced, and the fair scenery desecrated? This is not a necessary result. I have been informed, by Teachers who had made the greatest advances towards the appropriate and elegant accommodation of their pupils, that it was not so. They have said it was easier to enforce habits of neatness and order among objects whose taste and value made them worthy of care, than amid that parsimony of apparatus, whose pitiful meanness operates as a temptation to waste and destroy." And it will always also be found that those schools where the most attention has been paid to making the rooms pleasant and attractive to the children, will be the most orderly, and well disciplined, while in those held in ordinary rooms, where no attention seems to be given to refinement in appearances, the pupils are also proportionably unrefined and undisciplined.

"Let the communities," continues Mrs. Sigourney, in the Essay just quoted, "let the communities, now so anxious to raise the standard of education, venture the experiment of a more liberal adornment of the dwellings devoted to it. Let them put more faith in that respect for the beautiful, which really exists in the young heart, and requires only to be called forth and nurtured, to become an ally of virtue and a handmaid to religion. Knowledge has a more imposing effect on the young mind, when it stands, like the Apostle with the gifts of healing, at the 'beautiful gate of the Temple.' Memory looks back to it, more joyously, from the distant or desolated tracks of life, for the bright scenery of its early path." "But when the young children of this Republic are transferred from the nursery to those buildings, whose structure, imperfect ventilation, and contracted limits, furnish too strong an idea of a prison, the little spirits, which are in love with freedom and the fair face of Nature, learn to connect the rudiments of knowledge with keen associations of task-work, discomfort, and thraldom." "I hope the time is coming, when every isolated village schoolhouse shall be as an Attic temple, on whose exterior the occupant may study the principles of symmetry and of grace. Why need the structures, where the young are initiated into those virtues which make life beautiful, be divorced from taste, or devoid of comfort?"

"Do any reply, that 'the perception of the Beautiful' is but a luxurious sensation, and may be dispensed with in those systems of education which this age of *utility* establishes? But is not its culture the more demanded, to throw a healthful leaven into the mass of society, and to serve as some counterpoise for that love of accumulation, which pervades every rank, intrudes into every recess, and spreads even in consecrated places the 'tables of the money-changers, and the seats of such as sell doves?'

"In ancient times, the appreciation of whatever was beautiful in the frame of Nature, was accounted salutary, by philosophers and sages. Galen says, 'He who has two cakes of bread, let him sell one, and buy some flowers; for bread is food for the body, but *flowers are food for the soul.*'"

"If the *perception of the Beautiful* may be made conducive to present improvement, and to future happiness; if it have a tendency to refine and sublimate the character; ought it not to receive culture throughout the whole process of education? It takes root, most naturally and deeply, in the simple and loving heart; and is, therefore, peculiarly fitted to the early years of life, when, to borrow the language of a German writer, 'every sweet sound takes a sweet odor by the hand, and walks in through the open door of the child's heart.'"

We insert Mr. Ingraham's communication, unabridged, although it was drawn up by him as the material out of which we should prepare a description. We have also preserved his system of punctuation and capitalizing, though it differs from that followed in other parts of this work.

We think very highly of the plan of the Sheafe street School-house. Any objections we might entertain to some of the details, could be easily obviated in places where land is not so expensive as in Boston. We prefer, however, to see the Primary School-house with but one story, and in no case with more than two stories. In cities, the basement, under the school room, should always be paved, and fitted up for a covered play-ground, as is the case in Mr. Ingraham's plans.

Mr. Ingraham, in his letter, acknowledges his obligations to Mr. F. Emerson, and Dr. Henry G. Clark, for valuable aid in arranging his system of ventilation, and also to Mr. Joseph E. Billings, the Architect, for aid in the architectural arrangements, and for the manner in which the working plans were drawn.

Having given so minute a description of this School-house, we shall confer a favor upon such of our readers as may wish to erect buildings like it, if we insert, entire, MR. INGRAHAM's original Specification for the workmen, with such modifications as he proposes to introduce into the new buildings, which are to be erected during the present year, (1848.)

SPECIFICATION

Of materials to be provided, and labor performed, in the erection of a Primary School-house, to be built on a lot of land lying upon the southerly side of Sheafe street, according to the plans of JOSEPH W. INGRAHAM, Chairman of the Primary School Committee on Schoolhouses, as exhibited in the Drawings made by Joseph E. Billings, Architect.

DESCRIPTION.

The building is to be three stories high; each Story is to contain a Schoolroom, Recitation-rooms, Entries, and Privies, and to finish twelve feet high, in the clear. The first floor is to be set eighteen inches above the ground, at the front of the building. The Cellar, under the whole building, (except the entrance to the first-story Schoolroom, which is to finish six feet and eight inches,) is to be finished seven and one half feet high, in the clear. The main building is to measure twenty-six by forty-four feet, upon the ground plan, above the underpinning; the Projection on the east end, three and one half by twenty and one half feet; and the Projection containing the Privies, four and one half by sixteen and one half feet. The Roof is to have an inclination of thirty degrees.

The Front and Side Walls of the main building, and the Front Walls of the Projections, above the underpinning, and the Rear Wall of the main building and sides of the Projections, from the level of the ground on the rear of the lot, are to be built of brick.

MASON'S WORK.

Excavating.

The Dirt and Rubbish is to be dug out, as required, for the Cellar, the Cellar-Walls, the Vault, and the Drains; and the remainder of the lot is to be graded up, on an inclination of one inch to a foot, from Sheafe street to the front of the building.

All the rubbish, and the dirt that is not required for filling in, is to be removed from the premises. All the Loam is to be carefully taken up, kept by itself, and spread upon the surface of the Playground, as may be directed by the Committee.

Rough Stone.

The Footings to all the walls and piers, and the Cellar and Foundation-walls, are to be built of square-split Sandy-Bay or Quincy cellar-stone. The Bottom or Footing-course is to be puddled and rammed to a perfect bed, and those to the main walls and the piers, are to be laid entirely below the level of the cellar floor. The Walls are to be laid in lime mortar; and those of the Cellar are to be faced and pointed on the inside. The Footings are to be eighteen inches rise. Those to the main walls are to be three feet in width; those to the projections are to be two and one half feet in width; and those to the piers are to be three feet square. The Front Wall of the Cellar is to be two feet thick, and the other Walls twenty inches. Good and sufficient Foundations are to be laid for the Steps, Window Curbs, &c.

Hammered Stone.

The Underpinning to the front walls of the main building and projections, and the Returns at the first-story Entrance-doors, the Steps to the Entrance-doors, the Thresholds to the Entrance-doors and Gates, the Curbs, Sills, and Caps, to the cellar-windows, the Curbs to the sesspool, the Fence-stone, and the Platform steps to the Entrance-doors, are to be of Quincy granite, of even color, free from sap, rust, or flaws, fine-hammered, with all the returns, rabbets, washes, &c., indicated by the Drawings.

The Floors to the Privies on the first-story, a Moveable Cover to the Vault, and Hearth-stone in each Schoolroom, are to be of North-River Flagging-stone. About three quarters of the Playground is also to be laid with North-River Flagging-stone, as may be hereafter directed by the Committee. The rest of the Playground is to be left unpaved, for flower beds, &c.

There is to be an Iron Strainer fitted to the Sesspool-cover. The Hearth-stones are each to be three feet square, with a circular hole in the centre, eighteen inches in diameter, for the admission of the cold air under the stove.

Sand-stone.

There is to be a set of Caps and Sills to each of the windows in the brick walls, and Caps to the entrance-doors. The Caps to the doors are to be four courses rise, and ten inches thick, and those to the third-story front windows eight and one half inches thick: the other Caps are to be four inches thick. The Sills to the windows are to be eight inches wide. The Sills and Caps to the blind-openings, in the rear wall of the privies, are to be of the full thickness of the wall, and finished on all sides. There is to be a Moulded Belt on the front, and over the east and west entrance-doors; and a Base and Cap to the Chimney, of the forms shown by the Drawings. All the above is to be of the first quality of Connecticut free-stone; that in the faced-brick-work is to be sand-rubbed, and the remainder fine-chiselled.

All the stone-work is to be set in lime-mortar, and Cramped, Headed, and Pointed, as required.

Brick-work.

The Front Walls, above the underpinning, the Rear, Side, and Privy Walls, from the rough stone, the Piers in the cellar, the Backing-up of the stone-work, the Lining of the Vault, the Walls between the privies, the Sesspool, the Drains, and the Flues, are to be built of hard-burnt Charlestown (not Fresh Pond) bricks, excepting the Facing of the front and side walls of the main building and the front walls of the projections, the Covings, and the Chimney, which are to be of the first quality of pressed-brick, laid plumb-bond, tied into the other work with bond-irons in every seventh course.

The Front Wall, to the top of the belting, and above the top of the third-story windows, with the corner Piers on each side, and the Rear Wall, from the bottom to the top of the first-story floorings, are to be sixteen inches thick. The remainder of the Front and Rear Walls, the Side Walls of the main building, and the Front Walls of the Projections, are to be one foot thick. The Rear and Side Walls to the Privies, the Side Wall to the easterly Projection, and the Walls of the Sesspool, are to be eight inches thick. The Lining of the Vault, and the Walls between the Privies, are to be four inches thick. The Bottom of the Vault is to be laid three courses thick. The Piers in the cellar are to be sixteen inches square, on the ground.

The Vault, (which is to be of the sesspool plan, and so arranged, that no solid matter shall remain in the vault, but shall all pass off into the common sewer,) Sesspool, Drains, Wall between the privies, and the Hollow Wall between the privies and main building, are to be laid throughout with cement-mortar, and plastered inside, throughout, with the same. The remainder of the brick-work is to be done with lime-mortar. The Drains are to be barrel-form, the larger one to be of sixteen inches bore, and the smaller ones, one foot. The Vaults are to be not less than six feet deep.

The Cellar, and the Passage-way from the east end of the building, out to Margaret Avenue, are to be paved with the best paving-brick, on perfect foundations of gravel and sand.

The Cold-air Flues are to be twelve by eighteen inches, inside, and the Smoke Flues eight inches square, inside, all smoothly plastered, inside and out, with a stout coat of lime-mortar. The Flues are to be arranged as shown in the diagram. [*See p.* 182.]

The Cold-air Flue or Box, leading horizontally into the room to the aperture under the Stove, is also to be thoroughly and smoothly plastered, and made perfectly secure from danger by fire, in case of live coals or ashes dropping into it from the Stove. It is to be fitted with a valve, having a handle in the room, to regulate the admission of air.

Lathing and Plastering.

All the Walls, Ceilings, and Stairways, throughout the first, second, and third stories of the main building and the Projections, and the Ceiling of the Cellar, are to be Lathed and Plastered with a stout coat of lime and hair, and hard-finished, smoothly, with lime and sand, for painting; excepting the Ceiling of the Cellar, which is to be finished on the hair-coat, and the Wall between the main building and the privies, which is to be plastered upon the bricks. The Walls of the Cellar are to be white-washed with three coats.

Care must be taken, that the beads on the corners of the walls and stairways are not plastered. The quirks are to be neatly cut, and the beads kept clean.

Slates, Slating, &c.

Smoothly-polished Slates are to be set into the back wall of each Schoolroom, on each side of the Ventilating Pier, and neatly finished around the edges. They are to be two and a half feet wide, and ten feet in the whole length. They may be in slabs of five feet each, in length.*

The Roof is to be Slated with the best of Ladies' Slates, put on with Composition-nails, and properly secured with flashings of sheet lead, weighing three-and-one-half-pounds to the square foot, and warranted perfectly tight for two years.

Coppering.

There are to be moulded Copper Gutters, on the front and sides of the main building and front and rear of the Projections, worth one dollar and twenty-five cents per foot. They are to run back six inches under the slates.

There are to be two four-inch-square Trunks, from the gutters to the water-butts in the cellar; three-inch ones from the rear of the Projections to the Vault; and a round one from each butt to the vault. The Trunks are to be made of twenty-four-ounce cold-rolled copper, put up, connected with the gutters, and led off in a proper manner, with suitable lead pipes, of three inches in diameter.

Iron-work.

There is to be in each Smoke Flue an Iron Casting, with a funnel-hole twenty-four inches from the floor, and a hole below for clearing out the mouth of the flue; each hole to be fitted with a tight stopper.

There is to be an Iron Fence, on the line of Sheafe street, across the whole front, with two Gates, and an Iron Gate at the entrance of the back passage, on Margaret Avenue. All the Gates are to be fitted with Lever Locks, and Latches, of the best quality, and *small* duplicate keys.

There is to be an Iron Grating to each of the cellar-window curbs, of inch-and-a-quarter by one-quarter-inch bars, set one inch from centre to centre; and wire netting above it in front of the windows.

All the Iron-work is to be painted with three coats of lacker.

There are to be stout Iron Scrapers, placed at each door, where directed by the Committee.

There are to be an Iron Strainer to the Sesspool Cover, and Strong Iron Rings to the Moveable Cover of the Vault.

There are to be Composition Rods, in all the angles formed by the meeting of the ceilings and inner walls, in the Schoolrooms and Recitation-rooms, attached by neat staples, and fitted with Moveable Brass Rings, at suitable distances, for hanging charts, maps, &c.

CARPENTERS' WORK.

Framing.

The Floors and Roofs are to be Framed in the manner indicated by the Drawings, with good sound spruce lumber, of the following dimensions:

Principal Flooring-Joists,	3	by	14	inches.
Short Flooring-Joists,	3	"	11	"
Trimmers and Headers,	5	"	14	"
Partition Studs,	2	"	4	"
Privy-Floor Joists,	2	"	10	"
Attic-Floor Joists,	2	"	10	"
Ties to Roof Trusses,	7	"	10	"
Rafters to Trusses,	7	"	12	"
Collars,	7	"	9	"
Purlins,	8	"	8	"
Wall Plates,	3	"	8	"
Small Rafters,	3	"	6	"

The Flooring-Joists are to be worked to a mould, crowning one inch. They are to have a fair bearing of four inches on the walls, at each end, and to be bridged with two lines of Cross Bridging.

The Trusses in the Roof are to be fitted with Wrought-iron Bolts, one inch in diameter, with Heads, perfect Screws, and large Washers and Nuts.

* These large Slates may be procured in Boston, and cost no more than good Blackboards. When it is not convenient to obtain them, the walls, where Blackboards are needed, may be adapted to the purpose, by mixing the Plastering or Hard-finish with Lampblack, rubbing it down smoothly, and *allowing it to become perfectly dry and hard before it is used.* Or, Blackboards may *be covered* with the composition mentioned on p. 197.

The Floor-Joists are to be framed into the Trimmers, and the Ceiling-Joists of the third story into the Ties of the Roof-Trusses, with Tusk-Tenons, and properly secured with hard-wood Pins.

All the Partitions in the main building are to be set with two-by-four-inch plank Studs, so as to give five nailings to a lath, thoroughly bridged throughout, and trussed over the openings.

There is to be a Lintel, four by eight inches, over eaeh window, and other opening in the walls that requires it, and under the withs of the Privies, with a fair bearing of eight inches at each end.

Enclosing.

The Under-Floors of the Rooms, Entries, Passages, Platforms, and Privies, in each story, and the Floor of the Attic, are to be laid with No. 3 Pine boards, planed, jointed, laid close, and thoroughly nailed. The Roofs are to be covered with Matched boards, of the same quality, and thoroughly nailed.

Furring.

All the Walls, throughout, (excepting the cellar walls, the back walls of the several privies, and the side walls of the privies next to the main building,) and all the Ceilings, Entries, and Stairways, are to be Furred with three-inch Furrings of sound, seasoned, dry No. 3 Pine boards, spaced so as to give five nailings to a lath. They are to be put on the walls with twelve-penny nails, and on the ceilings with ten-pennies.

Grounds, three-fourths of an inch thick, are to be put up for all the finish, and three-quarter-inch Beads on all the angles and corners of the walls and stairways. The Beads are to be kept clean.

There are to be two Strips of Furring put up, (for convenience in driving nails for hanging charts, &c.,) extending entirely around the Schoolrooms, at distances of three and eight inches from the ceilings; and also similar Strips for the same purpose, set perpendicularly, on the rear and sidewalls, as directed by the Committee. Also, Composition Rods, in the angles of the ceiling, all round the rooms, with Moveable Rings at suitable distances, for picture lines.

Cold-air Boxes, and Ventiducts.

The Cold Air is to be taken in at one of the cellar-window openings, which is to be finished outside with a plank frame and coarse iron-wire netting.

The Air is to be conducted into the Brick Cold-air Flue of each Schoolroom, in separate Boxes, each twelve by eighteen inches, inside, made of thoroughly-seasoned Pine boards, smoothed on the inside, and put together with two-inch screws.

The Ventiducts, or Ventilating-Flues, are also to be made of thoroughly-seasoned Pine boards, smoothed on the inside, and put together with two-inch screws. There is to be a separate one for each Schoolroom, and the Privies, and each is to be fitted with two Swivel-blind Openings, or Registers, one at the floor and the other at the ceiling, with Stay-rods to regulate them, as may be directed by the Committee.

There are to be two Closets on each side of this Pier, in the first story, and on one side, in the second story, as shown in the diagram, on p. 183.

The Ventiducts, or Ventilating-Flues, for the Schoolrooms, are each to be sixteen inches square, inside; that for the Privies is to be ten inches square, inside. The Swivel-blind Openings in the Schoolrooms are to be sixteen by twenty-four inches; and those in the Privies are to be ten inches square.

The Ventiducts, or Ventilating-Flues, for the Schoolrooms, are to be brought together in the attic, and connected with the Ventilator on the main Roof.

The Ventiduct, or Ventilating-Shaft, for the Privies, is to be ten inches square, and carried down to within one foot of the surface of the water in the Vault or Sesspool; and the air from this Shaft, and also from the space between the privies and the main building, is to be conducted in a tight box over the ceilings of the third-story privies. to the Ventilator on the ridge.

Windows and Blinds.

All the Windows, (excepting those in the cellar,) are to have Double Box Frames, with two-inch pine plank Sills and Yokes, inch inside and outside Casings, one-and-one-fourth-inch hard-pine Pulley-styles, five-eighths-of-an-inch Inside Beads, and five-sixteenths-of-an-inch Parting Beads.

The Sashes are to be made of pine, one-and-three-fourths-inch thick, moulded and coped. They are all to be double hung with the best White Window Lines, Iron Pulleys with steel axles, and Round Iron Counter-weights. All the Sashes are to be fastened with strong Bronzed Sash-fastenings, of the best quality, to cost five dollars and fifty cents per dozen.

All the Windows in the first and second stories are to be fitted with one-and-one-fourth-inch Framed Blinds, two parts to each window, hung in light Box-frames, with Weights, Lines, and Pulleys, in the same manner as the sashes, excepting that they are to run up above the tops of the windows, in close boxes, and to have satisfactory Knobs, Rings, or Handles, on the bottom rails, to draw them down.

The Windows in the third story are to have Inside Shutter-Blinds, one inch thick, made in eight parts to each window, hung with Iron Butt-hinges, and fitted with Bronzed Hooks and Staples, and Rosewood Knobs.

The Openings in the Rear Wall of the Privies are to have Stationary Blinds, four inches thick, and reaching to the floors. The Windows in the Front Wall are to have Outside Blinds, one-and-three-fourths-inch thick, hung and fastened in the usual manner.

All the Windows, and the Openings in the Privy-Walls, are to be finished with one-and-one-fourth-inch moulded Architraves, with turned Corner-blocks. [Care to be taken to have no Architraves or Corner-blocks omitted on one side, or cut partly off.] Those in the first story are to have panel Jambs, and Soffits and Stools. Those in the second story, and all the Openings in the Privies, are to have Edge and Sill Casings. Those in the third story are to have Elbows to the Shutter-boxes, moulded panel Soffits, and wide Stools.

The Cellar-Windows are to be made with plank Frames, rabbeted for the sashes; and are to have Single Sashes, hung with Iron Butt-hinges to the tops of the frames, fastened with strong Iron Buttons, and fitted with Catches to hold them open when desired.

There is to be a Single Stationary Sash over each Entrance-door, made in six lights.

There are to be two Skylights in the Roof, which are to be made and hung in a neat and substantial manner, and properly fitted to rise and fasten.

There is to be a Scuttle, in the ceiling of the third story, made, cased, and hung, in a neat and substantial manner.

Doors.

All the Doors, throughout, (excepting the Outside ones, which are to be two-and-one-fourth-inches thick, and the Closet doors, which are to be one-and-one-fourth-inch thick,) are to be two inches thick, made in four moulded Panels each, hung with three four-inch iron Butt-hinges, and fastened (excepting the outside ones) with Robinson's best $2,50 Mortise Locks, with Catches and Bolts, Rosewood Knobs, Bronzed Trimmings, and *small* duplicate Keys to each. The Outside Doors are to be fastened with double-bolt Lever Locks of the best quality, having duplicate keys as *small* as practicable. The Privy Doors are to have strong Door-springs, in addition to the other trimmings.

All the Inside Doors, excepting those to the closets, are to be finished with hard-pine Sills, two-inch rabbeted and beaded Frames, and Architraves as described for the Windows, with Plinths. The doors, in every case, to be set so far from the walls, as to give the full Architraves and Corner-blocks on both sides.

The Outside Doors are to be hung to three-inch plank Frames, properly dogged to the thresholds and wall, and finished inside like the Inside Doors.

The Entrance and Cellar Doors are to be four feet by seven feet eight inches. The Inside Doors are to be three feet by seven feet four inches. The Privy Doors are to be two feet six inches, by seven feet four inches.

Stairs.

The Stairs are to be framed with deep plank Stringers and Winders, as shown by the Drawings. They are to be finished with hard-pine Risers, one inch thick, Treads one-and-one-fourth-inch thick, and Balusters one-and-one-eighth-inch diameter. The String and Gallery finish is to be of white pine, and the Posts, Newels, and Rails, of cherry. The bottom Posts are to be seven inches in diameter, turned, and the Rails three inches wide. The Rails are to be not less than three feet high, measuring from the nosing of the Steps.

There are to be two Flights of Stairs to the Cellar, framed with plank Stringers and Winders, and finished with planed pine Risers and Treads, and close Partitions one-and-one-half-inch thick, matched and planed.

There is to be a neat Flight of Portable Steps, to ascend from the third story to the Attic, and others to ascend from the Attic to the Skylight in the Roof.

Skirting.

The Rooms, Entries, Stairways, and Privies, are to be Skirted up as high as the window stools, in the respective stories, (except on the back sides of the Rooms,) with narrow matched beaded Lining, not to exceed seven inches in width, Capped to correspond with the nosing of the window stools. The Lining is to be gauged to a width, and set perpendicularly. That on the back Wall is to be fitted to the Slates in that wall, which are to rest on the Capping. That in the first story is to be of cherry-wood, the second story of maple, and the third story of white-pine, wrought and finished smoothly, suitable for being stained and varnished without painting.

Floorings, &c.

The Platforms are to be furred up, as shown by the Drawings, and the Stairways, Platforms, and Hearths, are to be bordered, and the Floors to be laid, with narrow hard-pine floorings, perfectly jointed and thoroughly nailed. The Strips are to be ganged to a width respectively in the schoolrooms, and the joints are to be broken, at least three feet, so that no two strips of different widths will but on to each other.

Cabinets, Closets, Clothes-Hooks, &c.

There are to be two Cabinets, in each Schoolroom, between the windows, above the skirting, and as high as the windows, with double cherry Sash-doors, each hung with three Brass Hinges, fastened with Thumb-catches and Locks, and fitted with Rosewood Knobs. There are to be twelve Shelves in each, and immediately below them are to be small Closets, with four Shelves in each, and double Doors, hung and fastened in the same manner as the sash doors. The shelves are to be placed as directed by the Committee. Six of them are to be inclined, with two narrow ledges on each.

There are to be two Closets in each side of the Ventilating Pier, in the First Story, and two in one side in the Second Story, as shown at *o o*, in the diagram on page 183. Each Closet is to be fitted with three shelves, and the doors are to be hung and fastened in the same manner as the Closets under the Cabinets.

There is to be for each Schoolroom, where directed by the Committee, a Press-closet, having three Shelves on one side, with six brass double Hat-and-Coat-Hooks, on beaded cherry-wood cleats; the Door to be neatly hung, fastened, and trimmed, similar to the other doors.

There is to be in the entry of each Schoolroom, where directed by the Committee, a Closet, for brushes, brooms, coal-hod, &c., two by three-and-one-half feet, made with matched boards, and fitted with three Shelves on one side, and eight Hooks on the other side and back. The Door is to be made, hung, and fastened, to correspond with the other doors.

There is to be a Sink, attached to each Schoolroom, where directed by the Committee, made of two-inch pine plank, the top hung with stout hinges, and with Drawers and Cupboards below. It is to be fitted with a Composition Sesspool, lined with zinc, and a lead Waste-pipe, leading to the vault. Suitable Pipes, to lead the City water into the sink in each story, are to be provided.

There is to be a Dumb-waiter from the cellar to the third story, opening into each story, for raising coals, wood, &c.

There are to be seventy extra-stout iron double Hat-and-Coat-Hooks, to each Schoolroom, put up on beaded cherry-wood Cleats, as directed by the Committee.

There are to be two Umbrella-stands, in each Entry, to hold six umbrellas each.

Coal-Bins, &c.

There are to be three Coal-Bins in the Cellar, each capable of holding three tons of Coal, having Covers hung with strong wrought-iron Hinges, and sliding Gates, with boxings around them to keep the Coal from the floor. Also, three Closets for Kindlings, the doors to be hung with iron Strap-hinges, and fastened with iron Buttons.

There are also to be in the Cellar, two large iron-bound Water-butts, with metal Faucets.

Privy-Finish.

The Privies are to be fitted with pine Risers, Seats, and Covers. The Covers are to be hung with stout Duck, or India-rubber cloth, instead of metal Hinges; the edges of the cloth to be covered with narrow slats. They are to be so arranged, that they will fall of themselves when left. There is to be a Box for paper in each Privy, and the Boys' Privies are to have Troughs, lined with zinc, with Sesspools. The whole finish of the Privies is to be equal to that of the other parts of the building.

Painting.

All the Hard-wood Finish, (except the Skirting of the first and second stories, which is to be varnished,) is to be oiled, with two coats of boiled Linseed-oil, well rubbed in with cloth.

All the Outside wood-work, the Copper-trunks, and the inner walls throughout, are to be prepared and painted with three coats of Oil-and-Lead paint, of such color as the Committee may direct. The Outside-doors are to be painted Bronze.

The Insides of the Closets and Cabinets are to be painted white, and the Teachers' Platforms in imitation of Marble. The Blinds are to be painted with four coats of Paris Green, and Varnished. The third-story skirting is to be stained with asphaltum, and varnished. The rest of the Inside Pine Finish is to be Putty-stopped, Primed, and Painted and Grained, in imitation of Oak, Maple, or other color, as directed by the Committee, and Varnished.

All the Painting and Varnishing is to be equal to that of first-class dwelling-houses.

Glazing.

All the Sashes, throughout, are to be glazed with Crystal Sheet Glass, of double thickness, and of the best quality. Each light is to be properly Bedded, Sprigged, and Back-Puttied.

The Windows are to have Lights of the following dimensions, as shown in the Drawings:

First Story, Front Windows, eighteen Lights, each eleven by fourteen inches. First Story, Rear Window, twelve Lights, each eleven by sixteen inches. That in the west wall, eight Lights, each eleven by sixteen inches.

Second Story, Front Windows, eighteen Lights, each eleven by fourteen inches. Second Story, Rear Windows, eight and twelve Lights, each eleven by sixteen inches. Front Window in easterly Projection, twelve Lights, each eleven by fourteen inches.

Third Story, Front Windows, twelve Lights, each eleven by nineteen inches. Third Story, Rear Windows, eight and twelve Lights, each eleven by fifteen inches. Front Windows in easterly Projection, eight Lights, each eleven by nineteen inches.

The Cellar Windows, eight Lights, each eight by ten inches.

The Sashes over the Doors, each six Lights.

The Skylights are to be two feet six inches by three feet six inches.

Ventilators.

There are to be two of Emerson's Patent Ventilators, of galvanized iron; one on the Roof of the Main Building, twenty-five inches in diameter, and another on the Roof of the Privies, twelve inches in diameter.

Furniture.

Each Schoolroom is to be furnished with sixty Small Arm-Chairs, of Mr. INGRAHAM's pattern, such as are used in the other Primary Schools in the City.* Also, with a Table, for the Teacher's Platform, four feet by two, (made of Mahogany, Black Walnut, or Cherry-wood, as directed by the Committee,) furnished with two Drawers, and fitted with Locks, Keys, and Rosewood Knobs, of the best quality.

Memorandum.

No bricks, stone, lumber, or other building-materials, of any description, are to be placed on the garden-plat; and the Trees and Garden are to have a rough box built around them, for their preservation from injury. No lines are to be fastened to the Trees, for any purpose whatever.

All the Lumber is to be well and thoroughly seasoned; and all that is in sight is to be free from Shakes, Sap, and Knots; and that and every part of the work is to be equal to any used in first-class dwelling-houses.

MR. INGRAHAM'S COMPOSITION FOR BLACKBOARDS.

Lampblack and Flour of Emery, mixed with Spirit-Varnish.

No more Lampblack and Flour of Emery should be used, than are sufficient to give the required black and abrading surface; and the Varnish should contain only sufficient gum to hold the ingredients together, and confine the Composition to the Board. The thinner the mixture, the better.

The Lampblack should first be ground with a small quantity of Alcohol, or Spirit-Varnish, to free it from lumps.

The Composition should be applied to the smoothly-planed surface of a Board, with a common painter's brush. Let it become *thoroughly dry and hard before it is used.* Rub it down with pumice-stone, or a piece of smooth wood covered with the Composition.

Boards prepared in this way are almost equal to Slates, and will last for years; and they can be used with slate-pencils, which are much better than crayons or chalk, on account of their freedom from dust and dirt. Crayon or chalk dust is deleterious to health, as well as to cleanliness.

This Composition may also be used on the walls.

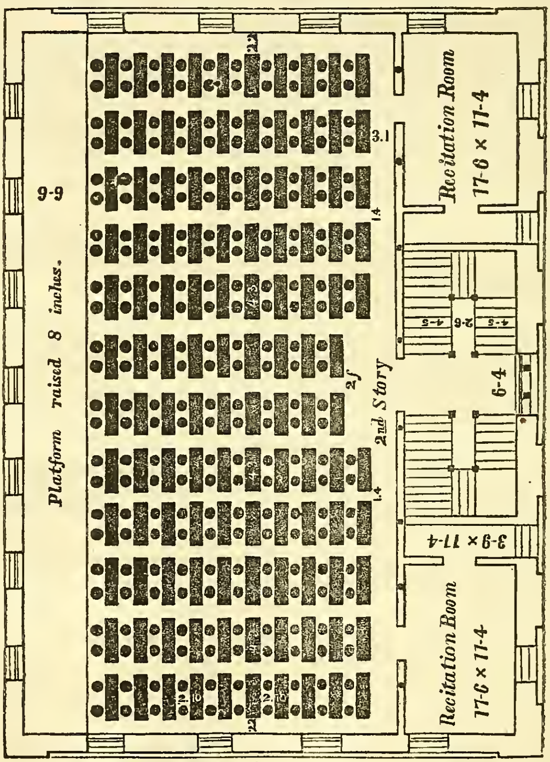
* See pp. and 181,

Plans, &c., of Brimmer Grammar School, Boston.

This building was erected in 1843. It is situated on Common-street, near Washington. It is 74 feet in length on the street, by 52 feet deep, with three stories. The entrance is in the center of the front into a hall 8 feet wide, leading through into the yard in the rear, which is divided by a wall into three portions. The passage to the second and third floors is by a double flight of stairs near the front door.

The first floor is occupied by two Primary School-rooms, each 30 by 22 feet, and 11 feet high; and the Ward-room, 30 by 50 feet.

The school-room on the *second floor* is 70 feet by 37 feet wide, and 14 feet 6 inches high between the bays. The ceiling is plastered up between the bays, (cross timbers) by which eighteen inches are grained in height, dividing the ceiling into equal compartments. There are two recitation rooms, one



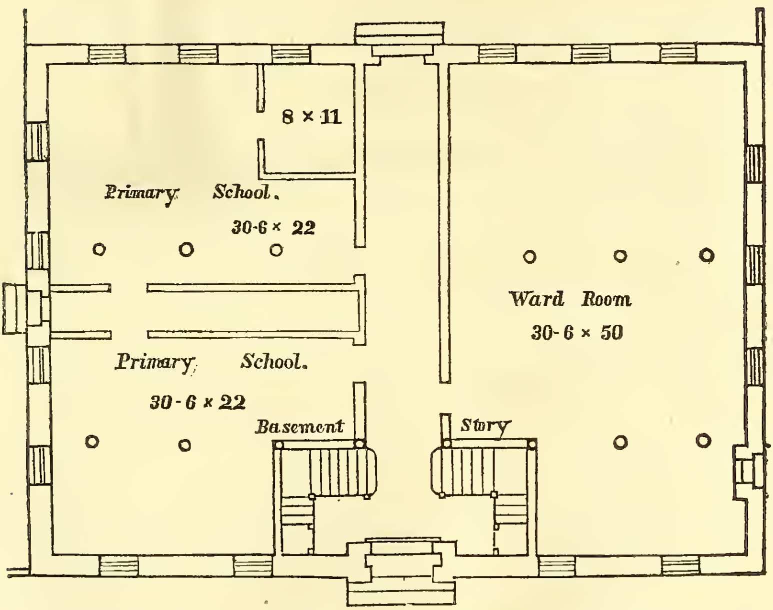
on each side the entrance, 17 feet 6 inches, by 11 feet 4 inches each, with two windows in each room, and benches on all the sides for the pupils. The school-room is lighted on three sides, and contains 118 desks, and 236 chairs, two chairs to each desk, the desks and chairs being of four sizes. The tops of the desks are cherry wood, and the chairs are Wales' patent. The desks are separated by aisles one foot four inches in width, except the center aisle, which is two feet wide.

The aisles on the side nearest the recitation-rooms, are three feet wide, and those at each end, 2 feet 6 inches each. The platform on which are the desks of the master and assistants, is eight inches high, and 6 feet 6 inches wide, and the desks are so placed *that the pupils sit with their backs to the platform;* and the pupils are so arranged at the desks in classes and sections, that when one class is reciting, the desk is only occupied by one pupil. The windows are shaded by inside blinds painted green.

The school-room on the *third floor* is of the same size, having an arched ceiling 13 feet high in the center, with recitation-rooms and other arrangements similar to the school-room on the second floor.

The building is warmed by two furnaces, and ventilated by six flues, discharging into the attic, from which the impure air is carried off by copper ventilators in the roof. The openings into the flues in the school-rooms are controlled by Preston's ventilators.

The frame of Preston's Ventilator is made of a flat bar of iron $2\frac{1}{2}$ by $\frac{1}{4}$ inch, framed at the corners, the end at each corner running by in order to receive a clamp to screw the frame to the brick work; the door is of plate iron, ($\frac{1}{16}$ wire gage), with a rod passing down the center of the plate, on the back side, each end of the rod running by the plate and entering the frame, forming a pivot on which the plate or door of the ventilator turns. The door shuts against a projection in the frame.

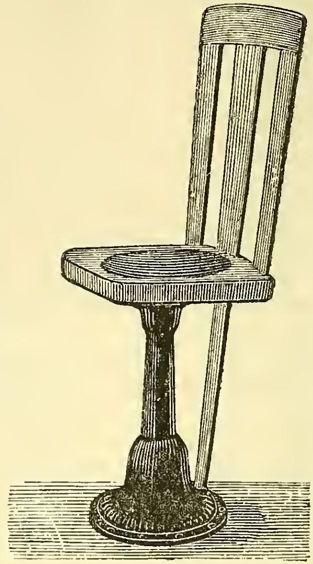


The Brimmer school has two masters, one in each room, and each with an usher and female assistant.

[Since the above description was first published, (in 1843) the seats and desks have been reversed, so that the pupils sit with their faces to the platform. The former method was found by the teacher to be "very inconvenient, and wholly impracticable. The scholar should see the face and hear the voice of the Principal as much as possible."]

The second and third stories are furnished with Wales' *Patent American School Chair*, which has been very extensively introduced into the public schools of Boston and vicinity.

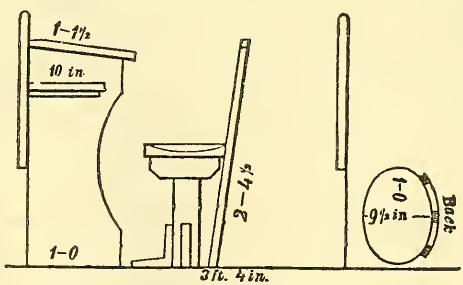
WALES' AMERICAN SCHOOL CHAIR.



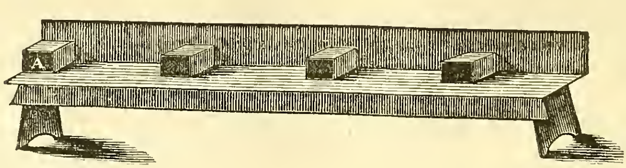
The seat of the chair is based upon a pedestal of cast iron, having no joining to get loose or come apart in the arm, and is made fast by screws both to the seat and to the floor. The back of the chair is firmly supported by the middle piece, which passes directly from the top through a dove-tail in the seat into the foot of the pedestal. These chairs are manufactured by S. Wales, Jr., 66 Kilby street, Boston, of any height from 8 inches to 17 inches from the top surface of the seat to the floor.

Mr. Wales has, during the present year, (1848,) greatly improved the style of his chairs, and now manufactures a desk with iron supports of new and improved construction. For description, *see p.* 202.

The desks in the Brimmer School are more like the one represented in the accompanying section of desk and chair used in the Eliot Grammar School.

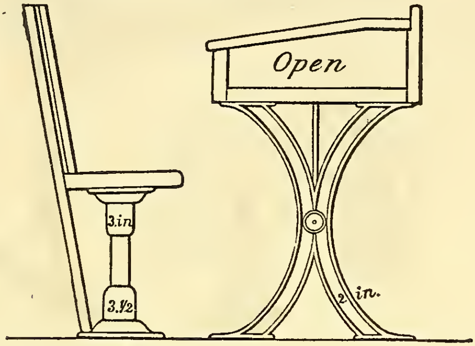


The cut below represents the bench used in the Primary School. The scholars are separated by a compartment, A, which serves as a rest for the arm, and place of deposit for books.



Since the foregoing style of chair and desk was introduced, much attention has been paid to the improvement of school furniture, with a view of securing convenience, durability, and economy, in the construction both of chairs and desks.

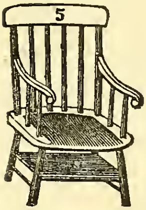
THE BOSTON LATIN HIGH SCHOOL DESK.

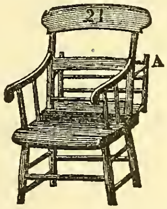


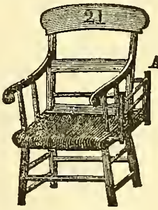
The above cut represents an end view of a new style of desk used in the Latin High School, in Bedford street, with a section of Wales' *Patent School Chair.* The standards of the desks are made of cast iron, and are braced in such a manner, that when properly secured to the floor, there is not the least motion. The curve in the standard facilitates the use of the broom in sweeping.

THE BOSTON PRIMARY SCHOOL CHAIR.

These Chairs were got up for the special benefit of the *Boston Primary Schools*, by JOSEPH W. INGRAHAM, Esq., Chairman of the Primary School Standing Committee; and have already been introduced, by order of the Primary School Board, into the greater portion of their Schools.





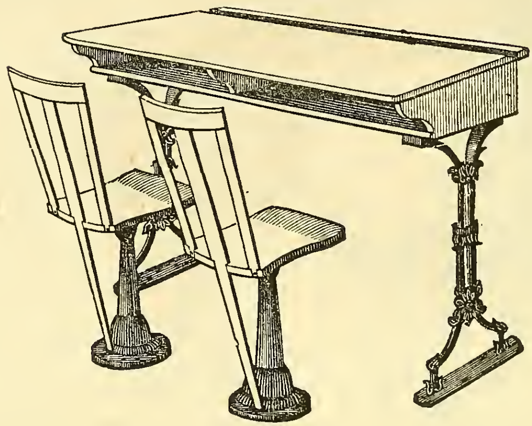


The first pattern, is a Chair with a *Shelf* (*s*) under the seat, for the purpose of holding the Books, Slates, &c. of the scholars.

The second pattern differs from the first, in having, instead of the *Shelf*, a *Rack* (A) on the back of the chair, for the same use as the Shelf in the preceding pattern. The third pattern is similar to the second, except that the *Rack* (A) is placed at *the side*, instead of *the back*, of the chair. The latter pattern (with the Rack on the side) is that now adopted in the Boston Schools.

These chairs are manufactured by William G. Shattuck, No. 80 *Commercial Street*, Boston. The price is fifty cents, each, for those with the Shelf, and *sixty-five* cents for those with the Rack.

Wales' School Chairs and Desks.



Wales' American School Chairs and Desk.

The figures above represent the largest size of Chairs and Desk, as described in the series of sizes below, the height decreasing as there stated from size to size.

The Chairs represented in the above cut are based upon a single pedestal of iron, (instead of the usual legs of a chair;) the wood-work of the Chair is fastened securely upon the top of the pedestal, the middle piece passes directly from the top into the foot of the pedestal, and the whole is firmly screwed to the floor of the school-room.

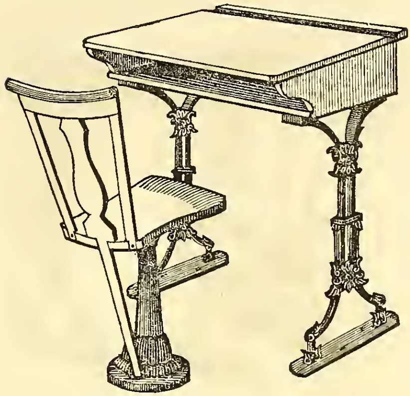
The Desk above is intended for two scholars, being in form and style, both in wood and iron, of the latest pattern.

The supports of the Desk are of iron, so constructed as to be entirely out of the way of the scholar, and at the same time light in form, and perfectly strong and firm in their position. They are secured to the wood-work at the top, and screwed firmly to the floor of the school-room at the bottom.

The whole plan embraces Chairs and Desks in seven sizes, as follows:

First size.	Chair	9	inches high,	Desk,	side	next	the	scholar,	17	inches.
Second size.	"	10½	"	"	"	"	"	"	"	19	"
Third size.	"	12	"	"	"	"	"	"	"	21	"
Fourth size.	"	13	"	"	"	"	"	"	"	23½	"
Fifth size.	"	14	"	"	"	"	"	"	"	25	"
Sixth size.	"	15	"	"	"	"	"	"	"	26½	"
Seventh size.	"	16	"	"	"	"	"	"	"	28	"

Thus combining a mode of furnishing public schools, for scholars of all ages, which, for comfort, durability, and ultimate economy, is believed to be unequalled. These Chairs have been very generally adopted in the Schools in Boston and the New England States. The Chairs or Desks, or any desired sizes of either, can be had separately.



WALES' BOWDOIN SCHOOL CHAIR AND DESK

The Chair above represented is finished with a very graceful scroll top and ornamental centre, the latter passing from the top through a dovetail in the seat, directly into the foot of the iron pedestal upon which it is based, thereby securing an unequalled degree of strength and durability, with comfort and beauty. The iron pedestals are secured firmly to the wood-work at the top, and are then screwed immovably to the floor of the school-room.

The Desk is for a single scholar, but can be made of any length in the same fashion, accommodating any number of scholars which may be needful. It rests upon iron supports, of a new and improved construction, which secures great firmness and strength.

A comparison of this cut with that preceding, will show that while the ornamental in form has been introduced in the Bowdoin School Chair, the more important elements of strength, durability and comfort, which experience has accorded to the American School Chair, have not been omitted. One secures every attainable degree of strength and comfort, at the lowest price, while the other adds to all these a greater beauty of style, with the price increased in proportion.

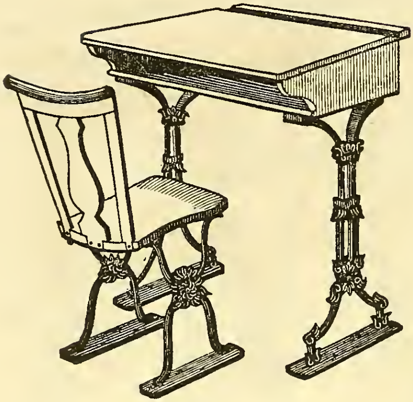
The size in the drawing is of a Chair of 16 inches, with a Desk of 28 inches in height, being the largest of the series of seven sizes, which may be found on a preceding page, in the description of the American School Chair.

560 of these Chairs are in use in the Bowdoin School, and 672 in the Quincy School, in Boston.

The Desk is of a later pattern than those in either of the schools named. Chairs or Desks of this style, or any sizes of them, can be had separately, if desired.

It is now about ten years, since the manufacturer first invented and adopted the iron pedestal, as the base for School Chairs, and although the introduction of this new principle has been slow, it has, nevertheless, been sure and satisfactory.

The knowledge of this mode of setting up School Chairs and Desks on pedestals, or on fancy forms of iron, as illustrated by the accompanying cuts has been widely extended, and has met with the universal approbation of experience.



WALES' HANCOCK SCHOOL CHAIR AND DESK.

The figures above represent the largest of a series of seven sizes, as described on a preceding page.

The Desk is for a single scholar, with a single chair. The supports, both of the Chairs and Desks, are of iron, secured firmly to the wood-work of the Chair or Desk at the top, and to the floor of the school-room at the bottom.

560 of these Chairs, with single Desks, are in the Hancock School, in Boston.

The Desk represented in the drawing is of a later, and, it is believed, a better pattern in several respects, than those in the Hancock School.

Chairs or Desks of this description are furnished separately, when desired.

The greatly increased demand for School Furniture of this description, and indeed for an improvement in School Furniture of all kinds, has induced the subscriber to establish a MANUFACTORY, where, under his own direction, all kinds of SCHOOL FURNITURE will be manufactured in the best manner.

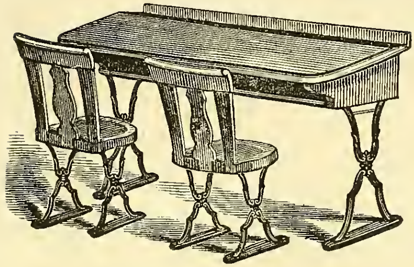
EVERY ARTICLE from this establishment will be WARRANTED.

Before closing these notices, it is proper to observe that drawings rarely give the complete idea of the thing, either in style or proportion, especially when small objects are intended to be represented. At the Ware-room of the Manufacturer, samples of all the foregoing styles of Desks and Chairs are set up, as if in actual use; and all persons who feel interest or curiosity in such matters are invited to visit and examine them. It is only by such an investigation that the complete idea can be realized. Orders by mail or otherwise will be executed with the same promptness and fidelity as if presented in person.

S. WALES, JR., No. 14 Bromfield street, Boston.

The foregoing drawings and description of School Chairs and School Desks, manufactured by S. Wales, Jun., 14 Bromfield street, Boston, Mass., are copied from the circular of the manufacturer, by permission.

Ross's School Chair and Desk.



The above cut represents a new style of school chair and desk, manufactured by Joseph L. Ross, corner of Ivers and Hopkins streets, Boston.

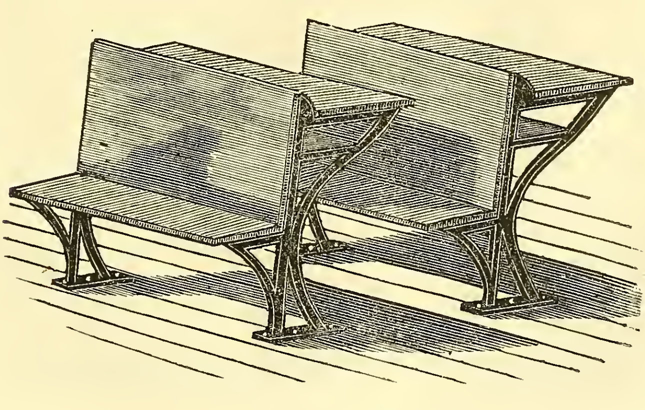
"The legs, or supports of the desk and seat, are of cast-iron, of classical design, conveniently shaped in reference to sweeping, and are firmly secured to the wood-work of the chair and desk, and to the floor.

The chairs are made of seven sizes, viz.: 9, 10, 12, 13, 14, 15, and 16 inches high from the floor to the upper surface of the seat; and the desks are manufactured to correspond to the size of the chairs."

These has been introduced into the new Public High School-house, Cambridge, and in Charlestown, and into several of the new Grammar School-houses in Boston, and have given entire satisfaction wherever they have been introduced.

Mr. Ross also manufactures tables and desks for the use of teachers, cases for apparatus, and for library, and other furniture for school-rooms."

Mr. Ross also manufactures a style of school desk, with seat attached, which has been introduced very extensively into village and country districts in Rhode Island, and is recommended wherever a rigid economy must be observed in furnishing a school-room. The end-piece, or supports, both of the desk and seat, are of cast-iron, and the wood-work is attached by screws. They are made of eight sizes, giving a seat from ten inches to seventeen, and a desk at the edge next to the scholar from seventeen to twenty-six inches from the floor.



Plan and Description of Bowdoin Grammar School-House.

The new Bowdoin School-house, completed in 1848, is situated on Myrtle street, and with the yard occupies an area of about 75 feet by 68 feet, bounded on each of the four sides by a street. It is built of brick with a basement story of hammered granite, and measures 75 feet 9 inches extreme length by 54 feet 6 inches extreme breadth—having three stories, the first and second being 13 feet, and the third, 15 feet high in the clear. The ground descends rapidly from Myrtle street, thereby securing a basement of 15 feet in the rear. One third of which is finished into entries, or occupied by three furnaces, coal bins, pumps, &c., and the remaining two thirds is open to the yard, thereby affording a covered play-ground for the pupils.

The third story is finished into one hall 72 feet long by 38 feet wide, with seats and desks for 180 pupils. On the south side of this hall there are two recitation rooms, each 16 feet by 12 feet, and a room for a library, &c. There are three rooms of the same size on the two floors below.

The second story is divided into two rooms by a partition wall, each of which is 35 feet by 38, and accommodates 90 pupils, and so connected by sliding doors that all the pupils of both schools can be brought under the eye and voice of the teacher.

The first story corresponds to the second, except there are no sliding doors in the partition, and no connection between the room except through the front entry. The two rooms on this floor have each seats and desks for 100 pupils.

Each story is thoroughly ventilated, and warmed by one of Chilson's Furnaces. In each furnace the air chambers, the apertures for conducting the cold air into them, and the flues for constructing the heated air into the rooms in each story, being all large, a great quantity of warm air is constantly rushing into the rooms, and the ventilating flues or ventiducts being so constructed and arranged that the air of the rooms will be frequently changed, and that a pure and healthy atmosphere will at all times be found in each of these rooms, provided the furnaces are properly and judiciously managed. On the top of the building there are two of Emerson's large ventilators, connected with the attic and ventilating flues, through which the impure air passes out into the atmosphere above.

To accommodate pupils who come to school with wet feet or clothes, there is an open fire in a grate in one of the recitation rooms.

Each room is furnished with Wales' American School Chair, and Ross's Desk, and both desk and chair are in material, form and style, as described on page 202 and 205.

This is a school for girls only, and consists of two departments, one of which is called the Grammar department, and the other the Writing department; the master of each department being independent of the other.

The number of assistant female teachers in each department of this school, when full, will be four, the teachers in each department being independent of the master and teacher in the other.

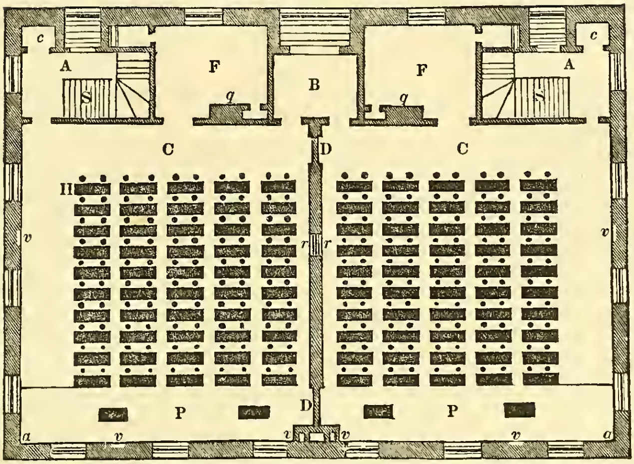
The master of the Grammar department and two of his assistants will occupy the large hall in the third story, and his other two assistants will occupy one of the rooms in the first story.

The master of the writing department and two of his assistants will occupy the rooms in the second story, and his other two assistants will occupy the other room in the first story, each master being the superintendence of his own department.

The school, when full, will be divided into five classes, and each class into two divisions, nearly equal in numbers. The first week after the vacation in August, the first division of each class will attend in the grammar department in the morning, and the second division of each class will attend in the writing department; and in the afternoon, the second division of each class will attend in the grammar department, and the first, in the writing department. The next week, this order of attendance is to be reversed, and this alteration is to continue through the year, the weeks of vacation not being counted.

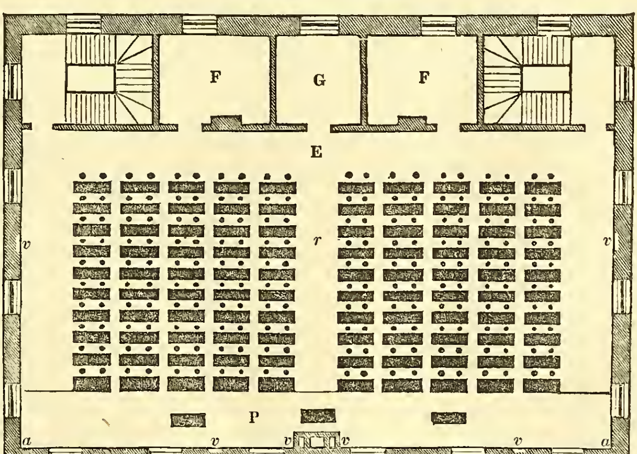
This house and the Quincy Grammar School-house are built after designs by Mr. Bryant.

PLAN OF FIRST AND SECOND FLOOR.



A, A, Entrance for Pupils.
B, Ditto for Teacher.
C, C, Study halls, each 35 by 38 feet; with seats and desks for 100 pupils.
D, Sliding door, by which the two rooms on the second floor are thrown into one.
E, Study hall, 72 feet by 38.
F, F, Two recitation rooms on each floor, 16 feet by 12.
G, Room 10 feet by 12, for library, apparatus, &c.
H, Ross' desk, and Wales' chair.
P, Teacher's platform with desk for teacher and assistants.
S, S, Staircase leading to second and third floors.
a, Case with glass doors for apparatus.
c, Closet for Teacher.
q, Grate.
r, Hot air register.
v, Flues for ventilation.

PLAN OF THIRD FLOOR.



Plan and Description of Quincy Grammar School-House, Boston.

This building, which was commenced in 1847, and dedicated on the 26th of June, 1848, is situated on a lot 90 feet by 130 feet, extending from Tyler street to Hudson street.

The ground plan is in the form of a cross, the exterior dimensions of the body being 80 feet by 58 feet, the end fronting on Tyler street. The wings are 12 feet in front by 36 feet deep. It is four stories high, with a basement 8 feet in the clear, for the furnaces and fuel, and an attic for gymnastic exercises.

Each wing contains a front and back entrance, a flight of stairs from the basement to the attic, and a room on each floor 10 feet by 11 feet, connected with a school-room.

The fourth story of the body is finished in one spacious hall, 16 feet high in the clear, with centre-pieces and a cornice, and a platform at each end 22 feet by 11 feet, and 22 inches high. It is furnished with settees arranged in 4 rows, sufficient to accommodate 700 children.

The third floor is divided by a corridor 8 feet wide, extending across the main body from one wing to the other, having 2 school-rooms on each side.

These four school-rooms are of nearly the same size, averaging about 31½ feet by 26½ feet, and 13 feet high. Each room is lighted by 2 windows at the side, and 2 at the end, and has a platform for the teacher 24 feet by about 5½, with one end towards the entrance from the corridor, and on the other end is placed a book-case of cherry, 3½ feet by 8 feet, with glazed doors, facing the entrance.

The scholars' desks front the platform and the windows on the side of the building, and are separated by aisles 1 foot and 4 inches wide. They are 2 feet in length, made of cherry-wood, and varnished and supported by cast iron stands. J. L. Ross, maker. Each scholar has a desk by himself.

The chair is made by Mr. Wales, of Boston. It has a scroll back and cast iron support.

Each room accommodates 56 pupils, one desk and chair being placed on a small movable platform for a monitor.

The rooms are lined with composition blackboards 3½ feet wide, 2 feet from the floor.

The school-rooms which have not small rooms attached, are provided with closets for the children's clothes. There are 2 sinks in the corridor, with conveniences for introducing Cochituate water. The description of this story will answer for the two below it, as the first three are essentially the same.

The windows are furnished with inside blinds, having revolving slats, so that the light may be regulated with great ease.

The building is warmed by 4 furnaces placed in the basement, 2 being placed at the middle of each end, each being intended to warm the three rooms immediately over it, the cast iron chimnies being relied upon for heating the hall.

Emerson's system of ventilation has been introduced since the building was finished, each room having a separate air-duct to the roof, 14 inches by 14 inches.

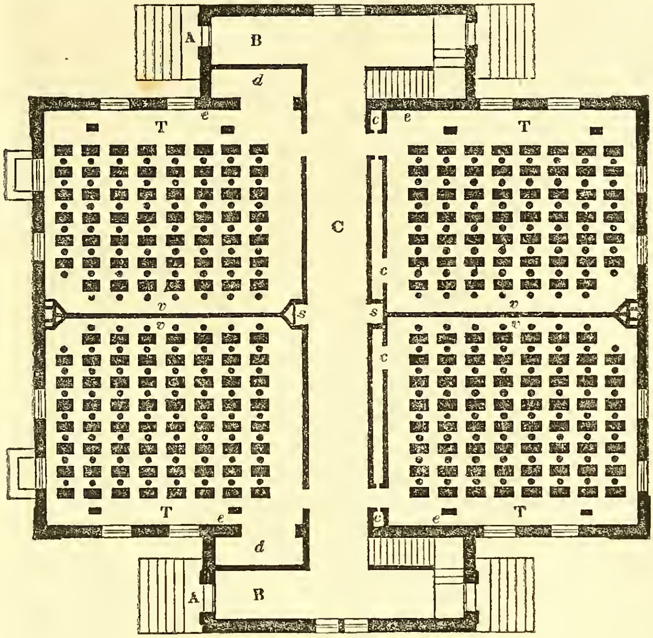
The apparatus consists of the Boston Philosophical set, by J. M. Wightman, Eayrs and Fairbanks' globe, 2 sets of Pelton's Outline Maps, and one of Mitchell's.

A library costing $200 has been furnished by the donation of Mayor Quincy.

To protect the desks from injury, the slate-frames are all required to be covered with cloth, and each scholar is to provide himself with a convenient box to contain his pen, pen-wiper, pencils, rubber, &c. Each desk has an inkstand sunk into the right-hand corner, with a revolving metalic cover.

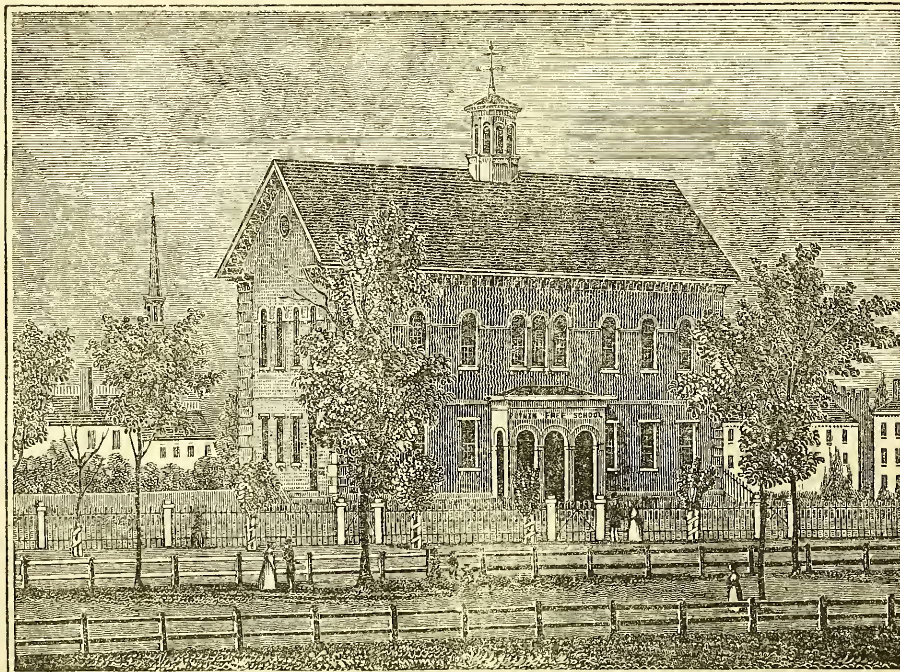
The building is calculated for but one school, and is at present occupied by but one, the organization of which is adapted to the arrangement and construction of the house. When the organization is complete, the school will be divided into 4 classes, each class containing 168 scholars, and each class into 3 divisions. At present the 3 lower classes contain two divisions each, and the first class 3.

On the 3rd floor are the first division of the first class under the instruction of the Principal, and the several divisions of the 2d class instructed by assistants; On the 2d floor is the 2d division of the 1st class instructed by the sub-master, with the several divisions of the 3d class under assistants; and the usher takes the 3rd division of the 1st class, with the several divisions of the 4th class on the 1st floor. By this arrangement the government is rendered comparatively easy. The whole school is brought together in the hall for devotional services, and other general exercises.



Plan of First Floor.

A, A, Front Door.
B, B, Entries.
C, Corridor or Hall.
T, T, T, T, Teachers' Platform 24 feet by 5½.
r, r, r, r, Hot-air flues.
v, v, v, v, Preston's Ventilators for controlling the flues in the partition wall, which communicate with the iron smoke pipes near the top of the building. This plan is adopted in the first story only.
e, e, e, e, Indicates the location of the flues of Emerson's Ventilators in the second, third and fourth stories.
s, Sink.
c, c. c, c, Closets.
d, d, Closets 10 feet by 11 feet



PUTNAM FREE SCHOOL, NEWBURYPORT, MASS.

Plans and Description of the Putnam Free School-House, Newburyport, Mass.

We are indebted to W. H. Wells, Esq., the gentleman who has been selected as Principal of the Putnam Free School, and to whom the work of organizing this important institution has been committed, for the following plans and description.

The Putnam Free School was founded by Mr. Oliver Putnam, a native of Newbury. It has a permanent fund of fifty thousand dollars, besides the amount invested in the school-house and its appurtenances.

The number of pupils to be admitted at the opening of the school (April, 1848,) is limited by the Trustees to 80. No pupil can be received under twelve years of age, nor for less time than one year.

The object of the Institution is to lead pupils through an extended course of English study. It is open to students from any portion of the country, who are prepared to meet the requirements for admission. No charge is made for tuition.

This building is situated on High street, directly opposite the Common or Mall. It is constructed of brick, with corners, door-sills, underpinning, steps, etc., of freestone. It is two stories in height, exclusive of a basement story, 85½ feet in length, and 52½ in breadth.

The upper story is divided into two principal school-rooms, each 49½ feet by 40½. There is also a small room in this story for the use of the Principal. The lower story contains a hall for lectures and other general exercises, and four recitation rooms. The hall is 44 feet by 48½. Two of the recitation rooms are 14 feet by 17, and two are 11 by 20.

Each of the principal school-rooms is furnished with 64 single seats and desks, besides recitation chairs, settees, etc. The desks are made of cherry; and both the desks and the chairs are supported by iron castings, screwed firmly to the floor. In form and construction, they are similar to Kimball's "Improved School Chairs and Desks."

The central aisles are two feet and eight inches in width; the side aisles, four feet and four inches; and the remaining aisles, two feet.

The building is warmed by two furnaces. It is ventilated by six flues from the hall on the lower floor, six from each of the school-rooms on the second floor, and one from each of the recitation rooms. Each of these flues has two registers; one near the floor, and the other near the ceiling. The two principal school-rooms are furnished with double windows.

The institution is provided with ample play-grounds and garden plots, back of the building and at the ends. It has also a bell weighing 340 lbs.

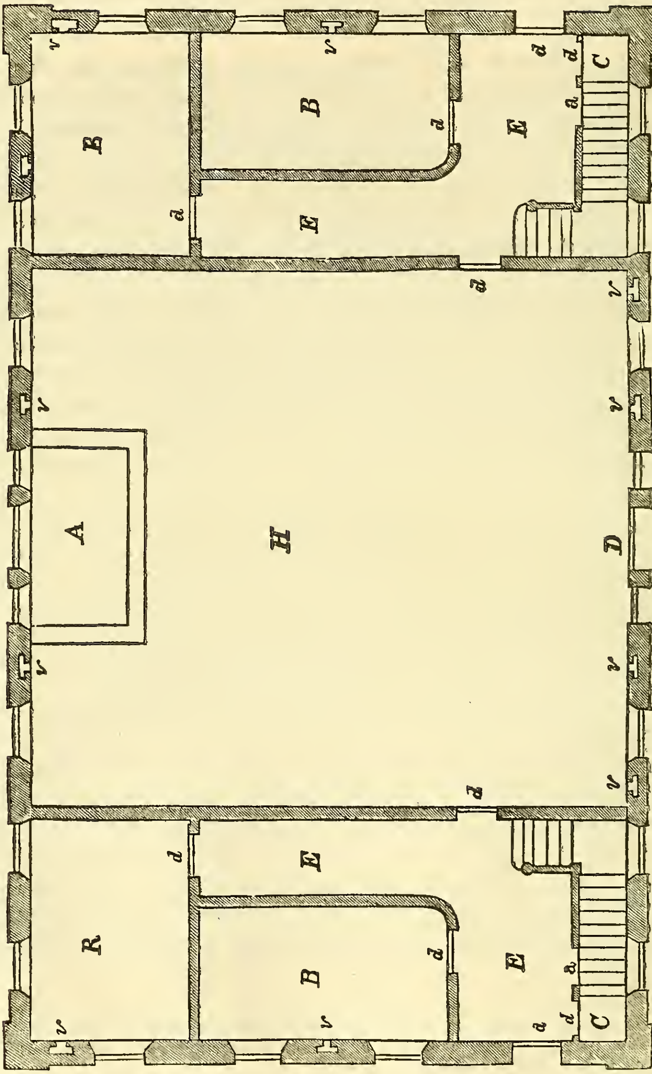
The first appropriation of the Trustees for the purchase of apparatus, is one thousand dollars. Other appropriations will probably be made, as the wants of the school may require. In addition to the apparatus procured by the Trustees, the institution is to have the use of an achromatic telescope, which will cost between three and four hundred dollars.

The cost of the building and ground, with the various appurtenances, exclusive of apparatus, has amounted to twenty-six thousand dollars.

The accompanying plans give a correct representation of the arrangements on the two principal floors.

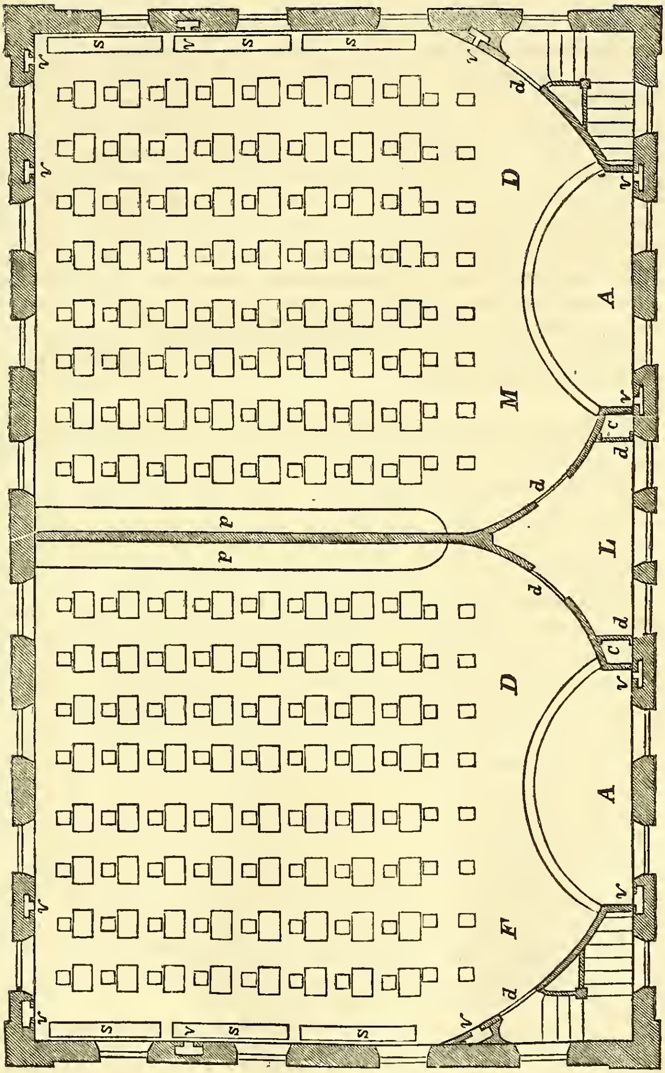
The building was erected after designs and specifications by Mr. Bryant, Architect, Boston.

PUTNAM FREE SCHOOL-HOUSE.—LOWER STORY.



H—Hall for lectures and other general exercises, 44 feet by 48½. A—Raised platform for desk. D—Front door. (The portico in front does not appear in the plate.) B, B—Recitation rooms, 11 feet by 20. R, R—Recitation rooms, 14 feet by 17. E, E, E, E—Entries. C, C—Wash closets, under the stairs. a, a—Doors leading to the basement story. d, d, d, d, d, d, d, d, d, d—Doors. v, v, v, v, v, v, v, v, v, v.—Ventilating flues.

PUTNAM FREE SCHOOL-HOUSE.—UPPER STORY.



M, D—Room for Male Department. F, D—Room for Female Department. A, A—Raised platforms for teachers' desks. L—Principal's room. C, C—Closets. p, p—Raised platforms under the black-boards. s, s, s, s, s, s—Settees d, d, d, d, d, d—Doors. v, v, v, v, v, v, v, v, v, v, v, v—Ventilating flues

Plans and Description of the Public High School-House, Hartford, Conn.

The Public High School-House of Hartford was built after more than ordinary search for the best plan, (a committee having visited Boston, Lowell, Salem, Newburyport, Worcester, Providence, and Middletown, for this purpose,) under the constant oversight of a prudent, practical and intelligent building committee, and with due regard to a wise economy. The committee were limited in their expenditure for lot, building, and fixtures, to $12,000; and when it was ascertained that a suitable building could not be constructed for that sum, individuals on the committee immediately contributed $2,400 out of their own pockets to complete the house with the latest improvements. The committee have now the satisfaction of knowing that their contributions and personal oversight have been mainly instrumental in erecting and furnishing the most complete structure of the kind in New England, when the aggregate cost is taken into consideration.

The High School is designed for both males and females, and the arrangements of the buildings, and the grounds, are made with reference to the separation of the sexes, so far as this is desirable in the same school.

The lot on which the building stands is at the corner of Asylum and Ann streets, and is at once central, and large enough for the appropriate yards. The yards are separated by a close and substantial board fence, and the grounds are well laid out and properly inclosed; they will also soon be planted with trees and shrubbery. The building is of brick, three stories high, upon a firm stone basement. Its dimensions are 50 by 75 feet. The basement is 13 feet in the clear, six feet of which are above the level of the yard. This part of the building is occupied by furnaces, coal bins, sinks, pumps, entrance rooms, &c. At one end, and on two opposite sides of the building, a stair case eleven feet in width extends from each of the two entrance rooms, to the upper story, with spacious landings on the first and second floors. Two rooms, each 11 by 14 feet, are between the stair cases, the one on the first floor being used for a front entry to the building, and the one on the second floor being appropriated to the Library and Apparatus. Two closets, eleven by four feet on the first floor, and immediately beneath the stair cases, receive the outer garments, umbrellas, &c., of the teachers.

An aisle of four feet four inches in width extends between the desks and outer walls of the rooms, and between every two ranges of desks is an aisle of two feet four inches in width. An aisle of eight feet in width passes through the middle of the rooms, parallel to the narrower passages. A space of five feet in width is likewise reserved between the remote seats in the ranges and the partition wall of the rooms. Around the sides of the rooms, tastefully constructed settees are placed for occasional recitations, and for the accommodation of visiters, and in the upper room for the use of the pupils of the room below, during the opening and closing exercises of the school.

The pupils, when seated, face the teachers' desks and platforms, which occupy the space between the entrance doors of each room.

A blackboard, or black plaster surface, forty feet long, and five broad, extends between the doors leading to the recitation rooms, which are also lined with a continuous blackboard. There is also a blackboard extending the entire length of the teachers' platform in the lower room, and two of smaller dimensions in the room above, a part of the space being occupied by the folding doors leading to the library and apparatus room. Twenty chairs, of small dimensions and sixteen inches in height, are placed around each recitation room, thirteen inches apart and seven inches from the walls, and securely fastened to the floor. A clock, with a circular gilt frame and eighteen-inch dial plate, is placed over the teachers' platform in each school room, in full view of the pupils. A small bell is also placed above the teachers' platform in the lower room, with a wire attached, passing to the desk of the Principal, in the room above, by which the time of recesses, change of recitation classes, &c., are signified to the members of the lower rooms.

The school-rooms in the first and second stories are 50 feet square, and 13 feet in height—to each of which, two recitation rooms 12 by 23 feet are attached. The large rooms are furnished with "Kimball's improved School Chairs and Desks," placed in six ranges, extending back from the teachers' platforms, ten desks forming a range, and two chairs attached to each desk, furnishing accommodations in each room for 120 pupils—60 of either sex. Ample room yet remains in front of these ranges to increase the number of desks when the wants of the school demand them. The desks are four feet in length and one foot four inches in breadth, constructed of cherry, oiled and varnished. The moderately inclined tops are *fixed* to the end supporters, and the openings for books are in front of the pupils. Glass inkstands are inserted in the tops of the desks, and the ink protected from dust and the action of the atmosphere by mahogany covers turning on pivots. The chairs are constructed with seats of basswood, hollowed, and backs of cherry, moulded both to add beauty to the form of the chair, and to afford support and comfort to the occupants. All are neatly stained and varnished, and they, as well as the desks, rest on iron supporters, firmly screwed to the floor.

The entire upper story is converted into a hall, being twelve feet in height at the walls, rising thence in an arch to the height of seventeen feet. This is appropriated to reading, and declamation, and for the female department of the school, to daily recess, and calisthenic exercises. A moderately raised platform is located at one end, above which an extended blackboard is placed, and settees are ranged around the walls; these, properly arranged, together with the settees from the lower rooms, which are easily transported above, speedily convert the open *Hall* into a commodious Lecture room,—and also adapt it to the purposes of public examinations and exhibitions.

In each of the two entrance rooms are placed the means of cleanliness and comfort,—a pump of the most approved construction, an ample sink, two wash basins with towels, glass drinking tumblers, and a looking-glass. Ranges of hooks for hats, coats, bonnets, cloaks, &c., extend around the rooms, and are numbered to correspond with the number of pupils, of each sex, which the capacity of the house will accommodate. In the girls' room, pairs of small iron hooks are placed directly beneath the bonnet hooks, and twelve inches from the floor, for holding the over-shoes. In the boys' room, boot-jacks are provided to facilitate the exchange of boots for slippers when they enter the building—an important article, and of which no one in this department of the school is destitute. A thin plank, moderately inclined by hollowing the upper side, is placed upon the floor, and extends around the walls of the room, to receive the boots and convey the melted ice and snow from them, by a pipe, beneath the floor. A large umbrella stand is furnished in each of the two entrance rooms, also with pipes for conveying away the water. Stools are secured to the floors for convenience in exchanging boots, shoes, &c. Directly under the stairs is an OMNIUM GATHERUM—an appropriate vessel, in which are carefully deposited shreds of paper, and whatever comes under the denomination of *litter*, subject, of course, to frequent removal. These rooms, in common with the others, are carefully warmed. The wainscoting of the entrance rooms, and the stair case, is formed of narrow boards, grooved and tongued, placed perpendicularly, and crowned with a simple moulding. The railing of the stair case is of black walnut. A paneled wainscoting reaching from the floor to the base of the windows, extends around the walls of the remaining rooms. All the wood work, including the library and apparatus cases, is neatly painted, oak-grained, and varnished. The teachers' tables are made of cherry, eight feet in length, and two feet four inches in breadth, with three drawers in each, and are supported on eight legs. A movable writing desk of the same material is placed on each. Immediately in front of the teachers' desk in the upper room, a piano is to be placed, for use during the opening and closing exercises of the school, and for the use of the young ladies during the recesses. Venetian window blinds with rolling slats, are placed inside the windows, and being of a slight buff color, they modify the light without imparting a sombre hue to the room.

The building is warmed throughout by two of Hanks' Improved Air Heater, placed in the basement.

The ventilation of the school-rooms, or the rapid discharge of the air which has become impure by respiration, is most thoroughly secured in connection with a constant influx of pure warm air from the furnaces, by discharging ventiducts or flues, situated on each side of the building at the part of the rooms most distant from the registers of the furnaces. The ventiducts of each room are eighteen inches in diameter, and are carried from the floor entirely separate to the Stationary Top, or Ejector above the roof. The openings into the ventiducts, both at the top and bottom of the room, are two feet square, and are governed by a sliding door or blind.

A flight of stone steps leads to the front and main entrance of the building. The architectural entrance is of simple design, fourteen feet in width, and twenty feet in height. All the parts are wrought from dark colored stone, and on the crowning stone of the entablature, Public High School, appears in plain and prominent relief. Large folding doors, with side and top lights, close the entrance.

A side knob commands a bell suspended in the Library Room, directly behind the Principal.

A broad stone walk reaches from the steps to the street; flagging walks also extend from the street to the side entrances of the building, and thence to the outbuildings.

The Library contains an Encyclopedia, the most approved Dictionaries, both Classical and English, and other important books of reference for the use of the School, together with selected works for the direct professional reading of the teachers.

Several educational and scientific periodicals are furnished to the School, and which at the end of each year will form additional volumes for the Library.

Pelton's and Olney's, together with Mitchell's new series of outline maps, published by J. H. Mather & Co., of Hartford, Ct., and a fourteen-inch terrestrial globe, aid in the department of General Geography.

Mattison's series of sixteen astronomical maps; a fourteen-inch celestial globe; Vale's improved twenty-four-inch celestial globe and transparent sphere; a magic lantern, with sets of slides, containing thirty accurate telescopic and astronomical views; a reflecting telescope of five feet focal distance, with magnifying power of 700, and Chamberlin's best Tellurium, aid in the department of Astronomy.

Historical maps, charts, &c., an Isothermal chart, and set of large drawings to illustrate the anatomical structure, and the physiological functions of the system, will be procured.

The following apparatus has already been procured to aid in illustrating and demonstrating in the studies named:

Mechanics.—Set of mechanical powers, arranged in a mahogany frame, comprising three levers, each sixteen inches long. Five sets of brass pulleys strung with cord and properly balanced. Brass weights from one to sixteen ounces. Screw and lever with nut. Screw as an inclined plane. Ship capstan. Wheel and axle. Wedge in two parts. Inclined plane, with carriage. Movable fulcrum and lever, for combining the power of screw and lever. Machine for illustrating the centrifugal and centripetal forces—thirteen experiments.

Pneumatics.—Air Pump—frame made of rose-wood beautifully polished—barrel twelve by four inches inside; large plate, stop-cock, and barometer in vacuo, and worked with a polished steel lever four feet in length, $85,00. Large swelled, open-top bell glass. Several plain bell glasses of smaller dimensions. Bell glass with brass cap to receive stop-cock. Connector, sliding rod, &c. Revolving jet in vacuo. Bursting squares and wire guard for same. Condensing chamber and condensing gauge. Artificial fountain, with exterior and interior jets. Sheet rubber bag in vacuo, illustrating the rarefaction of confined air by removing the pressure of the external. Mercury tunnel to exhibit the mercurial shower, porosity of wood, pressure of the air, and also the luminous shower. Guinea and feather tube. Philosophical water hammer.

Apparatus illustrating the absurdity of suction, or the necessity of atmospheric pressure to the operation of the lifting pump. Torricellian barometer improved. Bell in vacuo. Appatatus illustrating the buoyancy of air, gas, &c. Weighing air and specific gravity apparatus. Freezing apparatus with thermometer. Condensing syringe. Cylindrical open-top bell glasses, three sizes. Hand and bladder glass, to illustrate atmospheric pressure. Bladder cap, with cap and stop-cock. Double acting exhauster and condenser. Brass hemispherical caps with handles, stop-cock and stand. Apparatus to illustrate the upward pressure of the atmosphere. Connecting screws, guard screws, sliding rod, with packing screws and binding screws. Flexible hose and screw connectors. Hydrogen bottle. Lead hose for conducting gases. Floating bulbs for condensation. Sheet rubber and sheet rubber bags. Glass bells and stems for freezing apparatus. Pair magnetic swans. Detonating glass tubes. Wire gauze, to illustrate Davy's safety lamp.

Hydrostatics.—Hydrostatic bellows, with glass and brass tubes, glass tunnels, weights, &c. Pair of working models of the forcing and lifting pump. Graduated glass jars for cubic inches.

Electricity.—Electrical machine, 24 inch plate, $50,00. Leyden jar of four quarts. Do. do. for suspension with movable rings and points. Do. do. with sliding discharger. Electrometer jar, by which the charge may be measured, &c. Electric batteries with six four-quart jars. Sliding, directing rod. Spiral spotted tube. Jointed discharger, glass handle. Universal discharger. Insulating stand. Electric bells. Wax cylinder. Thunder house with fixtures. Gas pistol. Gas generator and platina igniter, four quarts. Long haired man. Electric float wheel and point. Abbe Noloes' globe. Luminous bell glass. Electric S. Aurora flask. Electric seasons machine. Elastic rubber ball. Ether spoon. Chamberlin's cylindrical gasometers, for oxygen and hydrogen, united, forming a compound blow pipe, $60,00. Iron retort for oxygen gas. Metallic reflectors with stand, iron ball and stands and a thermometer. Glass spirit lamp. Spirit boiler to use with reflectors. Dropping tube. Glass tunnels. Graduated glass hydrometer. Flask with screw-cap admitting thermometer. Platina and copper pendant spoons. Brass pipe for blowing gas bubbles. Hydrogen gas generator, with platina sponge for lighting a long detonating jet. Lamp stand. Flexible hose for transferring and conducting gases. Scales and weights for chemical purposes. Pyrometer with two lamps and rods. Section model of the high pressure engine.

Galvanic Magnetic and Electro Magnetic.—Davis's cylindric battery. Steel U magnet and armature. Magnetic needles and stands. Electro magnet. Electro coil and hemispheric magnets. Terrestrial helix. Primary coil and handles for shocks. Separable helics for analysis of shocks.

Optics.—Models of the human eye in three parts. *Fig.* 1*st.* A dissectible eye four inches in diameter, showing the cornea, iris, ciliary process, choroid tunic, crystalline lens, vitreous humor, retina, black pigment, optic nerve, &c. *Fig.* 2*d.* Showing the eye in its socket, with the muscles. *Fig.* 3*d.* The eye with rays of light passing from an object and forming the image on the retina. The object and the image movable, showing the cause of lens light, short sight, and perfect sight.

An oxy-hydrogen microscope will soon be added in this department.

With the above apparatus more than eight hundred experiments can be performed.

For the purpose of teaching practical surveying, and the elements of engineering, a Theodolite, of approved English manufacture, is provided. Cost $200.

Other apparatus will from time to time be added, as the wants of the School may require.

Building Committee.—A. M. Collins, D. F. Robinson, T. Belknap, J. M. Bunce, W. Pease, Jr., Edward Button, E. D. Tiffany.

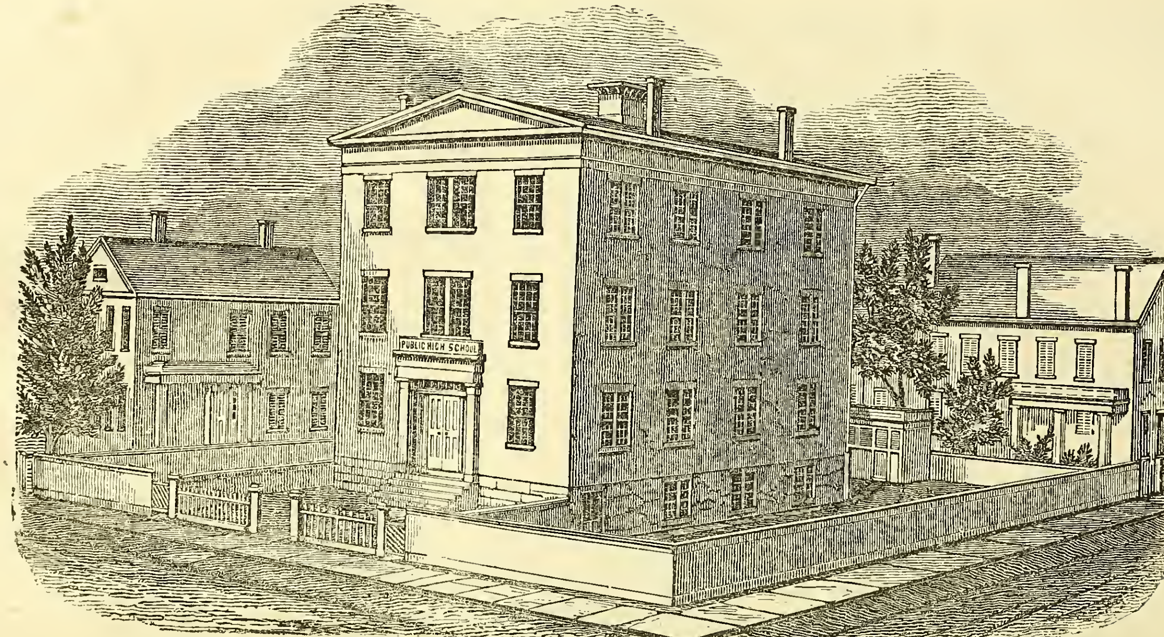
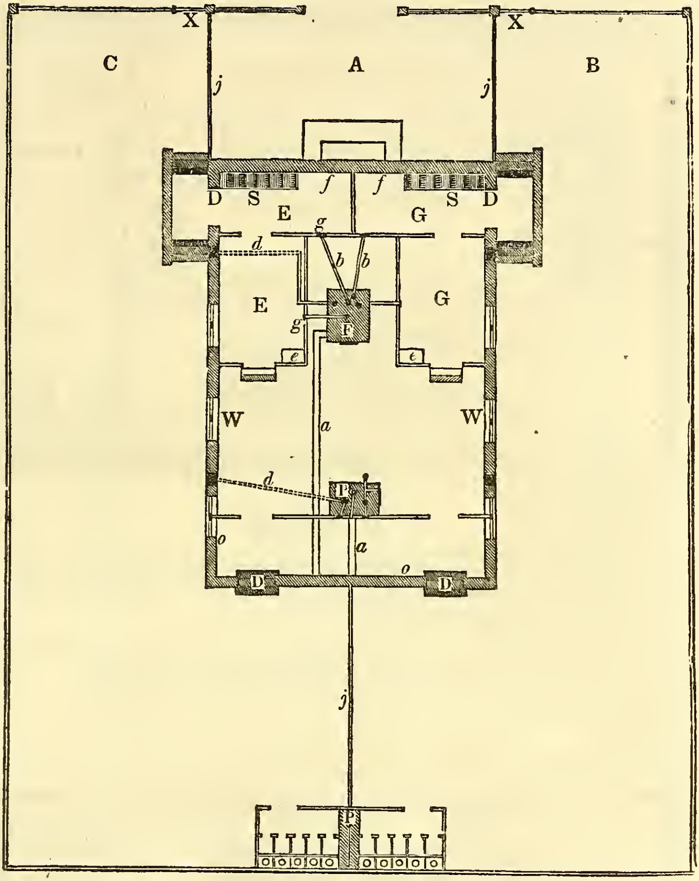


Fig. 1—Perspective of High School-House Hartford Conn.

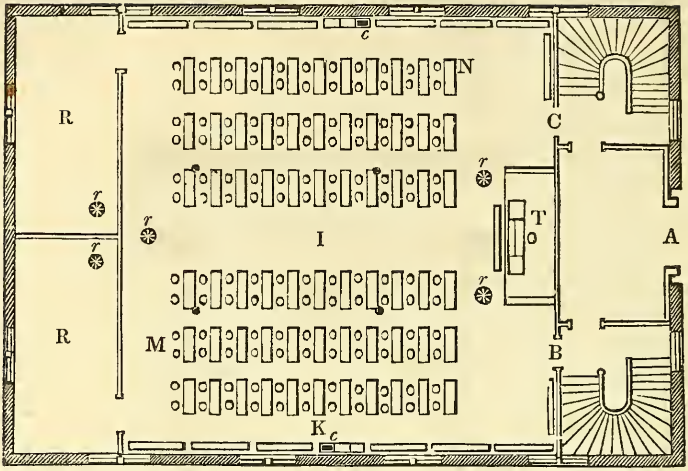
Fig. 2—Ground Plan, Yard, Basement, &c.



A—Front yard.
B—Girls' yard.
C—Boys' yard.
D—Door.
E—Boys' entrance rooms.
G—Girls' entrance rooms.
F—Furnace.
S—Stairs.
W—Windows.
P—Privies, with screen, doors, &c.
X—Gates.

a—Cold air ducts.
b—Warm air ducts.
c—Foul air ducts or ventilating flues.
d—Smoke pipe.
e—Pump, sink.
f—Umbrella stand.
g—Hollowed plank to receive wet boots, overshoes, &c.
o—Bins for hard coal, charcoal, &c.
j—Close board fence.

Fig. 3—Plan of First Floor.



A—Front entrance.
B—Girls' entrance.
C—Boys' entrance.
I—Centre aisle, eight feet.
L—Aisle between each range of seats and desks, two feet four inches.
K—Side aisle, four feet four inches.
M—Space five feet wide.
T—Teachers' platform and desk.
R—Recitation rooms, each twenty-three feet by twelve, furnished with twenty chairs, seven inches from the wall and thirteen inches apart.
Q—Library and apparatus, from eleven feet by fourteen feet.
N—Kimball's desk and two chairs.
O—Piano.
r—Hot air registers.
c—Ventilating flue or foul air duct. N—Settees.

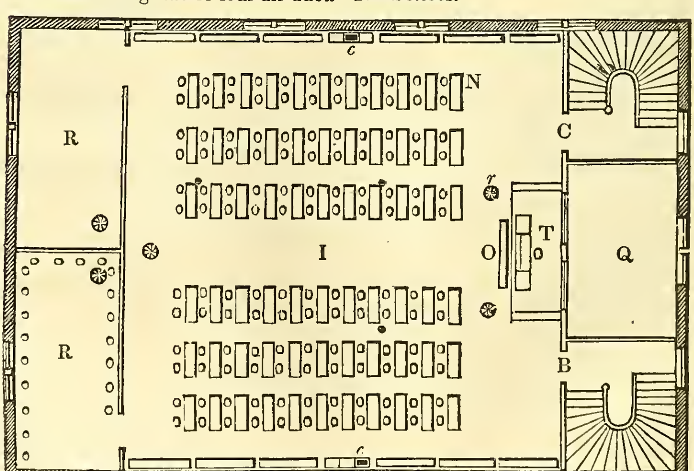


Fig. 4—Plan of Second Floor.

Figs. 5 and 6. PLANS EXHIBITING MODE OF VENTILATION.

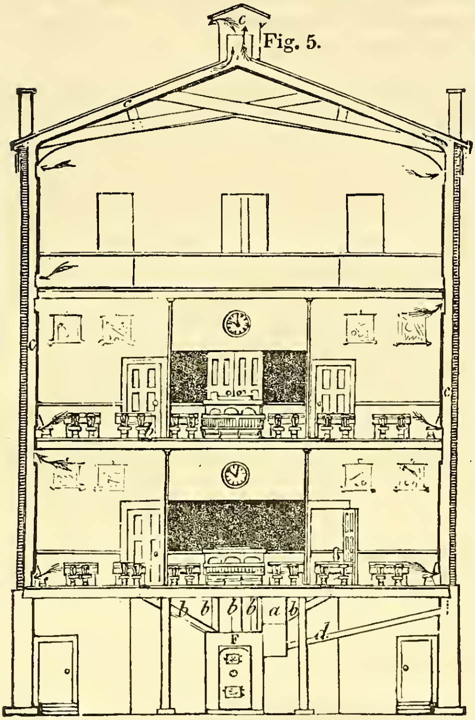


Fig. 5.

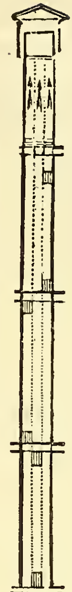
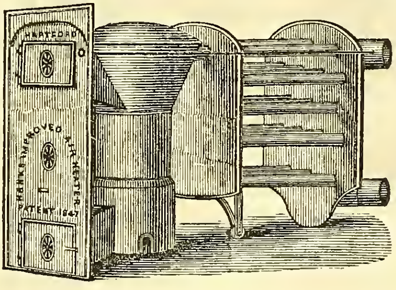


Fig. 6.

Fig. 5. Transverse section exhibiting the manner in which the ventiducts or hot air flues are carried up on the inside of the walls, under the roof, till they discharge into the Stationary Top or Ejector.

Fig. 6. Lateral section of the ventiducts or foul air flues, showing the manner in which the flues are packed together and carried up separately from the floor of each room until they discharge into the common Ejector. The cut does not represent properly the manner in which the flues are carried under and out of the roof.

Fig. 7. HANKS' IMPROVED AIR HEATER.



The following description and notice of Hanks' Furnace or Improved Air Heater, which has worked well in the High School, is taken from the Circular of the Patentee.

"The Air Heater is set in the cellar or basement surrounded by a double brick wall—each four inches thick and four inches apart, arched over the top, leaving a door in the rear, of sufficient size to take out the Heater—the door to be closed with two thicknesses of tin or sheet iron, three inches apart. At the bottom of the wall, directly under the pipes, also opposite the stove, introduce a supply of pure air from outside of the building—this coming in contact with the heated surfaces, rises rapidly and passes off into tin conductors leading from the arch over the Heater, to the apartments intended to be warmed.

The peculiar improvement and operation of this Apparatus is, that the heat, as its temperature is *reduced*, passes *down* into pipes of a still *lower* temperature, and at the *lowest*, passes off into the chimney. The air to be warmed, is brought *first* in contact with the pipes and conductors of the *lowest* temperature, and as it becomes warm and rises, is brought in contact with, and rises among pipes of a temperature *continually* and *regularly increasing*, until at the *highest* it passes off into conductors leading to the rooms Thus the *current* of *heat* is directly *contrary* to the *current* of *air* passing into the apartments.

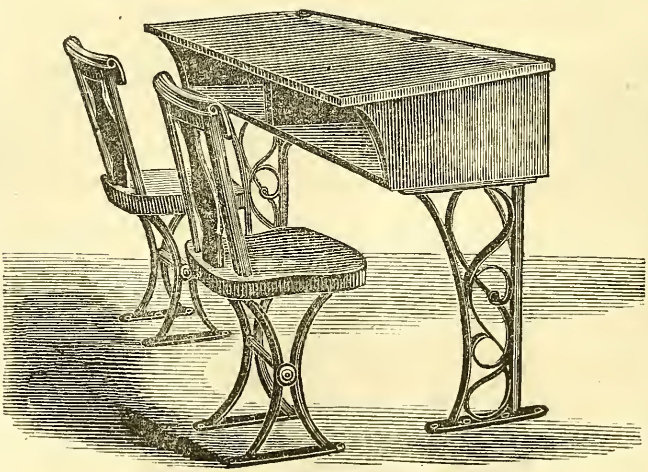
It will radiate more heat, with a given quantity of fuel, than any other apparatus now in use for the same purpose.

It is perfectly accessible at all times, and may be cleared of ashes and soot either when in operation or not, by simply opening the door of the Radiator.

All the coal it may contain can always be seen by looking in at the "feeding door;" thus it may at once be known if the *quantity* and *quality* of the coal is as it should be.

It is so constructed that the required quantity of heat can always be had and controlled, diminished or increased at pleasure, with a corresponding consumption of fuel."

Fig. 8. KIMBALL'S IMPROVED CHAIRS AND DESK.



For description, see p. 116.

Plan and Description of the Free Academy in the City of New York.

The Free Academy is situated on the S. E. corner of Twenty-third street and Lexington avenue, in the upper part of the city, being convenient of access from all the great thoroughfares. The style of architecture, in which the building is erected, is the same as that of the town halls and colleges of the 14th century, in Europe. This style attained its greatest perfection in the Low Countries, and especially in Belgium, which at that period was the great seat of learning, science and the arts, as well as the great centre of the commercial enterprise of Europe. It was the opinion of the architect, therefore, apart from the economy in construction, of the Gothic style, when properly managed, that this style would be peculiarly appropriate for the High School of the city of New York, and was also well adapted to the materials of which it was proposed to construct the building, many of the old halls and colleges being built of brick. The architect, Mr. Renwick, of New York, in a letter to the President of the Board of Education, remarks,

"I am confident that the style I have adopted is, at the same time the strongest, the cheapest, and the one best adapted to the purposes of heat and ventilation, being the only one, except the Norman, in which chimneys and flues become ornamental, and a roof of high pitch, necessary for external beauty, and capable of being intersected by dormer windows, which latter will add to the beauty of the building and to the convenience of lighting and ventilating the great hall, in the roof.

"As you (the Board) have proposed, with perfect correctness, to make the great hall in the Gothic style, for it can be in no other order, placed in such a position immediately beneath the roof, and is capable of being made highly ornamental in such a place, I was of opinion that the exterior of the whole building should accord with it, as, if it were planned in any other style, it would appear inharmonious, and therefore produce an unpleasant effect on the mind by its incongruity. The height of the building, too, the great pitch of the roof, and the numerous chimneys and ventilating flues necessary to render the arrangement perfect, would entirely preclude the adoption of the Grecian, Roman, or modern Italian styles, with any good effect, apart from their being much more expensive, and less beautiful.

"I have entered at length into the reasons which guided me in the adoption of a style for the building, because it might at first sight appear expensive, and therefore improper for such an institution. You will at once perceive the great strength which the buttresses impart to the building, and the consequent reduction in the thickness of the walls. These buttresses will also serve for ventilating flues, which in such a building should be of large size, in order to prevent, as far as possible, any friction from interfering with the passage of the currents of air, an end which can only be attained by large and smooth flues."

The dimensions of the building are as follows: The length of the building, exclusive of all projections, is 125 feet, and the breadth 80 feet. The height, to the eaves, 65 feet, and to the top of the gable, 100 feet. The height of the towers, 110 feet

The building is divided into a basement, three stories, and a great hall under the roof. The basement is nine feet in height, and is arched to afford ground for exercise in bad weather. In it, also, are the janitors' lodgings, the chemical laboratory, and the closets for the hats and clothes of the students. The first, second and third stories are divided into four great rooms by two wide, spacious halls, which are carried through the centre of the building longitudinally and transversely. Two of these rooms, on each floor, are again divided, affording smaller rooms for recitation, &c. Above these stories is the great hall, 125 feet long by 60 feet in breadth, divided by the king and queen posts of the roof, which are made ornamental, into three aisles, the centre one of which is 40 feet in height, and the two side aisles each 20 feet in height. The ceiling of this room is of wood immediately under the roof, of which it forms part, and it is ornamented with carved ribs of wood, in the manner of the old college halls at Oxford and Cambridge. It is lighted by windows at the ends and by dormers in the roof, and when finished, will probably be the largest and finest collegiate hal. in this country.

The expense of the building, complete, without the furniture, will be 46,000 dollars.

The Free Academy of the city of New York was established by the Board of Education, in 1847, in pursuance of authority granted by the Legislature on the memorial of the Board, and on condition that the question of its establishment should be submitted to the people of the city, and a majority of the votes given should be in favor of the proposition. The question was so submitted on the first Monday of June, 1847, and 19,904 votes were given in favor of the same to 3,409 against. The act of the Legislature authorized the Board to erect a building at an expense of $50,000, and to raise by tax annually for its support, the sum of $20,000, exclusive of a proportion of the State Literature Fund, and any other means from other sources than those of taxation. Admission into the Academy is confined to those who have been pupils in the public schools of the city. The character and design of this institution may be gathered from the following extracts from the Memorial of the Board:—

"It cannot be denied that the unavoidable expense of a regular course of education at this time, is greater than can be borne by the heads of families in this city pursuing the various trades and occupations, whose business occupies the great mass of the people.

"If the number of highly educated men can, with a trivial addition to the public expense, be greatly multiplied; if these benefits can be rendered accessible to the great mass of young men who cannot now indulge the hope of enjoying them at all, if pecuniary inability to defray the present expenses of a collegiate education can cease to be a barrier to the acquisition of it, it is but reasonable to expect that in a brief period the number liberally educated in this city will be increased at least four-fold.

"One of the important objects designed to be secured by establishing a Free Academy, is to bring the advantages of the best education that any school in our country can give, within the reach of all the children of the city whose genius, capacity, and desire of attainment are such as to render it reasonably certain that they may be made, and by such means would become, eminently useful to society.

"The permanency of our free institutions, the future state of society, the extent to which the laws of the country will be regarded, and social quiet and order preserved, depend essentially upon the virtue and intelligence of the people.

"It is believed that a liberal education of the largest practicable number of the young men who may propose to seek the means of subsistence in agriculture, mechanical, or other productive occupations, would exercise a genial influence upon all the varied relations of social and political life: and that such an education would not tend to dissatisfy them with such pursuits.

"One object of the proposed Free Institution is, to create an additional interest in, and more completely popularize the Common Schools. It is believed that they will be regarded with additional favor, and attended with increased satisfaction, when the pupils and their parents feel that the children who have received their primary education in these schools, can be admitted to all the benefits and advantages furnished by the best endowed college in the state, without any expense whatever. It is believed that such an institution as the proposed Free Academy is designed to be, in addition to the great benefits it will confer by annually graduating a large number of highly educated young men, destined to pursue some of all the various pursuits of life, would stimulate tens of thousands, who might never enter this academy, to additional industry and greater advances while in the common schools. The certainty to a young man of good abilities, and desirous of making large acquisitions in knowledge, of having the opportunity of gaining as extensive an education as can be acquired in any institution in the State, if his parents can only furnish him the means to subsist at home, is in the highest degree cheering, while the certainty that the limited earnings of his parents will preclude him, in the existing state of things, from having any such advantages, tends to repress all such generous aspirations, paralyze effort, and prevent the full development of his ability to become extensively useful to the class in which his lot may be cast, or to society at large."

Public High School.

In the preceding pages we have presented a variety of plans for the construction and internal arrangements of buildings designed and erected for Public High Schools. Whenever and wherever the interest of the community can be sufficiently awakened to call for a public school of the grade generally understood by the term High School, there will be no difficulty in raising the funds necessary to erect and furnish a suitable edifice for the accommodation of the school. It may not, then, be amiss in this place to present a few considerations and facts bearing upon the establishment of a school of this grade in every large village and city in our country.

By a Public or Common High School, is intended a public or common school for the older and more advanced scholars of the community in which the same is located, in a course of instruction adapted to their age, and intellectual and moral wants, and, to some extent, to their future pursuits in life. It is common or public in the same sense in which the district school, or any lower grade of school established and supported under a general law and for the public benefit, is common or public. It is open to all the children of the community to which the school belongs, under such regulations as to age, attainments, &c., as the good of the institution may require, or the community may adopt. A Public High School is not necessarily a free school. It may be supported by a fund, a public tax, or an assessment or rate of tuition per scholar, or by a combination of all, or any two of these modes. Much less is it a public or common school in the sense of being cheap, inferior, ordinary. To be truly a public school, a High School must embrace in its course of instruction studies which can be more profitably pursued there than in public schools of a lower grade, or which gather their pupils from a more circumscribed territory, and as profitably as in any private school of the same pretensions. It must make a good education common in the highest and best sense of the word common—common because it is good enough for the best, and cheap enough for the poorest family in the community. It would be a mockery of the idea of such a school, to call it a Public High School, if the course of instruction pursued in it is not higher and better than can be got in public schools of a lower grade, or if it does not meet the wants of the wealthiest and best educated families, or, if the course of instruction is liberal and thorough, and at the same time the worthy and talented child of a poor family is shut out from its privileges by a high rate of tuition. The school, to be common practically, must be both cheap and good. To be cheap, its support must be provided for wholly or mainly out of a fund, or by public tax. And to justify the imposition of a public tax, the advantages of such a school must accrue to the whole community. It must be shown to be a common benefit, a common interest, which cannot be secured so well, or at all, except through the medium of taxation. What, then, are the advantages which may reasonably be anticipated from the establishment of a Public High School, properly organized, instructed, and supervised?

First. Every thing which is now done in the several district schools, and schools of lower grade, can be better done, and in a shorter time, because the teachers will be relieved from the necessity of devoting the time and attention now required by few of the older and more advanced pupils, and can bestow all their time and attention upon the preparatory studies and younger children. These studies will be taught in methods suited to the age and attainments of the pupils. A right beginning can thus be made in the lower schools, in giving a thorough practical knowledge of elementary principles, and in the formation of correct mental and moral habits, which are indispensable to all sound education. All this will be done under the additional stimulus of being early and thoroughly fitted for the High School.

Second. A High School will give completeness to the system of public instruction which may be in operation. It will make suitable provision for the older and more advanced pupils of both sexes, and will admit of the methods of instruction and discipline which cannot be profitably introduced into the schools below. The lower grade of schools—those which are established for young children,—require a large use of oral and simultaneous methods, and a frequent change of place and position on the part of the pupils. The higher branches, especially all mathematical subjects, require patient application and habits of abstraction on the part of the older pupils, which can with difficulty, if at all, be attained by many pupils amid a multiplicity of distracting exercises, movements, and sounds. The recitations of this class of pupils, to be profitable and satisfactory, must be conducted in a manner which requires time, discussion, and explanation, and the undivided attention both of pupils and teacher. The course of instruction provided in the High School will be equal in extent and value to that which may be given in any private school, academy, or female seminary in the place, and which is now virtually denied to the great mass of the children by the burdensome charge of tuition.

As has been already implied, the advantages of a High School should not be confined to the male sex. The great influence of the female sex, as daughters, sisters, wives, mothers, companions, and teachers, in determining the manners, morals, and intelligence of the whole community, leaves no room to question the necessity of providing for the girls the best means of intellectual and moral culture. The course of instruction should embrace the first principles of natural and mechanical philosophy, by which inventive genius and practical skill in the useful arts can be fostered; such studies as navigation, book-keeping, surveying, botany, chemistry, and kindred studies, which are directly connected with success in the varied departments of domestic and inland trade, with foreign commerce, with gardening, agriculture, the manufacturing and domestic arts;

such studies as astronomy, physiology, the history of our own state and nation, the principles of our state and national constitutions, political economy, and moral science; in fine, such a course of study as is now given in more than fifty towns and cities in New England, and which shall prepare every young man, whose parents may desire it, for business, or for college, and give to every young woman a well disciplined mind, high moral aims, refined tastes, gentle and graceful manners, practical views of her own duties, and those resources of health, thought, conversation, and occupation, which bless alike the highest and lowest station in life. When such a course is provided and carried out, the true idea of the High School will be realized.

Third. It will equalize the opportunities of a good education, and exert a happy, social influence throughout the whole community from which it gathers its scholars. From the want of a public school of this character, the children of such families as rely exclusively on the district school are isolated, and are condemned to an inferior education, both in quality and quantity; they are cut off from the stimulus and sympathy which the mingling of children of the same age from different parts of the same community would impart. The benefits, direct and indirect, which will result to the country districts, or poor families who live in the outskirts of the city, from the establishment of a school of this class, cannot easily be overestimated. The number of young men and young women who will receive a thorough education, qualifying them for business, and to be teachers, will increase from year to year; and the number who will press up to the front ranks of scholarship in the school, bearing away the palm of excellence by the vigor of sound minds in sound bodies, of minds and bodies made vigorous by long walks and muscular labor in the open air, will be greater in proportion to their number than from the city districts. It will do both classes good, the children of the city, and the children of the country districts, to measure themselves intellectually in the same fields of study, and to subject the peculiarities of their respective manners, the roughness and awkwardness sometimes characteristic of the one, and the artificiality and flippancy of the other, to the harmonizing influence of reciprocal action and reaction. The isolation and estrangement which now divide and subdivide the community into country and city clans, which, if not hostile, are strangers to each other, will give place to the frequent intercourse and esteem of individual and family friendship, commenced in the school-room, and on the play-ground of the school. The school will thus become a bond of union, a channel of sympathy, a spring-head of healthy influence, and stimulus to the whole commnnity.

Fourth. The privileges of a good school will be brought within the reach of all classes of the community, and will actually be enjoyed by children of the same age from families of the most diverse circumstances as to wealth, education, and occupation. Side by side in the same recitations, heart and hand in the same sports, pressing up together to the same high attainments in knowledge and character, will be found the children of the rich and poor, the more and the less favored in outward circumstances, without knowing or caring to know how far their families are separated by the arbitrary distinctions which divide and distract society. With nearly equal opportunities of education in childhood and youth, the prizes of life, its best fields of usefulness, and sources of happiness will be open to all, whatever may have been their accidents of birth and fortune. From many obscure and humble homes in the city and in the country, will be called forth and trained inventive talent, productive skill, intellectual taste, and God-like benevolence, which will add to the general wealth, multiply workshops, increase the value of farms, and carry forward every moral and religious enterprise which aims to bless, purify, and elevate society.

Fifth. The influence which the annual or semi-annual examination of candidates for admission into the High School, will operate as a powerful and abiding stimulus to exertion throughout all the lower schools. The privileges of the High School will be held forth as the reward of exertion in the lower grade of schools; and promotion to it, based on the result of an impartial examination, will form an unobjectional standard by which the relative standing of the different schools can be ascertained, and will also indicate the studies and departments of education to which the teachers in particular schools should devote special attention. This influence upon the lower schools, upon scholars and teachers, upon those who reach, and those who do not reach the High School, will be worth more than all it costs, independent of the advantages received by its pupils.

Sixth. While the expenses of public or common schools will necessarily be increased by the establishment of a school of this class, in addition to those already supported, the aggregate expenditures for education, including public and private schools, will be diminished. Private schools of the same relative standing will be discontinued for want of patronage, while those of a higher grade, if really called for by the educational wants of the community, will be improved. A healthy competition will necessarily exist between the public and private schools of the highest grade, and the school or schools which do not come up to the highest mark, must go down in public estimation. Other things being equal, viz., school-houses, teachers, classification, and the means and appliances of instruction, the public school is always better than the private. From the uniform experience of those places where a High School has been established, it may be safely stated, that there will be an annual saving in the expenses of education to any community, equal to one half the amount paid for tuition in private schools, and, with this saving of expense, there will be a better state of education.

Seventh. The successful establishment of a High School, by improving the whole system of common schools, and interesting a larger number of families in the prosperity of the schools, will create a better public sentiment on the subject than has heretofore existed, and the schools will be regarded as the common property, the common glory, the common security of the whole community. The wealthy will feel that the small additional tax required to establish and sustain this school, if not saved to them in the diminished tuition for the education of their own children in private schools, at home and abroad, is returned to them a hundred fold in the enterprise which it will quicken, in the increased value given to property, and in the number of families which will resort to the place where it is located, as a desirable residence, because of the facilities enjoyed for a good education. The poor will feel that, whatever may betide them, their children are born to an inheritance more valuable than lands or shops, in the free access to institutions where as good an education can be had as money can buy at home or abroad. The stranger will be invited to visit not only the institutions which public or individual benevolence has provided for the poor, the orphan, the deaf mute, and the criminal, but schools where the children and youth of the community are trained to inventive and creative habits of mind, to a practical knowledge of the fundamental principles of business, to sound moral habits, refined tastes, and respectful manners. And in what balance, it has well been asked in reference to the cost of good public schools, as compared with these advantages, shall we weigh the value of cultivated, intelligent, energetic, polished, and virtuous citizens? How much would a community be justified in paying for a physician who should discover or practice some mode of treatment through which many lives should be preserved? How much for a judge, who, in the able administration of the laws, should secure many fortunes, or rights more precious than fortunes, that might else be lost? How much for a minister of religion who should be the instrument of saving hundreds from vice and crime, and persuading them to the exertion of their best powers for the common good? How much for the ingenious inventor, who, proceeding from the first principles of science onward, should produce some improvement that should enlarge all the comforts of society, not to say a steam-engine or a magnetic telegraph? How much for the patriotic statesman, who, in difficult times, becomes the savior of his country? How much for the well-instructed and enterprising merchant who should suggest and commence the branches of business that should bring in a vast accession of wealth and strength? One such person as any of these might repay what a High School would cost for centuries. Whether, in the course of centuries, every High School would produce one such person, it would be useless to prophesy. But it is certain that it would produce many intelligent citizens, intelligent men of business, intelligent servants of the state, intelligent teachers, intelligent wives and daughters, who, in their several spheres, would repay to any community much more than they and all their associates had received. The very taxes of a town, in twenty years, will be lessened by the existence of a school which will continually have sent forth those who were so educated as to become not burdens but benefactors.

These results have been realized wherever a Public High School has been opened under circumstances favorable to the success of a private school of the same grade,—wherever a good school-house, good regulations, (for admission, attendance, studies, and books,) good teachers, and good supervision have been provided.

The Principal of the Latin High School of Boston, in a letter written 1846, says,—

"There is no institution so truly republican as such a school as this. While we, the present teachers, were undergraduates of the school, the rich sent their sons to the school because it was the best that could be found. They ascertained that it was not a source of contamination, but that their boys learned here to compare themselves with others, and to feel the necessity of something more that mere *wealth* to gain consideration. At that time, poor men sent their sons hither because they knew that they here would get that education which they could afford to give them in no other way. They gained too by intercourse with their wealthier mates a polish of exterior manners, and an intellectual turn of mind which their friends could appreciate and perceive, although they could not tell what it was that had been acquired. Oftentimes also the poor boy would take the lead of his more pampered classmate, and take the honors of the school.

In a class lately belonging to the school were two boys, one the son of a man of extreme wealth, whose property cannot be less than $500,000; and the other the son of an Irish laborer employed by the city at a dollar a day to sweep the streets. The latter boy was the better scholar."

The Principal of the English High School in a letter writes,—

"The school under my charge is pricipally composed of what are called the middling classes of our city. At present, about one third of my pupils are sons of merchants; the remaining two thirds are sons of professional men, mechanics and others. Some of our best scholars are sons of coopers, lamplighters, and day laborers. A few years ago, he who ranked, the last year of his course, as our third scholar, was the son of a lamplighter, and worked three nights per week, during his whole course, to save his father the expense of books, &c., while at school. This year my second (if not the first,) scholar, is a cooper's son. We have several sons of clergymen of distinction and lawyers of eminence. Indeed, the school is a perfect example of the poor and the rich, meeting on common ground and on terms quite democratic.

The Principal of the High School for girls in Newburyport, writes,

"The Female High School was established by the town of Newburyport nearly three years since, under great opposition. It was the desire of its principal advocates to make it such a school, in respect to the course of instruction, and facilities for acquiring knowledge, and laying the foundation for usefulness, as should so successfully compete with our best private schools, as to supersede their necessity."

"A few days after we were organized, a gentleman came into the school-room to make some inquiries respecting the classes of society most fully represented amongst us. I was totally unable to give him the desired information, and judging from the appearance of the individuals of my charge, I could form no idea as to who were the children of poor parents, or of those in better circumstances. I mentioned the names of the parents of several, which I had just taken, and, amongst others, of two young ladies of seventeen or eighteen years of age, who, at that moment, it being recess, were walking down the room, with their arms closely entwined about each other's necks. 'The first of the two,' said the gentleman, 'is a daughter of one of our first merchants, the other has a father worse than none, who obtains a livelihood from one of the lowest and most questionable occupations, and is himself most degraded.' These two young ladies were classmates for more than two years, and very nearly equal in scholarship. The friendship they have formed, I am confident no circumstances of station in life can ever impair.

"We have had in our number many from the best families, in all respects, in the place. They sit side by side, they recite, and they associate most freely with those of the humblest parentage, whose widowed mothers, perhaps, toil day after day, at a wash-tub, without fear of contamination, or, as I honestly believe, a thought of the differences which exist. I have, at present, both extremes under my charge—the child of affluence and the child of low parentage and deep poverty. As my arrangements of pupils in divisions, &c. are, most of them, alphabetical, it often happens that the two extremes are brought together. This never causes a murmur, or look of dislike.

The history of the High School in Providence is the history of almost every similar institution.

"The High School was the only feature of our system which encountered much opposition. When first proposed, its bearings on the schools below, and in various ways on the cause of education in the city, was not clearly seen. It was opposed because it was "aristocratic," "because it was unconstitutional to tax property for a city college," "because it would educate children above working for their support," "because a poor boy or girl would never be seen in it"—and for all such contradictory reasons. Before it became a part of the system, the question of its adoption, or rejection, was submitted directly to the people, who passed in its favor by a vote of two thirds of all the legal voters of the city. Even after this expression of popular vote in its favor, and after the building for its accommodation was erected, there was a considerable minority who circulated a petition to the City Council against its going into operation. But the school was opened, and now it would be as easy to strike out the whole or any other feature of the system as this. Its influence in giving stimulus and steadiness to the workings of the lower grade of schools,—in giving thoroughness and expansion to the whole course of instruction,—in assisting to train teachers for our city and country schools,—and in bringing together the older and more advanced pupils, of either sex, from families of every profession, occupation and location in the city, many of whom, but for the opportunities of this school, would enter on the business and duties of life with an imperfect education—has demonstrated its own usefulness as a part of the system, and has converted its opponents into friends."

Testimony of the same character might be adduced from Philadelphia, Lowell, New Orleans, and every place where a school of this grade has been established.

While thus advocating the claims of Public High Schools, we would not be thought to overlook or underrate the importance of Primary Schools. The more of them, properly constituted and managed, we have in any community, the better it will be, not only for the High Schools, but for the community in all its diversified interests and relations, and especially in our crowded manufacturing villages and cities. In certain districts and neighborhoods of our large cities, the Primary School should partake largely of the original idea and methods of the best Infant Schools. It should be established in the "infected districts," and the teacher, with all the aids and appliances which Christian charity and public spirit can furnish, should stand between the living and the dead to stay the plague. Its doors should stand wide open to receive such children as are abandoned by orphanage, or, worse than orphanage, by parental neglect and example, to idle, vicious, and pilfering habits, before the corruptions incident to their situation have struck deep into their moral nature, and before they have fallen under the alluring and training influences and instruction of bad boys who infest such regions, polluting the atmosphere by their profane and vulgar speech, and participating in every street brawl and low-bred riot. From all such influences, the earlier the children of the poor and the ignorant are withdrawn, and placed under the care and instruction of an Infant or Primary School, the better it will be for them and for society. But in every locality the Primary School should be established, and brought as near as possible to the homes of the children, in order to secure their early and regular attendance, and to relieve the anxiety of parents for their safety on their way to and from school. The peculiarities of play-ground, school-room, and teachers required for this class of schools, should be carefully studied, and promptly and liberally provided. The school-room should be light, cheerful, and large enough for the evolutions of large classes,—furnished with appropriate seats, furniture, apparatus, and means of visible illustration, and having a retired, dry, and airy play-ground, with a shelter to resort to in inclement weather, and with flower borders, shrubbery, and shade-trees, which they should be taught to love and respect. The play-ground is as essential as the school-room for a Primary School, and is indeed the uncovered school-room of physical and moral education, and the place where the manners and personal habits of children can be better trained than elsewhere. With them, the hours of play and study, of confinement and recreation, must alternate more frequently than with older pupils.

To teach these schools properly, to regulate the hours of play and study so as to give variety, vivacity, and interest to all of the exercises, without over-exciting the nervous system, or overtasking any faculty of mind or body,—to train boys and girls to mild dispositions, graceful and respectful manners, and unquestioning obedience,—to preserve and quicken a tenderness and sensibility of conscience as the instinctive monitor of the approach of wrong,—to cultivate the senses to habits of quick and accurate observation and discrimination,—to prevent the formation of artificial and sing-song tones,—to teach the use of the voice, and of simple, ready, and correct language, and to begin in this way, and by appropriate exercises in drawing, calculation, and lessons on the properties and classification of objects, the cultivation of the intellectual faculties,—to do all these things and more, require in the teacher a rare union of qualities, seldom found in one in a hundred of the male sex, and to be looked for with the greatest chance of success among females, "in whose own hearts, love, hope, and patience have first kept school," and whose laps seem always full of the blossoms of knowledge, to be showered on the heads and hearts of infancy and childhood. In the right education of early childhood, must we look for a corrective of the evils of society in our large cities and manufacturing villages, and for the beginning of a better and higher civilization than has yet blessed our world. The earlier we can establish, in every populous district, primary schools, under female teachers, whose hearts are made strong by deep religious principle,—who have faith in the power of Christian love steadily exerted to fashion anew the bad manners, and soften the harsh and self-willed perverseness of neglected children,—with patience to begin every morning, with but little, if any, perceptible advance beyond where they began the previous morning,—with prompt and kind sympathies, and ready skill in music, drawing, and oral methods, the better it will be for the cause of education, and for every other good cause. The establishment of Primary Schools in Boston, in 1818, and the modification which they have received there and elsewhere, from the principles and exercises of the infant school system, is one of the most important improvements of modern education.

Plans and Descriptions of the Public School-Houses in Providence, R. I.

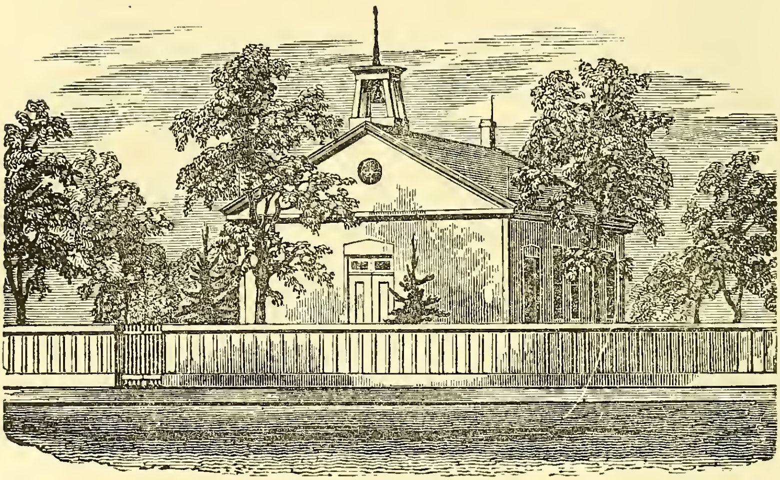
By an ordinance of the City Council of Providence, in the spring of 1838, the public schools were reorganized, and provision was made for a liberal course of instruction, in schools of different grades, for all the children of the city. A committee was appointed to examine into the condition of the school-houses then occupied by the public schools, and report what alterations, improvements, and additional accommodations were required. This committee, after a full investigation, reported in favor of building new school-houses, on large and eligible sites, in different parts of the city. After a further report from a sub-committee, who had visited Boston, Salem, Lowell, and New Bedford, for the purpose of examining the latest improvements in the construction of school-houses, and the style and arrangements of seats and desks, plans for the different grades of schools were determined on, and the committee were authorized to purchase such new sites as should be required, and "to erect such new school-houses as may be necessary to carry into full operation" the new ordinance. This committee acted with great discretion, and, at the same time, with wise regard to the accommodations of the public schools; and the result was, that, at the close of their work in 1842, no city in the United States could show so many public school-houses, uniformly well built, with most of the latest improvements, as Providence.

Since 1842, great improvements have been introduced into this class of buildings, in many of the large cities and villages of Massachusetts, as well as in the large districts of Rhode Island; and it is feared, that, in respect to ventilation, size of recitation rooms, and suitable accommodation for hats and outer garments, the public school-houses of Providence can no longer claim that superiority in school architecture which has been heretofore very generally, and most justly, accorded to them.

From the Report of the Building Committee to the City Council, giving the details of their proceedings and expenditures, it appears that they expended in the purchase of lots and the erection of buildings, \$100,060.92. Since this committee completed their duties, ten new houses have been erected, making the aggregate amount invested by the city in school-houses, lots, and furniture about \$150,000. The following plans and descriptions of these houses are taken, with permission, from the Report of Nathan Bishop, Esq., Superintendent of Public Schools in Providence dated August, 1846.

Primary School-Houses.

These buildings are located in different parts of the city, and are designed for the accommodation of children from four to six or seven years of age, or until they are prepared to enter the intermediate schools.

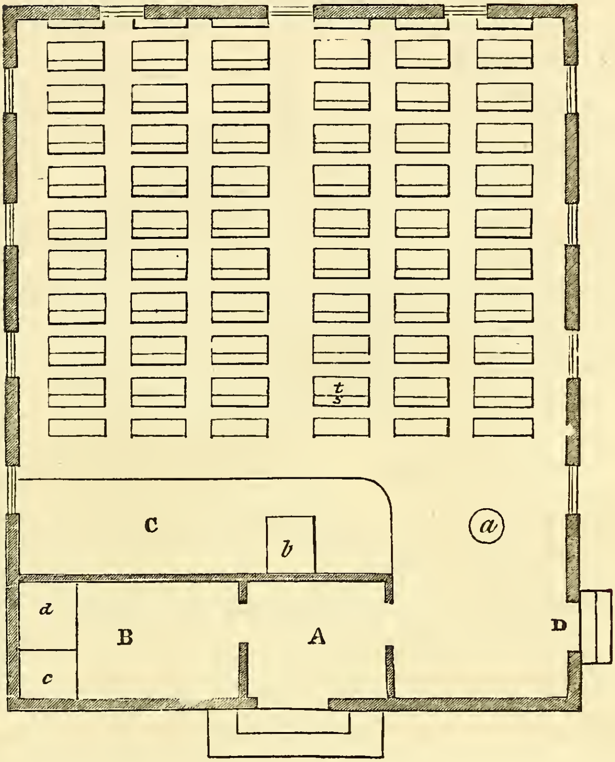


No. 1.—View of a Primary School-House.

These school-houses stand back from thirty to sixty feet from the line of the street, and near the center of lots varying from eighty to one hundred feet in breadth, and from one hundred to one hundred and twenty feet in length. Each lot is inclosed by a neat and substantial fence, six feet high, and is divided into two yards—one for boys and the other for girls—with suitable out-buildings, shade trees, and shrubbery.

These houses are each forty feet long by thirty-three feet wide, with twelve-feet posts, built of wood, in a plain, substantial manner, and, with the fences, are painted white, presenting a neat and attractive exterior.

The entrance is into a lobby [A] and thence into an open area, where stands the stove [*a*]. A portion of the lobby is appropriated to bins for charcoal [*c*] and anthracite [*d*], which is the fuel used in all the schools; the remainder [B] is occupied by a sink, and as depositories for brooms, brushes, &c. Each room is arched, thereby securing an average height of thirteen feet, with an opening in the center of the arch, two feet in diameter, for ventilation. The ventilator is controlled by a cord passing over a pulley, and descending into the room near the teacher's desk [*b*]. In each end of the attic is a circular window, which, turning on an axis, can be opened and closed by cords, in the same manner as the ventilator.



No. 2.—Interior of a Primary School-House.

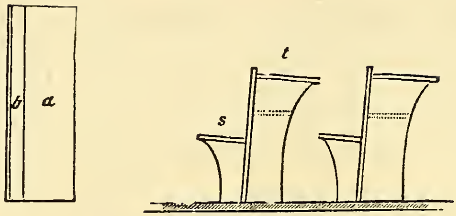
The teacher's platform [C] is five feet wide, twenty feet long, and seven inches high, with a black-board ten feet long and three feet wide on the wall in the rear.

The floor is of inch and a half plank, tongued and grooved; and, for the purpose of securing warmth and firmness, and avoiding noise, is laid on cement.

The windows, eleven in number, of twenty-four lights, of seven by nine glass, are hung with weights, and furnished with inside blinds. The sides of the room and entries are ceiled all round with wood as high as the window-sills, which are four feet from the floor. The rest of the walls are plastered, and covered with white hard finish. Each room is provided with sixty seats [*s*] and desks [*t*], placed in six ranges; each range containing ten seats and desks, of three different sizes, and each seat and desk accommodating two scholars, or one hundred and twenty in all.

The center aisle is three feet and a half wide, and each of the others about two feet.

The desks are over three feet long, by sixteen inches wide, with a shelf beneath for books. The upper surface of the desk [*a*], except about two inches at the top [*b*], slopes one inch and a half in a foot.



No 3.—View of Top of a Desk, and Sectional View of Primary Seats and Desks.

The front of the desk, constituting the back of the next seat, slopes one inch in a foot. The seat also inclines a very little from the edge. The seats are of four different sizes, varying from seven to ten inches wide, and from nine to fourteen inches in height, the lowest being nearest the teacher's platform.

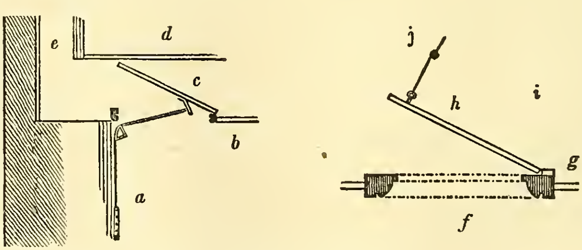
Intermediate School-Houses.

All the buildings of this class are two stories high, affording accommodations for two schools, a primary and an intermediate. These houses are generally in pleasant situations, on large lots, varying in size from one hundred feet wide by one hundred and twenty feet long, to one hundred and fifty by two hundred feet.

Rows of shade trees, consisting of elms, lindens, and maples, are planted along the side-walks and the fences inclosing the yards; and evergreens, the mountain ash, and other ornamental trees, are placed within the inclosures.

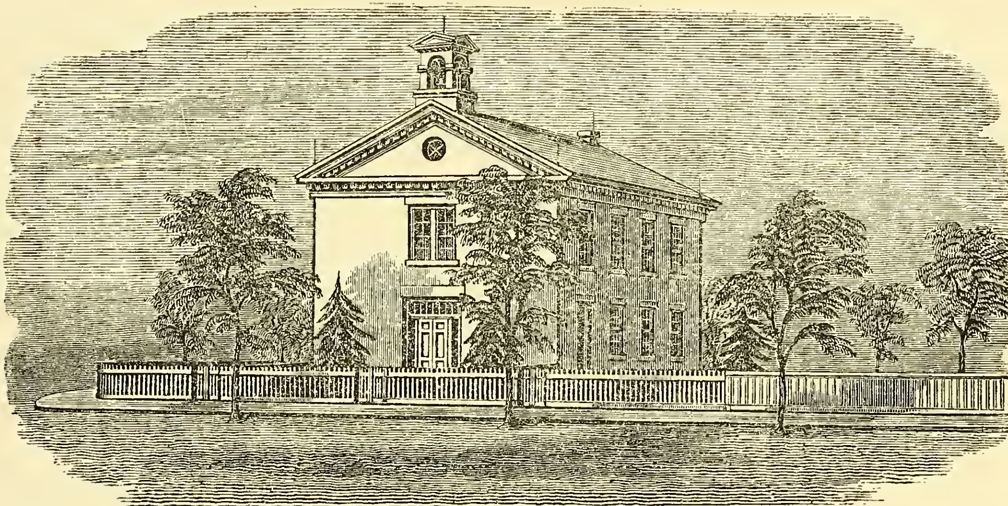
These houses are forty-four feet long, by thirty-three feet wide. Some of them are built of wood, the remainder of brick, and all in a tasteful and substantial style.

The rooms are large, and easily ventilated, being twelve feet in the clear, with large openings in the ceiling of the upper room, and on the sides in the lower room, leading into flues in the walls, which conduct the foul air into the attic, from which it escapes at circular windows in the gables of the buildings. These flues and windows can be opened and closed by cords passing over pulleys, and descending into the rooms below, where the teachers can control them with ease.



No. 5.—Sections of Ventilators.

In this cut, the cord [*i*], passing over the pulley [*j*], raising [*h*], hung on hinges at [*g*], opens wholly or partially the ventilator [*f*], a circular aperture three feet in diameter. The plan of ventilating the lower rooms is shown on

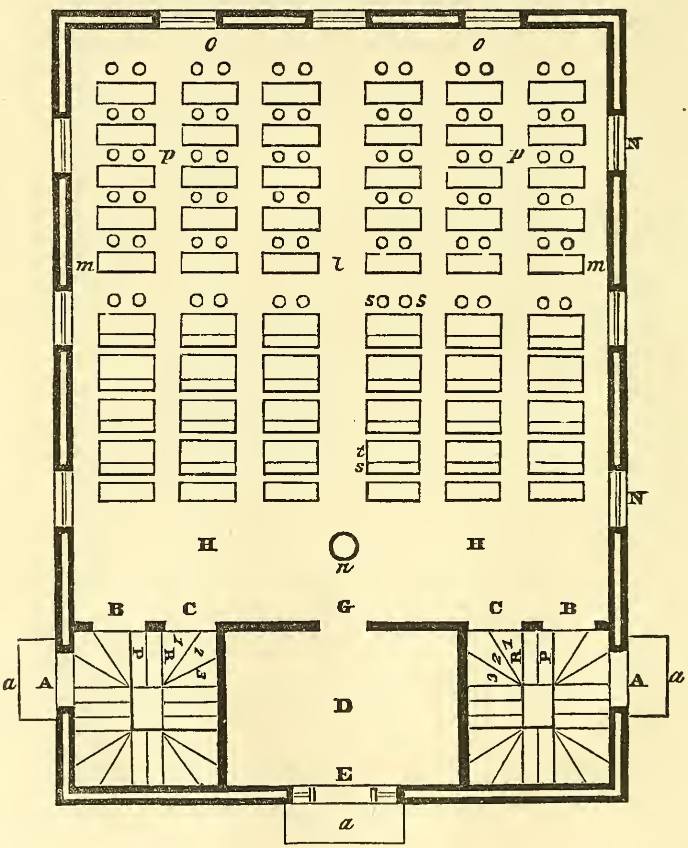


No. 4.—View of an Intermediate School-House

the other part of the diagram, in which [*a*] represents a cord running over a pulley, and attached to [*c*], a board three feet long by one foot wide, opening the space between [*b*], the top of the lower room, and [*d*], the floor of the upper, leading into the flue [*e*], ascending to the attic.

The windows, nine in number in each school-room, of twelve lights, of ten by sixteen glass, are hung with weights, so as to be easily opened at top and bottom, and furnished with Venetian blinds inside, to regulate the amount of light admitted.

The floors are of hard pine boards, an inch and a half thick, and about six inches wide, tongued and grooved, and laid on mortar, as a protection against fire, for the prevention of noise, and to secure warmth and firmness. All the rooms, entries, and stairways are ceiled up with matched boards about four feet, as high as the window-sills. The remaining portions of the walls are plastered, and coated with white hard finish.



No. 6.—Interior of an Intermediate School-House.

The walls of some of these buildings are solid stone-work, faced with brick; others are built with double brick walls, as above shown, connected by ties of iron or brick.

As the rooms in the lower stories of this class of buildings are appropriated to primary schools, and are furnished in the same manner as those already described, the preceding cut is intended to serve the double purpose of exhibiting on the *first* floor only the improvements on the former plan, and, on the *second*, the whole view of a room for an intermediate school.

The steps [*a*, *a*, *a*] are broad, granite blocks, with scrapers on each end. The side doors [A, A], one for boys, the other for girls, lead into entries, eight feet by ten, from which the pupils of the primary schools pass through the doors [B, B] into the main rooms, which differ from those above described, in having a space [*o*, *o*], two feet wide, on the back part of the rooms, for reading and other class exercises; and the recitation-room, [D], another valuable improvement, as it avoids the confusion arising from having two recitations in one room at the same time.

The flight of stairs in each entry, commencing at the points [R, R], and ascending in the direction of [1, 2, 3], lands on the open space [P] in the upper entry, from which the pupils pass through the doors [C, C] into the school-room.

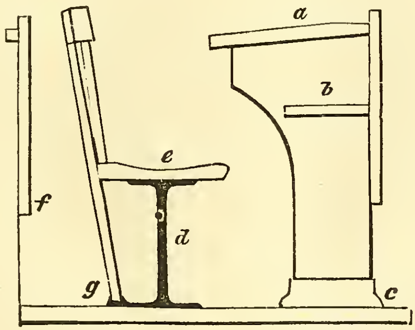
Coal-bins and convenient closets, for brooms, brushes, &c., are built under the stairs, in the lower entries; and similar closets, for the same purposes, are provided in the upper entries.

The large area [H, H], thirty feet long by seven wide, is the same in both the rooms, and is occupied by the principal teacher in each school, for such class exercises as may be more conveniently managed there than in the other place [*o*, *o*], left for the same purpose. The position of the stove [*n*] is such as not to render it uncomfortably warm on the front seats, and, at the same time, not to interfere with the passage of classes through the door [G] into the recitation-room [D], which is fourteen feet by ten, and, like all the school-rooms, furnished with black-boards. The lower room is lighted by a window over the front door, and by the side-lights; and the upper one by a double or mullion window, of sixteen lights, of ten by sixteen glass.

The side aisles [*m*, *m*] are two feet and a half wide; the others [P, P, &c.] are only eighteen inches wide, except the middle one [C], which is three and a half feet. The passage across the center of the room is about a foot and a half wide, and is very convenient for teachers in passing to the different parts of the room, and also for scholars in going to and from their recitations.

The seats and desks, in the front part of this room, are made and arranged on the same plan as those in the primary school-rooms above described, differing from them only in being one size larger. The lower end, or foot of each perpendicular support, or end-piece, is strongly fastened into a groove in a "shoe," or piece of plank, which, being screwed to the floor, secures the desks in a durable manner, and in a firm position.

The others are constructed upon a different plan, designed especially for the accommodation of pupils while writing. These desks and seats are of three different sizes.



No. 7.—Section of a Writing-Desk and Seat.

The top of the desk [*a*] is of pine, one inch and a half thick, fifteen inches wide, and three feet and a half long. These desks are twenty-seven inches high on the front, and twenty-four on the side next to the seats. A space about three inches wide, on the front edge of the top, is planed down to a level, and an inkstand is let into the center of this, even with the surface, and covered with a small lid. The ends of these desks are an inch and a half thick, and fastened by a strong tenon to the shoe [*c*], which is screwed to the floor. The front of the desk, and the shelf [*b*], for books, &c., are inch boards; the whole desk, made in the strongest manner, is painted a pleasant green, and varnished. In the next smaller size, the same proportion is observed, but all the dimensions are one inch *less;* and in the third, or smallest size, the dimensions are all one inch less than in the second. For each desk there are two chairs, resting on cast-iron supporters [*d*], an inch and a quarter in diameter, with a wide *flange* at each end; the upper one, screwed to the under side of the seat [*e*], is a little smaller than the lower, which is fastened to the floor by five strong screws, rendering the chair almost immovable. The largest size seats [*e*] in these rooms are fourteen inches in diameter and fifteen inches high, with backs, twenty-eight inches from [*g*] to the top, slanting an inch and a quarter to a foot. These backs are made with three slats, fastened by strong tenons into a top-piece, like some styles of common chairs, and screwed to the seat, while the middle one extends down into a socket on the foot of the iron standard. The seats, like the desks, are diminished one inch for the middle size, and two for the smallest, preserving the proportions in the different sizes, which adapts them to the sizes of the desks.

Grammar School-Houses.

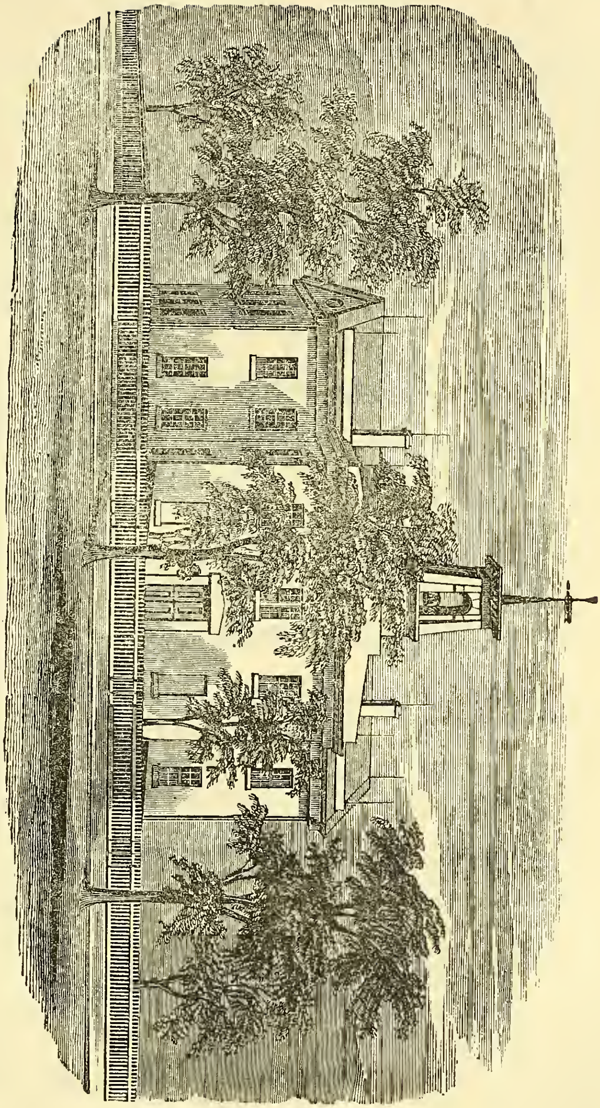
There are six buildings of this class, constructed on the same plan, and of the same size. They are seventy feet long by forty wide, with a front projection, twenty-eight feet long by fourteen feet wide. They are located on very large lots, varying from one hundred and fifty to two hundred feet long—from a hundred and twenty to a hundred and fifty feet wide. All of them, except one, are on corner lots, and all have large open spaces around them. These, and all the other public school-houses in the city, are protected with Quimby's lightning-rods, and each is furnished with a bell, which can be heard in the remotest parts of its district.

In the accompanying view, No. 9, the engraver has represented a *few* trees, a little *larger* than any at present around these buildings, because he could not crowd all the trees and shrubbery into the picture, without obscuring the lower part of the house.

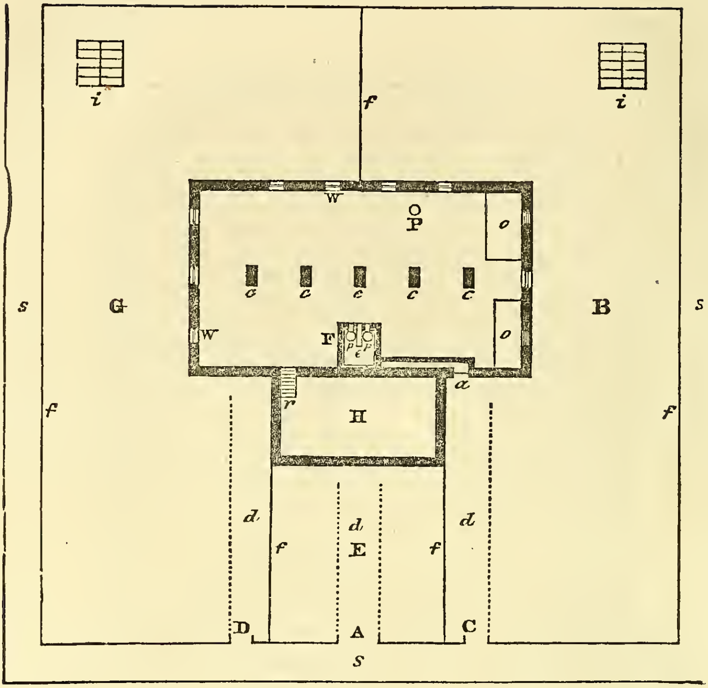
The cut on p. 91, No. 10, is a ground plan, on a reduced scale, of a Grammar School-House, including a general view of the cellar, yards, fences, gates, sidewalks, &c.

The yards around each of the grammar school-houses contain from 18,000 to 20,000 square feet, or between a third and half an acre. These grounds are inclosed, and divided into three separate yards, by substantial close board fences [*f, f, f, f*], six feet high, neatly made, and painted white. The boys' play-ground [B], and that of the girls [G], are large; but the front yard [E] is small, and, not being occupied by pupils, is planted with trees and shrubbery. The graveled sidewalks [*s, s, s*], running on two sides of all the grammar school lots, and on three of some of them, are shaded by rows of elms, maples, and lindens, set near the curb-stones. The gates [A, C, D] and the graveled walks [*d, d, d*] lead to the front and the two side doors of the school-house; and [*f*] is a large gate for carting in coal, &c. The out-buildings [*i, i*] are arranged with a large number of separate apartments on both sides, all well ventilated, each furnished with a door, and the whole surrounded with evergreens.

In the plan of the projection [H] the stairway [*r*] leads to the cellar, which is seven feet in the clear, and extends under the whole of the main building. These cellars are well lighted, having eight windows [W, W], with ten lights of seven by nine glass. The windows, being hung with hinges on the upper



No. 9.—View of a Grammar School-House.



No.10 .—Ground Plan, &c., of a Grammar School-House.

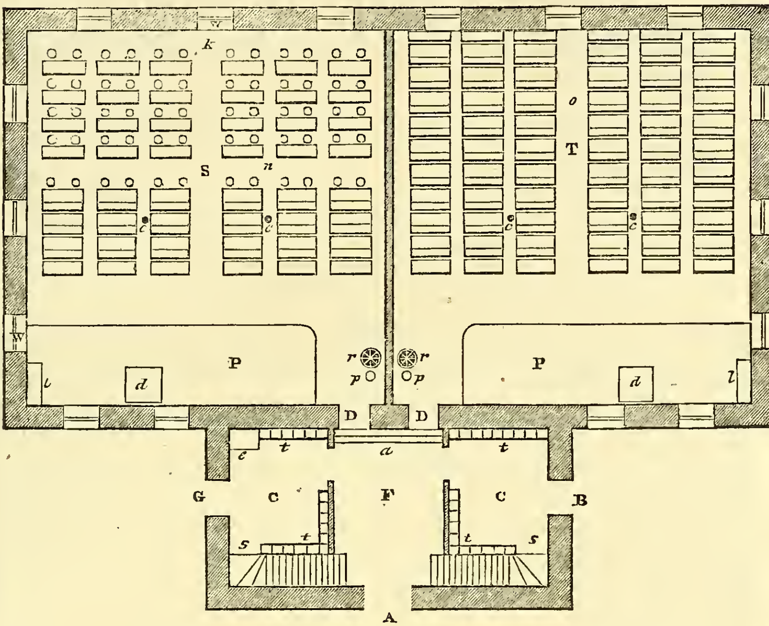
side, and fastened with hooks and staples at the lower edge, may be opened by raising them into a horizontal position, where they are fastened with hooks as when closed. With this arrangement, it is easy to keep the cellars well ventilated at all seasons. The openings for the admission of coal into the bins [*o*, *o*], one for anthracite, and the other for charcoal, are furnished with sheet-iron shutters, fastening on the inside. Every school-house has, in the cellar, an abundant supply of good water, obtained from a fountain, or from a well, which is generally outside of the building, the water being brought in by a pump [P]. A supply of good water for a school-house should not be considered merely as a convenience, but as absolutely necessary.

The horizontal section of a furnace [F] shows merely the ground plan. The cold air passes through [*a*] to the air-chamber, where it is warmed by the fires in [*p*, *p*], two cast-iron cylinders, fourteen inches in diameter. The evaporator [*e*] holds about fifteen gallons of water, which is kept in a state of rapid evaporation, thus supplying the air-chamber with an abundance of moisture.

In the plan and construction of the various parts of these furnaces, special pains have been taken to remove all danger of fire—an important consideration, which should never be overlooked. The furnace is covered with stone, thickly coated with mortar, and the under side of the floor above is lathed and plastered, not only above the furnace, but at least ten feet from it in every direction.

A full description of the construction and operation of the furnaces used in the public school-houses will be given under another diagram. The cellar walls and the stone piers [*c*, *c*, *c*, *c*, *c*] are well pointed, and the whole inside, including the wood-work overhead, is neatly whitewashed, giving this apartment a neat and pleasant appearance.

The walls of all these buildings are of stone, about two feet thick, faced with common brick, and painted a tasteful color.



No. 11.—Plan of the First Floor of a Grammar School-House.

There are three entrances to these houses; the front [A], and the two side doors [B], for boys, and [G], for girls, leading into the entries [F, C, C]. The front is a large double door, with a beautiful frontice of fine hammered Quincy granite. At all the outside doors are two or three hewn granite steps, furnished with four or six scrapers at each door.

Pupils belonging to the schools in the lower story pass from the side entries into the middle one, and, ascending two steps at [a], enter their respective rooms [T, S], which are rather larger than those in the primary and intermediate school-houses, previously described, being thirty-six feet by thirty-two inside, and eleven feet high in the clear.

In each of the entries [C, C] there is a provision [t, t, t, t] for setting up umbrellas. It resembles a ladder placed in a horizontal position, and is fastened to the ceiling on one side, and supported on the other by substantial posts of oak or other strong wood, turned in a tasteful style, and set into the floor.

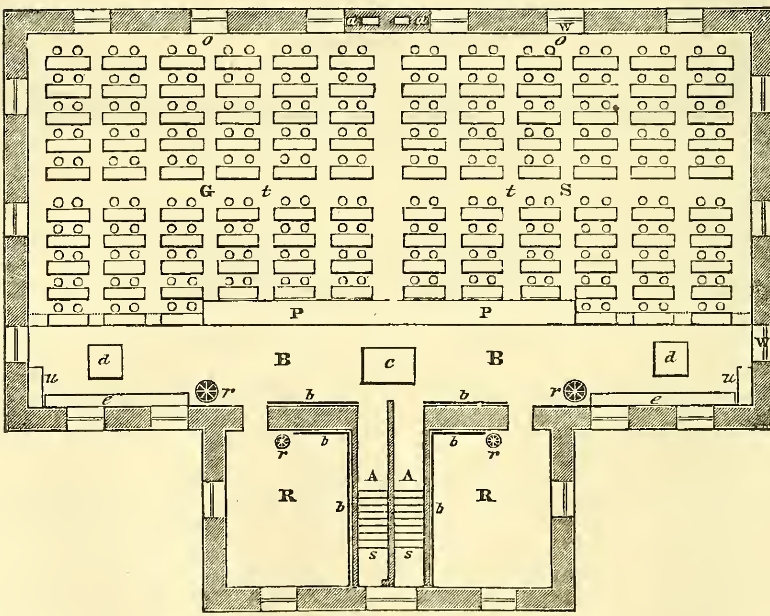
The seats and desks in the rooms [T and S] are of the same dimensions, and arranged in the same manner as those in the primary and the intermediate school-rooms before described. The small iron posts [c, c, c, c], about two and a half inches in diameter, supporting the floor above, are placed against the ends of the seats, so close as not to obstruct the passages at all. Besides the platforms [P, P], twenty feet by six—the tables, three feet by four, for the teachers, and the closets [l, l], for brushes, &c., there are black-boards, painted upon the walls, extending from the doors [D, D] to the windows, fourteen feet long by four wide, with the lines of a stave painted on one end, to aid in giving instruction in vocal music.

The plan of ventilating these rooms on the first floor is represented by cut No. 5, page 85. Every room is provided with two ventilators, each three feet long by about twelve inches wide, opening into flues of the same dimensions, leading into the attic, from which the impure air escapes at circular windows in the gables. These flues should have extended down to the bottom of the rooms, with openings on a level with the floors, so that, when the rooms are warmed with air from the furnaces above the temperature of the human breath, they might be ventilated by removing the foul air from the lower parts, and thus causing fresh, warm air to be slowly settling down upon the scholars —a very pleasant and healthful mode of ventilation.

These rooms are well warmed by heated air, admitted through registers [*r*, *r*], eighteen inches in diameter, from the furnace below, from which [*p*, *p*] tin pipes, fourteen inches in diameter, convey the air to the grammar school-rooms in the second story.

These rooms are large, with arched ceilings, measuring twelve feet to the foot of the arch, and seventeen to its crown. They are each provided with two ventilators, three feet and a half in diameter, placed in the crown of the arch, about twenty feet apart.

The entrances to the Grammar School-rooms are by two short flights of stairs on a side; from the lower entries to [*s*, *s*], spaces about three feet square,



No. 12.—Plan of a Grammar School-Room.

and thence to [A, A], spaces three by five feet, extending from the top of the stairs to the doors opening into the school-room.

The master's table [*c*], as well as tables [*d*, *d*], for the assistants, are movable. The large area [B, B], being fourteen inches above the floor of the room, is eight feet wide by sixty-four long, with large closets [*u*, *u*] at the ends, fitted up with shelves, &c., for the use of the teachers.

The school-room is warmed by heated air, admitted at the registers, [*r*, *r*] and the recitation-rooms [R, R] in the same manner, by the small registers, [*r*, *r*] all of which are connected with the furnace in the cellar by large tin pipes or conductors.

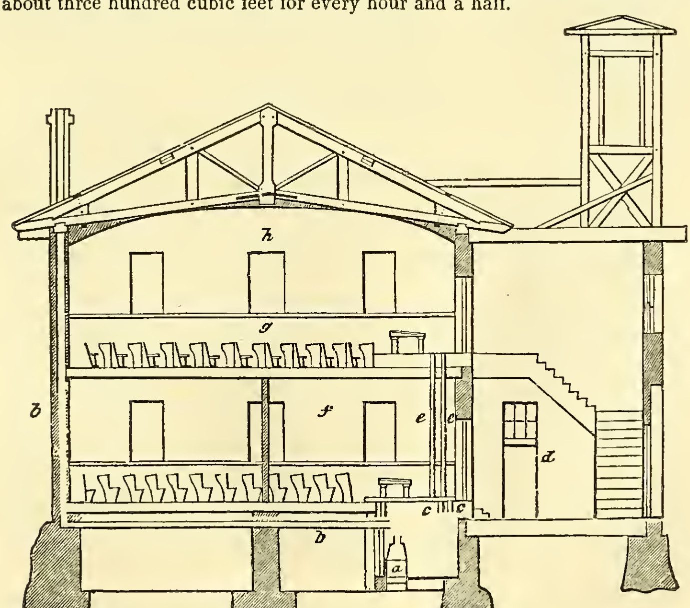
The black-boards, four feet wide, painted upon the hard-finished walls, are indicated by the lines [*b*, *b*, *b*, &c.] in the recitation-rooms, and along the walls behind the master's table, extending on each side to the windows beyond, [*e*, *e*] making, in each Grammar School, about three hundred square feet of black-board.

The long benches [*e*, *e*] are used for seating *temporarily* new pupils on their entering school, until the master can assign them regular seats; also for seating visitors at the quarterly examinations. The space [P, P], a broad step, eighteen feet long and two feet wide, is used for some class exercises on the black-boards. The passage [*t*, *t*], about eighteen inches wide, running the whole length of the room, affords great facility in the movements of pupils to and from the recitations and other class exercises. The master's classes generally recite in the space [*o*, *o*] on the back side of the room, four feet wide and sixty-four feet long, where seats are placed for scholars to sit during recitation, when it is necessary; and the same accommodations are provided in the recitation-rooms.

The windows [W, W, &c.], which are hung with weights, and furnished with inside blinds, in the manner before described, contain twelve lights each, of ten by sixteen glass, of the strongest kind, the Saranac or Redford glass.

The quantity of air furnished for each scholar in the public school-rooms is a matter of no small importance. The rooms for the primary and the intermediate schools—the former designed to accommodate one hundred and twenty, and the latter only ninety-six pupils—contain between fifteen and sixteen thousand cubic feet of atmospheric air. The rooms for the grammar schools, intended to accommodate two hundred pupils, contain over thirty-five thousand cubic feet, after a suitable deduction for the furniture is made.

This estimate allows every child, when the rooms are not crowded, about one hundred and fifty cubic feet of air for every hour and a half, on the supposition that no change takes place, except at the times of recess, and at the close of each session. But the rate at which warm air is constantly coming into the rooms from the furnaces, increases the allowance for every child to about three hundred cubic feet for every hour and a half.



No. 13.—Transverse Section of a Grammar School-House.

The preceding cut is given in order to show an *end view*, the projection, belfry, rooms, seats, desks, and cellar. An imperfect section of the warming apparatus is presented, giving an outline of the plan of its construction. The smoke-pipe, connected with [*a*], the heater, coiled twice around in the air-chamber, passes off in the direction of [*b*, *b*] to the chimney. The short tin pipes [*c*, *c*] conduct the warm air into the lower rooms; and the long ones [*e*, *e*] convey it to the rooms in the second story. On each side of the projection over the door [*d*] is a window, lighting the outside entry, and also the middle entry by another window over the inside door. The end views of seats and desks do not represent the different sizes very accurately, but sufficiently so to give a correct idea of the general plan.

The High School-House.

This building occupies an elevated and beautiful situation, at the head of President street, near the central part of the city. It is a specimen of plain, but tasteful architecture, on which the eye reposes with pleasure. The lot, somewhat irregular in its form, is equivalent to one a hundred feet by a hundred and fifteen, and lies on a gentle hill-side, rendering it easy to construct a basement almost entirely above ground, except on the back side. The extensive grounds in front, and on either side, all planted with trees, and separated from the High School only by the width of the streets, add much to the beauty and pleasantness of its situation. The yards around it are inclosed by a handsome baluster fence, resting in front on heavy blocks of rough granite. The steps are of hewn granite, twelve feet long, making a very convenient entrance.

The High School being designed for both boys and girls, an entirely separate entrance is provided for each department. The front door, at which the girls enter, has a very beautiful frontispiece, with double columns (thus providing for large side-lights), and a heavy ornamented cap, all cut from Quincy granite in the best style.

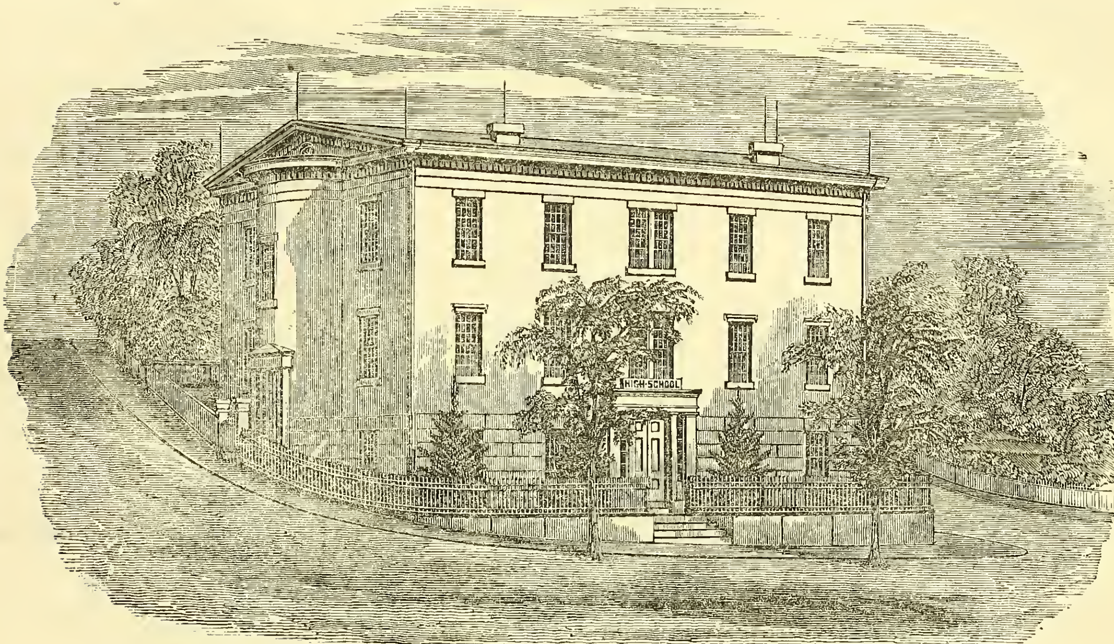
The door in the circular projection, fronting on another street, has also a fine frontispiece, cut from Quincy granite.

The size of this building is fifty feet by seventy-six, with a projection of seven feet. The walls of the basement are of stone, three feet thick, and faced with rough-hewn granite, laid in courses twenty inches wide. Each stone has a "chiseled draft, fine cut," an inch wide around the face, and all the joints as close and true as if the whole were fine hammered. The remaining portions of the walls, diminishing in thickness as they rise, are faced with the best quality of Danvers pressed brick, giving the building a beautiful appearance. The roof is covered with tin, every joint soldered, and the whole surface kept well painted.

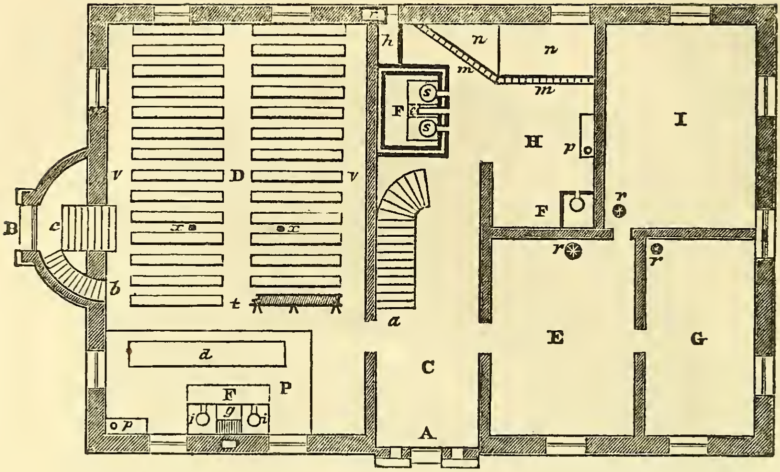
The rooms in the basement story, which is twelve feet high in the clear, are separated from each other by solid brick walls. The pupils in the girls' department, entering the house at [A], pass into the large lobby [C], twelve feet by twenty-eight, from which they can go to all parts of the building appropriated to their use.

The furnace-room [H] has a brick floor, and is kept in as good order as the other parts of the house. The coal-bins [*n*, *n*] and the furnace [F] are so constructed, that, with an ordinary degree of care, the room may be kept as clean as any of the school-rooms. The arrangements [*m*, *m*] for setting up umbrellas have been described. The pump [*p*], accessible to all in the girls' department, connected with a nice sink, lined with lead, affords an abundant supply of excellent water. The rooms [E, G, I], each not far from sixteen by twenty-four feet, are appropriated as the Superintendent's Office, and for such meetings of the School Committee, and of its sub-committees, as may be appointed there.

The large lecture-room, on the opposite side of the lobby, is furnished with settees, which will accommodate about two hundred and fifty pupils. On the



No. 14.—View of the High School-House.



No. 15.—Plan of the Basement of High School.

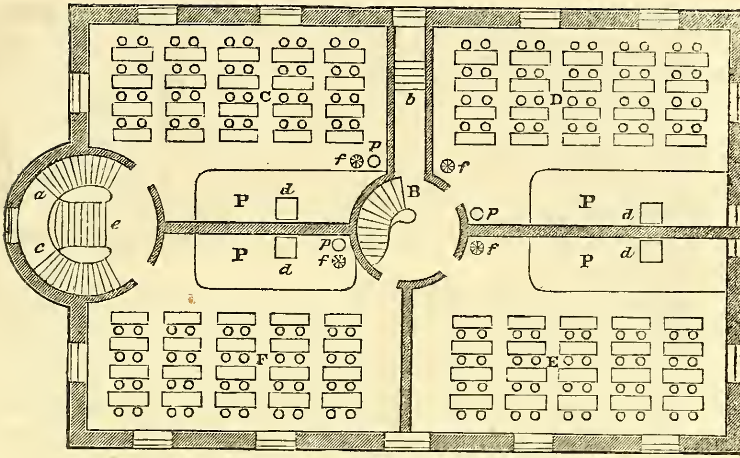
platform [P], raised seven inches from the floor, a long table or counter [*d*], made convenient for experimental lectures in Chemistry, Natural Philosophy, &c., having pneumatic cisterns for holding gasses. At [F, &c.] are suitable provisions for the fires used in the preparations of chemical experiments. The pump [*p*], with a sink like the other, is used exclusively by the pupils in the boys' department.

In all lectures, and other exercises in this room, the girls, entering at [*a*], occupy the seats on the right of [D], the middle aisle. The boys, entering by descending the short flight of stairs [*b*], are seated on the opposite side of the room. This may seem like descending to useless particulars, but it is done to show that there are no grounds for the objections sometimes made against having a school for boys and for girls in the same building, where the departments are kept entirely separate, except in exercises in vocal music and occasional lectures. The boys enter the house at the end door [B], which is six feet above the basement floor, and, by a short flight of stairs, they reach the first story at [*e*].

The three rooms [C, D, F] are appropriated to the department for girls. They are easy of access to the pupils, who, ascending the broad flight of stairs, terminating at [B], can pass readily into their respective rooms.

The course of instruction in the school occupying three years, the room [D] is appropriated to the studies for the first, [E] to those of the second, and [F] to the course for the third year. In each room there are three sizes of seats and desks, and their arrangement in all is uniform. The largest are on the back side of the room. The largest desks are four feet eight inches long, and twenty-two inches wide on the top; the middle size is two inches smaller, and the other is reduced in the same proportions. The largest seats are as high as common chairs, about seventeen inches, and the remaining sizes are reduced to correspond with the desks. The passages around the sides of the rooms vary from two to four feet wide, and those between the rows of desks, from eighteen to twenty-four inches.

On the raised platforms [P, P, P, P] are the teachers' tables [*d*, *d*, *d*, *d*], covered with dark woolen cloth, and furnished with four drawers each. The registers [*f*, *f*, *f*, *f*] admit the warm air from the furnace, and the pipes [*p*, *p*, *p*] conduct it into the rooms in the upper story. The passage [*b*] leads into the back yard, which is ornamented with a variety of shrubbery.

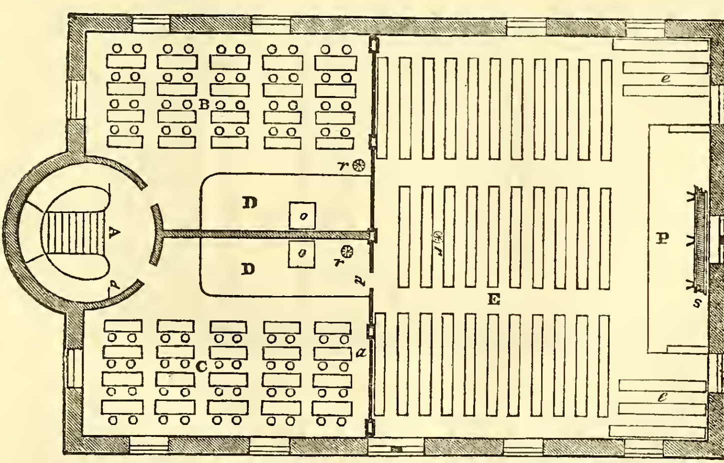


No. 16.—Plan of the First Story of the High School.

The door leading from the room [F] is used only for teachers and visitors, except when the two departments assemble in the hall.

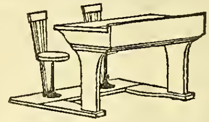
In the room [C] the boys pursue the studies prescribed for the first year; the other rooms in this department are in the next story.

Pupils ascending from the area [e], by two circular stairways, land on the broad space [a, c], from which, by a short flight of stairs, they reach [A], in the following cut, the floor of the upper story, which is sixteen feet in the clear.



No. 17.—Plan of the Second Story of the High School-House

The room [B] is appropriated to the middle class, and [C] to the senior class. The arrangement of the seats and desks are the same as in the other rooms, except they are *movable*—being screwed to a frame not fastened to the floor, as shown in this cut.

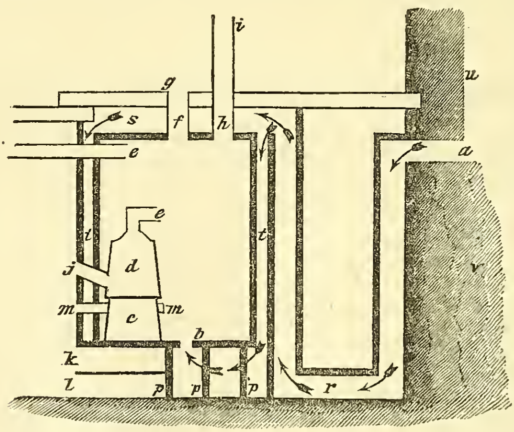


The cross partition [*a*]—see cut No. 17—is composed of four very large doors, about fourteen feet square, hung with weights in such a manner that they may be raised into the attic, thus throwing the whole upper story into one large hall—an arrangement by which one room can be changed into *three*, and three into *one*, as the occasion may require. On all public occasions, such as Quarterly Examinations, and Annual Exhibitions, the rooms are thus thrown together, and the seats and desks turned so as to face the platform [P], in [E], the principal hall.

Observation and experiment, relative to the modes of warming the public school-rooms, have proved that very *large* stoves, eighteen inches in diameter, render the temperature of the rooms *more uniform and pleasant*, and that they are also *more economical*, both in regard to the amount of fuel consumed, and the amount of repairs required. It is a general principle, that a warming apparatus, containing a *large* quantity of fuel, undergoing a *slow* combustion, is better than one containing a *small* quantity of fuel, in a state of *rapid* combustion. The stoves in the small buildings, and the furnaces in the large ones, are constructed on this principle.

In regard to the construction of furnaces for warming public buildings or private dwellings, so much depends upon circumstances, that no specific plan can be given which would be successful in all cases. One familiar with the principles which regulate the motions of currents of air at different temperatures, can, with an ordinary degree of good judgment and mechanical skill, make a furnace in any place, where one can be made at all, that will accomplish all which the laws of nature will permit.

The following cut is intended to illustrate *two* plans for a furnace.



No. 18.—A Vertical Section of a Furnace.

In the first, the cold air is admitted at [*a*], through the outside walls of the building, and descends in the direction described by the arrows, to [*r*], and thence rises to the top of the furnace, as shown by the arrows. At this place, the cold air diffuses itself over the whole upper surface, about eight feet by ten, and passes down between the double walls of the furnace, in the spaces [*t*, *t*], which extend all around the furnace, and rises from beneath, through a large opening [*h*], into the air-chamber, where it is heated and conducted to the rooms by large pipes, [*f*, *h*]. The object of this mode of taking in air is two-fold. In the first place, the constant currents of cold air, passing over the top of the furnace, keep that surface comparatively cool, and also keep the floors above the furnace cool, thus removing all danger of setting fire to the wood-work over the furnace.

In the second place, as the inside walls are constantly becoming heated, and the currents of cold air, passing down on all sides of the walls, become rarified by their radiation, and thus, as it were, take the heat from the outside of the inner walls, and bring it round into the air-chamber again, at [*b*]. This is not mere theory, but has been found to work well in practice. On this plan, the outside walls are kept so cool, that very little heat is wasted by radiation.

In the second plan, the cold air is admitted as before; but, instead of ascending from [*r*] to the top of the furnace, it passes through a large opening, directly from [*r*], to [*p*, *p*, *p*], representing small piers, supporting the inside walls, and thence into the air-chamber at [*b*], and also *up* the spaces [*t*, *t*], to the top [*s*], from which the air warmed by coming up between the walls is taken into the rooms by separate registers, or is let into the sides of the pipes [*f*, *h*].

By this plan, the air passes more rapidly through the air-chamber, and enters the rooms in *larger* quantities, but at a *lower* temperature. This is the better mode, if the furnace be properly constructed with large inlets and outlets for air, so that no parts become highly heated; otherwise, the wood-work over the furnace will be in some danger of taking fire. The general defects in the construction of furnaces are:—*too small* openings for the admission of cold air—*too small* pipes for conveying the warm air in all horizontal and inclined directions—and defective dampers in the perpendicular pipes. A frequent cause of failure in warming public buildings and private dwellings may be found in the ignorance and negligence of attendants.

A single remark will close this report, which has been extended, perhaps too far by specific details—a want of which is often complained of by mechanics who are engaged in building school-houses.

It is believed to be *best*, and, all things considered, *cheapest*, in the end, to build *very good* school-houses—to make their external appearance pleasant and attractive, and their internal arrangements comfortable and convenient—to keep them in *first-rate* order, well repaired, and *always clean*.

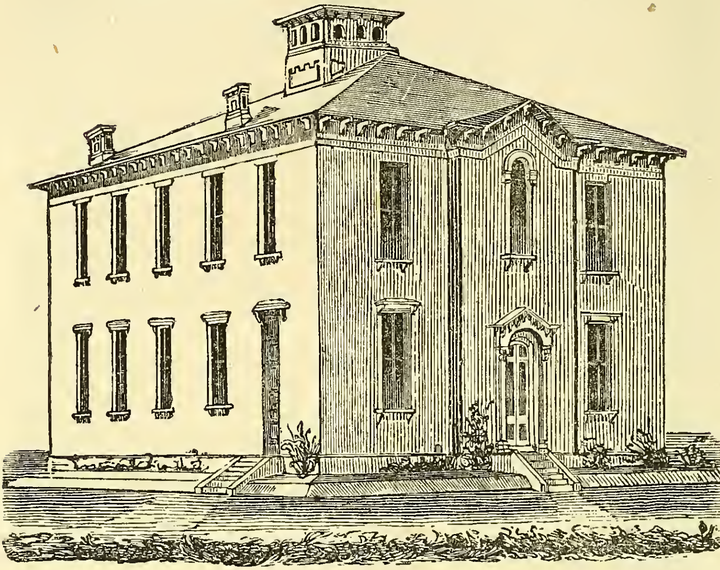
The amount of damage done to school property in this city has uniformly been *least* in those houses in which the teachers have done *most* to keep every thing in very good order. The very appearance of school property well taken care of rebukes the spirit of mischief, and thus elevates the taste and character of the pupils.

Respectfully submitted.

N. BISHOP,
Superintendent of Public Schools.

PROVIDENCE, August, 1846.

PUBLIC HIGH SCHOOL-HOUSE IN WARREN, R. I.



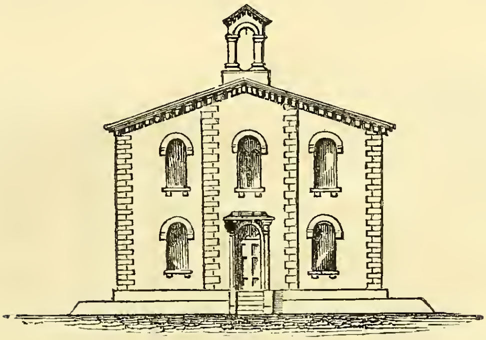
In the above cut, a very inadequate view is presented of the external appearance of the Public High School-house in Warren, which was erected after designs by Thomas A. Teft, Providence. For location, style, con struction, means of warming, ventilation, cleanliness, and furniture—for all the essential features of a good and cheap school-house, this house can be pointed to as a model. The interior arrangements are nearly similar to those of the Hartford High School-house, with a few improvements in the details. The tops of the desks are covered with cloth, and the aisles are to be cheaply carpeted, thus destroying two of the main sources of noise in a school-room. The two recitation rooms attached to each school-room can be changed into one, by a sliding door. The yards for either sex are spacious, appropriately fitted up. and properly guarded from all exposure. The description, however, of the new house at Hartford, will generally apply to this in Warren. The size is 62 feet by 44.

We present on the opposite page, the front and side elevation, of the original design drawn by Mr. Teft for this school. It is in a different style, but is very chaste and ornamental, and in excellent proportion for a school-house. We have aimed to introduce variety, both in the external appearance, and in the interior arrangements of the school-houses, recently erected in Rhode Island, and thus directly and indirectly, by familiarizing the children at school, and the community at large, with specimens of correct proportion and utility of arrangement, to elevate the standard of taste in architecture.

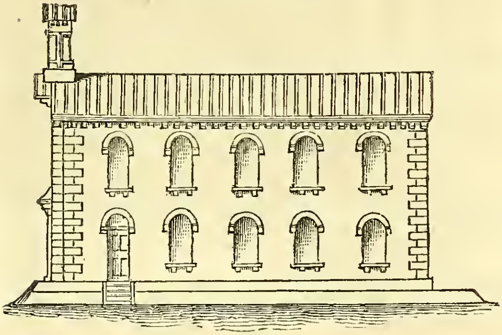
Regarded in this light, the beautiful structure designed by Mr. Teft, and erected by Mr. Kingsbury of Providence, for the accommodation of his school, is one of the most valuable lessons the public eye can read.

The State is already under great obligation to Mr. Teft for the valuable contributions which he has already made to architectural improvement.

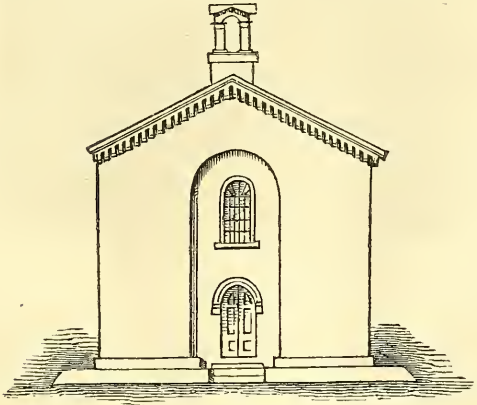
FRONT ELEVATION.



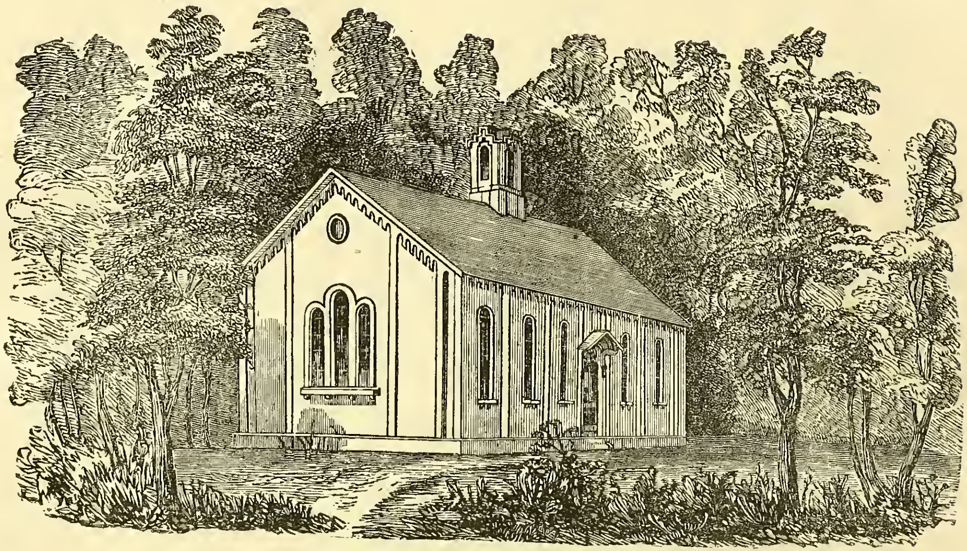
SIDE ELEVATION.



Both the plan and style of the Secondary or Grammar school-house in Woonsocket and also of the new house in Chepachet, differ from the above.

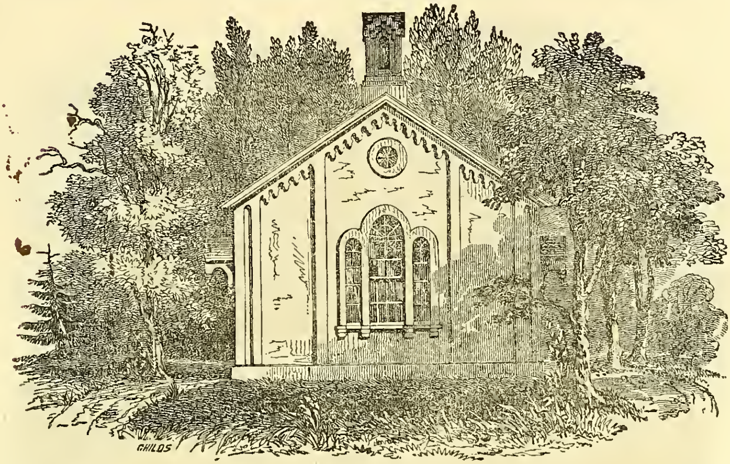


The above cut represents the front elevation of an Intermediate School-house in Providence.

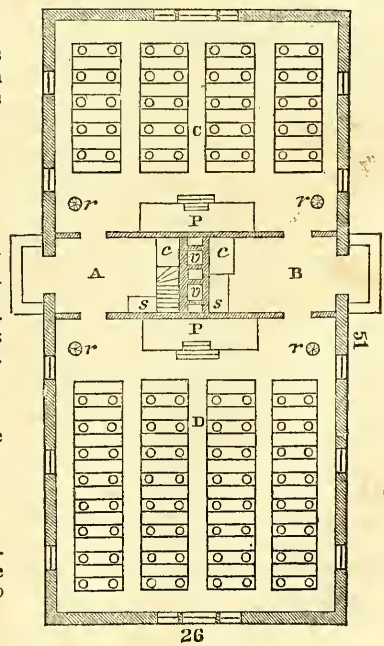


View of District School-house in Centremill.

Plan and Description of District School-House in Centremill, North Providence, R. I.



This house was erected after designs by Mr. Teft, of Providence. It stands back from the highway, on an elevated site, in the midst of a grove, and for beauty of design and convenience of arrangement, is not surpassed by any similar structure in New England. It is 26 feet by 51, and 13 feet high in the clear, with two departments on the same floor.



A, Boys' entry, 6 feet by 10.
B, Girls' ditto.
C, Primary department, 25 feet by 25, with desks and seats attached for 70 pupils; *see p.* 205.
D, Secondary, or Grammar department, 25 feet by 25, with desks and chairs for 64 pupils; *see p.* 120.
r, Register for hot air.
v, *v*, Flues for ventilation.
c, Closets for dinner pails of those who come from a distance
s, Sink.

The smoke pipe is carried up between the ventilating flues, and the top of the chimney is finished so as to accommodate the bell.

Primary School in Westerly, R. I.

The above cut presents a sufficiently correct view of a Primary School-house erected in Westerly in 1846, after designs by Mr. Teft, of Providence, except that there are two porches or entrances in front, instead of one, as shown in the above view. The porch opens into a spacious entry furnished with hooks and shelves for hats, bonnets, &c., and a sink, with water-pail, wash-bowls, &c. The school-room accommodates sixty pupils, with a desk and seat, each desk accommodating two scholars. In the original plan there were to be thirty chairs, similar to the Boston Primary School Chair, but the committee preferred that every child should have a desk, in which a slate should be inserted.

There is a blackboard, or black surface in front of the scholars, extending between the two entrance doors, and across the entire end in the rear. Below the blackboard, at the rear end of the school-room, there is a leaf in which slates are inserted, where the young children can copy, or otherwise amuse themselves, from lessons drawn by the teacher on the blackboard above.

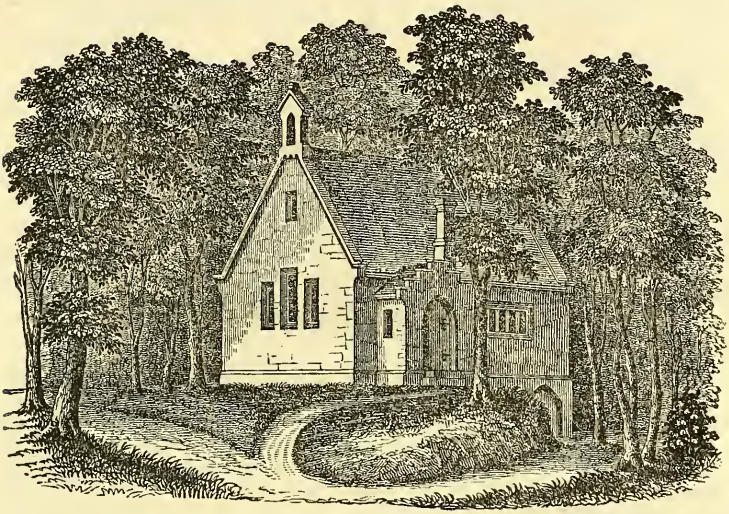
The play-ground attached is spacious, and the children can there amuse and recreate themselves in the open air, without exposure to accidents from passing vehicles, &c.

A second primary school-house on the same plan has been erected in another part of the village.

With very slight modifications, these houses can be pointed to as safe models for Primary school-houses.

These schools receive the small children, while the older attend in an intermediate department and in the High School situated in the centre of the village. These schools, as at present organized and managed, meet the educational wants of the village.

Plan of Village School-house in Allendale, N. Providence, R. I.

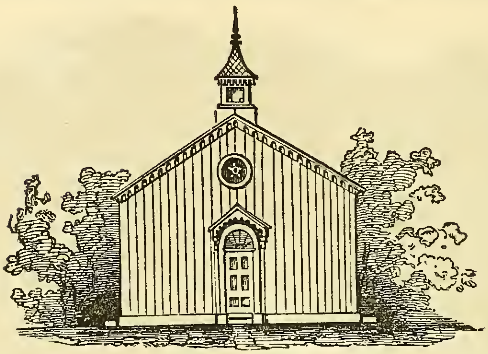


The above is a view of the Village school-house erected by Z. Allen, Esq., at Allendale, North Providence, after designs by T. A. Teft, of Providence. It is situated in a beautiful grove, on a little knoll which admits of a basement room in the rear, originally designed for a library and reading room for the village, but now occupied by a Primary school. It is built of stone in a style very common in structures of this kind in England. The main room, which is intended for a school-room, although for the present used for lectures, and religious exercises, is very appropriately finished—the walls being made to represent stone work of a very subdued neutral tint, and the ceiling, supported by wooden tracery, is finished partially in the roof, leaving the necessary open space above to protect the room from the effects of excessive heat and cold. The ceiling, wainscoting, seats, desks and doors, are grained in imitation of oak. It is thoroughly ventilated and warmed by air heated in a chamber below.

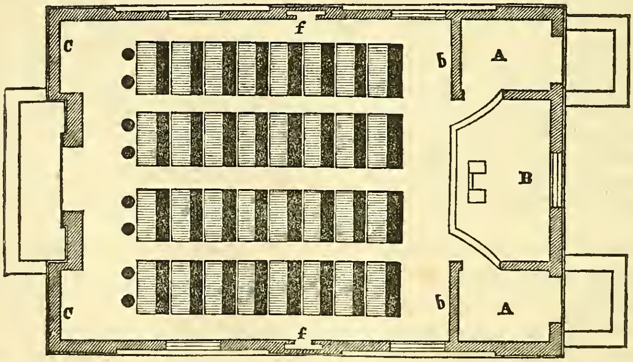
By the above pleasing specimen of the Elizabethan style, and other varieties not commonly introduced into structures of this kind, Mr. Teft has broken, in Rhode Island at least, the dull monotony of wretched perversions of architecture which characterize the village and country school-houses of New England. We shall present in another place a few specimens of the Elizabethan style, in front and side elevations, for large and small schools, which can be easily modified to suit the wants of particular localities.

In many neighborhoods it is a matter of economy to build of stone, and where this is the case, the style of architecture should be adapted to the material.

District School-House in Glocester, R. I.



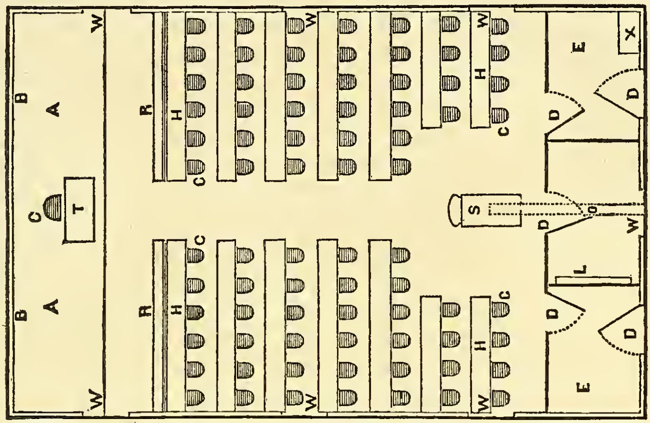
The above cut represents the front elevation of a new school-house which is soon (1848,) to be built in a small agricultural district in Glocester, Rhode Island. The design, as drawn by Mr. Teft, contemplates a building which will finish 25 feet in breadth, by 36 in length, and twelve feet high in the clear. The main entrances for the scholars are in the rear, as shown in the following ground plan—the boys on one side, and the girls on the other, each sex having a separate yard in the rear, and both a common play-ground in front. The room is to be heated and ventilated, *c*, by two of Millar's ventilating stoves for burning wood. The ventilating flue, *f*, which is along the side of the smoke flue, is to be surmounted by Emerson's Ejector.



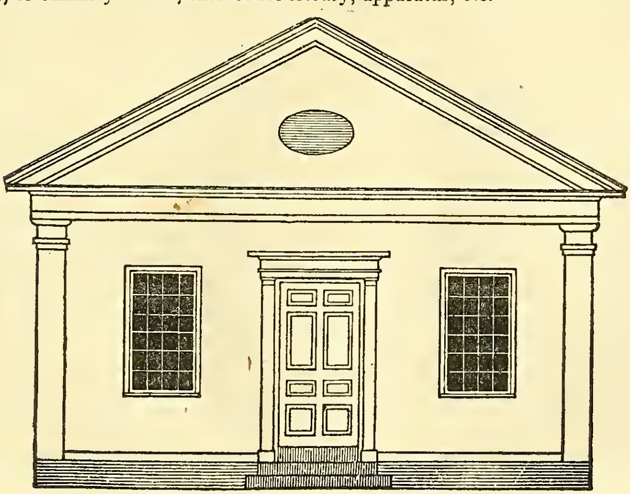
The school-room will accommodate sixty pupils, with seats and desks similar to those described and delineated on page 205. The side and centre aisles are each two feet wide, and the remaining two aisles are each eighteen inches.

Plan of District School-house in Monroe, Michigan.

The following plan was prepared by the Hon. Ira Mayhew, Superintendent of Public Instruction in Michigan, for a public school in Monroe, and is recommended by him for general adoption in the country districts of that State.



D D, entrance and inner doors. W W, windows, one in front and three on each side. E E, entries, lighted over doors, one for boys and the other for girls. X, a wood-box in boys' entry. A A, teacher's platform, six feet broad, raised seven inches. B B, blackboard, reaching entirely across the end of the house, made by giving the plastering a colored hard finish. T, teacher's desk, two feet by four. H H, desks 11 feet long, except the two next the entrance doors. C C, Mott's patent cast-iron chairs. S, stove, door opening towards the centre of the room. O O, an air tube under the floor, through which pure air from without may be introduced beneath the stove. Directly over the teacher's desk there should be a ventilator, through which the impure air may escape into the attic, or chimney. L L, shelves for library, apparatus, etc.



Plans of School-Houses with Apartments for the Teacher.

In the "Series of Plans for School-houses," published by the Committee of Council on Education, for the benefit of such schools as apply for the benefit of the Parliamentary Grant for promoting Public Education in Great Britain, provision is uniformly made for apartments, or a dwelling-house, for the master. This would be a wise and economical arrangement in connection with our district and village school houses. The property of the district would be better cared for, and more of permanence and character would soon attach to the employment of teaching, if suitable apartments in the same building were provided for the teacher. We do not propose at this time to present any plan, framed in reference both to the accommodation of the school and of the teacher, but have made the foregoing statement as explanatory of some peculiarities in the following plans, copied mostly from the work above referred to. Our object in giving the following plans is to introduce committees and others to a different style of architecture than has thus far been adopted in structures of this kind. It will not be difficult for any one familiar with drafting plans to adapt this style to the particular wants of any district or village.

No. 1. This plan contemplates a school-room 22 by 15 feet for 30 children, with apartments for the master consisting of one sitting-room, (13 by 10) one bedroom, (10 by 10,) and a kitchen (12 by 6,) with two closets (6 by 6 each) attached. These arrangements are limited to the strictest simplicity. The small window in the wing or projection lights the master's bed-room. In all the plans an independent entrance into the master's apartment is provided, and the yards are also distinct.

No. 2. In this plan the school-room is 29 feet by 18, with two lobbies, and a closet in the rear, each 6 feet by 4, and will accommodate 56 pupils. The arrangements for the master are the same as the above.

No. 3. In this plan the school room is 36 feet by 18, and will accommodate 80 children—with separate lobby, or entry for girls and boys, each 4 feet by 12, and a closet of the same size. The master's apartments are the same in number as in No. 1, but each room is 12 feet by 12. The master's desk is between the windows in the front elevation.

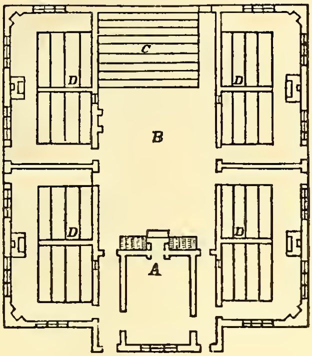
No. 4. In this plan there are two school-rooms, each 28 feet by 16, and capable of accommodating 55 pupils, with a lobby 12 feet by 5 on each side, into which the door represented on the side elevation opens. Between the lobbies are the master's bedroom and sitting room, each 13 feet by 12, and back of them a second bedroom, and the kitchen, each 12 feet by 9. The teacher's platform and desk in each room is against the windows, which are painted in imitation of ground glass.

No. 5. The plan of which this is the front elevation, contemplates a school-room 48 feet by 19, for 112 children, to be taught by one master and two pupil teachers. The classes are separated by a screen extending from the rear of the room to the teacher's platform.

No. 6. This plan is designed to accommodate 394 pupils—150 belonging to an Infant or Primary department. The arrangement for the schools consists of a large hall in the centre, 40 feet by 24, which is occupied by the Infant school, and two rooms, each 32 by 18 feet—one of which occupies the wing on the left, and the other being back, of the hall. The hall is employed every morning and evening for prayers, and other exercises, in which the whole school can engage.

The master's house contains a sitting-room, two bedrooms, kitchen, &c., and occupies the right wing of the building.

No 7. This plan is intended to accommodate the Infant or Primary school, of 150 pupils, in a large hall in the main building, (the front of which on the first floor is occupied by the master's sitting room, with a flight of stairs leading to his other departments in the second story. in the basement) and 300 or 400 pupils in four class-rooms, as shown in the accompanying drawing on a reduced scale. The Hall, B, is 54 feet by 27, in which the infant school is taught, and where the whole school is assembled for religious and other general exercises. Each of the four class-rooms D, each 19 feet by 17, is divided into two rooms by a screen, both of which is under the supervision of an assistant teacher, who is aided in instruction by one pupil teacher.



No. 8. This plan is designed for an infant school of 223 pupils. The entrance to the school is by the porch lighted by a small window, attached to a slight projection on the left, with the end towards the spectator. The entrance to the apartments of the teacher is by the other porch at the extreme right.

Nos. 9 and 10. These plans, of which the elevations only are given, will accommodate each three schools—one for 150 boys, and another for the same number of girls, and a third for a school of 150 infants.

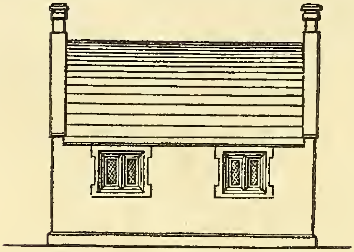
No. 11. The plan of which a front elevation is given on page 268, will accommodate three schools (in all 436 pupils) on the same floor, and two families. Two of the school-rooms are in a projection extending back 60 feet in the rear of the centre of the main building.

Nos. 12 and 13. These elevations are given to show how this style of architecture can be adapted to buildings of two stories.

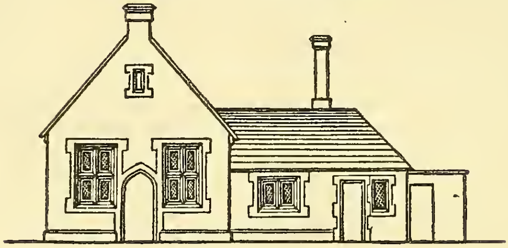
No. 14. Plan of the Willesdon School, drawn and published by H. E. Kendall, Jr. This house will accommodate two schools, one for eighty boys and the other for the same number of girls, each wing entered from the side, with apartments for the teacher entered by the porch in the centre. The building is in the mixed Tudor style, and is built of brick. The plinths to the porches are of stone, and the window copings, cornice and ornaments are executed in cement. The wood-work is finished to imitate oak. The whole cost less than $2000.

This plan is taken from "*Designs for Schools and School-houses, by H. E. Kendall, Jr.*, London," in which the Architect has aimed to apply the principles of Mediæval Architecture, as developed in the ecclesiastical and collegiate buildings of England and the Low Countries, to village schools. The work referred to, contains six designs, modelled after schools erected by the author,—all mediæval in character, and all combining ornament with simplicity. It is to be hoped that our architects will avail themselves of the opportunity now presented, in the increased and increasing attention paid all over the country to the establishment and improvement of public schools of every grade, to promote a taste for the propriety and beauty of their art, by throwing something of comeliness over the humblest structure designed for the education of childhood and youth, and thus creating and stimulating the growing taste of the community for the study of Architecture.

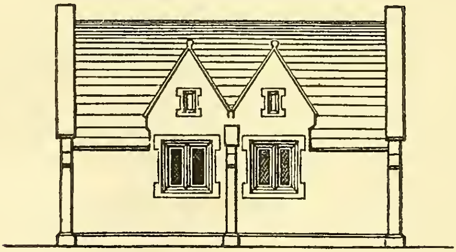
PLAN—No. 1. FRONT ELEVATION.



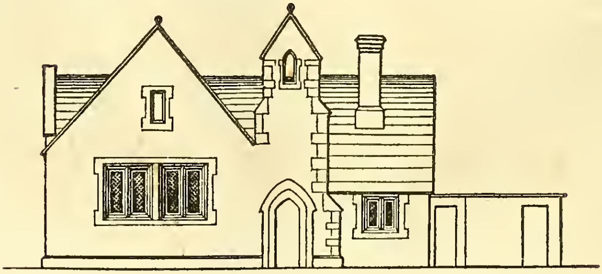
PLAN—No. 1. SIDE ELEVATION.



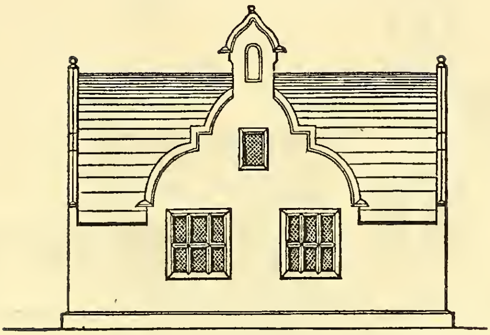
PLAN—No. 2. FRONT ELEVATION.



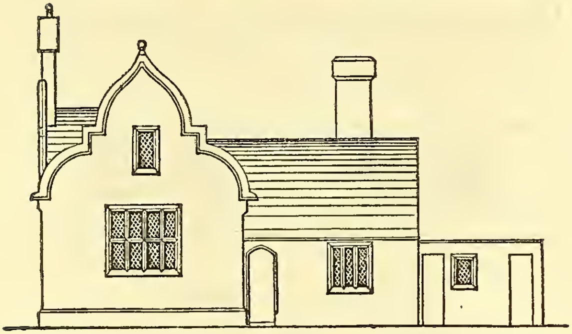
PLAN—No. 2. SIDE ELEVATION.



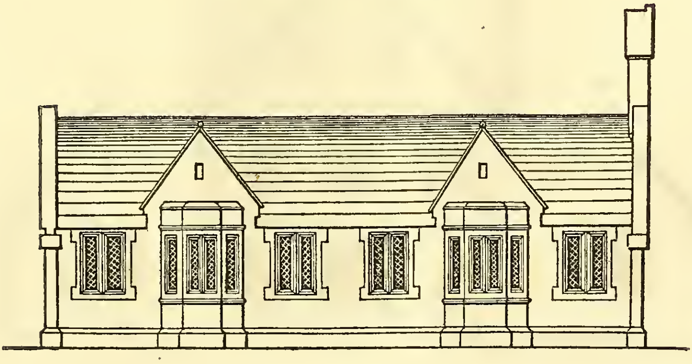
PLAN—No. 3. FRONT ELEVATION.



PLAN—No. 3. SIDE ELEVATION.

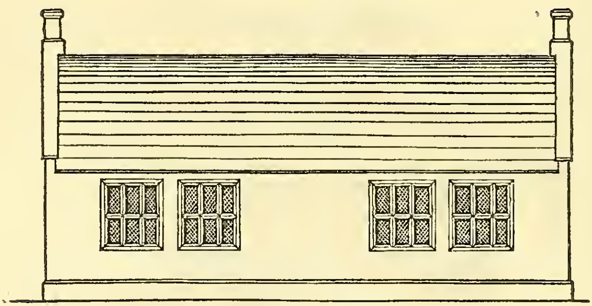


PLAN—No. 4. FRONT ELEVATION.

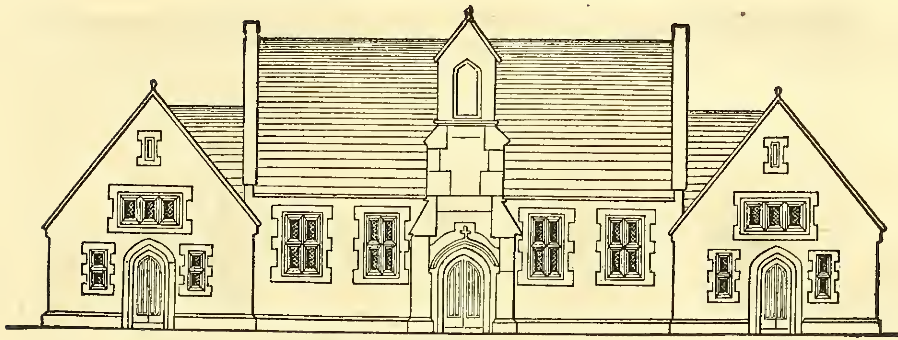


PLAN—NO. 4. SIDE ELEVATION.

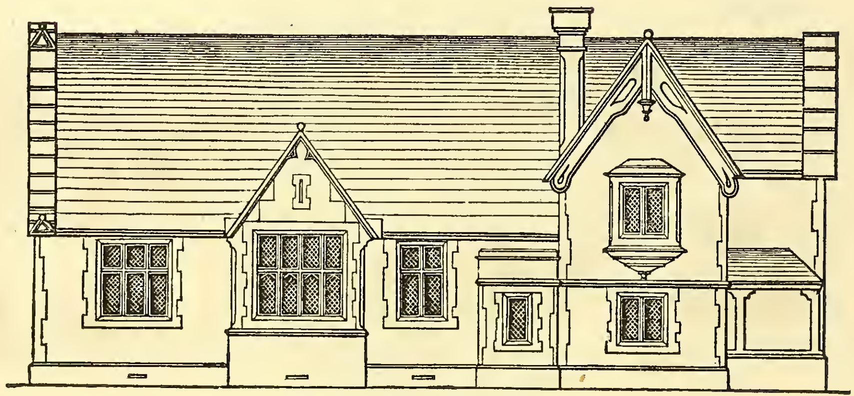
PLAN—NO. 5. FRONT ELEVATION.



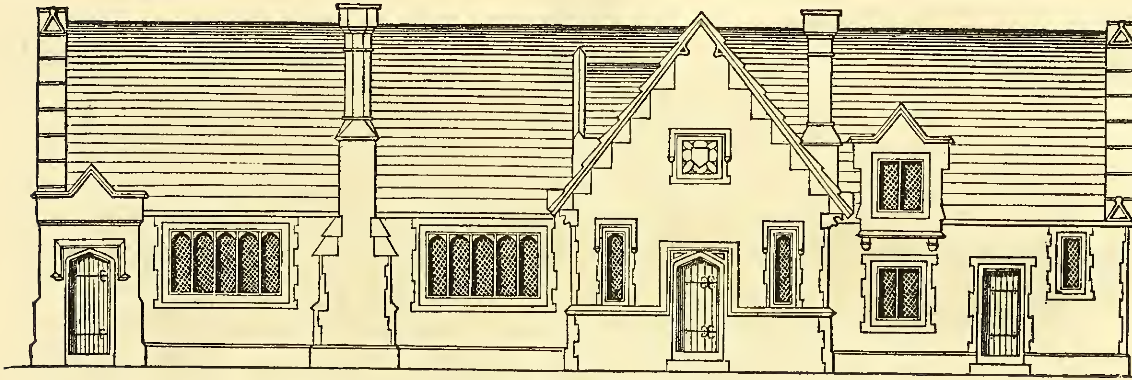
PLAN—NO. 7. FRONT ELEVATION.



Plan—No. 6 Front Elevation.

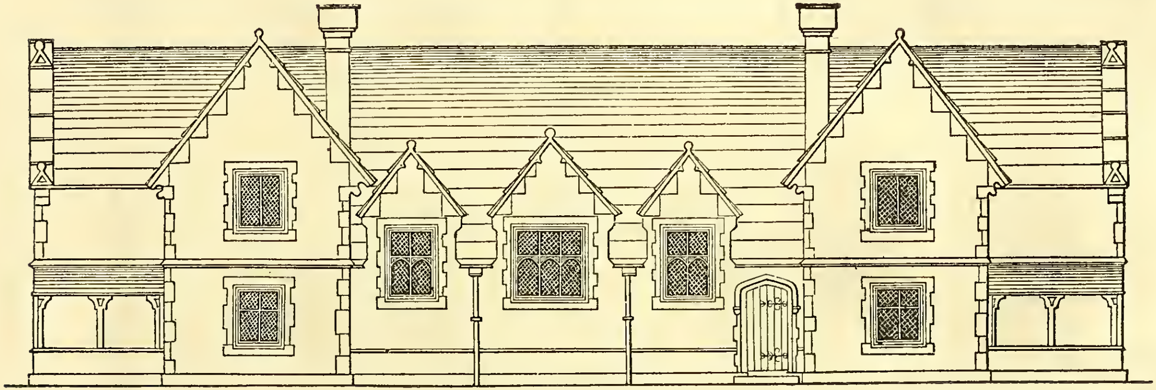


Plan—No. 8. Front Elevation.



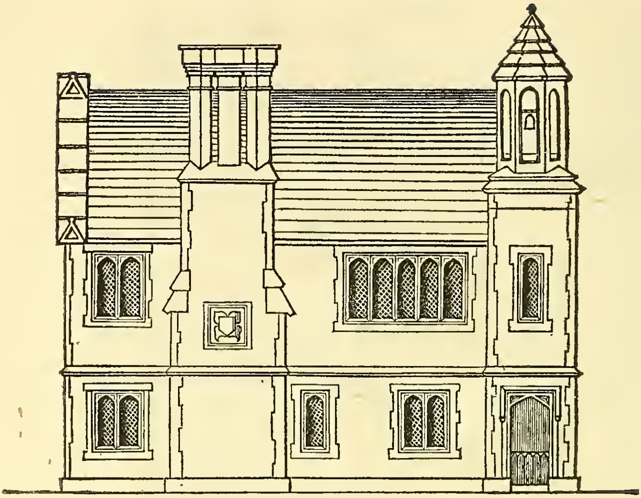
Plan—No. 9. Front Elevation.

Plan—No. 10. Front Elevation.

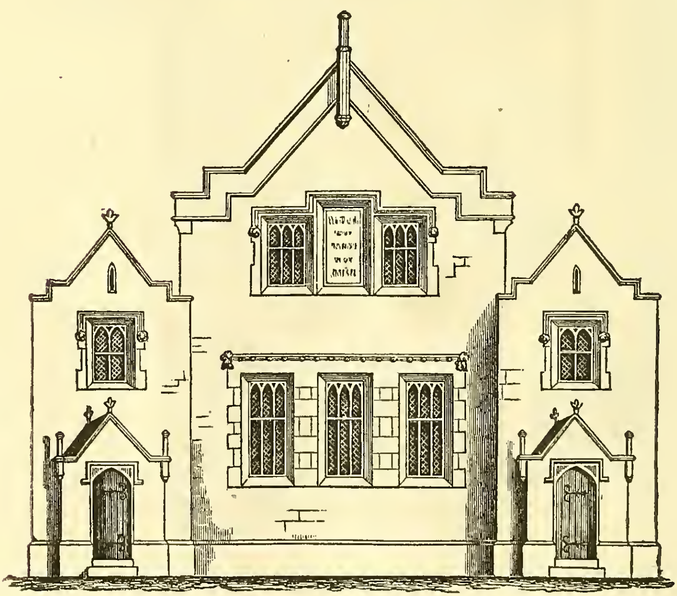


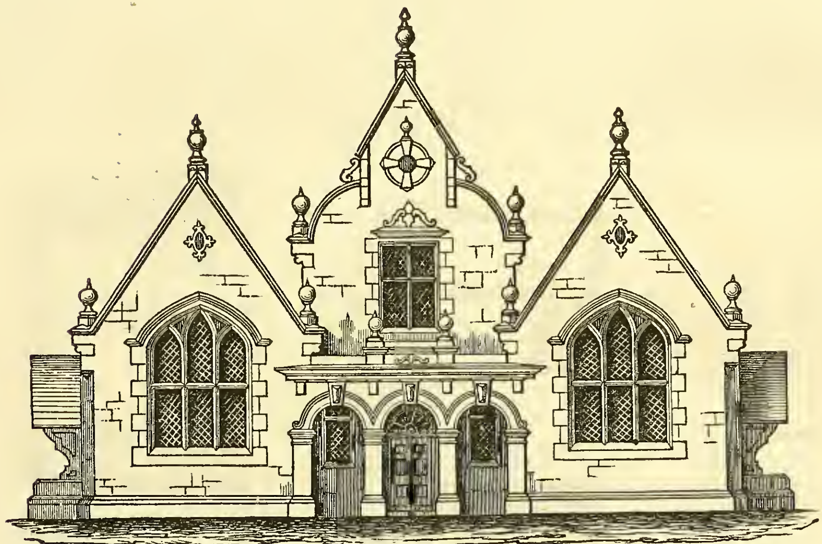
Plan—No. 11. Front Elevation.

PLAN—No. 12. FRONT ELEVATION.



PLAN—No. 13. FRONT ELEVATION.





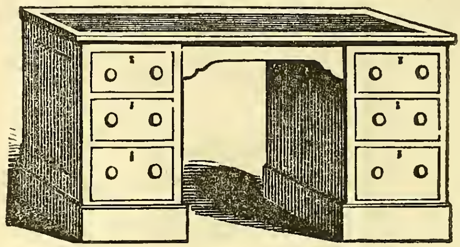
PLAN—No. 14. FRONT ELEVATION.

Teachers' Desks.

Much ingenuity has been expended recently in devising and constructing Teachers' Desks. Some of them are very simple, being a plain table with one or two drawers,—some with the top inclined, and others with the top level;—some with a desk in the centre and a set of drawers on each side; and others, with drawers only on one side; some with the front finished in a library case, and the lower shelf extending into the platform so as to be deep enough to receive large maps and diagrams.

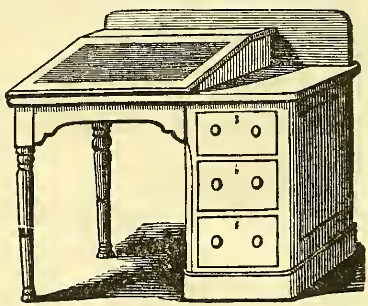
This (No. 1,) is a style of Teacher's Desk manufactured by Stephen Smith, 44 Cornhill, Boston, which is very generally used in the schools of Boston and vicinity. It is made of cherry or mahogany, and 5 ft. long by 2 ft. 6 inches wide—with a level top, covered with cloth, and with drawers on each side, leaving an open space for the teacher's feet. The front next to the school is neatly finished.

No. 1.



No. 2 represents a desk 3 feet long by 2 feet wide, made generally, in style and material, like No. 1, except that one half of the top is flat, and the other half inclined.

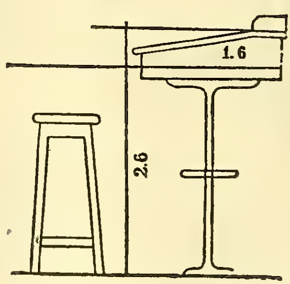
No. 2.



We have had a desk resembling this constructed with a drawing board, of nearly the same size of the top of the desk, inserted like a drawer immediately below it; and also with a large slate, on which the teacher could enter all minutes, memoranda, &c., inserted on the right immediately over the drawers represented in the cut. The front of either of these desks could be neatly finished in a case, with shelves to receive the books of reference, where they could be conveniently consulted, and also protected from the dust.

No. 3 is a style of movable desk and stool, on a platform raised six inches from the floor, recommended in the *Minutes of the Committee of Council on Education*. The standard is of iron with a shelf below the desk.

No. 3.



APPARATUS.

In addition to the necessary furniture of a school, such as seats, desks, and other fixtures and articles required for the accommodation of pupils and teacher, and the order and cleanliness of the premises, every school-room should be furnished with such apparatus as shall enable the teacher to employ the hand and eye of every pupil in illustration and experiment, so far as may be practicable and desirable in the course of instruction pursued in the school. It is therefore important, in the internal arrangement of a school-house, to have regard to the safe-keeping, display, and use of such apparatus as the grade of the school, for which the house is intended, may require. A few suggestions will therefore be made on these points, and in aid of committees and trustees in selecting apparatus.

1. In a large school, and in schools of the highest grade, there will be need of a separate apartment appropriated to the safe-keeping of the apparatus, and in some departments of instruction, for the proper use of the same. But in small schools, and as far as practicable in all schools, maps, diagrams, and other apparatus, should be in view of the school at all times.

This will not only add to the attractions of the school, and make the school-room look like a workshop of education, but will awaken a desire in the pupils to know the uses of the various articles, and to become acquainted with the facts and principles which can thus be seen, heard, or handled.

2. Such articles as are liable to be injured by dust, or handling, must be provided with an appropriate room, or a case of sufficient size, having glazed and sliding doors, and convenient shelves.

The doors should not be glazed to the floor, on account of liability to breakage, and also to admit of drawers for maps and diagrams, and a closet for such articles as may be uninteresting or unseemly to the eye, although useful in their place.

The shelves should be movable, so as to admit of additions of larger or smaller specimens of apparatus, and also of such arrangement as the varying tastes of different teachers may require.

3. There should be a table, with a level top, and capable of being made perfectly firm, unless the teacher's desk can be so, for the teacher to place his apparatus on, when in use.

4. The apparatus of every school-room should be selected with reference to the grade of schools to which it is appropriated, and in Primary and District schools in particular, should be of simple construction and convenient for use.

5. As far as practicable, the real object in nature and art, and not a diagram, or model, should be secured.

The following list of articles is necessarily very imperfect, but it may help to guide committees in their search after apparatus.

Articles indispensable in Schools of every Grade.

A clock.

The cardinal points of the heavens painted on the ceiling, or on the teacher's platform, or the floor of the recitation room.

As much blackboard, or black surface on the walls of the school-room, and the recitation rooms, as can be secured. A portion of this black surface should be in full view of the whole school, for passing explanations; and another portion out of the way, within reach of the smallest pupils.

One or more movable blackboards, or large slate, with one or more movable stands or supporters.

All the appendages to a blackboard, such as chalk, crayons, and a rubber of soft cloth, leather, or sheepskin, and a pointer.

An inkstand, fixed into the desk, with a lid, and with a pen-wiper attached.

A slate, iron-bound at the corners, and covered with list, or India-rubber cloth, for every desk, with a pencil-holder and sponge attached. A few extra slates for the use of the youngest pupils, under the care and at the discretion of the teacher.

A map of the district, town, county, and state.

A terrestrial globe, properly mounted, or suspended by a wire.

The measure of an inch, foot, yard, and rod, marked off on the edge of the blackboard, or on the wall.

Real measures of all kinds, linear, superficial, solid, and liquid; as a foot-rule, a yard-stick, quarts, bushels, an ounce, pound, &c., for the exercise of the eye and hand.

Vases for flowers and natural grasses.

Apparatus for a Primary or District School.

The apparatus for this class of schools cannot be specified with much minuteness, because the ages of the pupils, and the modes of instruction vary so much in different localities. The following list embraces the articles purchased for Primary and District schools in Rhode Island:

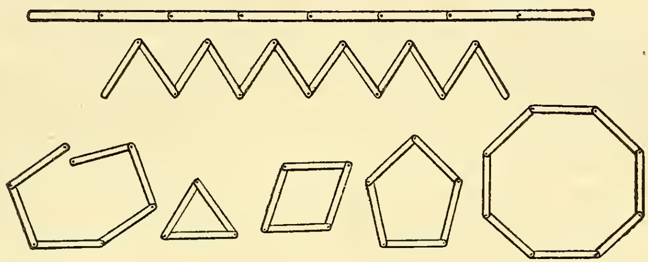
Movable Lesson Posts. These are from three and a half to four feet high, and are variously made of wood, and of cast-iron. It consists, when made of wood, of an upright piece of plank from two to three inches square at the bottom, and diminishing regularly to the top, where it is one inch, inserted in a round or cross base broad enough to support the lesson board, or card, which is suspended by a ring on a hook at or near the top of the post.

J. L. Mott, 264, Water street, New York, manufactures for the Primary schools of the Public School Society of New York, a very neat *cast-iron* lesson stand.

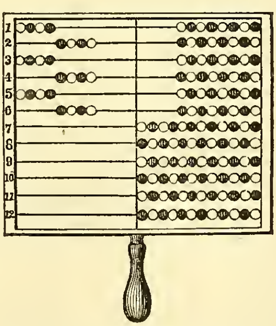
Reading Lessons. Colored Prints, and Diagrams of various kinds, such as of animals, costumes, trades, &c., pasted on boards of wood or strong pasteboard; some with, and others without printed descriptions beneath; to be suspended at appropriate times on the lesson stands, for class exercises, and at other times, on the walls, or deposited in their appropriate places.

In this list should be included the numeration table, tables for reading arithmetical marks, easy lessons, geometrical figures, punctuation marks, outline maps, &c.

The Gonigraph is a small instrument composed of a number of flat rods connected by pivots, which can be put into all possible geometrical figures that consist of straight lines and angles, as triangles, squares, pentagons, hexagons, octagons, &c.



The Arithmeticon, represented in the annexed cut, is a most useful instrument. In an oblong open frame, twelve rows of wooden balls, alternately black and white, and of the size of a nutmeg or small walnut, and twelve in each row, are strung like beads on strong wires. The instrument, when fixed to a stand, is about four feet high, the frame being one-fourth part broader than it is high. It may be made much smaller, as in the cut. When it is used to exercise the children in arithmetic, the teacher or monitor stands behind, and slides the balls along the wires from *his* left to his right, calling out the number he shifts, as, twice two are four, thrice two are six, shifting first four balls, and then two more. As the children are apt to confuse the balls remaining with those shifted, a thin board covers half the surface on the side next the children, as marked by a line down the centre, so that they see only the balls shifted to the open side.



Holbrook's Scientific Apparatus embraces a variety of articles which will be found highly useful in the District school, in which both the older and younger pupils of the districts are ordinarily gathered at the same time, and under one teacher.

The following articles constitute a set which costs $14.75, including a neat box with lock and key:

Tellurian; Suspension Orrery; Gear or Wheel Orrery with metal wheels; Globe; Orbit Plain; Numerical Frame; Geometrical Forms *and Solids; Twenty-five Geological Specimens; Geometry; Scale and Triangle; Block to illustrate Cube Roots; Geometrical Chart; Manuscript Letters: Text Book.*

Mr. Josiah Holbrook of New York, whose name was originally connected with this set of apparatus, and with which, as manufactured under his direction, we are familiar, disclaims at this time (1848) any responsibility for the articles manufactured by Holbrook & Co., of Ohio.

This gentleman, so long and so favorably known from his connection with Lyceums, and elementary instruction, is now residing in New York, and has an office in the Hall of the Public School Society. There, in connection with Mr. Seton, and two very ingenious workmen, (Messrs. Riker,) he is now getting up apparatus "which shall be simple, easily used, readily understood, not liable to get out of order, and durable." The following is a list of articles already prepared for Primary Schools:

A Geological Cabinet, Geometricals, embracing plain figures, solids, models of crystals, illustrations of insect architecture and human mechanism, transposing and revolving figures, all illustrated with cuts and explanations; a globe with maps of the world and United States; numeral frame; a simple lever, with weights; a syphon and glass pump, showing the weight of the atmosphere in raising water; an air bulb, showing the expansive power of heat, simply by the hand; a simple permanent magnet; also an electro-magnet, a microscope, a simple orrery, and First Drawing Book for children, are among the instruments fitted to make clear, distinct, correct and lasting *first impressions* upon young minds, before reading-lessons or the letters of the alphabet can be rendered intelligible to them.

To teach Geography and History properly, the following maps are desirable:

Map or plan of the school-room, yard, &c.
Map or plan of the District or Village.
Map or plan of the Town, County, and State.
Map of the United States.
Map of North America.
Map of Europe.
Map of the World.
Map of Palestine.
Map of the countries mentioned in the Bible and in ancient history.
Map of Europe during the middle ages.
Fitch's Chirography, or plates and instruction in map-drawing.
Series of Outline Maps, published by J. H. Mather & Co., Hartford, Ct.
A selection from Borgaus & Johnston's *Physical Atlas*, published in Edinburgh in 1847, viz.
    Rivers in America.
    Rivers in Europe and Asia.
    Mountain chains in North and South America.
    Mountain chains in Europe and Asia.
    Regions of Earthquakes and Volcanoes.
    Geological Map of America.
    Geological Map of Europe.
    Distribution of Food-plants over the world.
    Distribution of Animals.
    Distribution of Man.
Colton's Historical Chart.
Willard's Map of Time.
Mattison's Astronomical Maps.
Page's Normal Chart of Elementary Sounds.

Fulton's Chirographic Charts.
Green's Analysis of Sentences.
Henry's Family and School Monitor.
Wickham's Drawing Tablets.

Apparatus for Grammar Schools.

The School Committee of Boston, in 1847, adopted the following articles as a set of Philosophical Apparatus for the Grammar schools, which was selected and classified by Mr. Wightman, whose long experience in manufacturing apparatus for schools of every grade, admirably qualified him for the work:

Laws of Matter.

Apparatus for illustrating Inertia.
Pair of Lead Hemispheres, for Cohesion.
Pair of Glass Plates, for Capillary Attraction.

Laws of Motion.

Ivory Balls on Stand, for Collision.
Set of eight illustrations for Centre of Gravity.
Sliding Frame, for Composition of Forces.
Apparatus for illustrating Central Forces.

Mechanics.

Complete set of Mechanicals, consisting of Pulleys; Wheel and Axle; Capstan; Screw; Inclined Plane; Wedge.

Hydrostatics.

Bent Glass Tube, for Fluid Level.
Mounted Spirit Level.
Hydrometer and Jar, for Specific Gravity.
Scales and Weights, for Specific Gravity.
Hydrostatic Bellows, and Paradox.

Hydraulics.

Lifting, or Common Water Pump.
Forcing Pump; illustrating the Fire Engine.
Glass Syphon Cup; for illustrating Intermitting Springs.
Glass and Metal Syphons.

Pneumatics.

Patent Lever Air Pump and Clamp.
Three Glass Bell Receivers, adapted to the Apparatus.
Condensing and Exhausting Syringe.
Copper Chamber, for Condensed Air Fountain.
Revolving Jet and Glass Barrel.
Fountain Glass, Cock, and Jet for Vacuum.
Brass Magdeburg Hemispheres.
Improved Weight Lifter for upward pressure.
Iron Weight of 56 lbs. and Strap Flexible Tube and Connectors for Weight Lifter.
Brass Plate and Sliding Rod.
Bolt Head and Jar.
Tall Jar and Balloon.
Hand and Bladder Glasses.
Wood Cylinder and Plate.
India Rubber Bag, for expansion of air.
Guinea and Feather Apparatus.
Glass Flask and Stop-Cock, for weighing air.

Electricity.

Plate Electrical Machine.
Pith Ball Electrometer.
Electrical Battery of four Jars.
Electrical Discharger.
Image Plates and Figure.
Insulated Stool.
Chime of Bells.
Miser's Plate, for shocks.
Tissue Figure, Ball and Point.
Electrical Flyer and Tellurian.
Electrical Sportsman, Jar and Birds.
Mahogany Thunder House and Pistol.

Hydrogen Gas Generator.
Chains, Balls of Pith, and Amalgam.

Optics.

Glass Prism; and pair of Lenses.
Dissected Eye Ball, showing its arrangement.

Magnetism.

Magnetic Needle on Stand.
Pair of Magnetic Swans.
Glass Vase for Magnetic Swans.
Horseshoe Magnet.

Astronomy.

Improved School Orrery.
Tellurian, or, Season Machine.

Arithmetic, and Geometry.

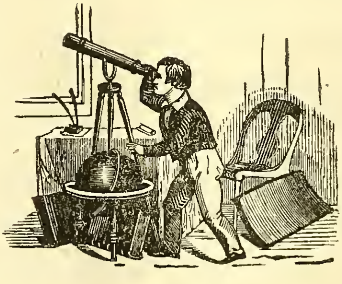
Set of 13 Geometrical Figures of Solids.
Box of 64 one inch Cubes, for Cube Root, &c.

Auxiliaries.

Tin Oiler.
Glass Funnel.
Sulphuric Acid.
Set of Iron Weights for Hydrostatic Paradox.

Apparatus for High Schools.

The articles of Apparatus for a High School, will depend on the extent to which such studies as Natural Philosophy, Chemistry, &c., are carried, and to the amount of money which can be expended. We have drawn up several such lists, and in doing so have been governed by the circumstances mentioned. As the best guide to committees and teachers, we shall publish in another place, under the head of Priced Catalogues, &c., lists of such articles as can be purchased for sums of money varying from $50 to $1000.



LIBRARY.

Every school should be furnished with a Library which should include,

1. Books on schools and school-systems, for the use of school officers and parents; and on the theory and practice of teaching, for the professional instruction of teachers.

2. Books of reference, for the use principally of teachers.

3. Books for circulation among the pupils.

4. Books for circulation among the parents, and inhabitants of the District, or neighborhood.

In the arrangement, and furniture of a school-house, provision should be made for the Library.

The following catalogue may assist those who are charged with the purchase of books:

Books on Education.

The School and School-master, by Alonzo Potter, (Bishop of Pennsylvania,) and George B. Emerson. New York: Harper and Brothers. Boston: Fowle and Capen. Price $1.00. 551 pages.

This volume was prepared at the request of the late James Wadsworth, of Geneseo, New York, with special reference to the condition and wants of common schools in that State. Its general principles and most of its details are applicable to similar schools in other parts of the country, and, indeed, to all seminaries employed in giving elementary instruction. Mr. Wadsworth directed a copy of it to be placed in each of the school libraries of New York, at his expense, and his noble example was followed in respect to the schools of Massachusetts, by the Hon. Martin Brimmer, of Boston.

CONTENTS. PART I. Introduction. Chapter I. Education of the People. *Sec.* I. What is Education. *Sec.* II. Prevailing Errors in regard to the Nature and End of Education. *Sec.* III. The same Subject continued *Sec.* IV. Same Subject continued. *Sec.* V. What is the Education most needed by the American People. *Sec.* VI. The Importance of Education, 1. To the Individual. *Sec.* VII. The Importance of Education, 2. To Society.

Chapter II. Common Schools. *Sec.* I Relation of Common Schools to other Means of Education. *Sec.* II. *Present State of Common Schools.*—1. School-houses. 2. Manners. 3. Morals. *Sec.* III. *Same Subject continued* —4. Intellectual Instruction. 5. Irregular Attendance. *Sec.* IV *How can Common Schools be improved ?*—1. Discussion. 2. Female Teachers. 3. Union or High Schools. 4. Consolidation of Districts. *Sec.* V. *The Improvement of Common Schools continued.* Organization in Cities.—1. District System. 2. Monitorial. 3. Fächer System. 4. American system. 5. Diversity of Class-books. *Sec.* VI. *Same Subject, continued* —Education of Teachers.

CONTENTS. PART II. Introduction. Book I. Qualities. *Chap.* I. Mental and Moral, important in a Teacher. *Chap.* II. Health. Exercise. Diet. Sleep. Recreation.

Book II. Studies. *Chap.* I. Laws of the Creation. *Chap.* II. Natural Laws. *Chap.* III. Independence of the Natural Laws. *Chap.* IV. Higher Studies. *Chap.* V. Advantages of a Teacher's Life.

Book III. Duties. *Chap.* I. To Himself. Self-Culture. *Chap.* II. To his Pupils, to give them means of Knowledge. *Chap.* III. To his Pupils, to form their Moral Character. *Chap.* IV. To his Pupils, Cultivation of their Powers. *Chap.* V. Communication of Knowledge. *Chap.* VI To his Fellow-Teachers. *Chap.* VII. To Parents and the Community.

Book IV. The School. *Chap.* I. Organization. *Chap.* II. Instruction. General Principles. *Chap.* III. Teaching: 1. Reading. 2. Spelling. 3. Grammar. 4. Writing. 5. Drawing. 6. Arithmetic. 7. Accounts. 8. Geography. 9. History. 10. Physiology. 11. Composition. *Chap.* IV. Government.

BOOK V. THE SCHOOL-HOUSE. *Chap.* I. Situation. *Chap.* II. Size. *Chap.* III. Position and Arrangement. *Chap.* IV. Light. Warming. Ventilation.

THE TEACHER'S MANUAL, by Thomas H. Palmer. Boston: Marsh, Capen, Lyon & Webb, 1840. pp. 263. Price, 75 cents.

This work received the prize of five hundred dollars, offered by the American Institute of Instruction, in 1838, for "the best Essay on a system of Education best adapted to the Common Schools of our country."

CONTENTS. PART I. *Chapter* I. Introductory. *Chapter* II. Who are our Schoolmasters. *Chapter* III. Physical Education. *Chapter* IV. Intellectual Education. *Chapter* V. Intellectual Education, continued. *Chapter* VI. Moral Education. *Chapter* VII. Recapitulation. PART II. *Chapter* I. Introductory. *Chapter* II. Physical Education. *Chapter* III. Physical Education, continued. *Chapter* IV. Physical Education, continued. *Chapter* V. Intellectual Education. *Chapter* VI. Intellectual Education, continued. *Chapter* VII. Intellectual Education. continued. *Chapter* VIII. Intellectual Education, continued. *Chapter* IX. Intellectual Education, continued. *Chapter* X. Intellectual Education, concluded. *Chapter* XI. Moral Education. *Chapter* XII. Moral Education, continued. *Chapter* XIII. Conclusion.

THE TEACHER TAUGHT, by Emerson Davis, late Principal of the Westfield Academy. Boston: Marsh, Capen, Lyon & Webb, 1839. pp. 79. Price 37½ cents.

This valuable work was first published in 1833, as "An Abstract of a Course of Lectures on School-keeping."

SLATE AND BLACKBOARD EXERCISES, By William A. Alcott. New York: Mark H. Newman. Price 37 cents.

The chapters in this little work were first published in the Connecticut Common School Journal, in 1841. The various suggestions and methods are highly practical.

THEORY AND PRACTICE OF TEACHING. by David P. Page, Principal of the New York State Normal School. New York: A. S. Barnes & Co.

CONTENTS. CHAPTER I. The Spirit of the Teacher. CHAPTER II. Responsibility of the Teacher. *Sec.* I. The Neglected Tree. *Sec.* II. Extent of Responsibility. *Sec.* III The Auburn Prison. CHAPTER III. Habits of the Teacher. CHAPTER IV. Literary Qualifications of the Teacher. CHAPTER V. Right Views of Education. CHAPTER VI. Right Modes of Teaching. *Sec.* I. Pouring-in Process. *Sec.* II. Drawing-out Process. *Sec.* III. The more Excellent Way. *Sec.* IV. Waking up Mind. *Sec.* V. Remarks. CHAPTER VII. Conducting Recitations. CHAPTER VIII. Exciting an Interest in Study. *Sec.* I. Incentives. Emulation. *Sec.* II. Prizes and Rewards. *Sec.* III. Proper Incentives. CHAPTER IX. School Government. *Sec.* I. Requisites in the Teacher for Government. *Sec.* II. Means of securing Good Order. *Sec.* III. Punishments, Improper, Proper. *Sec.* IV. Corporal Punishment. *Sec.* V. Limitations and Suggestions. CHAPTER X. School Arrangements. *Sec.* I. Plan of Day's Work. *Sec.* II. Interruptions. *Sec.* III. Recesses. *Sec.* IV. Assignment of Lessons. *Sec.* V. Reviews. *Sec.* VI. Examinations, Exhibitions, Celebrations. CHAPTER XI. The Teacher's Relation to the Parents of his Pupils. CHAPTER XII. The Teacher's Care of his Health. CHAPTER XIII. The Teacher's Relation to his Profession. CHAPTER XIV. Miscellaneous Suggestions. *Sec.* I. Things to be avoided. *Sec.* II. Things to be performed. CHAPTER XV. The Rewards of the Teacher.

HINTS AND METHODS FOR THE USE OF TEACHERS. Hartford: Price 25 cents.

This volume is made up principally of selections from publications on methods of teaching, not easily accessible; and under each subject discussed, reference is made to various volumes, where additional suggestions can be found.

THE DISTRICT SCHOOL AS IT WAS, by one who went to it, (*Rev. Warren Burton.*) New York: J. Orville Taylor, 1838.

In this amusing picture of "the lights and shadows" of school life as it was in New England twenty years ago, the teachers and scholars of some of our District Schools as they are, will recognize the school-house, books, practices, and methods with which they are too familiar.

Confessions of a School-master, by Dr. William A. Alcott. New York: Mark H. Newman. Price 50 cents.

If our teachers will read these confessions of errors of omission and commission, and the record which it gives of real excellencies attained by the steps of a slow and laborious progress, they will save themselves the mortification of the first, and realize earlier the fruits of the last. Few men have the moral courage to look their former bad methods so directly in the face. Every young teacher should read this book.

CONTENTS. Chapter I. My Introduction to School Keeping. *Section* I. Preparation and Engagement. *Section* II. The Examination. *Section* III. My Cogitations.

Chapter II. My First Year. *Section* I. First day of School. *Section* II. General Course of Instruction. *Section* III Particular Errors. *Section* IV. Religious Exercises.

Chapter III. My Second Year. *Section* I. Course of Instruction. *Section* II. Serious Mistakes.

Chapter IV. My Third Year. *Section* I. Complaint to the Grand Jurors. *Section* II. Introduction of a New School Book. *Section* III. Meeting of the Schools.

Chapter V. Fourth and Fifth Years. *Section* I. Modes of Punishing. *Section* II. Attending to other Employments. *Section* III. Late Evening Visits. *Section* IV. Studies and Methods.

Chapter VI. My Sixth Year. *Section* I. Teaching by the Year. Terms and Object. *Section* II. Description of the School and School-house. *Section* III. First Efforts at Improvement. Punctuality. *Section* IV. Methods and Discipline. *Section* V. Schools Neglected by Parents. *Section* VI. School Libraries. *Section* VII. Improper Company. Example.

Chapter VII. My Seventh Year. *Section* I. Divided Attention. *Section* II. Teaching on the Sabbath.

Chapter VIII. My Eighth Year. *Section* I. General Account of my School. *Section* II. Causes of Failure.

Chapter IX. My Ninth Year. *Section* I. A Novel Enterprise. *Section* II. Methods of Teaching. Discipline.

Chapter X. My Experience as a School Visitor. *Section* I. Examination of Teachers. *Section* II. Special Visits to Schools. *Section* III. Meetings for Improvement. *Section* IV. Introduction of a New Reading Book.

Chapter XI. My Tenth Year in School. *Section* I. Commencement of School. *Section* II. Spelling, Reading, Writing, etc. *Section* III. Teaching Geography. *Section* IV. A Practical Exercise. *Section* V. Experiment in Teaching Etymology. *Section* VI. Teaching Orthography. *Section* VII. Forcing Knowledge. *Section* VIII. Teaching Pupils to sit still. *Section* IX. My Moral Influence. *Section* X. My Ill Health. *Section* XI. Countenancing the Sports of my Pupils. *Section* XII. Discipline.

The School Teacher's Manual, by Henry Dunn, Secretary of the British and Foreign School Society, London. Hartford: Reed & Barber, 1839. pp. 223. Price 50 cents.

The American edition of this work is edited by Rev. Thomas H. Gallaudet, which is the best evidence that could be given of the general soundness of the views presented by the English author.

Teachers' Institute, by W. B. Fowle. Boston.

Teaching a Science: The Teacher an Artist, by Rev. B. R. Hall. New York: Baker & Scribner.

Corporal Punishment, by Lyman Cobb. New York: Mark H. Newman.

School Keeping, by an Experienced Teacher. Philadelphia: John Grigg, 1831.

The School-master's Friend, with the Committee-man's Guide, by Theodore Dwight, Jr. pp. 360. New York, Roe Lockwood, 415, Broadway, 1835.

The Teacher, or Moral Influences in the Instruction and Government of the Young, by Jacob Abbott. Boston, Whipple & Damrell, No. 9 Cornhill, Boston. Price 75 cents.

Theory of Teaching, with a few practical Illustrations, by a Teacher. Boston: E. P. Peabody, 1841. pp. 128.

District School, by J. Orville Taylor. New York: Harper & Brothers, 1834.

Lectures on Education, by Horace Mann, Secretary of the Massachusetts Board of Education. Boston: Fowle & Capen, 1845. Pp. 338. Price $1.00.

This volume embraces seven lectures, most of which were delivered before the Annual Common School Conventions, held in the several counties of Massachusetts, in 1838, '39, '40, '41, and '42. They are published in this form at the request of the Board of Education. No man, teacher, committee, parent, or friend of education generally, can read these lectures without obtaining much practical knowledge, and without being fired with a holy zeal in the cause.

CONTENTS. *Lecture* I. Means and Objects of Common School Education. *Lecture* II Special Preparation, a prerequisite to Teaching. *Lecture* III. The Necessity of Education in a Republican Government. *Lecture* IV. What God does, and what He leaves for Man to do, in the work of Education. *Lecture* V. An Historical View of Education; showing its Dignity and its Degradation. *Lecture* VI. On District School Libraries. *Lecture* VII. On School Punishments.

Locke and Milton on Education. Boston: Gray & Brown, 1830.

The Education of Mothers, by L. Aimé-Martin. Philadelphia: Lea & Blanchard, 1843.

Education and Health, by Amariah Brigham. Boston: Marsh, Capen & Lyon, 1843.

Dr. Channing on Self Culture. Boston: Monroe & Co. Price 33 cents.

Miss Sedgwick on Self Training, or Means and Ends. New York: Harper & Brothers.

These two volumes,—the first written with special reference to young men, and the last, to young women, should be read by all young teachers, who would make their own individual character, attainments, and conduct, the basis of all improvement in their profession.

The following works have special reference to instruction in Infant and Primary Schools:

Exercises for the Senses. London: Charles Knight & Co. Published under the superintendence of the Society for the Diffusion of Useful Knowledge.

Lessons on Objects: as given to children between the ages of six and eight, in a Pestalozzian School at Cheam, Sussex, by C. Mayo. London: Seeley, Burnside & Seeley, Fleet street, 1845.

Lessons on Shells, as given to children between the ages of eight and ten, and by the author of "Lessons on Objects." London: Seeley, Burnside & Seeley, 1846.

Patterson's Zoology for Schools. London.

Model Lessons for Infant School Teachers, by the author of "Lessons on Objects." Parts I. and II. London: Seeley, Burnside & Seeley, 1846.

Wilderspin's Infant System. London: James S. Hodgson, 112 Fleet street.

Wilderspin's Elementary Education. London: James S. Hodgson.

Chambers' Educational Course,—Infant Education, from two to six years of age. Edinburgh: W. R. Chambers.

Practical Education, by Maria Edgeworth. New York: Harper & Brothers, 1835.

The following works will exhibit a pretty full view of the progress and condition of education in Europe.

SMITH'S HISTORY OF EDUCATION. Harper & Brothers. Price 50 cents.

This work is substantially an abridgement of the great German work of Schwartz, and is worthy of an attentive perusal, not only for its historical view of the subject, but for the discussion of the general principles which should be recognized in every system of education.

BIBER'S MEMOIR OF PESTALOZZI, and his plan of Education. London: I. Souter, 1831.

EDUCATIONAL INSTITUTIONS OF DR. FELLENBERG, with an Appendix containing Woodbridge's Sketches of Hofwyl. London: Longman, 1842.

REPORT ON EDUCATION IN EUROPE, by Alexander Dallas Bache. Philadelphia: Lydia R. Bailey, 1829. pp. 666.

REPORT ON ELEMENTARY INSTRUCTION IN EUROPE, by Calvin E. Stowe, D. D. Boston: Thomas H. Webb & Co. Price 31 cents.

SEVENTH ANNUAL REPORT of the Secretary of the (Massachusetts) Board of Education, Hon. Horace Mann, 1843. Boston: Fowle and Capen. Price 25 cents.

These three reports introduce the teacher into the school-rooms of the best teachers in Europe, and enable him to profit by the observations and experience of men who have been trained by a thorough preparatory course of study and practice at home, to the best methods of classification, instruction, and government of schools, as pursued abroad.

ACCOUNT OF THE EDINGURGH SESSIONAL SCHOOL, Edinburgh, by John Wood. Boston: Monroe & Francis, 1830.

COUSIN'S REPORT ON PUBLIC INSTRUCTION IN PRUSSIA, translated by Sarah Austin. New York: Wiley & Long, 1835.

WILLM ON THE EDUCATION OF THE PEOPLE, translated from the French by Prof. Nichol. Glasgow: 1847.

MANUAL OF THE SYSTEM OF PRIMARY INSTRUCTION pursued in the model schools of the British and Foreign School Society. London: 1839.

MINUTES OF THE PROCEEDINGS OF THE COMMITTEE OF COUNCIL ON EDUCATION, from 1838 to 1844. London: 8 vols.

STOW'S TRAINING SYSTEM, as pursued in the Glasgow Normal Seminary. Edinburgh: 1840.

AN OUTLINE OF THE METHODS OF TEACHING, in the Model School of the Board of National Education for Ireland. Dublin: I. S. Folds, 1840.

COUSIN'S REPORT ON PRIMARY INSTRUCTION IN HOLLAND. London: 1835.

GIRARDIN'S REPORT ON EDUCATION IN AUSTRIA, BAVARIA, &c. Paris: 1835.

HICKSON'S ACCOUNT OF THE DUTCH AND GERMAN SCHOOLS. London: Taylor and Walton, 1840.

INTRODUCTION TO THE SCIENCE AND ART OF EDUCATION AND INSTRUCTION FOR MASTERS OF PRIMARY SCHOOLS, by B. S. Denzel, President of Royal Training College for School-masters at Esslingen. 6 vols. Stutgard, 1839.

This is considered the most complete German Treatise on the subject.

LECTURES AND PROCEEDINGS OF THE AMERICAN INSTITUTE OF INSTRUCTION from 1830 to 1847. Eighteen volumes. Boston: Ticknor.

These volumes embrace more than 150 lectures and essays, on a great variety of important topics, by some of the ablest scholars and most successful teachers in the country.

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Reports and Documents relating to the Common School System of Connecticut. Hartford: Case, Tiffany & Co.

This Volume is made up of different numbers of the Connecticut Common School Journal, which contain separate documents of permanent value. It makes a large quarto volume of 400 pages, in double columns, and small type. Price $1.00.

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" Address of the Board of Commissioners of C. S. to the People, 1838.
" First Annual Report to the Board of C. C. S., 1839; Second do. for 1840; Third do. for 1841; Fourth do. for 1842.
" Report on Education in other States and Countries, 1840.
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" " " Bavaria and Hanover, by Hawkins.
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REPORT ON THE PUBLIC SCHOOLS OF RHODE ISLAND, for 1845, by Henry Barnard, Commissioner of Public Schools. Providence: C. Burnett, Jr.

THE AMERICAN JOURNAL OF EDUCATION, Boston: commenced in 1826, and merged in the Annals of Education, in 1831. The set consists of five volumes.

AMERICAN ANNALS OF EDUCATION AND INSTRUCTION, Boston: commenced in 1831, and discontinued at the close of 1839. The set embraces nine volumes. It was edited at different periods by William Russell, W. C. Woodbridge, Dr. Alcott, and other able writers on Education.

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THE COMMON SCHOOL JOURNAL, published semi-monthly by W. B. Fowle, 184 Washington street, Boston, and edited by Horace Mann, Secretary of the Board of Education for Massachusetts. Price $1.00, payable in advance. This Journal was commenced in Nov 1838, and embraces all the official documents of the Board of Education, and their Secretary. The set embraces (1848) 9 vols., octavo

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Kitto's Cyclopedia of Biblical Literature.
Bridgewater Treatises, on the Power, Wisdom and Goodness of God, manifested in the Creation.
Horne's Introduction to the study of the Bible.
Paley's Natural Theology.
Wiseman on the Connection of Science and Religion.
Cudworth's Intellectual System of the Universe.
Wheaton on the Law of Nations.
Blackstone's Commentaries on the Common Law of England, Wendall's edition, 4 vols.
Kent's Commentaries on the Constitution and Laws of the U. States, 4 vols.
Stephens' DeLome on the English Constitution.
Beckman's History of Inventions, 2 vols.
Bigelow's Technology.
Tuthill's History of Architecture.
Lanzi's History of Painting.
Whately's Elements of Logic.
Mills' System of Logic.
Whately's Elements of Rhetoric.
Parker's Aids to Composition.
Russell's Vocal Culture.
Wayland's Moral Science.
Dymond's Essays on Morality.
Whewell's Elements of Morality.
Wayland's Political Economy.
Atkinson's Principles of Political Economy.
Keith on the Use of Globes.
Nichols' Architecture of the Heavens, and Solar System.
Olmsted's Elements of Astronomy.
Herschell's Astronomy.
Jackson's "What to Observe."
Bonnycastle's Bossut's History of the Mathematics.
Stanley's Mathematical Tables.
Barlow's Theory of Numbers.
Agassiz's Natural History.
Dana's Mineralogy.
Lyell's Elements and Principles of Geology.
Gray's Botanical Text Book.
Brockelsby's Meteorology.
Sabine's Humboldt's Cosmos.
Whewell's Philosophy of the Inductive Sciences.
Whewell's History of the Inductive Sciences.

3—4. Catalogue of Books for Juvenile and Adult Reading.

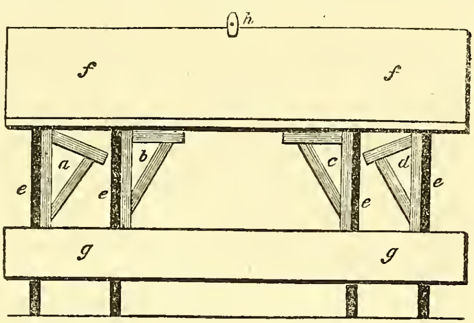
We cannot, in the space allotted to this subject, announce even the principles on which books should be selected for popular reading,—much less give a list of suitable books. The general subject, so far as School District Libraries are concerned, is very ably discussed in a Report by Henry S. Randall, Esq., of Cortland, New York, which may be found in Randall's (S.S.) Mental and Moral Culture. For list, see Vol. 2, of R. I. School Journal

Hints respecting Blackboards.

The upper portion of the standing blackboard should be inclined back a little from the perpendicular, and along the lower edge there should be a projection or trough to catch the particles detached from the chalk or crayon when in use, and a drawer to receive the sponge, cloth, lamb's-skin, or other soft article used in cleaning the surface of the board.

Blackboards, even when made with great care, and of the best seasoned materials, are liable to injury and defacement from warping, opening of seams, or splitting when exposed to the overheated atmosphere of school-rooms, unless they are set in a frame like a slate, or the panel of a door.

By the following ingenious, and cheap contrivance, a few feet of board can be converted into a table, a sloping desk, one or two blackboards, and a form or seat, and the whole folded up so as not to occupy a space more than five inches wide, and be easily moved from one room to another. It is equally well adapted to a school-room, class-room, library or nursery.



f f Under side of the swinging board, suspended by rule-joint hinges, when turned up, painted black or dark chocolate.

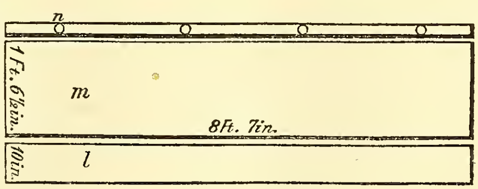
a d Folding brackets, inclined at an angle of 75 degrees, and swung out to support the board when a sloping desk is required.

b c Folding brackets to support the swinging board when a bench or flat table is required.

e e e e Uprights attached to the wall.

g g Form to be used when the swinging board is let down, and to be supported by folding legs. The under side can be used as a blackboard for small children.

h A wooden button to retain the swinging board when turned up for use as a blackboard.



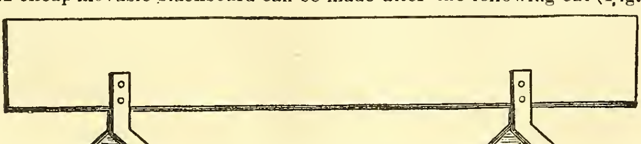
n Opening to receive inkstands, and deposit for slate, pencil, chalk, &c.

m Surface of swinging board when let down.

l Surface of form or bench.

When not in use, or let down, the desk and form should hang flush with each other.

A cheap movable blackboard can be made after the following cut (Fig. 3.



Slate Blackboard.

In the class-rooms of the American Asylum for the Deaf and Dumb, and all similar institutions, where most of the instruction is given by writing, and drawings on the blackboard, large slates from three feet wide, to four feet long are substituted for the blackboard. These slates cost from $2 to $3, and are superior to any other form of blackboard, and in a series of years prove more economical.

Plaster Blackboard.

As a substitute for the painted board, it is common to paint black a portion of the plastered wall when covered with hard finish, (i. e. plaster of Paris and sand;) or to color it by mixing with the hard finish a sufficient quantity of lamp-black, wet with alcohol, at the time of putting it on. The hard finish, colored in this way, can be put on to an old, as well as to a new surface. Unless the lamp-black is wet with alcohol, or sour beer, it will not mix uniformly with the hard finish, and when dry, the surface, instead of being a uniform black, will present a spotted appearance.

Canvas Blackboard.

Every teacher can provide himself with a portable blackboard made of canvas cloth, 3 feet wide and 6 feet long, covered with three or four coats of black paint, like Winchester's Writing Charts. One side might, like this chart, present the elements of the written characters classified in the order of their simplicity, and guide-marks to enable a child to determine with ease the height, width, and inclination of every letter. Below, on the same side, might be ruled the musical scale, leaving sufficient space to receive such characters as may be required to illustrate lessons in music. The opposite side can be used for the ordinary purposes of a blackboard. When rolled up, the canvas would occupy a space three feet long, and not more than three inches in diameter.

Directions for making Crayons.

A school, or the schools of a town, may be supplied with crayons very cheaply, made after the following directions given by Professor Turner of the American Asylum for the Deaf and Dumb.

Take 5 pounds of Paris White, 1 pound of Wheat Flour, wet with water, and knead it well, make it so stiff that it will not stick to the table, but not so stiff as to crumble and fall to pieces when it is rolled under the hand.

To *roll* out the crayons to the proper size, two boards are needed, *one*, to roll them *on;* the *other* to roll them *with.* The first should be a smooth pine board, three feet long, and nine inches wide. The other should also be pine, a foot long, and nine inches wide, having nailed on the under side, near each edge, a slip of wood one third of an inch thick, in order to raise it so much above the under board, as, that the crayon, when brought to its proper size, may lie between them without being flattened.

The mass is rolled into a ball, and slices are cut from one side of it about one third of an inch thick; these slices are again cut into strips about four inches long and one third of an inch wide, and rolled separately between these boards until smooth and round.

Near at hand, should be another board 3 feet long and 4 inches wide, across which each crayon, as it is made, should be laid so that the ends may project on each side—the crayons should be laid in close contact and straight. When the board is filled, the ends should be trimmed off so as to make the crayons as long as the width of the board. It is then laid in the sun, if in hot weather, or if in winter, near a stove or fire-place, where the crayons may dry gradually, which will require twelve hours. When thoroughly dry, they are fit for use.

An experienced hand will make 150 in an hour.

Rules for the Care and Preservation of School-Houses.

The following provisions are included among the Regulations for the Government of Teachers and Pupils of Public Schools, adopted by School Committees in most of the towns of Rhode Island:

For Teachers:

There shall be a recess of at least fifteen minutes in the middle of every half day; but the primary schools may have a recess of ten minutes every hour: at the discretion of the teacher.

It shall be the duty of teachers to see that fires are made, in cold weather, in their respective school-rooms, at a seasonable hour to render them warm and comfortable by school time; to take care that their rooms are properly swept and dusted; and that a due regard to neatness and order is observed, both in and around the school-house.

As pure air of a proper temperature is indispensable to health and comfort, teachers cannot be too careful in giving attention to these things. If the room has no ventilator, the doors and windows should be opened before and after school, to permit a free and healthful circulation of air; and the temperature should be regulated by a thermometer suspended, five or six feet from the floor, in such a position as to indicate as near as possible the average temperature, and should be kept about 65 degrees Fahrenheit.

The teachers shall take care that the school-houses, tables, desks, and apparatus in the same, and all the public property entrusted to their charge, be not cut, scratched, marked, or injured and defaced in any manner whatever. And it shall be the duty of the teachers to give prompt notice to one or more of the trustees, of any repairs that may be needed.

For Pupils:

Every pupil who shall, *accidentally* or *otherwise*, injure any school property, whether fences, gates, trees or shrubs, or any building or any part thereof; or break any window glass, or injure or destroy any instrument, apparatus or furniture belonging to the school, shall be liable to pay all damages.

Every pupil who shall any where, on or around the school premises, use or write any profane or unchaste language, or shall draw any obscene pictures or representations, or cut, mark, or otherwise *intentionally* deface any school furniture or buildings, or any property whatsoever belonging to the school estate, shall be punished in proportion to the nature and extent of the offence, and shall be liable to the action of the civil law.

No scholar of either sex shall be permitted to enter any part of the yard or buildings appropriated to the other, without the teacher's permission.

Smoking and chewing tobacco in the school-house or upon the school premises, are strictly prohibited.

The scholars shall pass through the streets on their way to and from school in an orderly and becoming manner; shall clean the mud and dirt from their feet on entering the school-room: and take their seats in a quiet and respectful manner, as soon as convenient after the first bell rings; and shall take proper care that their books, desks, and the floor around them, are kept clean and in good order.

It is expected that all the scholars who enjoy the advantages of public schools, will give proper attention to the *cleanliness* of their persons, and the neatness and decency of their clothes—not only for the moral effect of the habit of neatness and order, but that the pupils may be at all times prepared, both in conduct and external appearance—to receive their friends and visitors in a respectable manner; and to render the school-room pleasant, comfortable and happy for teachers and scholars.

In the "*Regulations of the Public Schools in the city of Providence*," it is made the duty "of the principal teacher in each school-house, for the compensation allowed by the Committee, to employ some suitable person to make the fires in the same when necessary, and to see that this important work is properly and economically done;" also "for the compensation allowed, to employ some suitable person to sweep the room and its entries daily, and dust the blinds, seats, desks, and other furniture in the same, and to clean the same once a quarter, and to see that this work is neatly and properly done."

The teachers must also "take care that the school-houses, the apparatus in the same, and all the public property entrusted to their charge, be not defaced, or otherwise injured by the scholars, and to give prompt notice to the Superintendant of any repairs and supplies that may be needed."

Practical Suggestions respecting Ventilation, Fires, Sweeping and Dusting.

The following suggestions are taken from the *Manual of the System of Discipline and Instruction for the Schools of the Public School Society of New York:*

VENTILATION.

Strict attention should be paid to all the means provided for temperature and ventilation. During the season of fires, the thermometer should be watched,—and the ventilating flues, windows, doors, and stoves, should be constantly attended to,—and every precaution taken, to give as pure an atmosphere to the school-room, as circumstances will allow. This is not only necessary, for a proper and free exercise of the physical powers,—but it will be found greatly to influence every mental exercise; for, both will partake of either languor, or vigor, according as ventilation is neglected, or duly attended to. In wârm weather, the upper sashes should be down during school hours, and allowed to remain open about four inches during the night,—except, that on occasion of a storm, the windows against which it beats, may be closed. In winter, excepting when the weather is exceedingly cold and piercing, it may be of advantage to have two or more of the upper sashes down about an inch during the night; but these as well as the doors should be closed before kindling the fires. Two or more of the upper sashes should be drawn down at the end of the first half hour after opening school,—and again, for a short time at each successive half hour,—and whenever the thermometer rises to 70 degrees. At all seasons, the windows and doors should be thrown wide open for a few minutes during each recess, while the scholars are in the yard. The teacher should be careful to require all the scholars to go out, except such as may reasonably be excused on account of infirmity or sickness; and even these should be required to change their places, and to exercise themselves by walking to and fro in the school-room. At all seasons, at the close of school, all the doors and windows should be opened for a few minutes, in order that a pure atmosphere may be admitted and retained during the noon-time recess, or at night. A thermometrical diary must be kept during the winter season, and the temperature of the room noted at the opening, middle, and close, of each daily session. Further directions on this point are given in the instructions for making fires. The window-blinds and curtains are for the purpose of guarding against the sunshine, or observation from without. They should, therefore, be so managed, as only to exclude the direct rays of the sun, and kept open or shut accordingly. When required as a screen from observation, they should extend no farther than necessary for that purpose. Attention to these rules will give an air of cheerfulness within, so congenial to the young. It is important that this fact be impressed on all—that air, and light, are grand essentials in a school-room: let the first be freely admitted, and the second never causelessly excluded.

FIRES.

The ashes should be taken from the stoves in the morning only, leaving a layer of one inch in depth: then to proceed to build with the materials after the following manner: Place one large stick on each side; in the space between them, place the kindling wood; and above it, the small wood, somewhat crosswise; then, set fire to the kindling, and close the stove door. See that the draught is cleared of ashes, or other obstructions; and that the dampers are properly adjusted; (these are generally so arranged as to open the draught when the handle is parallel with the pipe). If the materials have been laid according to the foregoing directions, the combustion will be free. Should the temperature of the room be as low as 40°, fill the stove with wood. Under ordinary circumstances, in thirty-five minutes the temperature will be raised to 60 degrees,—at which point it should certainly be, at the time of opening school; when the stove may be supplied with one or two large sticks. At all times, before supplying wood, draw forward the brands and coals with the fire-hook. If there should be too much fire, open the stove door, and if necessary, turn the damper,—or, what may be better for economy, effectually close the draft at the stove door with ashes. By attention to all these directions,* the temperature may be maintained, the wood entirely consumed, and the thermometer stand at 60 degrees, at the close of the school; which is desirable in cold weather, so as not to subject the pupils to too sudden a change of temperature on going into the open air. The evaporating pan should be kept *clean*, and filled with water when in use. In damp rooms it is not needed,—nor in damp weather:—but it should be emptied, and wiped dry, before it is set aside.

DUSTING AND SWEEPING.

For a large room, or one department of a Public School building, six brooms will be found sufficient to be in use. When half worn, they will serve for sweeping the yard; and when well worn down in that service, will still be useful for scrubbing, with water or sand; and, if properly used by the sweepers, will be evenly worn to the last. Before sweeping, pull down the upper sashes, and raise the under ones. Let the sweepers be arranged, one to each passage between the desks,—and, beginning at the windward side, sweep the dirt before them, till it is carried forward to the opposite side of the room. The broom should rest square on the floor, and, with the motion used in raking hay, should be drawn towards the sweeper, without flirting it outwards, or upwards, which raises unnecessary dust, and wears the broom irregularly. The dirt, when taken up, should be carried into the *middle of the street.* The dusting is to be done in the same regular manner, allowing a suitable interval after sweeping. If at noon, dusting should be done shortly before school time; if at night, dust the next morning. In out-door sweeping, the same rule is to be followed—the sweepers going in ranks, and sweeping from the windward. Let the scrubbing be done by a similar method. When once acquainted with these methodical plans, the cleaners will do the work, not only more effectually, but with more satisfaction and ease to themselves—and being a part of domestic economy, it will be, so far, an advantage to understand how to do it well.

Although not strictly within the design of this work, but as closely connected with habits of neatness and order, we insert from the Manual quoted above, the following directions for delivering, holding, and returning a book.

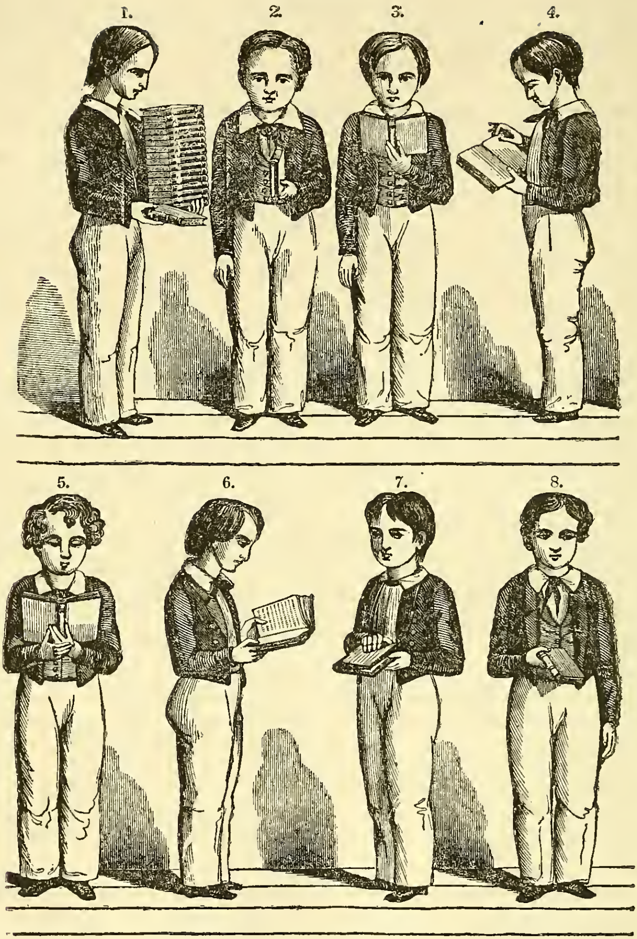
The Manual is soon to be enlarged, and well deserves a place in every teacher's library, although it has special reference to the organization and system of instruction adopted in the schools of the Public School Society.

* From a return recently made out respecting the quantity and cost of fuel used in the different schools of the Public School Society, it appears that the average cost of wood for a house like No. 17, (plans and description of which may be seen on p. 100.) having 13 stoves, including cartage, sawing, carrying in and piling, is $160. The lowest cost is $141, and the highest, $200. In a Primary house, (like that described on page 103,) having four stoves, the average cost is $33; the highest being $40, and the lowest $25. The difference in the cost is mainly to be attributed to the difference in the care and oversight of the fire by the teacher.

With a view of correcting the evil, the committee having charge of this business have prepared a table which exhibits at one view the quantity of wood furnished to each school, so as to enable every teacher to compare himself with every other in this particular.

The cost of heating a Primary building of the same size, by wood in a furnace, is $75, and of Ward school building, of the same size as No. 17, by coal in a furnace, is $260.

Book Manual.



The pupil should stand erect,—his heels near together,—toes turned out,—and his eyes directed to the face of the person speaking to him.

Figure one represents the Book Monitor with a pile of books across his left arm, with the backs from him, and with the top of the page to the right hand.

Figure two represents the Book Monitor, with the right hand hands the book to the Pupil, who receives it in his right hand, with the back of the book to the left; and then passes it into the left hand, where it is held with the back upwards, and with the thumb extended at an angle of forty-five degrees with the edge of the book (as in figure 2,) until a further order is given.

Figure three—When the page is given out, the book is turned by the thumb on the side; and, while held with both hands, is turned with the back downwards, with the thumbs meeting across the leaves, at a point judged to be nearest the place to be found. On opening the book, the left hand slides down to the bottom, and thence to the middle, where the thumb and little finger are made to press on the two opposite pages. If the Pupil should have thus lit upon the page sought for, he lets fall the right hand by the side, and his position is that of Fig. 3.

Figure four—But, if he has opened short of the page required, the thumb of the right hand is to be placed near the upper corner of the page, as seen in Fig. 4; while the forefinger lifts the leaves to bring into view the number of the page. If he finds that he has not raised enough, the forefinger and thumb hold those already raised, while the second finger lifts the leaves, and brings them within the grasp of the thumb and finger. When the page required is found, all the fingers are to be passed under the leaves, and the whole turned at once. Should the Pupil, on the contrary, have opened too far, and be obliged to turn back, he places the right thumb, in like manner, on the left-hand page, and the leaves are lifted as before described.

Figure five—Should the book be old, or so large as to be wearisome to hold, the right hand may sustain the left, as seen in Fig. 5.

Figure six and seven—While reading, as the eye rises to the top of the right-hand page, the right hand is brought to the position seen in Fig. 4; and, with the forefinger under the leaf, the hand is slid down to the lower corner, and retained there during the reading of this page, as seen in Fig. 6. This also is the position in which the book is to be held when about to be closed; in doing which, the left hand, being carried up to the side, supports the book firmly and unmoved, while the right hand turns the part it supports over on the left thumb, as seen in Fig. 7. The thumb will then be drawn out from between the leaves, and placed on the cover; when the right hand will fall by the side, as seen in Fig. 2.

Figure eight—But, if the reading has ended, the right hand retains the book, and the left hand falls by the side, as seen in Fig. 8. The book will now be in a position to be handed to the Book Monitor; who receives it in his right hand, and places it on his left arm, with the back towards his body. The books are now in the most suitable situation for being passed to the shelves or drawers, where, without being crowded, they should be placed with uniformity and care.

In conclusion, it may be proper to remark, that however trivial these minute directions may appear to some minds, it will be found on experience, that books thus treated, may be made to last double the time that they will do, under the usual management in schools. Nor is the attainment of a correct and graceful mode of handling a book, the only benefit received by the pupil. The use of this manual is calculated to beget a love of *order* and *propriety*, and disposes him more readily to adopt the habit generally, of doing things in a methodical and systematic manner.

Regulations of Chauncy-Hall School, Boston.

The following Regulations of one of the best conducted Private Schools for Boys in New England, will furnish useful hints to teachers in framing regulations for their own schools, especially in reference to the *good behavior* of the pupils, and to the care of the school-room, furniture, &c.

REQUISITION.

Boys are required to be punctual at school.

To scrape their feet on the scraper, and to wipe them on every mat they pass over on their way to the hall.

To hang their hats, caps, coats, &c., on the hooks appropriated to them respectively, by loops prepared for the purpose.

To bow gracefully and respectfully on entering and leaving the hall, and any recitation room when a teacher is present.

To take their places on entering the hall.

To make no unnecessary noise within the walls of the building, at any time of night or day.

To keep their persons, clothes, and shoes clean.

To carry and bring their books for study, in a satchel.

To quit the neighborhood of the school in a quiet and orderly manner, immediately after dismissal.

To bring notes for absence, dated, and signed by persons authorized to do so, and stating the duration of the absence; also, notes for tardiness, and for occasions when pupils are wanted at home before the regular hour of dismissal.

To study lessons at home, except when inconvenient to the family—in such cases to bring a certificate of the fact in writing.

To present a pen by the feather end; a knife, by its handle; a book, the right side upward to be read by the person receiving it.

To bow on presenting or receiving any thing.

To stand while speaking to a teacher.

To keep all books clean, and the contents of desks neatly arranged.

To deposite in desks all books (except writing books,) slates, pencils, rulers, &c., before dismissal.

To give notice through the school Post Office, of all books, slates, &c., missing.

To pick up hats, caps, coats, pens, slips, books, &c., found on the floor, and put them in their appropriate places.

To replace lost keys, books, &c., belonging to the school, and make good all damage done by them.

To write all requests on their slates, and wait until called.

To close desks and fasten them before quitting school for the session.

To raise the hand as a request to speak across the hall or any recitation room

To show two fingers when a pen is wanted.

To put all refuse paper, stumps of pens, &c., in the dust box.

To be accountable for the condition of the floor nearest their own seats.

To fill all vacant time with ciphering, as a general occupation; and to give notice to the teacher, before dismissal, in case of omitting the exercise wholly on any day.

To be particularly vigilant, when no teacher is in the hall.

To promote as far as possible, the happiness, comfort, and improvement of others.

To *follow* every class-mate while reading, and correct all errors discovered in pronunciation, emphasis, or inflection.

To point the fore finger of the left hand, at each letter or figure of the slip or copy, while writing, and the feather of the pen towards the right shoulder.

To keep the writing book square in front.

To rest the body on the left arm, while spelling, and keep the eye directed towards their own slates.

To sit erectly against the back of the chairs, during the singing lessons, and to direct their attention to the instructor.

Transferrers to show reports finished as early in the week as 3 o'clock on Tuesday, P. M.

PROHIBITIONS.

Boys are forbidden to buy or sell, borrow or lend, give, take, or exchange, any thing, except fruit or other eatables, without the teacher's permission.

To read any book in school except such as contain the reading lesson of his class.

To have in his possession at school any book without the teacher's knowledge.

To throw pens, paper, or any thing whatever on the floor, or out at a window or door.

To go out to play with his class when he has had a *deviation.*

To spit on the floor.

To climb on any fence, railing, ladder, &c., about the school-house.

To scrawl on, blot, or mark slips.

To mark, cut, scratch, chalk, or otherwise disfigure, injure, or defile, any portion of the building or any thing connected with it.

To take out an inkstand, meddle with the contents of another's desk, or unnecessarily open or shut his own.

To write without using a card and wiper.

To quit school without having finished his copy.

To use a knife, except on the conditions prescribed.

To remove class lists from their depositories.

To meddle with ink unnecessarily.

To study *home* lessons in school hours.

To leave the hall at any time without leave.

To pass noisily, or upon the run, from one room to another, or through the entries.

To visit the office, furnace room, or any closet or teacher's room, except in class, without a written *permit.*

To play at *paw paw* any where, or any game within the building.

To play in the play-ground before school.

To leave whittlings or other rubbish in the play-ground, on the side-walk, or around the building.

To go out of the play-ground in school hours.

To carry out his pen on his ear.

To use any profane or indelicate language.

To nick-name any person.

To press his knees, in sitting, against a form.

To leave his seat for any purpose, but to receive class instruction.

To go home, when deficient, without having answered to his name.

To indulge in eating or drinking in school.

To go out in class, after having been out singly; or going out singly, to linger below to play.

To waste school hours by unnecessary talking, laughing, playing, idling, standing up, turning round, teazing, or otherwise calling off the attention of another boy.

To throw stones, snow-balls, or other missiles about the neighborhood of the school.

To bring bats, *hockey* sticks, bows and arrows, or other dangerous play-things to school.

To visit a privy in company with any one.

To strike, kick, push, or otherwise annoy his associates or others.

In fine, to do any thing that the law of love forbids—that law which requires us To do to others as we would think it right that they should do to us.

These regulations are not stated according to their relative importance, but as they have been adopted or called to mind. They are intended to meet general circumstances, but may be waived in cases of necessity, by special permission, obtained in the prescribed mode.

In a Lecture on Courtesy, delivered before the American Institute of Instruction at Boston, in August, 1840, Mr. Thayer, the Principal of the Chauncy Hall School, introduced the above regulations as the topics of his discourse. We extract portions of this admirable lecture, which may be found entire in the annual volume of the American Institute, published in 1842, and in the Massachusetts Common School Journal, Vol. II, for 1840.

Scraping the feet at the door, and wiping them on the mats. This should be insisted on as one of the most obvious items in the code of cleanliness. It is not only indispensable to the decent *appearance* of a school room, but, if neglected, a large quantity of soil is carried in on the feet, which, in the course of the day, is ground to powder, and a liberal portion inhaled at the nostrils, and otherwise deposited in the system, to its serious detriment. Besides, if the habit of neglecting this at school is indulged, it is practiced elsewhere; and the child, entering whatever place he may, shop, store, kitchen, or drawing room, carries along with him his usual complement of mud and dirt; and the unscraped and unwiped feet are welcome nowhere, among persons a single grade above the quadruped race.

I may be told, it is a matter little attended to by many adult persons of both sexes. To which I would reply, in the language of Polonius,

> ——— "'T is true—'t is pity;
> And pity 't is—'t is true."

But this, instead of being an argument in favor of the non-observance of the wholesome rule in our schools, only points more emphatically to the duty of teachers in relation to it; for when, unless during the school-days, are such habits to be corrected, and better ones established?

I am fully aware of the difficulty of carrying rules like this into execution, even among children of double the age of those that form the schools of some who hear me; and do not forget how much this difficulty is increased by the tender age, and consequently greater thoughtlessness, of most of the pupils of the schools usually taught by females; but still, much may be done by proclaiming the rule, and placing at the school entrance one of the elder scholars, to remind the others of it, and see that it is observed, until the cleanly *habit* be established.

In the school above alluded to, the rule has grown into so general observance, that the discovery of mud on the stairs or entry leads immediately to the inquiry, whether any *stranger* has been in. For, though few carry the habit with them, all are so trained by *daily drilling*, that it soon becomes as difficult to *neglect* it, as it was at first to regard it.

Hanging up on the hooks, caps, outer garments, &c., by loops. It is not every school that is provided with hooks or pegs for children's caps, garments, &c. All, however, *should* be so provided with as much certainty as seats are furnished to sit upon. It not only encourages the parents to send the children in comfortable trim, but induces the children to take better care of their things, especially if a particular hook or peg be assigned to each individual pupil. It is one step in the system of *order*, so essential to the well-being of those destined to live among fellow-men. If dependent on the attention of mothers at home, I am aware that many children would often be destitute of the loops spoken of; but the children themselves could supply these, under the teacher's supervision; for I understand the use of the needle is taught, in many schools, to the younger pupils of both sexes, and has been found a very satisfactory mode of filling up time, which, among the junior classes, would otherwise be devoted to idleness.

The next in order is, on keeping clean the person, clothes, and shoes. This, I am aware, must cost the teacher a great deal of labor to enforce; for if sent from home in a clean condition, the chances are more than two to one, that, on reaching school, a new ablution will be necessary. And in how many families this business of ablution is rarely attended to at all, with any fidelity; and as to clean clothes and shoes, if insisted on, the answer might be in some such *pleasant* and laconic language as this: "He ought to be thankful that he can get *any* clothes, without all this fuss, as if he were dressing for a wedding or a coronation!" Still, the rule is a *good* one, and should be enforced, as far as practicable. *Water* can at least be had; and if a child seems a stranger to its application, one or two of the elder scholars should be sent out, as is the practice in some European schools, to introduce it to him, and aid him in using it. And if you can arouse him to feel some pride in keeping his dress and person clean, and his shoes well polished, or at least, in keeping them *free of mud*, you teach him a lesson of self-respect, that may prove his temporal salvation, and bring him to be, when out of school, instead of the squalid vagrant, a companion of pilferers and refugees from justice, the incipient worthy member of society, and perhaps a benefactor of his race. It is amazing to reflect how very slight a circumstance in the life of a human being, in the early stages, sometimes casts him on that tide, which leads to glory or to infamy!

Some one of note has said, that "he considers cleanliness as next to godliness;" and I have been accustomed to look upon one, thoroughly clean in the outward man, as necessarily possessing a clean heart, a pure spirit. Whether it may be adopted as a rule of judgment or not, need not now be decided. The claims of cleanliness are, without considering the deduction as infallible, too commanding to be resisted, and should ever be maintained.

The fourth relates to quitting the neighborhood of the school, on being dismissed. This is desirable for the safety of the children; it removes them to some extent, from temptation, and aids in the fulfillment of the reasonable expectations of parents, that their children will be at home at the appointed hour. It is a practical lesson in punctuality, which, as the young come into life, will be found of great service to them. It may be ranked with behavior, and considered as among those things which constitute the character of a good child. It is especially due to the families residing in the vicinity of the school. Do what you may to prevent annoyance, it is scarcely possible for a large school to be an agreeable neighbor to families within its hearing. They are subject to its petty disturbances, in all states of health and sickness, in trouble and in joy; and are surely entitled to the relief afforded by dismissal and sending the children to their homes. Shouting, screaming, and yelling, should be prohibited, and the children directed to go away in a quiet and orderly manner. Surely, every principle of courtesy, of kindness, and good neighborhood, demands it, and should not demand in vain. Who has not waited with the operations of some of the senses suspended, for the periodical abatement of an intolerable nuisance, and *felt*, in due time, all the joy of the anticipated relief?

"Every boy to be accountable for the condition of the floor nearest his seat;" that is, he is not to allow any thing, whether valuable or not, to lie on the floor, and, consequently, every thing contemplated in the preceding rule, as far as any individual's vicinity is concerned, is taken care of, and all worthless articles likewise removed. This making committee-men of all the pupils must have a very good effect on the condition of the school room, and promote that neatness and order, which are above recommended.

The next rule requires the pupils to be particularly quiet and diligent, when the teacher is called out of the room. This I regard as of very great consequence; for it involves a sentiment of magnanimity, which it should be the aim of all guardians of the young to implant, to develop, and to cherish. Children often infringe school regulations, and much is to be overlooked in them, especially when at a very tender age. Their little minds are scarcely able to entertain, for a long time together, the influence of many rules, except under the excitement of great hope or fear; and when the teacher is *present*, they often unconsciously offend, and should be judged with clemency; but when left as their own keepers, they should be early made to understand how discourteous, how dishonorable, how base, it is to transgress the laws of the school. Each should vie with each in good example, and thus convince the instructor, that confidence reposed in them can never be abused.

The last item, under the head of Requisitions, is this: "To promote, as far as possible, the happiness, comfort, and improvement, of others." If to the few exclusively moral and religious obligations, those of *courtesy* be added, this requisition cannot fail of being observed. I say, exclusively or *strictly* moral, because the notion of courtesy hardly enters the mind, when we speak of *moral* conduct; and yet, in nearly all the minor points, and in most which affect the happiness of others, in our ordinary intercourse with them, apart from the transactions of business, it is *courtesy* that influences us most. It may be denominated the *benevolence* of *behavior*. Aware I am that a hypocrite may be courteous; and hypocrisy in a child is inexpressibly loathsome. But hypocrisy is not a *necessary* attendant on courtesy. One may be as courteous as Lafayette, and yet as pure and upright as Washington. If, then, school-boys are kind-hearted and friendly to their mates, and evince it towards them in their manners, they will, by their example as well as by their words, fulfill the injunction of the rule.

The "*Prohibitions*" are in the same spirit as the *requisitions*, and seem to be much the same in substance, although thrown into a negative form of speech. The first is in these words: "No boy to throw pens, paper, or any thing whatever, on the floor, or out at a window or door." This refers to a *voluntary* act of the pupil,—the rule requiring boys to pick up whatever is found on the floor, to those accidental scatterings, for which one would not be culpable. The prohibition is founded on that necessity for order and neatness, which must ever be maintained in a well-conducted institution, to whatever object, worthy of attention, it may be devoted. And this is urged thus repeatedly, because of the ineffable importance of *first steps*. Begin right, should be the motto and rallying word of every nursery and every school.

Spitting on the floor. This topic I would willingly avoid, but fidelity to my charge forbids it. The *practice*, disgusting as it is, is too prevalent in many of the families that furnish pupils for your schools, to be overlooked, or winked out of sight; and if the children could carry home new notions in regard to it, I am sure you would have furnished a good lesson to their parents.

The habits of large portions of society demand a reform. It is futile to expect any general amendment in those who have grown old in given practices; but with the children, those whose habits are, to a great extent, yet unformed, much may be done. And although the counteracting influences of home militate against your wholesome requisitions, happy is it for us, that a goodly portion of New England respect for teachers still remains, to give authority and weight to your well-founded and reasonable rules. In many, if not in most, families, of our own countrymen, the fact that the 'school-ma'am' said so, is sufficient to make the rule promulgated binding on the parents; the mother, especially, will exert her authority and influence on the teacher's side; and if the teacher possesses the qualities of judgment, discretion, a proper consideration for the circumstances of the families to which her children belong, to guide her in the adoption of her regulations, she will be able to exert a power for good, within the sphere of her daily duties, which will continue to be felt and acknowledged, long after she shall have rendered her final account.

Marking, cutting, scratching, chalking, on the school-house, fence, walls, &c., are forbidden, as connected with much that is low, corrupting, and injurious to the property and rights of others. They are the beginnings in that course of debasing follies and vices, for which the idle, the ignorant, and profane, are most remarkable; the first steps in that course of degradation and impurity, by which the community is disgraced, and the streams of social intercourse polluted. You mark the track of its subjects as you would the trail of a savage marauding party, by its foul deeds and revolting exploits; as you would the path of the boa constrictor, in its *filthy slime*, which tells that man's deadly enemy is abroad. And *we* are called on, by every consideration of duty, to ourselves, to our offspring, and to our race, to *arm* against this tremendous evil, this spiritual bohon upas, which threatens so wide-spread a moral death.

We cannot escape the evidences of this, which assail us on every hand, sometimes on the very walls of our school-houses and churches; but especially in places removed from *public* view, where the most schocking obscenity of language is displayed, to poison the youthful mind, illustrated by emblems, which, in the words of one who deeply mourns with us over the existence of this monstrous evil, this desolating curse, "*would make a heathen blush!*" These frightful assaults on decency demand reform. The deep, low murmur of insulted humanity will, I doubt not, unless this evil be checked, ascend to the tribunal of Eternal Purity, and invoke the malediction of our Judge, which may yet be displayed in the blasting of our fair land, like another Sodom! To avert so deplorable a catastrophe, let the thousands of the good and virtuous in your midst, formed into one indomitable phalanx, take the noble stand which belongs to them, and never abandon it, till the enemy be forever vanquished; forever banished from the now polluted, but ever to be cherished, land of the Pilgrims!

By these practices, the mind acquires such a hankering after, and morbid relish for mischief, that no tree, or shrubbery, or flowers, or public embellishments, or exhibitions of art or taste, however beautiful or expensive, are sacred from the marring or destructive touch. A sensibility to the beautiful needs to be cultivated among us; and may easily be done with the young, if a proper and sincere value be placed upon it by ourselves, and the children see that our admiration is a reality. It exists much more generally in continental Europe, than in our own country. There, the decorations of public walks, parks, and gardens; the galleries of the arts, and the magnificent structures which adorn their cities, are looked at, enjoyed, admired, by all classes; and rarely, indeed, is the Vandal hand of mischief or destruction found to desecrate these monuments of a nation's refinement. But how is it with us? No sooner has the artist given the last touch to the fluted column, than some barbarian urchin chips off a wedge of it, in wanton sport. How often is our indignation excited by the painter's boy, who, as he passes the newly-erected dwelling or recently-painted wall, daubs it with his black paint-brush, for yards in length, as he saunters heedlessly along. And what more common, in almost all public buildings, in cupolas, observatories, &c., especially, for persons, apprehensive of being forgotten by posterity, than to cut out their names or their initials, as if this were their only road to immortality!

The *use of knives* is the thing next prohibited. In mere *primary* schools, this rule, and the one last mentioned, would find, perhaps, little to do. Some, however, there are, I doubt not, even in such schools, who suffer from the too free use of knives, as their forms, desks, or benches, could testify. Nothing is more fascinating to a boy than a knife. And what pleasure can there be in possessing a knife, if one may not use it? Hence the trouble occasioned by the instrument. He early learns in imitation of his *elders* if not his *betters*, that wood was made to be cut, and that the mission of a knife is, to do the work.

This topic can hardly be thought out of place, by those who will look into the recitation-rooms of almost any of our colleges, where many a dunce, unworthy of any *degree*, soon, by his dexterity in this department, lays claim to that of master of the art,—of *hacking;* "and has his claim allowed."

I have already adverted to the *whittling* propensities of our people; but, with your permission, I will add a remark or two, with a view to placing this national peculiarity in a stronger light. So proverbial have we become, among foreigners, in this respect, that, if a Yankee is to be represented on the stage, you find him with a jackknife in one hand, and in the other a huge bit of pine timber, becoming every moment smaller, by his diligent handiwork. If he is talking, arguing, or, more appropriately, if he is driving a bargain, you find him plying this, his wonted trade, with all the energy and dexterity of a beaver; and, as it was once said of an English advocate, that he could never plead, without a piece of packthread in his hands, so the Yankee would lose half his thrift, unless the knife and wood were concomitants of his chaffering. But the habit is of evil tendency, and ought to be checked. He indulges in it without discrimination, upon whatever is cut-able; and, worse than the white ant, which saws down and carries away whole human habitations, when they have become deserted, the whittling Yankee would hack your dwelling in present occupation, until he rendered you houseless. Let the mischief be checked betimes; do it at school; showing, at the same time, the uselessness, the folly, and the annoying nature, of the habit. It is not merely at home, among our own people, that it is practiced by us; but we carry it with us wherever we go, and, even among strangers, establish our New England identity by it.

The *spirit* of the school rules at which we have glanced, should be carried into every family. It is not enough to present the summary at which we have arrived; we should also insist on minor particulars, by words and actions, not at school only, but *at home*, where great familiarity produces influences unfavorable to the exercise of courtesy,—such as the closing of all doors, especially in cold weather; the doing of it gently, without *slamming;* moving quietly over the floor; abstaining from shouting, whistling, boisterous plays, wearing the hat in the house, &c. Just in proportion as such habits can be secured by *your* labors, will you bring down upon your heads the blessing of mothers, worn by care, by sickness, and the rudeness of their offspring. Powerless themselves, to produce a reformation, their gratitude to you will be sincere and heartfelt.

Children should be taught to take leave of their parents and friends, on going to school, and to offer the friendly salute and kind inquiry, on returning home. Nothing tends more to strengthen the silken cords of family affection, than these little acts of courtesy; and their influence on the observer is highly favorable to benevolent feeling. If these points are attended to in our families, they will not fail of being carried into company, where they are always a coin of sterling value.

Dedicatory Exercises.

The opening of a new school-house is an occasion which well deserves a public and joyful commemoration. Out of it are to be the issues of life to the community in the midst of which it stands, and like the river seen in the vision of the prophet, which nourished all along its banks trees whose leaves were for the healing of the nations, the well-spring of all its influences should be a spot consecrated by religion. In prayer, and in praise to the Giver of all good, and the Author of all being,—in song, and hymn and anthem, and in addresses, from those whose position in society will command the highest respect for any object in whose behalf they may speak, and in the presence of all classes of the community, of pupils, and teachers, of fathers and mothers, of the old and young,—the school-house should be set apart to the sacred purpose of the physical, intellectual and moral culture of the children who will be gathered within its walls. We rejoice to see that these occasions are thus improved, and that so many of our most distinguished teachers, scholars and statesmen take part in the exercises. We have before us a large number of addresses, at once eloquent and practical, which have been delivered at the opening of new school-houses, and we shall select a few, not for their superiority to the rest, but as specimens of the manner in which topics appropriate to the occasion are introduced, and as fitting testimony to the importance of School Architecture.

School Celebration at Salem, Mass.

On the first of March, 1842, the occasion of occupying several new school-houses, was marked by a variety of interesting exercises, an account of which will be found in the Common School Journal for that year. We copy the addresses of Mr. George B. Emerson, and of G. F. Thayer.

Mr. Emerson said,—

"I congratulate you, my young friends, on this happy event. This pleasant day is like a smile of Heaven upon this occasion; and I believe Heaven always smiles on events like this. Many of us whom you see here have come from a distance, on the invitation of your excellent friend the Mayor, to show the interest which we feel in you, and in what has been done here for your improvement. We have taken great pleasure in looking over the buildings prepared for your use, the admirable arrangements and apparatus, so much superior to what is usually enjoyed by children in your position. We have been pleased to hear of the faithful teachers that are provided for you, and the excellent plan of your studies, and the excellent regulations.

Your fathers and friends have spared no pains to furnish you with all the best means and opportunities for learning. They now look to you to do your part. All that they have done will be of no avail, unless you are excited to exert yourselves,—to prove yourselves worthy of these great advantages.

I was gratified, in looking over the regulations, to see the course marked out for you,—to see the stress laid upon the great substantials of a good education,—to see the prominent place given to that most useful art, that most graceful accomplishment, *reading*. You cannot, my young friends, realize the great and manifold advantages of gaining, now, in the beginning of your life, familiarly and perfectly, the single power of reading distinctly, naturally, intelligently, with taste and interest,—and of acquiring a *love* for reading. There is no situation in life, in which it will not prove to you a source of the purest pleasure and highest improvement.

For many years, and many times in a year, I have passed by the shop of a diligent, industrious mechanic, whom I have often seen busy at his trade, with his arms bare, hard at work. His industry and steadiness have been successful, and he has gained a competency. But he still remains wisely devoted to his trade. During the day, you may see him at his work, or chatting with his neighbors. At night, he sits down in his parlor, by his quiet fireside, and enjoys the company of his friends. And he has the most extraordinary collection of friends that any man in New England can boast of. William H. Prescott goes out from Boston, and talks with him about Ferdinand and Isabella. Washington Irving comes from New York, and tells him the story of the wars of Grenada, and the adventurous voyage of Columbus, or the Legend of Sleepy Hollow, or the tale of the Broken Heart. George Bancroft sits down with him, and points out on a map, the colonies and settlements of America, their circumstances and fates, and gives him the early history of liberty. Jared Sparks comes down from Cambridge, and reads to him the letters of Washington, and makes his heart glow with the heroic deeds of that godlike man for the cause of his country. Or, if he is in the mood for poetry, his neighbor Washington Allston, the great painter, steps in and tells him a story,—and nobody tells a story so well,—or repeats to him lines of poetry. Bryant comes, with his sweet wood-notes, which he learnt among the green hills of Berkshire. And Richard H. Dana, father and son, come, the one to repeat grave, heart-stirring poetry, the other to speak of his *two years before the mast.* Or, if this mechanic is in a speculative mood, Professor Hitchcock comes to talk to him of all the changes that have befallen the soil of Massachusetts, since the flood and before; or Professor Espy tries to show him how to predict a storm. Nor is his acquaintance confined to his own country. In his graver hours, he sends for Sir John Herschel from across the ocean, and he comes and sits down and discourses eloquently upon the wonders of the vast creation,—of all the worlds that are poured upon our sight by the glory of a starry night. Nor is it across the stormy ocean of blue waves alone that his friends come to visit him; but across the darker and wider ocean of time, come the wise and the good, the eloquent and the witty, and sit down by his table, and discourse with him as long as he wishes to listen. That eloquent blind old man of Scio, with beard descending to his girdle, still blind, but still eloquent, sits down with him; and, as he sang almost three thousand years ago among the Grecian isles, sings the war of Troy or the wanderings of the sage Ulysses. The poet of the human heart comes from the banks of Avon, and the poet of Paradise from his small garden-house in Westminster; Burns from his cottage on the Ayr, and Scott from his dwelling by the Tweed;—and, any time these three years past, may have been seen by his fireside a man who ought to be a hero with schoolboys, for no one ever so felt for them; a man whom so many of your neighbors in Boston lately strove in vain to see,—Charles Dickens. In the midst of such friends, our friend the leather-dresser lives a happy and respected life, not less respected, and far more happy, than if an uneasy ambition had made him a representative in Congress, or a governor of a State; and the more respected and happy that he disdains not to labor daily in his honorable calling.

My young friends, this is no fancy sketch. Many who hear me know as well as I do, Thomas Dowse, the leather-dresser of Cambridgeport, and many have seen his choice and beautiful library. But I suppose there is no one here who knows a neighbor of his, who had in his early years the same advantages, but who did not improve them;—who never gained this love of reading, and who now, in consequence, instead of living this happy and desirable life, wastes his evenings in low company at taverns, or dozes them away by his own fire. Which of these lives will you choose to lead? They are both before you.

Some of you, perhaps, are looking forward to the life of a farmer,—a very happy life, if it be well spent. On the southern side of a gently sloping hill in Natick, not far from the place where may be still standing the last wigwam of the tribe of Indians of that name, in a comfortable farm-house, lives a man whom I sometimes go to see. I find him with his farmer's frock on, sometimes at the plough-tail, sometimes handling the hoe or the axe; and I never shake his hand, hardened by honorable toil, without wishing that I could harden my own poor hands by his side in the same respectable employment. I go out to look with him at trees, and to talk about them; for he is a lover of trees, and so am I; and he is not unwilling, when I come, to leave his work for a stroll in the woods. He long ago learnt the language of plants, and they have told him their history and their uses. He, again, is a reader, and has collected about him a set of friends, not so numerous as our friend Dowse, nor of just the same character, but a goodly number of very entertaining and instructive ones; and he finds time every day to enjoy their company. His winter evenings he spends with them, and in repeating experiments which the chemists and philosophers have made. He leads a happy life. Time never hangs heavy on his hands. For such a man we have an involuntary respect.

On the other side of Boston, down by the coast, lived, a few years ago, a farmer of a far different character. He had been what is called fortunate in business, and had a beautiful farm and garden in the country, and a house in town. Chancing to pass by his place, some four or five years ago, I stopped to see him. And I could not but congratulate him on having so delightful a place to spend his summers in. But he frankly confessed that he was heartily tired of it, and that he longed to go back to Boston. I found that he knew nothing about his trees, of which he had many fine ones,—for it was an old place he had bought,—nor of the plants in his garden. He had no books, and no taste for them. His time hung like a burden on him. He enjoyed neither his leisure nor his wealth. It would have been a blessing to him if he could have been obliged to exchange places with his hired men, and dig in his garden for his gardener, or plough the field for his ploughman. He went from country to town and from town to country, and died, at last, weary and sick of life. Yet he was a kind man, and might have been a happy one but for a single misfortune; he had not learned to enjoy reading. The love of reading is a blessing in any pursuit, in any course of life;—not less to the merchant and sailor than to the mechanic and farmer. What was it but a love of reading which made of a merchant's apprentice, a man whom many of you have seen and all have heard of, the truly great and learned Bowditch?

Our friends the young ladies may not think this which I have said exactly suited to them. But to you, my young friends, even more than to your brothers, it is important now to acquire a talent for reading well, and a taste for reading. I say *more important*, for, looking forward to the future, you will need it more than they. They are more independent of this resource. They have their shops, and farms, and counting-houses to go to. They are daily on change. They go abroad on the ocean. The sphere of woman, her place of honor, is home, her own fireside, the cares of her own family. A well-educated woman is a sun in this sphere, shedding around her the light of intelligence, the warmth of love and happiness.

And by a well-educated woman I do not mean merely one who has acquired ancient and foreign languages, or curious or striking accomplishments. I mean a woman who, having left school with a firmly-fixed love of reading, has employed the golden leisure of her youth in reading the best English books, such as shall prepare her for her duties. All the best books ever written are in English, either original or translated; and in this richest and best literature of the world she may find enough to prepare her for all the duties and relations of life. The mere talent of reading well, simply, gracefully,—what a beautiful accomplishment it is in woman! How many weary and otherwise heavy hours have I had charmed into pleasure by this talent in a female friend. But I speak of the higher acquisition, the natural and usual consequence of this, a taste for reading. This will give a woman a world of resources.

It gives her the oracles of God. These will be ever near her;—nearest to her hand when she wakes, and last from her hand when she retires to sleep. And what stores of wisdom, for this world and for a higher, will she gain from this volume! This will enable her to form her own character and the hearts of her children. Almost every distinguished man has confessed his obligations to his mother. To her is committed the whole formation of the character,—mind, heart, and body, at the most important period of life. How necessary, then, is it that she should possess a knowledge of the laws of the body and the mind! and how can she get it but by reading? If you gain only this, what an unspeakable blessing will your education be to you!

I need not, my young friends, speak of the other acquisitions you may make,—of writing, which places friends in the remotest parts of the world side by side,—or of calculation, the very basis of justice and honesty.

The acquisitions you may make will depend chiefly on yourselves. You will find your teachers ready to lead you on to higher studies whenever you are prepared to go.

These excellent establishments are emphatically yours. They are raised for your good; and, as we your seniors pass away,—and in a few years we shall have passed,—these buildings will become your property, and your children will fill the seats you now occupy. Consider them yours, then, to enjoy and profit by, but not yours to waste. Let it be your pride to preserve them uninjured, unmarred by the mischievous knives and pencils of vulgar children. Unite for this purpose. Consider an injury done to these buildings as an injury done to yourselves.

There is another thing which will depend on you, of more importance than any I have spoken of. I mean the tone of character which shall prevail in these schools. Your teachers will be happy to treat you as high-minded and generous children. Show that you can be so treated; that you are such.

Let me congratulate you upon the happy auspices of the name of him under whom, with the zealous co-operation of enlightened and patriotic associates, this momentous change in your school system has been effected,—a name which is borne by the oldest and best school in New Hampshire, and by one of the oldest and best in Massachusetts. It will depend upon you, my friends, to make the schools of Salem, equally, or still more distinguished, among those of the State."

Mr. Thayer said,—

Children: I did not expect that I should have the privilege of addressing you, on this most joyful occasion; for it was not till I met your respected Mayor, an hour ago, at the beautiful school-house we have just left, that I received an invitation to do so. You will not, therefore, anticipate a studied discourse, or any thing particularly interesting. Devoted, however, as my life is, and has long been, to the instruction and guidance of the young in no inconsiderable numbers, I shall, without further preface, imagine myself in the midst of my own school, and talk familiarly to you as I would, and do, to them.

And allow me to add my congratulations to those of your other friends, for the ample, beautiful, and convenient arrangements that have been made for you, in the school-houses of this city; and especially in the new one we have just examined. I can assure you, it is superior in almost every respect to any public school-house in New England, if not in the United States. It, with others in the city, has cost your fathers and friends a great deal of money, which they have cheerfully expended as a means of making you wise and good. But you have incurred a great debt to them, which you can never repay while you are children, but must endeavor to do it to your children, when you shall become men and women, and take the place of your parents in the world. But before that period, you can do something. Now, immediately on entering upon the enjoyment of the precious privileges extended to you, you can acknowledge the debt, evince the gratitude you feel, not by *words*, but *deeds*;—by, (to use an expression well understood by all children,) '*being good.*' Yes,—by 'being good and doing good;'—by obedience to parents and teachers; by kindness to brothers and sisters, and all your young friends and companions; by fidelity in duty, at home and at school; by the practice of honesty and truth at all times; by refraining from the use of profane and indecent language; by keeping the mind and heart free from every thing impure. These are the means in your own hands. Fail not to use them; and although they will in fact be merely an acknowledgment of your obligation for the boon you possess, your friends will consider themselves well repaid for all they have done for you. It is from such conduct that the teacher's, as well as the father's, richest reward and highest satisfaction are derived. To see the beloved objects of our care and instruction appreciating our labors, and improving in all that is good and useful, under our management, affords the greatest happiness, lightens the heavy load of toil, relieves the aching head, and revives the fainting spirit.

There is, however, one great danger to which you,—to which all the young,—are especially exposed. I mean the influence of bad example. Example is omnipotent. Its force is irresistible to most minds. We are all swayed more or less, by others. Others are swayed by us. And this process is continually going on, even though we are entirely unconscious of it ourselves. Hence we see the importance of choosing good companions, and flying from the bad. Unless this is done, it will be in vain for your friends to give you wise counsel, or for you to form good resolutions. 'Who can touch pitch and be clean?' You will resemble those with whom you associate. You will catch their words, their manners, their habits. Are they pure, you will be pure. Are they depraved, they will corrupt you. Be it a rule with you, then, to avoid those who are addicted to practices that you would be unwilling your most respected friends should know, and regulate your own conduct by the same standard.

I would particularly caution you against *beginnings*. It is the *first step* that is the dangerous one; since it is obvious that, if you were to ascend the highest mountain, it could only be done by a step at a time, and if the first were not taken, the summit could never be reached. But, one successfully accomplished, the next follows as a matter of course. And equally and fatally sure is the *downward* track to crime and misery! If we suffer ourselves to be drawn in *that* direction, what human power can save us from destruction? This danger, too, is increased by the feeling of security we indulge, when we say, 'It is only a *little* thing; we shall never commit any great fault;'—not remembering that nothing stands still in life, in character, any more than in the material universe. We must be going forward or backward; up, towards improvement and glory,—or down, towards infamy and woe! Every thing accumulates, according to its kind; though it begins small, like the snowball you hold in your hand, it becomes, as you roll it on the ground before you, larger at every revolution, till, at last, it is beyond your power to move it at all.

I will illustrate this by a sad case which has recently occurred in Boston. But first, I wish to interest you in something of an agreeable nature, in connection with the faithful performance of duty.

I have spoken of some things that you should do, to show your sense of the benefits which have been conferred upon you, and I should like to dwell on each one of them separately; but I shall have time only to speak of one. It is, however, among the most important. I allude to *speaking the truth*,—the most substantial foundation of moral character. It has innumerable advantages, one of which is strikingly exhibited in the following story:—

Petrarch, an eminent Italian poet, who lived about five hundred years ago, secured the confidence and friendship of Cardinal Colonna, in whose family he resided in his youth, by his candor and strict regard to truth.

A violent quarrel had occurred in the family of this nobleman, which was carried so far, that resort was had to arms. The cardinal wished to know the foundation of the affair; and, calling all his people before him, he required each one to bind himself by a solemn oath, on the Gospels, to declare the whole truth. None were exempt. Even the cardinal's brother submitted to it. Petrarch, in his turn, presenting himself to take the oath, the cardinal closed the book, and said, '*As for you, Petrarch, your* WORD *is sufficient!*'

What more delightful reward could have been presented to the feelings of the noble youth than this, from his friend, his master, and one of the highest dignitaries of the church? Nothing but the peaceful whispers of his own conscience, or the approbation of his Maker, could have given him more heart-felt satisfaction. Who among you would not be a Petrarch? and, in this respect, which of you could not?

While, then, I would hold up for imitation this beautiful example, I would present a contrast as a warning to you.

There is now confined in the Boston jail a boy of fourteen years of age, who, for the previous six years, had been sinking deeper and deeper into vice and crime, until last October, when he was convicted, and sentenced to two years' confinement within the cold damp cell of a gloomy prison, for aggravated theft. In his own written account of his life, which I have seen, he says that he began his wretched course by playing truant from school. His second step was *lying*, to conceal it. Idle, and destitute of any fixed purpose, he fell in company with others, guilty like himself, of whom he learned to steal, and to use indecent and profane language. He sought the worst boys he could find. He became a gambler, a frequenter of the circus and the theatre, and engaged in various other corrupt and sinful practices. At length, becoming bold in his dishonesty, he robbed the post-office of letters containing very considerable sums of money, and was soon detected and condemned. If you were to visit that abode of misery, you might often see the boy's broken-hearted mother, weeping, and sobbing, and groaning, at the iron grating of his solitary cell, as if she would sink on the flinty floor, and die! 'And all this,' (to use the boy's own words,) 'comes from playing truant!'

Look, then, my young friends, on these two pictures,—both taken from life,—and tell me which you like best; and which of the two characters you propose to imitate. Will you be young Petrarchs, or will you adopt the course of the unfortunate boy in Boston jail? They are both before you. If you would be like the former, *begin right*. Resist temptation to wrong-doing, with all your might. Let no one entice you from the way which conscience points out.

This precept is applicable to all,—to both sexes and every age. Let me, then, I pray you, when I shall inquire, hereafter, respecting the habits and characters of the children of the Public Schools of Salem, have the satisfaction to hear, that the instructions of this occasion made an impression on their minds favorable to truth and duty, which subsequent time could never efface.

Dedication of the New School-house in Pawtucket, October 31, 1846

Address of President Wayland, of Brown University.

Ladies and Gentlemen,

There is something deeply interesting, both to the philanthropist and to the political economist, in the appearance of such a village as this, the abode of wealth, civilization and refinement. We find ourselves, as we look upon it, unconsciously reverting to the period, not very remote, when this whole region was a desert. Thick forests covered all these hills, and pressed down even to the water's brink. This river rushed over its rocky bed, or tumbled down its precipitous ledges, unnoticed by the eye of civilized man. A few savages from time to time, erected their transient wigwams upon its banks, as the season of hunting or fishing attracted them, and they alone disputed the claim of the beasts of the forest to this beautiful domain. The products of all this region were a scanty and precarious pasturage for game, a few canoe loads of fish, and, it may be, a few hundred pounds of venison. Whatever else the earth produced, fell and perished ungathered. Age after age, beheld this annual waste. Here was the earth with all its capabilities. Here were the waters with all their unexpended powers. But here was no man whose intellect had been instructed in the laws of nature. Here was neither continuous industry, nor even frugal forethought. Hence there could be no progress. All things continued as they were from the beginning of the creation.

About two hundred years since, the first civilized man cast his eyes over this beautiful landscape. He brought with him the arts and the science of the older world, and a new era commenced in the history of that part of our country, since known as Rhode Island. The labors of agriculture soon began to work their magic changes. The forest was felled, the soil was tilled, and, in the place of the precarious products of the uncultivated field, rich harvests of grain waved over these plains. The beasts of the forest retired, and the animals given by the Creator to aid us in our toil, occupied their place. Instead of the graceful deer, the clumsy moose, the prowling wolf and the ravenous panther, these fields were covered with the lowing herds, the bleating sheep, the laborious ox, and the horse, in all latitudes the faithful servant of man.

This was a great and glorious transformation. From the moment that a civilized man first thrust his spade into this earth, or here yoked his oxen to the plough, the sleep of ages was broken, and the reign of progress commenced. From this moment the darkness had begun to pass away, and the sun was dispersing that night, which, since the deluge, ad brooded over this land. From that auspicious beginning, all the means of happiness that the eye beholds, have proceeded. Acre after acre has been reclaimed from barrenness. Every variety of product has been tried, in order to ascertain which would be produced by the earth most kindly. The smoky wigwam gave place to the log house, and this in turn, to the convenient farm-house, or the stately mansion. And thus another portion of the earth was added to the area of Anglo-Saxon civilization.

But still the river, to which all the distinctive prosperity of this region owes its origin, ran, as it ever had ran, to utter waste. This mighty and most productive means of wealth, remained wholly unemployed. A mine richer than that of gold, was yet unwrought. It was a mine of *mechanical power*, instead of *metallic treasure*, and let me add, a mine of incalculably greater value. At last it was discovered, that this little river, falling over its innumerable ledges, could do the labor of many thousand men. An accomplished manufacturer,* from England, whose name has made this village one of the most renowned spots in our country, came among us, and applied the power of this water-fall to the spinning and weaving of cotton. Who can measure the results of this one grand experiment? We hear of battles and sieges, of the defeat of armies, the capture of towns, the destruction of fleets; but what achievement of war was ever of such importance to a people, as that which was accomplished, when that wheel made its first revolution, and the first thread of cotton was here, in this very village, spun by water power? From this moment may be dated the commencement of general manufactures in this country, and that of cotton in particular. From that moment, every fall of water throughout our land became a most valuable possession. From that moment, this noble natural agent began, everywhere, to fabricate garments for our people. From that moment all the labor, of every age, throughout New England, could be profitably employed. From that moment it was certain that capital to any amount could readily find investment. The rich proceeds of one manufactory laid the foundations of a similar one by the side of it. As one branch of manufactures began to supply the demand of the nation, another branch was established. Thus we are every year adding millions to this form of investment, and employing additional thousands of hands in this mode of industry. We are entering into generous and successful rivalry with the nations of Europe. Already many of our cottons are preferred to theirs in the markets of the world. Soon, other branches of our manufactures will be brought to equal perfection. Nay, I anticipate the time when we, in this country, under a system of generous reciprocity, shall supply the continent and England herself with all those articles, for the fabrication of which we have special advantages.

But this chain of events by no means ceases here. Year after year every branch of manufactures is increasing its means, and distributing the proceeds of its labor over every part of our land. Wherever a fabric is sent, it is exchanged, in some form, for the productions of that region in which it is consumed. The common means for accomplishing these mutual and increasing exchanges, soon became utterly inadequate; more efficient modes of transportation must, from necessity, be invented. The business of the country could not be carried on without them. Our manufacturing prosperity, while it creates the necessity for internal improvements, also supplies the means for constructing them. The annual gains of manufacturing capital are next invested in canals and railroads, and thus the means of transporting these fabrics at the least cost, are at once

* Mr. Slater has even a higher claim to the gratitude and veneration of this country, than that which he derives from the introduction of the cotton manufacture. He established in Pawtucket the first Sunday School that was ever opened in America; and for some time sustained it wholly at his own expense.

provided. Here is, then, another mode created, of advantageous investment. By means of internal improvement, the market of every producer is indefinitely extended, he also receives a fair remuneration for this very investment, by which his market is thus extended, and, at the same time the consumer receives whatever he purchases at a cheaper rate and in greater perfection. Thus, as we always observe, under the government of God, a real benefit to one is a benefit to all. And hence we learn, that to attempt to secure exclusive advantages to ourselves, is always abor lost. Nothing can be a real benefit to us, that is not a real benefit also to our neighbors.

And the illustration of all that I have said, is manifest every where around us. We behold how every other art has clustered around the art of transforming cotton into clothing. We see how one establishment has been the seed that has produced a multitude of those that resemble it. You see how manufactures have given rise to internal improvements; how the spindle has cut through the mountains, and filled up the valleys and graded the road, and stretched from city to city the iron rail. You see how loth these inseparable friends are to be parted from each other. The region of manufactures is the region of railroads. And you perceive, as the iron road that passes through this village, pursues its way toward the west, how it winds along through the valley of the Blackstone, greeting every village and waking every hamlet to renewed activity.

All this you readily perceive. You must be astonished yourselves, when you reflect upon the amount of capital which a single life time has added to the resources of this village, and the country in its immediate vicinity. But while we exult in the large measure of prosperity with which a bountiful Providence has endowed us, it may not be uninstructive to inquire, in what ways have these blessings been improved? Has it ever occurred to you, that almost all this capital has been invested in procuring for ourselves, the means of *physical* happiness? We erect houses, and we render them spacious, warm, and commodious. We furnish them with every means of physical luxury. We spread carpets for our feet. We stretch ourselves on couches of down. We temper the atmosphere at our will. We clothe ourselves with vestments wrought in every clime, and by people of every hue and language. We vary our dress with every fashion. We load our tables with luxuries imported from the tropics or the poles; we vex sea and land for new viands to stimulate our palates, already saturated with abundance. We please ourselves with every form of equipage, and tax the ingenuity of every artisan, that we may be enabled to roll from place to place without the fatigue of motion. But why need I proceed to specify any further. We all perceive, on the least reflection, that it is in expenditures of this kind, that almost all the expenses of living are incurred.

But if this be true, must there not be some grievous error in the principles of our conduct? Can this be a wise mode of expenditure for intelligent and immortal beings? In all that I have here recited, is there any thing in which, on principle, we have excelled, (excuse the homeliness of the illustration,) the *Beaver* that once inhabited these streams? The thoughtful animal expended all the treasures of his intellect or instinct, in rendering his dwelling commodious; and he accomplished it. Have we not done precisely the same thing? Has not all the expenditure of which I have spoken, been consumed for the convenience of the physical, the perishable, the material? Might not all this have been done, had we no consciousness of an immortal spirit?

But God has made us immortal. He has given to us a spiritual existence. Each one of us possesses a priceless mind. We are endowed with reason to discover truth, imagination to form conceptions of the beautiful and the grand, taste to delight in all that is lovely or glorious, and conscience by which we are allied to God the Father of all, and the holy and blessed throughout the universe. It is by the possession of these powers, that man claims precedence over the brute. It is by the cultivation of these, that we have become more powerful than the savage, who once dwelt where we now dwell. It is by the use of these powers, that all the wonders of art have been wrought, which we now behold around us. If such be the fact, it must certainly be true that this, the spiritual part of man, is by far the most deserving of attention, and that, in the cultivation of this portion of our nature, we can in the most appropriate manner invest our capital.

But while this is evident, does our practice correspond with these well established principles? We liberally expend our substance to preserve our bodies in health, and to cultivate in our children the full development of every power, and the outward manifestation of every grace. But do we bestow proportionate labor in developing every spiritual faculty, and protecting the immortal part from the spreading contagion of evil example, and the wasting results of evil habit? We expend whatever is necessary in furnishing our tables with every thing that may be desired for the sustentation of the body. Where is there the man among us, who would not blush to be considered an illiberal provider for the wants of his household? but is any man ashamed to confess that he has made no provision for the spiritual appetites of his children? Who of us would permit tainted or unwholesome food to be brought into his house, or placed upon his table? and yet is not intellectual food of the most questionable character, daily read in the houses of many of our most excellent citizens? Who is ashamed to declare, that he has no library in his house, or that, he has never taken the pains to inquire whether the books that are read by his family, are useful or deleterious?

But this is not all. We know that the youthful mind is destitute of knowledge, and that it is strongly predisposed to the formation of improper habits. Every one knows that a child needs instruction, and that the labor of giving it instruction should be devolved upon those only, who are intellectually and morally qualified to impart it. The parent can rarely do this for himself. The principle of division of labor teaches us, that it can be much more successfully done by some one who will devote his whole attention to it. But, now, let us look over our own neighborhoods, and observe how very small, until quite lately, has been the amount of capital devoted to the education of our youth. Compare it with almost every other form of investment, and you at once perceive how small is its relative amount. Take, for instance, the railroad which passes within a stone's throw of the place in which we are assembled. Many of you and your fellow citizens, subscribed for its stock. You did wisely. It will, I presume, raise the value of every form of property here. Land will sell for a better price. You will thus become directly connected with the whole of the South, and with the whole of the East and West; and you can, at very little expense of transportation, exchange productions with the remotest extremities of our country. This is certainly an improvement upon your former means of communication, and you are willing to invest your capital in the effort to secure it. But suppose you had been assessed to an equal amount, in order to provide the means of education; suppose you had been called upon to subscribe the same sum in aid of an effort to give to the youth of this village the best education in New England, would you not have considered the demand excessive? Would you have believed that you could possibly have paid it? Yet, I ask, is not the education of your children as important an object as the improvement of your means of transportation? Suppose you were to unite in such an effort, would not the amount of which I have spoken be sufficient to accomplish the result, the giving to your children the best education in New England. Is it not evident, then, that we bestow upon the means of education, an attention very much less than they deserve?

I have spoken in this manner as though I were addressing you in particular. But this is not what I intend. I speak of the amount of attention which, until lately, has been given to this subject, here in this State, and throughout New England. I know as well as you, that you have not been specially behind hand in this matter. You have always been prepared to do your part, in every effort to improve the condition of education amongst us. I have, however, alluded to these facts and have presented these parallels, that you may be enabled to judge of the degree in which we have erred, in estimating the proportion of our income which is due to the cause of education.

I greatly rejoice, however, that indications of decided improvement in this respect, are visible every where around us. In Massachusetts, for several years past, no subject has appealed with greater success to the enlightened public opinion of her citizens. One of her most gifted and eloquent sons has consecrated his life to this noble cause, and the results of his efforts have become every where apparent. Nor have we of Rhode Island been wholly wanting to ourselves in this good work. Although for many years the people were indifferent to their true interests in this respect, yet, when they came to its importance, they pursued it with a manly steadfastness and a far-seeing liberality, which would do honor to any community in our country. The school system of Providence is acknowledged to be second to none in the land, in excellence and efficiency. The people in all our districts, agricultural and manufacturing, are seeking to know the best means of promoting the thorough education of their children; they are building school-houses on the best models that can be presented to them, and are raising money, with annually increasing liberality, for the purpose of accomplishing these results most perfectly.

It gives me great pleasure, Ladies and Gentlemen of Pawtucket, to be a witness to the enlightened zeal which you have manifested on this subject. From this village, first went forth the impulse which called into existence the most important manufacturing interest in this country. It is meet that as you have taught us how to supply our external, you should teach us how to supply our internal wants. You have taught us how we may clothe our bodies, it is well that you should teach us how to cultivate, and strengthen, and ennoble our minds. You have intended to render this school-house a model for your fellow citizens throughout the State. It is a noble and patriotic emulation, and we thank you for it. We hope that every village and district in the State will imitate your example.

I am delighted to observe that, in all your arrangements, you have in this matter acted with wise and thoughtful liberality. Instead of putting your school-house out of sight, in an inconvenient and unhealthy position, you have placed it on an eminence, in a desirable locality, and have determined to surround it with ample play-grounds. The building itself is exceedingly pleasing in its external proportions, and forms one of the most agreeable ornaments of your village. You thus associate education in the mind of the young with every thing gladsome and alluring; while, at the same time, you testify to your children, the importance which you attach to their intellectual cultivation.

The apartments of your house are large and convenient. The desks are constructed upon the most improved models, and the seats seem to me durable and neat, and, at the same time, comfortable to the pupil. Every thing in the school-rooms has the air of finish and completeness. The arrangements for illustration, by the blackboards, are, and I presume that those by every other means will be, ample. With such instructors as you have appointed, seconded by your own zealous and untiring efforts, I have no doubt that this school will be all that you desire to make it, one of the first model schools of New England.

But I perceive that your forethought has gone farther. You have determined that other habits, besides those of the intellect, shall here receive their appropriate share of attention. You have provided for each scholar an exclusive place for his own hat and outer clothing. You have furnished your apartments with convenient wash-rooms, an improvemen which I do not remember to have seen in any other school-house. Thus you have made it necessary for each scholar to cultivate habits of order and cleanliness. In all these respects, I do not see how your arrangements could be better made, or how any thing else could reasonably be desired.

How delightful an object of contemplation is such a school as this, when faithfully and zealously conducted. Here the slumbering germs of intellect will be quickened into life. Here talent, that would otherwise become torpid from inaction, will be placed upon the course of indefinite improvement. Here, the rough and uncultivated, arrested by the charms of knowledge, and allured by the accents of kindness, will lay aside their harshness, and assume the manners of refinement and good breeding. From hence the lessons of knowledge and the habits of order will be carried to many a family, and they will there awaken a whole circle to a higher and purer life. In a word, take the five hundred children, whom this building will accommodate, and suppose them destitute of the knowledge, the discipline and the manners, which this school will confer; trace their course through life in all its vicissitudes, and observe the station which each of them must occupy; and then, suppose these five hundred children imbued with the knowledge which you here are prepared to give, and the habits which you intend to cultivate, and follow them through life, and observe the stations which you have qualified them to occupy; and you have the measure of good which, year after year, you are accomplishing by the establishment of these means of instruction. Look at the money that it costs. You can calculate it to a single cent, both the principal investment and the interest which it would yield. But can you estimate the intellectual service, and moral advantages which will accrue to you and your children, by this expenditure? The one is to you as the small dust of the balance. Were it all lost, you would hardly think of it. You would not think it worth while to smile at a man, who should say, Pawtucket is ruined, for it has lost a sum equal to that which all its means of education have cost. But suppose that, what that sum has purchased were lost; suppose that your schools were shut up, and your whole population consigned to ignorance; that henceforth reading, writing, and all the knowledge which they unfold, should be taught or learned here no more for ever; then would Pawtucket in reality be ruined. Every virtuous and intelligent family would flee from your border, and very soon your name would be an opprobrium to New England. I ask, then, in view of all this, is there any money which you invest, that brings you in so rich a revenue, as that which you devote to the cause of education?

But I ought to apologize for occupying so much larger a portion of your time than I intended. I must, however, even now, break off abruptly, and give place to others who are much more deserving than myself to be heard on this occasion. I will therefore add but a single suggestion. Let this effort which you have made, be but the first step in your progress. Cultivate enlarged and liberal views of your duties to the young who are coming after you, and of the means that are given you to discharge them. A place as large as this, can perfectly well provide for all its youth of both sexes, as good an education as any one can desire.

What we are capable of doing in this respect, is so little known, that any public spirited and united population, as wealthy as this, can easily place itself in the vanguard in this march of improvement. It is in your power so to cultivate the mind and manners of your children, that wherever they go, they will take precedence of those of their own age and condition. Your example would excite others to follow in your footsteps. Who can tell how widely you might bless others, while you were laboring to bless yourselves? Are you prepared to enter upon so noble a career of improvement?

Remarks of Rev Mr. Osgood.

Mr. Osgood, of Providence, being called upon by the Chairman of the School Committee, spoke in substance as follows:

You will agree with me, friends, in deeming it a happy circumstance, that he, whose position places him at the head of the educational interests of this State, and whose name stands among the highest in the literature of our land, has favored us with his presence upon this occasion, and borne so decided witness to the importance of a far nobler popular education. After what we have heard, we cannot but recognize the common interests of all friends of sound learning, and rank the school and the university as helpers in the same good cause.

We have met to-day to consecrate this pleasant edifice to the service of popular instruction. Solemn prayer has been offered to the throne of mercy, and honest counsel has been addressed to you. This house is now consecrated as a temple of learning. Do we feel duly the significance of these exercises? Do we realize the common responsibility that we assume by participating in them? This afternoon has been spent in mockery, unless the parties here represented entertain and carry out serious convictions of duty.

Let us feel that in consecrating this house to the purposes of education, we consecrate it to the spirit of *order*. Without good order, education cannot succeed; and surely all will allow that good order cannot exist without the aid alike of master and scholar, pa ent and guardian. Let the teacher have your hearty co-operation in his endeavors to regulate his school. Let him not be left at the mercy of the unreasonable, who will call every act of discipline, tyranny; or of the quarrelsome, who will resent every restraint as a personality. Encourage in yourselves and your children the idea that good order has its foundation in the very nature of things, in the plan of the creation, and the hearts of man. There is order in God's works,—in the heavens above,—on the earth beneath. We imitate the divine mind when we strive to do our work in accordance with the best rules, and submit passing impulses and little details to a common standard of right. Let the child be taught to accept this idea, and to see in the order of the school not so much the teacher's will as the law of general good. Let this idea prevail, and a new day will come over our schools. Teachers will be more careful to place their passions under due control, by looking beyond present provocations to permanent principles; and parents and children will acknowledge the justice of proper discipline, even when its penalties fall upon themselves. Consecrating this house to education, we consecrate it then to the spirit of good order.

Akin to order is the spirit of *good will*,—that love that heightens every task, and cheers every labor. Let us feel that this building is set apart as the abode of good will. In the simple beauty of its walls, and the neatness of its arrangements, we see at once that it is intended to be a pleasant place, where the young shall come rather in love than fear. Let every thing be done to carry out this idea, and remove all gloom from the work that here is to go forward. Let the voice of music be heard in the intervals of study, and charm away weariness and discontent. Let courteous manners prevail between scholars and teachers. Let the law of love be supreme, and the good of each be regarded as the good of all. Let every thing be done to make knowledge attractive, without impairing its solidity. You have declared your principles upon this subject in the very structure of this edifice; virtually acknowledged the relation of the beautiful to the true, and applied to education that law of attraction that pervades all the plans of Divine Providence. Carry out these principles without fear and without extravagance. Let not your care be given merely to make your dwelling-houses attractive. Let there be no more school-rooms so rude and uncleanly as hardly to be fit to shelter well-bred cattle. Let children learn neatness, taste, and refinement, along with their alphabet and multiplication table. To good will, under every one of its attractive agencies, this house should be devoted.

Thus devoted, it will be a nursery of good works. *Utility* will go hand in hand with *good order* and *good will.* In this community, practical industry is the ruling power; utility is the prevailing standard. See to it that this standard is rightly adjusted, and that we do not confine our idea of usefulness to worldly or material interests. As we hear the sound of the spindle and the anvil, and see the spray of the waterfall, and the smoke of the furnace, let us rejoice at the large measure of enterprise and prosperity that have been granted us. But when we turn away from these things to look upon this house of learning, let us not think as some base souls do, that we have left utility behind, and are dealing only with what is visionary and unsubstantial. Next to the church of God, let us feel that the school-house is the most useful building in the community, and that from it should emanate the knowledge, principles, and habits that are to give life its direction and efficiency. Reckon in your estimate of the best wealth of your city, your schools, and, without them, regard all other wealth as disgraceful covetousness or mental poverty.

Let the idea of utility preside over the direction of this school, and all its studies tend not to fill the memory with loads of words, but to strengthen the mind, and invigorate and regulate the will and all the active powers.

Standing as it does in so sacred a seat of manufacturing industry, this house has a peculiar significance. Overlooking this prosperous town, it serves to express a generous creed—to say as if it were:—"We, the people of North Providence, think much of the importance of industry and wealth, but we think that some other things are of still greater importance, and however remiss in duty we may have been in time past, we mean to practice upon a more generous system, and this fair temple of learning, standing so far above the factory and workshop, is a substantial testimonial of our determination."

It is an interesting fact, that the first movement in this State in behalf of popular education was made, not by professional men, nor by merchants, nor any of the classes that might be thought, from their leisure or literature, to advocate the claims of sound learning, but by an association of mechanics and manufacturers in Providence. I read to-day, with great pleasure, the memorial which this association presented to the Legislature, in the year 1798. I honor those men for that document. But one of the original signers now survives. Who can meet that old man without respect? Who will not honor John Howland even more for taking the lead in that memorial, than for having served under Washington at Trenton, and braved death in the battles of the revolution? Peace to his sturdy heart, and many good days yet to that stout Saxon frame!

I must cease speaking with these few words as to the good order, good will and good works, to which this house of learning is devoted. May a good providence watch over it. Imagination cannot but conjecture the various scenes of its future history—picture to herself the groups of children who shall come to enjoy its privileges, and who in due time shall leave its walls for the pursuits of maturer life. Prophesy is not our gift, except the prophesy that calculates events by purposes and principles. Let this edifice be used faithfully for true purposes and for just principles, and its future history will be a blessed volume in the annal of your town It will tell of generations of noble men and women, who have been educated within these walls. And when this house shall have gone to dust, it will have performed a noble mission, by being the nursery of mental life that cannot die.

"Cold in the dust, the perished heart may lie,
But that which warmed it once, can never die."

Dedication of the Public High School-House, in Cambridge, Mass.

The edifice, which has just been erected (1848,) for the accommodation of the Public High School of the city of Cambridge, is built of brick, two stories high with a basement, and is a substantial, attractive and convenient school-house, of which the citizens of Cambridge may well feel proud. The cost, including land, furniture and apparatus, is $13,500. The plan of the interior is substantially the same as that of the High School in Hartford.

The following account of the Dedication of this house is abridged from the Cambridge Chronicle for June 29, 1848.

The services were commenced by the chanting of the Lord's Prayer by the scholars of the school.

Alderman Whitney, in behalf of the building committee, transferred the building to the care of the School Committee, through the Mayor of the city, with an appropriate address. After a dedicatory prayer by Rev. N. Hoppin, and another chant, of selections from Proverbs, by the children, the Mayor addressed remarks to the audience upon the relation of the High School to the other grades of schools, and to the cause of education generally in the city, and on some of the conditions on which the success of this and the other schools depended. Addresses were also made by gentlemen present, in which many pleasing incidents in the history of the public schools, and of the town and city of Cambridge, were narrated, and many valuable suggestions thrown out, by which children, teachers, parents and school officers can profit. We make the following extract from the address of Rev. Mr. Stearns, Chairman of the High School Committee.

"At the time of my settlement here as a clergyman in this place, in December, 1831, there were in the town 6 school-houses, 8 school-rooms, 8 teachers and about 400 scholars.

At this time, 1848, there are 17 school-houses, 35 rooms, 44 teachers, and 2136 children.

During this time, it is true, the population has more than doubled, but the interest taken in the schools, and their progress, has much more than tripled or quadrupled.

If at that period any school committee had seriously proposed the erection of such a building as this for a High School, they would undoubtedly have been excused from public service the coming year, if not immediately sent to Charlestown as insane. But the spirit of improvement has prevailed, and now we have all needed advantages for making good scholars, who shall be an honor to their parents, and to their generation.

But, Mr. Mayor, it cannot be too deeply impressed on the minds of our youth that the *means* of education, are not education itself. We may have good school-houses, fine libraries, superior collections of philosophical apparatus, and the best of teachers, with miserable scholars. There are means of improvement in creation all around us—good influences ascend to us from the earth and come down to us from the sky. The sun is a teacher, the evening stars impart knowledge, while every flower is eloquent with wisdom. But what intelligence do all these outward instructors communicate to the ox who grazes without reflection, or to the horse who eats his provender without thanksgiving? Hardly more will books, and maps, and pleasant seats, and air-pumps, and scientific lectures, do for a doltish mind. The outward may stimulate to improvement, but all good action springs from within. There must be in the scholar's own mind a strong desire for knowledge, a spirit aspiring to excellence, a force of moral purpose which no small difficulties can vanquish, or but little which is valuable will be accomplished.

Mr. Chairman, we have great hopes from the school now to be organized in this house,—and these teachers, and these parents, and these scholars, must see to it, that we and our fellow citizens are not disappointed.

This school is intended to carry forward and complete the education of our children—I mean complete it as far as it goes—for *education* never can be completed. It is a work which extends beyond the school-room into active life, all through time into eternity. It is the destiny of good minds to improve for ever. They will go on rising, expanding, increasing in true wisdom as the endless ages pass along, and their progress will be co-eternal with the eternity of God. We wish to begin right with the young in their earliest years, and to carry them forward in this school till they are prepared for service and usefulness in society, and the good beginnings of immortal advancement are firmly laid. We wish to attend here to the proper development of their faculties, to see that these unfold themselves in just proportions, and that our children are qualified to meet the demands of the age and devote their powers to life's best ends.

We establish this school, also, with our schools generally, as a preservative against vice. When I look round, as I do now, upon more than one hundred children fresh as a flower garden in the morning, it seems hardly in good taste, to suggest that any of them may become the victims of evil, and sink in disgrace from society. And yet, it is possible that among these young men and young women too, there may be some one or more who will live to be the objects of public indignation and of *self*-scorn. God forbid! But juvenile depravity has fearfully increased within a few years! And no one can tell who will be among the next victims. Mr. Chairman, I once had a dream—and it was among the most terrible dreams which ever troubled my sleeping imagination. I saw a bright and beautiful boy playing innocently upon the green, suddenly the grass began to move, the earth to undulate till it became water, and the boy went down in an instant, and nothing was left of him but three or four air bubbles on the surface. I awoke in horror, and was troubled all day by this midnight vision. I thought then, and I have ever since thought, that it was a vivid illustration of the course and end of many a youth. They sport thoughtlessly among the green and flowery fields of temptation. They begin to yield, principle gives way, and they go down and are lost as respects character for ever. We wish to render the treacherous earth under them firmer. We would change it into the hard granite of virtue, we would have them stand on the immovable rock of ages.

We hope, also, Mr. Mayor, from this school an advantage to the adult community. The benefits of an institution like this do not terminate with the children. By a reflex influence, they return to the families from which our children come. It is no unheard of thing for a rough, hard, uneducated man to be mellowed and transformed by the influences which his children and his children's children bring home from the churches and the schools. A good school does excite the adult mind; it awakens interest in education, and promotes improvement. If this school fulfills our expectations, it will be to the community a moral and intellectual sun, throwing light into every dwelling.

We believe also that it will act happily upon our younger schools. It will be to them an object of hope and honorable ambition. They will take their examples from it—and our little children from the first will be aspiring and reaching towards it. But I must stop, for I am impatient, as doubtless you and this assembly must be, for the instructions which are to fall from more eloquent lips than mine. Children, consider how much is depending upon you. Be determined to fix down to hard study, *to do right;* and on the first principle of all true wisdom, "Remember now thy Creator in the days of thy youth."

After Mr. Stearns had concluded, a hymn was sung. The Mayor then stated that the President of Harvard College was present, and that he hoped he would favor the company with some remarks."

President Everett accepted the invitation, and responded to the call as follows:—

May it please your Honor:—

Connected as I am with another place of education, of a kind which is commonly regarded as of a higher order, it is precisely in that connection, that I learn to feel and appreciate the importance of good schools. I am not so ignorant of the history of our fathers, as not to know, that the spirit, which founded and fostered Harvard College, is the spirit which has founded and upheld and will continue to support and cherish the schools of New England. I know well, sir, that Universities and Colleges can neither flourish nor even stand alone. You might as well attempt to build your second and third stories in the air, without a first floor or a basement, as to have collegiate institutions without good schools for preparatory education, and for the diffusion of general information throughout the community. If the day should ever come, which I do not fear in our beloved country, when this general education shall be neglected and these preparatory institutions allowed to perish;—if the day should ever come (of which I have no apprehension) when the schools of New England shall go down, depend upon it, sir, the colleges will go with them. It will be with them, as it was with the granite warehouses, the day before yesterday in Federal street, in Boston; if the piers at the foundation give way, the upper stories will come down in one undistinguished ruin.

I anticipate no such disaster, Mr. Mayor, though it must be admitted that we live in an age of revolutions, of which every steamer brings us some fresh and astonishing account. But our revolutions are of a more auspicious character, and it occurred to me as I was coming down with your worthy associate (Mr. Whitney,) and your respected predecessor (Mr. Green,) to whom we have just listened with so much pleasure, that we were traversing a region, in which a more important revolution commenced no very long time since, and is still in progress,—far more important for us and our children,—than any of those which have lately convulsed the continent of Europe. I do not now refer to the great political and historical events of which this neighborhood was the theatre; of which the monuments are in sight from these windows, but to a revolution quiet and silent in its origin and progress, unostentatious in outward manifestations, but imparting greater change and warranting brighter hopes for most of those who hear me,—for our young friends before us,—than any of the most startling events that stare upon us in capitals in the columns of the newspapers, after every arrival from Europe. The Reverend Mr. Stearns has beautifully sketched some of the most important features of this peaceful revolution.

When I entered college, Mr. Mayor, (and I believe I shall not tell the audience quite how many years ago that is; you can do it, sir, but I will thank you not to,) there were a few straggling houses, shops, and taverns along the Main street at Cambridgeport. All back of this street to the north, and I believe almost all south of it to the river,—the entire district, in the centre of which we are now assembled, was in a state of nature, pretty equally divided between barren pasturage, salt-marsh, and what I must admit had no mean attraction for us freshmen, whortleberry swamp. Not one of the high roads had been cut, which now traverse the plain between Main street and the old road to Charlestown. East Cambridge did not exist even in the surveyor's imagination. There was not a church nor a public school east of Dr. Holmes' and Old Cambridge Common, and if any one had prophesied that within forty years a population like this would cover the soil,—with its streets and houses, and gardens, its numerous school-houses and churches, its conservatories breathing all the sweets of the tropics, its private libraries equal to the choicest in the land, and all the other appendages of a high civilization, he would have been set down as a visionary indeed. But this change, this revolution has taken place even within the life time of the venerable lady (Mrs. Merriam) introduced to us in such a pleasing manner by Mr. Stearns; and we are assembled this morning to take a respectful notice of what may be called its crowning incident, the opening of a High School in that primitive whortleberry swamp. I believe I do not over-state matters when I say, that no more important event than this is likely to occur, in the course of the lives of many of those here assembled. As far as our interests are concerned, all the revolutions in Europe multiplied tenfold are nothing to it. No, sir, not if the north were again to pour forth its myriads on central and southern Europe and break up the existing governments and states into one general wreck, it would not be an article of intelligence at all so important to us as the opening of a new school. No, my young friends, this is a day which may give an auspicious turn to your whole career in life; may affect your best interests not merely for time but for eternity.

There is certainly nothing in which the rapid progress of the country is more distinctly marked than its schools. It is not merely their multiplication in numbers, but their improvement as places of education. A school forty years ago was a very different affair from what it is now. The meaning of the word is changed. A little reading, writing, and ciphering, a very little grammar; and for those destined for college, a little Latin and Greek, very indifferently taught, were all we got at a common town school in my day. The range was narrow; the instruction superficial. In our modern school system, taking it as a whole composed of its several parts in due gradation,—viz. the primary, the district, and the High School,—the fortunate pupil not only enjoys a very thorough course of instruction in the elementary branches, but gets a good foundation in French, a good preparation for college, if he desires it, according to the present advanced standard of requirement; a general acquaintance with the applied mathematics, the elements of natural philosophy, some suitable information as to the form of government and political system under which we live, and no inconsiderable practice in the noble arts of writing and speaking our mother tongue.

It might seem, at first, that this is too wide a circle for a school. But the experience of our well conducted schools has abundantly shown that it is not too extensive. With faithful and competent teachers and willing and hearty learners, all the branches I have named and others I have passed over can be attended to with advantage, between the ages of four and sixteen.

Such being the case, our School Committees have done no more than their duty, in prescribing this extensive course and furnishing to master and pupils the means of pursuing it. I cannot tell you, sir, how much I have been gratified at hastily looking into the alcove behind us. As I stepped into it this morning, Mr. Smith, the intelligent master of the school, pointed out to me the beautiful electrical machine behind the door with the just remark that my venerable predecessor, President Dunster, would not have known what it was. No, sir, nor would the most eminent philosopher in the world before the time of Franklin. Lord Bacon would not have known what it was, nor Sir Isaac Newton. Mr. Smith reminded me of the notion of Cotton Mather (one of the most learned men of his day,) that lightning proceeded from the Prince of the Power of the Air, by which he accounted for the fact that it was so apt to strike the spires of churches. Cotton Mather would have come nearer the truth, if he had called it a shining manifestation of the power and skill, by which the Great Author of the Universe works out some of the mighty miracles of creation and nature. And only think, sir, that these newly discovered mysteries of the material world, unknown to the profoundest sages of elder days, are so effectually brought down to the reach of common schools in our day, that these young friends, before they are finally dismissed from these walls, will be made acquainted with not a few of the wonderful properties of the subtle element, evolved and condensed by that machine, and which recent science has taught to be but different forms of one principle, whether it flame across the heavens in the midnight storm, or guide the mariner across the pathless ocean;—or leap from city to city across the continent as swiftly as the thought of which it is the vehicle; and which I almost venture to predict, before some here present shall taste of death, will, by some still more sublime generalization, be identified with the yet hidden principle which thrills through the nerves of animated beings, and binds life to matter, by the ties of sensation.

But while you do well, sir, in your High School to make provision for these advanced studies, I know that as long as it remains under your instruction, the plain elementary branches will not be undervalued. There is perhaps a tendency in that direction in some of our modern schools: I venture to hope it will not be encouraged here. I know it is not to be the province of this school to teach the elements; but I am sure you will show that you entertain sound views of their importance. I hold, sir, that to read the English language well, that is with intelligence, feeling, spirit, and effect;—to write with dispatch, a neat, handsome, legible hand, (for it is after all, a great object in writing to have others able to read what you write,) and to be master of the four rules of arithmetic, so as to dispose at once with accuracy of every question of figures which comes up in practical life:—I say I call this a good education; and if you add the ability to write pure grammatical English, with the help of very few hard words, I regard it as an excellent education. These are the tools; you can do much with them, but you are helpless without them. They are the foundation; and unless you begin with these, all your flashy attainments, a little natural philosophy, and a little mental philosophy, a little physiology and a little geology, and all the other *ologies and osophies*, are but ostentatious rubbish.

There is certainly no country in the world in which so much money is paid for schooling as in ours. This can be proved by figures. I believe there is no country where the common schools are so good. But they may be improved. It is not enough to erect commodious school-houses; or compensate able teachers, and then leave them, masters and pupils, to themselves. A school is not a clock which you can wind up and then leave it to go of itself. It is an organized living body: it has sensibilities; it craves sympathy. You must not leave the School Committee to do all the work. Your teachers want the active countenance of the whole body of parents, of the whole intelligent community. I am sure you, Mr. Smith, would gladly put up with a little injudicious interference in single cases, if you could have the active sympathies of the whole body of parents to fall back upon in delicate and difficult cases, and to support and cheer you under the burthen of your labors, from day to day. I think this matter deserves more attention than it has received; and if so small a number as thirty parents would agree together, to come to the school, some one of them, each in his turn, but once a month, or rather if but 25 or 26 would do it, it would give your teacher the support and countenance of a parent's presence every day; at a cost to each individual of ten or eleven days in the year. Would not the good to be effected be worth the sacrifice?

I have already spoken too long, Mr. Mayor, and will allude to but one other topic. In most things, as I have said, connected with education, we are incalculably in advance of other days:—in some, perhaps, we have fallen below their standard. I know, sir, old men are apt to make unfavorable contrasts between the present time and the past; and if I do not soon begin to place myself in that class, others will do it for me. But I really think that in some things, belonging, perhaps, it will be thought, to the minor morals, the present promising generation of youth might learn something of their grandfathers, if not their fathers. When I first went to a village school, sir, I remember it as yesterday;—I seem still to hold by one hand for protection, (I was of the valiant age of three years) to an elder sister's apron;—with the other I grasped my primer, a volume of about two and a half inches in length, which formed then the sum total of my library, and which had lost the blue paper cover from one corner, (my first misfortune in life;) I say it was the practice then, as we were trudging along to school, to draw up by the road-side, if a traveller, a stranger, or a person in years, passed along, "and make our manners," as it was called. The little girls courtesied, the boys made a bow; it was not done with much grace, I suppose: but there was a civility and decency about it, which did the children good, and produced a pleasing impression on those who witnessed it. The age of village chivalry is past, never to return. These manners belong to a forgotten order of things. They are too precise and rigorous for this enlightened age. I sometimes fear the pendulum has swung too far in the opposite extreme. Last winter I was driving into town in a carriage closed behind, but open in front. There was in company with me, the Rev. President Woods, of Bowdoin College, Maine, and that distinguished philanthropist and excellent citizen, Mr. Amos Lawrence. Well, sir, we happened to pass a school-house just as the boys (to use the common expression) were "let out." I suppose the little men had just been taught within doors something about the laws, which regulate the course of projectiles, and determine the curves in which they move. Intent on a practical demonstration, and tempted by the convenient material, I must say they put in motion a quantity of spherical bodies, in the shape of snow balls, which brought the doctrine quite home to us wayfarers, and made it wonderful that we got off with no serious inconvenience, which was happily the case. This I thought was an instance of free and easy manners, verging to the opposite extreme of the old fashioned courtesy, which I have just described. I am quite sure that the boys of this school would be the last to indulge an experiment attended with so much risk to the heads of innocent third persons.

Nothing remains, sir, but to add my best wishes for teachers and pupils;—You are both commencing under the happiest auspices. When I consider that there is not one of you, my young friends, who does not enjoy gratuitously the opportunity of obtaining a better school education, than we could have bought, Mr. Mayor, when we were boys, with the wealth of the Indies, I cannot but think that each one of you, boys and girls, will be ready to say with grateful hearts, the lines have fallen to me in pleasant places; yea, I have a goodly heritage.

To you, Mr. Smith, we wish entire success. The community looks to you with confidence, to add to your high reputation as an instructor, and commits to you these its treasures, with the full assurance that you will be faithful to the trust.

An original hymn, written for the occasion, was then sung.

At the close of the exercises, the Mayor, as Chairman of the School Committee, transferred the Building and the School to the immediate care of the High School Committee. Mr. Stearns responded in a word, as follows:—Mr. Mayor, in behalf of the High School Committee, I accept this important trust at your hands. We will endeavor faithfully and according to the best of our ability, to perform its duties, the first of which will be to commit the care of the school to Mr. Elbridge Smith, its principal teacher.

Mr. Smith, we sometimes say of a remarkably honest man, I would trust him with untold gold. We are about to entrust to you what is of unspeakably more value. If each of these pupils were a million of gold, the treasure committed to you would be worth infinitely less than these immortal minds. I speak in the name of every parent here, when I say we have no higher interests than the welfare of our children. If evil befall them—if through a defective education, they should turn out badly, there would be but little left to make life desirable to us. If you so succeed in your good work, that our sons and daughters shall grow up around us, intelligent, respectable, filial and good, you shall have our thanks here, and hereafter. We give you our confidence—Heaven grant you its blessing.

Mr. Smith remarked in reply,

That it was his sincere intention to receive the important trust, which had been committed to his care, without attempting a reply. But such had been the course of remark as to awaken feelings too strong to be suppressed: and though it might be but an act of rashness for an unpracticed hand to attempt extempore discourse in the presence of distinguished gentlemen, he felt called upon to say that he was deeply sensible that, in accepting this trust, he received no sinecure. Without enlarging upon the nature of his duties, or adding aught to what had already been said, he would simply say that he would perform the duties assigned him to the best of his humble ability. He felt that he should do injustice to his feelings not to return his thanks to the distinguished gentleman who had addressed us, for the sentiments which he had so beautifully and forcibly expressed. He had spoken of what he termed the *minor immoralities.* Mr. Smith had often had occasion to use the same expressions in enforcing the practice of those civilities of school life to which he had referred. And you, scholars, he remarked, can bear me testimony how often, during the brief period of my connection with you, I have referred you to our distinguished guest as combining in himself those very qualities which he has enjoined upon you. He had felt great pleasure in hearing his feeble instructions seconded by the example and precepts of one of the most gifted scholars of the land. He should have occasion to remember him with gratitude during the remainder of his life, for the aid which he had this day afforded him in the discharge of his duties as a teacher. The children have heard to-day the sentiments of one who has left the high duties of State and diplomacy for the still higher work of instructing New England youth. They should make this day a *crisis* in their existence.

He closed by remarking that in his boyhood, while laboring hard to acquire an education, he became the proud owner of a handsome octavo, entitled "Everett's Orations,"—no inconsiderable portion of which he committed to memory. He could not better conclude, than by reciting an extract which this occasion brought fresh to his recollection. "Let the pride of military glory belong to foreign nations: let the refined corruptions of the older world attract the traveller to its splendid capitals; let a fervid sun ripen for others the luxuries of a tropical clime. Let it be ours to boast that we inherit a land of liberty and light; let the school-house and the church continue to be the landmarks of the New England village; let the son of New England, whither soever he may wander, leave that behind him which shall make him home-sick for his native land; let freedom, and knowledge, and morals, and religion, as they are our birthright, be the birthright of our children to the end of time."

The exercises were closed by singing a benediction hymn to the tune of Old Hundred, in which all present joined. The company left reluctantly; having spent three hours so profitably and pleasantly that the time passed unawares. The highest expectations have been raised in regard to the school, and we hope they may be more than realized.

We would gladly devote more of our pages to the publication of such addresses as these, but we have already swelled this volume beyond our original plan.

Our readers will find in the eighth and ninth volumes of the Massachusetts Common School Journal, for 1846 and 1847, very full and interesting accounts of the Dedication of the State Normal School-houses at Bridgewater and at Westfield. The addresses of the Hon. Horace Mann, Gov. Briggs, Prof. Sears, Hon. William Bates, and Rev. Dr. Humphrey, are worthy of the widest circulation. Dr. Humphrey's address is an elaborate argument in behalf of Normal Schools.

Priced Catalogues of Books on Education, Globes, Maps, &c.

Under this head we shall aim to apprize committees and teachers of some of the places where apparatus and books on education can be procured, and the price of the same.

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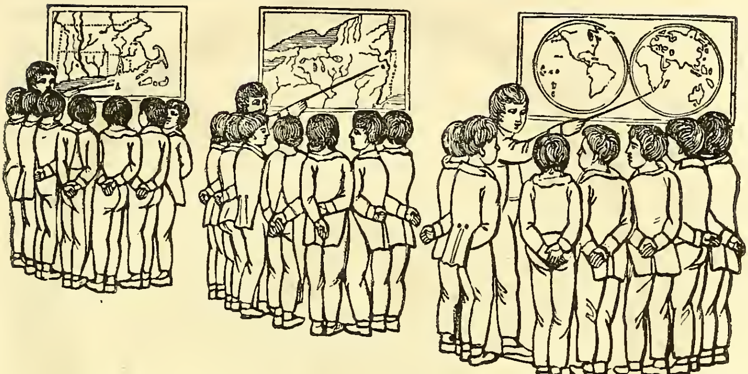

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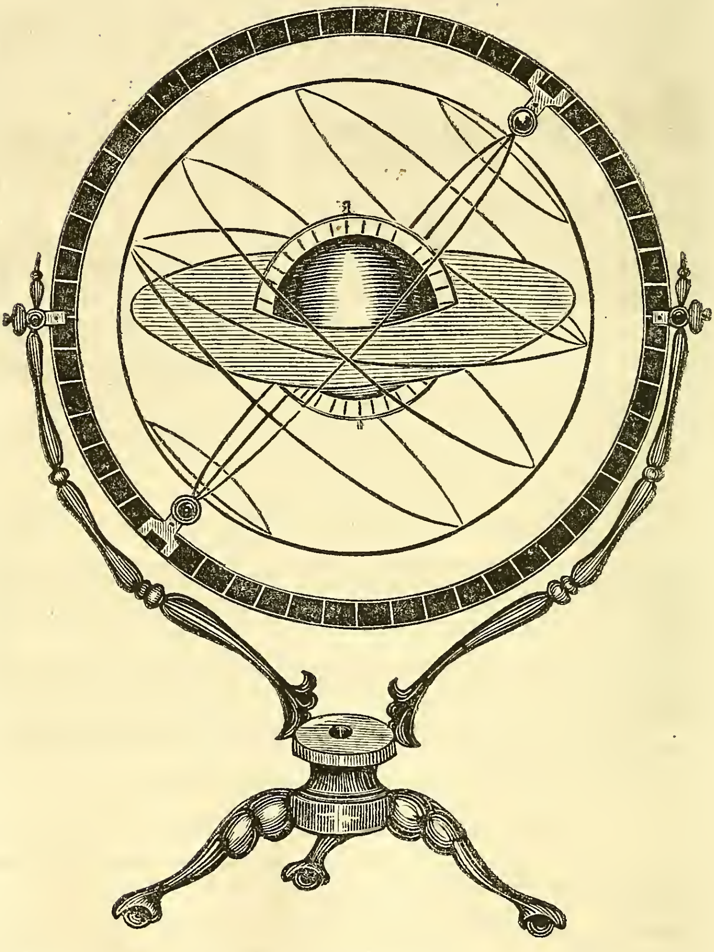

VALE'S GLOBE AND TRANSPARENT SPHERE, which is but imperfectly represented in the above drawing, aims to accomplish a much desired object, the conjunction of the Terrestrial and Celestial Globe, on so simple a principle that without cogs or wheels, all the apparent and real motions of the earth and heavens can be illustrated. It therefore presents great facilities for pursuing together the study of Geography and Astronomy, which cannot be separated without injury to each other.

The outer circle supports the instrument. In this, the axis slides, by which the instrument is adjusted. This circle is capable of a swivel motion, by which the antipodes, and the seasons in relation to different positions of the spectator, can be easily exhibited.

The sphere just within the outer circle, represents the great circles of the Heavens, as the meridians, equator, ecliptic, with the poles, &c. On this sphere can be placed at pleasure, transparent sections of the Celestial Sphere, which are not shown in the above drawing. One or more quarter sections can be used at a time, by which the stars can be seen within the sphere, or as they appear to the earth in a concave heaven, or sphere. On this transparent celestial globe, the places of the planets and moon can be represented by wafers, and as the sphere revolves, their apparent daily motions and their exact places for every hour, can be shown.

The solid globe within the sphere, represents the Earth. The globe will move on its axis to represent the real daily motion of the earth. To this globe is attached a small Meridian, on which is placed a broad surface extending from the earth within, to the sphere without, by which the horizon is represented to a little traveller attached to the upper surface of the meridian. The traveller can move to any part of the surface of the earth, and the horizon moves with him, thus dividing the heavens into the visible and invisible parts to such traveller, and thereby representing the earth and heavens as they really appear.

A quadrant accompanies the globe, but it is attached to the heavens, and not to the earth. It has a swivel motion, and thus will serve to measure the altitude of the sun, &c., at all times.

The best fitted up Globes have a compass above the stand, and also a horizontal motion, in the joint of the stand, which is very convenient in large instruments, as it enables the teacher to turn the instrument, without passing round it himself.

The instrument is accompanied by wires, by which it can be converted into a Planetarium. By elevating the North end of the axis 23½ degrees, and by bringing the traveller under the arctic circle, and by turning the Sphere till the ecliptic coincides with the horizon, the instrument will be converted into a planetarium, for the Globe within may represent the sun, the ecliptic the real passage of the Earth, and the horizon the *plane* of the ecliptic, and the different wires will represent the orbits of both the inferior and superior planets.

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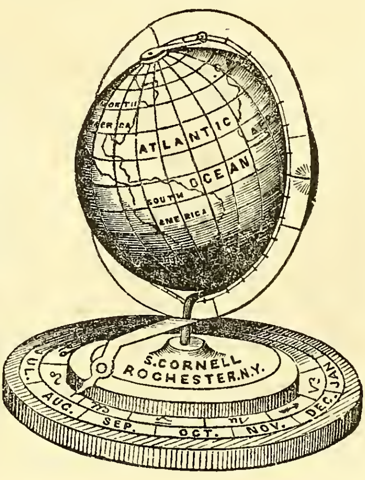

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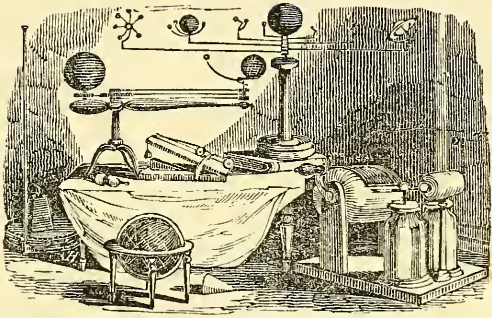

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Fig. 12. The Eye in its socket with the muscles.

Fig. 13. The Eye with rays of light passing from an object and forming the image on the retina. The object and image are movable, showing the cause of "long sight," "short sight," and "perfect sight."

Fig. 14. Section view of Fig. 11.

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*Curculio Scropularia and *Lampyris Festiva—Water Beetle and Larvæ—Buprestis Ocellata and *Attelabus Melanurus.

SLIDER III.

Great Locust—Chinese Lantern-fly and Walking Leaf—Mole Cricket and *Cimex Prasinus (two views.)

SLIDER IV.

Telemachus Butterfly, with Caterpillar and Chrysalis—Sphinx Ocellata, with Caterpillar and Chrysalis—Atlas Moth.

SLIDER V.

Dragon-fly and Larva—Nest of the Humble Bee—*Working and *Female Ants.

SLIDER VI.

*Golden Fly and Ichneumon Ramidulus—*Sheep Gad-fly and *Diopsis Ichneumonea—*Human Louse and *Lice from different Birds.

SLIDER VII.

Termites, or White Ants, male and female—a magnified view of a Termite in the Pupa state (called a soldier;) in the upper part of the slider is a picture representing a distant view of the Habitations of the White Ants, in the foreground of which are several Laborers and a Soldier, of the natural size—a *Flea, with the Egg, Larva, and Pupa.

SLIDER VIII.

*A Cheese Mite and Garden Spider—Cancer Mantis—Scolopendra Morsitans. 16 00

CLASS VI.—WORMS.—8 SLIDERS.

SLIDER I.

Serrated Tape-worm, natural size, with a separate view of the Head, highly magnified—Nais Serpentina, magnified—Sea Anemone—Brown Holothuria.

SLIDER II.

Phosphoric Pyrosoma—Eight-armed Cuttle-fish—Balloon Cuttle-fish—Medusa Pulmo.

SLIDER III.

Medusa's Head Star-fish—Duck Barnacle—Great Sea Pinna—Iceland Scallop.

SLIDER IV.

Paper Nautilus, with the animal seated in the shell—Pearly Nautilus, with the inhabitant—Tortoise-shell Limpet, and Veined Volute.

SLIDER V.

Snow-flaked Volute and Waved Turbo—Corded Murex—Anguina Serpula and Serpula Vermicularis, with the animal.

SLIDER VI.

Green Polypes, natural size and magnified—Sea-bristle Coralline, magnified to show its polype heads—Tubularia Reptans, magnified—Phosphoric Sea-Pen.

SLIDER VII.

Red Coral, with a small branch slightly magnified to show its polype heads—Thick-armed Gorgonia—Cinnamon Madrepore—Madrepora, Patella, and Meandrites.

SLIDER VIII.

Vorticella Racemosa and a group of Wheel Animals—a group of Bell Animals and a group of the Vorticella Urceolaris and the Sun Animal—groups of the Cercaria Mutabilis, Globe Animals, and Paste Eels.

N. B. The animals in this Slider are Microscopic Animalcules. 16 00

BOTANICAL ILLUSTRATIONS.

In 14 Sliders, with Compendium.

Slider I.

1. Cellular Tissue.
2. Cellular Ducts.
3. Woody Fibre.
4. Spiral Vessels.

Slider II.

5. Spiral Vessels in Leaf.
6. Vascular Ducts.
7. Forms of Roots.
8. Forms of Stem.

Slider III.

9. Section of Exogenous Stem.
10. Section of Sassafras Wood.
11. Sections of Endogenous Stem.

Slider IV.

12. Fern Stem.
13. Forms of Leaves.
14. Leaf of Gleditsia.
15. Pitchers of Nepenthes, &c.

Slider V.

16. Pitcher of Dischidia.
17. Cuticle and Stomata.
18. Section of Apple Leaf.
19. Section of Oleander Leaf.

Slider VI.

20. Forms of Stamens.
21. Structure of Pistil.
22. Monstrous Carpels.
23. Structure of Seed-vessel.

Slider VII.

24. Process of Fertilization.
25. Germination of Seed.
26. Algæ: (Sea-weeds.)
27. Lichen: Iceland Moss.

Slider VIII.

28. Fungus: Amanita.
29. Rafflesia Arnoldi.
30. Chara Flexilis.
31. Moss: Bryum cæspiticum.

Slider IX.

32. Tree-fern.
33. Endogens: Saccharum officinale, (Sugar-cane.)
34. Phœnix dactylifera, (Date Palm.)
35. Colchicum autumnale, (Meadow Saffron.)

Slider X.

36. Zingiber officinale, (Ginger Plant.)
37. Exogens: Zamia horrida.
38. Atropa belladonna, (Deadly Night Shade.)

Slider XI.

39. Linaria communis, (Snap-Dragon.)
40. Convolvulus major.
41. Ericeæ, (Heaths.)

Slider XII.

42. Anthemis pyrethrum, (Pellitory.)
43. Tamarindus Indica, (Tamarind.)
44. Camelia Japonica.

Slider XIII.

45. Passiflora magniflora, (Grenadilla.)
46. Cardamine pratensis, (Lady's Smock.)
47. Ficus carica, (Fig.)

Slider XIV.

48. Cactus speciosissima.
49. Ligusticum Scoticum.
50. Myristica moschata, (Nutmeg.) 30 00

SELECT SCRIPTURE SUBJECTS.

In 12 Sliders.

Slider I.

Adam and Eve driven out of Paradise. *Gen.* iii. 24.
Hagar and Ishmael ... *Gen.* xxi. 14.
Isaac blessing Jacob .. *Gen.* xxvii. 27.

Slider II.

Joseph sold into Egypt. *Gen.* xxxvii. 28.
Joseph meeting his Father. *Gen.* l. 1.
The finding of Moses .. *Exod.* ii. 5.

Slider III.

The Ark of the Covenant. *Exod.* xxv. 10.
The Dress of the High Priest. *Exod.* xxviii. 4.
The Altar of Incense .. *Exod.* xxx. 1.

Slider IV.

The Altar of Burnt-Offering. *Exod.* xxvii. 1.
An Aaronite or Scribe. *Exod.* xxviii. 40.
The Golden Candlestick. *Exod.* xxv. 31.

Slider V.

Return of the Spies ... *Num.* xiii. 23.
The Brazen Serpent ... *Num.* xxi. 9.
Balaam and his Ass ... *Num.* xxii. 22.

Slider VI.

Samson and the Lion .. *Jud.* xiv. 6.
Presentation of Samuel. 1st *Sam.* i. 28.
Samuel in the Temple. 1st *Sam.* iii. 10.
Elijah fed by Ravens .. 1st *Kings*, xvii. 6.

Slider VII.

David and Goliath .... 1st *Sam.* xvii. 51.
David dancing before the Ark. 2d *Sam.* vi. 14.
Nathan reproving David. 2d *Sam.* xii. 7.

Slider VIII.

The Annunciation ..... *Luke* i. 28.
The Birth of Christ ... *Luke* ii. 16.
Christ brought to the Temple. *Luke* ii. 22.

Slider IX.

The Flight into Egypt. *Matt.* ii. 13.
The Holy Family ...... *Mark* i.
Christ and the Woman of Samaria. *John* iv. 7.

SLIDER X.

Christ stilling the Tempest. *Matt.* viii. 24.
The Good Samaritan. .*Luke* x. 30.
The Lord of the Vineyard and Laborer. *Matt.* xx. 12.

SLIDER XI.

The Return of the Prodigal Son. *Luke* xv. 20.
Trial of Peter's Faith. .*Matt.* xiv. 29.
Herodias with the Head of John the Baptist . . . .*Mark* vi. 28.

SLIDER XII.

The Crucifixion. . . . . . .*John* xix. 30.
The Women at the Sepulchre. *Mark* xvi. 5.
The Resurrection. . . . .*Matt.* xxviii. 9.
The Disciples at Emmaus. *Luke* xxiv. 31.
25 00

PORTRAITS OF KINGS AND QUEENS OF ENGLAND.

FROM WILLIAM THE CONQUEROR TO VICTORIA.

IN 9 SLIDERS.

SLIDER I.

William the Conqueror. — William II. — Henry I. — Stephen.

SLIDER II.

Henry II. — Richard I. — John. — Henry III.

SLIDER III.

Edward I. — Edward II. — Edward III. — Richard II.

SLIDER IV.

Henry IV., of Bolingbroke. — Henry V., of Monmouth. — Henry VI., of Windsor. — Edward IV.

SLIDER V.

Edward V. — Richard III. — Henry VII. — Henry VIII.

SLIDER VI.

Edward VI. — Mary I. — Elizabeth. — James I.

SLIDER VII.

Charles I. — Charles II. — James II.

SLIDER VIII.

William III. and Mary II. — Anne, of the Stuart family. — George I., of Hanover. — George II.

SLIDER IX.

George III. — George IV. — William IV. — Victoria. 15 00

VIEWS OF PUBLIC BUILDINGS, &c.

IN 4 SLIDERS.

SLIDER I.

View of Saint Paul's Cathedral, London. — The Pavilion, at Brighton. — Southwark Bridge, London.

SLIDER II.

View of Westminster Abbey. — View of the Cataract of Niagara. — Waterloo Bridge, London.

SLIDER III.

Saint Peter's Church, at Rome — Fingal's Cave — The Pantheon, at Paris.

SLIDER IV.

View of Mount St. Michael, Cornwall. — The Military Hospital, Paris. — View of the Island of Staffa. 8 00

ASTRONOMICAL DIAGRAMS.

IN ELEVEN SLIDERS, PACKED IN A BOX, WITH A DESCRIPTION.

No. SLIDER I.

1. System of Ptolemy.
2. ——— Copernicus.
3. ——— Tycho Brahe.
4. ——— Newton.

SLIDER II.

5. Telescopic View of the Moon.
6. Ditto of Jupiter.
7. ——— Saturn.

SLIDER III.

8. Comparative Sizes of the Planets.
9. Comparative Distances of the Planets.
10. Orbit of a Comet.
11. The Comet of 1811.

SLIDER IV.

12. Signs of the Zodiac.
13. Inclination of the Planets' Orbits.
14. Direct and Retrograde Motion.

SLIDER V. (*Lever, movable.*)

15. Rotundity of the Earth.

SLIDER VI.

16. The Seasons.
17. Phases of the Moon.
18. The Earth's Shadow.

SLIDER VII.

19. Cause of the Sun's Eclipse.
20. Ditto Moon's ditto.
21. Inclination of the Moon's Orbit.

SLIDER VIII. (*movable.*)

22. Eclipse of the Sun, with a Transit of Venus.

SLIDER IX. (*movable.*)

23. Eclipse of the Moon.

SLIDER X.

24. Spring Tide at New Moon.
25. Ditto Full Moon.
26. Neap Tide.

SLIDER XI.

27. The Constellation Orion.
28. ——————— Ursa Major.
29. Various Nebulæ.
30. A Portion of the Milky Way. 67 20 00

CONSTELLATIONS.

IN 6 SLIDERS.

Their situation with regard to the North Pole is denoted by an Arrow.

SLIDER I.

Aries — Taurus — Gemini — Cancer.

SLIDER II.

Leo — Virgo — Libra — Scorpio.

SLIDER III.

Sagittarius — Capricornus — Aquarius — Pisces.

SLIDER IV.

Draco and Ursa Minor — Cepheus and Cassiopea — Andromeda and Triangula — Auriga.

SLIDER V.

Perseus and Caput Medusæ — Boötes and Canes Venetici — Hercules and Cerberus — Cygnus and Lyra.

SLIDER VI.

Antinöus and Aquila — Ophiucus and Serpens — Canis Major and Minor — Cetus, $9 00

ASTRONOMICAL DIAGRAMS.

In a Set of 30 *Three-Inch Sliders, Double Glass, each Diagram framed separate.*

No.
1. System of Ptolemy.
2. ———— Copernicus.
3. ———— Tycho Brahe.
4. ———— Newton.
5. Telescopic View of the Moon.
5. Ditto at three different periods of its increase.
5. Ditto of Venus, with Phases, (three Views.)
5. Ditto of Mars.
6. Ditto of Jupiter.
7. Ditto of Saturn.
8. Comparative Sizes of the Planets.
8. Ditto, the colored Circle representing the Sun.
9. Comparative Distances of the Planets.
10. Orbit of a Comet.
11. Comet of 1811.
12. Signs of the Zodiac.
13. Inclination of the Planets' Orbits.
14. Direct and Retrograde Motion.
16. The Seasons.
17. Phases of the Moon.
18. The Earth's Shadow.
19. Cause of the Sun's Eclipse.
20. Ditto Moon's ditto.
21. Inclination of the Moon's Orbit.
27. The Constellation Orion.
28. ———————— Ursa Major.
29. Various Nebulæ.
30. A Portion of the Milky Way.
30. A Diagram to show *Meridians, Parallels*, and *Circles*.
30. A Diagram, showing the various Zones, $30 00

REVOLVING ASTRONOMICAL DIAGRAMS.

THE MOTION PRODUCED BY RACK-WORK.

In a Set of Nine Sliders, packed in a Box, with a Lock.

SLIDER I.

The Solar System, showing the Revolution of all the Planets, with their Satellites, round the Sun.

SLIDER II.

The Earth's Annual Motion round the Sun, showing the Parallelism of its Axis, thus producing the Seasons.

SLIDER III.

This Diagram illustrates the cause of Spring and Neap Tides, and shows the Moon's Phases, during its Revolution.

SLIDER IV.

This Diagram illustrates the Apparent Direct and Retrograde Motion of Venus or Mercury, and also its Stationary Appearance.

SLIDER V.

A Diagram to prove the Earth's Rotundity, by a Ship sailing round the Globe, and a line drawn from the eye of an observer placed on an eminence.

SLIDER VI.

This Diagram illustrates the Eccentric Revolution of a Comet round the Sun, and shows the appearance of its Tail at different points of its Orbit.

SLIDER VII.

The Diurnal Motion of the Earth, showing the Rising and Setting of the Sun, illustrating the cause of Day and Night, by the Earth's Rotation upon its Axis.

SLIDER VIII.

This Diagram illustrates the Annual Motion of the Earth round the Sun, with the Monthly Lunations of the Moon.

SLIDER IX.

This Diagram shows the various Eclipses of the Sun with the Transit of Venus; the Sun appears as seen through a Telescope, $40 00

PNEUMATICS.

No. Price.

1. Fig. 1. Air Pump, (Chamberlain's American;) rose-wood frame, polished; barrel, 13 by 4½ inches; large plate, 15 inches; small do., 6 inches; three gauges, ...$150 00
2. Air Pump, superb mahogany frame, polished; barrel 13 by 4½ inches; plate 15 inches; barometer gauge; otherwise as No. 1,..................125 00
3. Air Pump, plain mahogany

No. — Price.

frame, varnished; plate 13 inches; otherwise as No. 2,.................... $100 00

4. Fig. 2. Air Pump, rose-wood frame, polished; barrel 12 by 4 inches; plate 12 inches; barometer gauge,..........100 00

5. Air Pump, extra finished; rose-wood frame, polished; plate 12 inches; barrel 11 by 3½ inches; barometer gauge,..[7] 85 00

6. Air Pump, mahogany frame, varnished; plate 12 inches; barrel 11 by 3½; common finish,..................[6,7] 75 00

7. Fig. 3. Air Pump, two barrels, 7 by 2 inches; plate 8 inches; works with double lever; mahogany basement,...... 35 00

8. Air Pump, as above mounted, on rose-wood basement, with parts extra finished,....... 40 00

9. Air Pump, as above mounted, on a splendid serpentine basement, extra finished in every particular, ... 45 00

10. Fig. 4. Air Pump, one barrel, 7 by 2 inches; works with lever; plate 8 inches,......[3] 25 00

11. Fig. 5. Air Pump, English form; two barrels, two plates, 8 and 4 inch; works with rack and pinion,........... 40 00

12. Fig. 6. Air Pump, two barrels; one plate, 8 inch,.......... 25 00

13. Fig. 7. Air Pump, plate, 6 inch; one barrel, 7 by 1¼ inch; piston works by a T handle, .. 10 00

14. Fig. 8. Chamberlain's Double Acting Exhauster and Condenser; barrel 7 by 1¼ inches, [7] 8 00

15. Fig. 9. Condensing Syringe; barrel 7 by 1½,.............. [3] 5 00

16. Fig. 10. Stop-cock, large screw; 3 inch, $1 00; 3½ inch, $1 25; 4 inch, $1 50; 4½ inch, $2 00; 5 inch,.................... 2 50

17. Fig. 11. Stop-cock, small screw, 70 cents; 1½ inch, 80 cents; 2 inch, 90 cents.

18. Fig. 12. Connecting-Screw; fits pump-plate, ...[3,4,5,6,7] 50

19. Fig. 13. Double Female Screw-Coupling,...............[3,4,5,6,7] 50

20. Fig. 14. Guard-Screw; fits pump-plate,............[3,4,5,6,7] 50

21. Fig. 15. Screw-Plug, for closing brass caps, &c.,.........[3,4,5,6,7] 50

22. Fig. 16. Double Female Coupling, large and small screw,[3,4,5,6,7] 50

23. Fig. 17. Gallows-Connecter and Tip; male screws,..... 1 25

24. Fig. 18. Gallows-Connecter and Tip; female screws,... 1 25

25. Fig. 19. Flexible Hose and Screw-Connecter, four feet,. 2 00

26. Fig. 20. Sliding-Rod and Brass Plate, with fixtures,....... 5 00

No. — Price.

27. Fig. 21. Sliding-Rod and Packing-Screw, with regulating Binding-Screws,........... [7] 2 00

28. Fig. 22. Sliding-Rod and Packing-Screw, with Ball-Handle; (used with Electrics,)[3,4,5,6] 1 50

29. Fig. 23. Swelled Bell-Glasses; six sizes; one gallon, $1 25; two galls., $2 00; four galls., $4 00; eight galls., $7 00; ten galls., $8 00; twelve galls., $10 00; and ground to fit the six different size pump-plates.

30. Fig. 24. Swelled Open-Top Bell-Glasses; six sizes; capacities and dimensions as No. 29; one gallon, $2 00; two galls., $3 50; four galls., $4 50[6]; eight galls.,[7] $8 00; ten galls., $9 00; twelve galls., ... 12 00

31. Fig. 25. Plain Bell-Glasses; eight sizes; half pint, 30 cents; pint, 50 cents; quart, 75 cents; two quarts, $1 00; gallon, $2 00; two galls., $3 00; four galls., $4 00; six galls.,.................. 5 50

32. Fig. 26. Bell-Glasses with Glass Stoppers; eight sizes; half pint, 40 cents; pint, 60 cents; quart, $1 00; two quarts, $1 25; three quarts, $1 50; gallon, $2 25; six quarts, $3 00; two galls.,.. 4 00

33. Fig. 27. Bell-Glasses with brass Screw-Caps, to receive a stop-cock, connecter, sliding-rod, &c.; six sizes; two quarts, $1 50; three quarts, $2 00; four quarts, $2 50; six quarts, [3,6] $3 00; eight quarts, [6,7] $4 50; ten quarts, 5 50

34. Fig. 28. Cylindrical Open-Top Bell-Glass, with Glass Cap; two quarts, $2 00; four quarts, $3 00; eight quarts, 5 00

35. Fig. 29. Hand Glass, to show pressure of the air,.........[3,4] 75

36. Fig. 30. Bladder Glass; may be used as a Hand Glass, [5,6,7] 1 00

37. Fig 31. Bladder-Cup, Cap, and Cock, to use with Condenser and Condensing Chamber, or under a Bell-Glass; is used for the Sheet Rubber experiments, &c.,......[3,4,5,6,7] 2 00

38. Fig. 32. Cupping Glass, with Cap and Cock,............ 1 50

39. Fig. 33. Hemispherical Cups, with Cock, Handles, and Stand; 5 inch diameter,... [6,7] 7 00

40. Hemispherical Cups, with Cock, Handles, and Stand; 3 inch diameter,..........[3,4,5] 5 00

41. Fig. 35. Stand, Lever, and Fulcrum, used with Hemi-

No. Price.

spherical Cups, for weighing a column of air,.......... [7] 5 00

42. Fig. 37. Apparatus illustrating the upward pressure of the atmosphere; Glass Cylinder, 4½ inches diameter, 12 long; with Piston; 5 inch brass plate, Hose, and Screws, Strap for connecting weight, and Tripod Stand, three feet high,.......... 12 00

43. Upward Pressure Apparatus; Glass Cylinder, 3½ by 10 inches; 4 inch Brass Plate; Hose, Strap, and 30 inch Stand,.................. [6,7] 9 00

44. Fig. 38. Upward Pressure Apparatus; Cylinder, 3 by 9 inches; Brass Plate, 3½ inches; Hose, Strap, and Stand,.................. [3,4,5] 6 00

45. Fig. 39. Brass Cylinder and Piston, with Weight, to illustrate the power of expanding air,............... 4 00

46. Fig. 40. Expansion Fountain for vacuum, or by condensation,..................... 4 00

47. Fig. 41. Revolving Jet in vacuo, with a stand. This is figured and arranged for several experiments, and referred to in some ten or twelve following,...... [3,4,5,6,7] 1 25

48. Fig. 42. Bursting Squares, for expansion or pressure; per dozen, boxed,.......... [4,5,6,7] 1 50

49. Fig. 42. Wire Guard, for Bursting Squares, [4] 75......... [5,6,7] 1 00

50. Fig. 43. Brass Cap Valve, for bursting Squares,........ [4,5,6,7] 25

51. Fig. 44. Revolving Jet and Fountain in vacuo,........ 2 50

52. Revolving Jet and Fountain in vacuo, with valves by which the water returns to the chamber as the air is let into the bell-glass, and the experiment repeated,........ 3 50

53. Fig. 45. Fountain in vacuo, the treble globe, or liquid transferrer, ... [7] 3 00

Fig. 46. Explains Revolving Jet by external pressure, &c.

54. Fig. 47. Condensing Chamber, &c., arranged for experiments, and figured for explanations; Chamber and Cock,................ [3,4,5,6,7] 3 50

Cock, with interior and exterior jets, ... [4,5,6,7] 2 00

Water-Pan and Tube, 6,..... [4,5,6,7] 75

Paradox Tunnel, Jet, and Balls, ... [4,5,6,7] 1 50

55. Fig. 48. Condensation Gauge and Stand, syphon form, in glass case; two sizes, [7] 2 50 and 3 00

56. Fig. 49. Air Gun-Barrel, [3,4,5,6] 1 00 and .... [7] 1 25

57. Fig. 50. Plate Paradox and Disc, [4,5] 1 00 and......... [6,7] 1 25

58. Fig. 51. Pipe and Ball Paradox, [4,5] 1 00 and .... [6,7] 1 25

59. Fig. 52. Flexible Hose and Jet,.................. [3,4,5,6,7] 1 00

60. Fig. 53. Brass Jet, for water, air, gas, &c., [3,4,5,6] 50 cents and [7] 75

Fig. 54. Revolving Jet and Stand,................ [3,4,5,6,7] 1 25

Globe Jet; see Exp. 15, page 25, 1 25

Revolving Stand, for Condenssing Chamber, &c.,........ 1 25

Single straight Jet,.......... 1 00

61. Reaction, or Revolving Wheels, $1 25 and 2 00

62. Double Revolving Jet,....... 2 00

63. Fig. 55. Improved Glass Condensing Chamber; capacity, two quarts; one inch thick; Screw-Cap and Stop-Cock, [7] 10 00

Pressure Gauge, for experiments with Glass Chamber, [7] 1 00

Square Vials, for experiment with condensed air in glass chamber. per dozen,....... [7] 1 00

Horizontal Connecting Piece, for glass chamber,......... 75

Bell, for condensed air in glass chamber, ... [7] 1 00

64. Fig. 56. Large Copper Condensing Chamber, ten inches diameter, with Stop-Cock and Interior Jet, ... 10 00

Fig. 57. Long Jet, for experiments with fountains,...... 50

65. Fig. 58. Artificial Fountain, with Cock, Jets, and Stand, [3,4,5] 3 00 and .... [6,7] 5 00

66. Fig. 59. Bolthead, $1 00 and [7] 1 50

Glass Jars, for various experiments, [3] 25 cents, and... [4,5,6,7] 1 00

67. Fig. 60. Bacchus in vacuo; brass mounted,............ 5 00

68. Fig. 61. Bacchus illustrated, [6] 1 50 and .... [7] 3 00

69. Fig. 62. Sheet Rubber Bags, with cap and hook, [3,4,5] 1 50 and .... [6,7] 2 00

70. Fig. 63. Lungs Glass, illustrating the mechanical action of the lungs, $2 00 and 3 00

71. Fig. 64. Bell-Glass, Jar, and Bolthead, illustrating the expansion of air, &c., [3,4,5,6] 1 00 and................. [7] 2 00

72. Fig. 65. Brass Plate and Wood Cylinder, illustrating the porosity of wood, pressure of air, &c.,................ 1 00

73. Fig. 66. Wood Cylinders and Weights, for sinking in water, after the air is removed from the pores, 15 cts., and 25

74. Fig. 67. Mercury Tunnel, for showing porosity of wood,

No.		Price.
	pressure of air, electric luminous shower, &c., ..[34567]	1 00
75.	Fig. 68. Float Wheel, illustrating the resistance of air, [3456]	1 00
76.	Fig. 69. An illustration of the materiality of air. (Each part has been priced separately.)[34567]	
77.	Fig. 70. An improved Vane and Mill, for vacuo,........ [7]	7 00
78.	Fig. 71. Tall Conical Guinea and Feather Glass, three feet high, $4 00; three and a half feet, $6 00; four feet high, eight inch diameter at bottom, four inch at top,...	8 00
	Brass Plate to use with Guinea and Feather Tube, four and five inches diameter, $2 00 and......................	3 00
	Sliding-Rod and Drop Button, for guinea and feather experiment; see Fig. 20.	
	Drop Tables (4) for guinea and feather experiment,........	2 00
79.	Fig. 72. Guinea and Feather Tube, capped both ends; has Stop-cock and Stand, Ball and Point for Electricity, &c., for vacuum or condensed air; (see experiments;) 3 feet long, [3456] 5 00; four feet, [7] 7 00; 5 feet, $8 00; 6 feet, $10 00; 8 feet,....................	12 00
80.	Fig. 73. Philosophical Water Hammer, $1 00 and.......	2 00
81.	Fig. 74. Philosophical Water Hammer, with brass Cup and Stop-cock, for exhausting, [34567] 3 00 and.......	4 00
82.	Fig. 75. Stout Syphon Barometer, with brass Cap, and Stop-cock, for exhausting, &c., ...	5 00
83.	Fig. 76. Apparatus illustrating the absurdity of suction, 36 inches high, without exhausting syringe,..........	5 00
84.	Fig. 77. Barometer in vacuo, (complete,) ....[345]	3 00
85.	Fig. 78. Chamberlain's improved Torricellian Barometer, with Sliding-Rod, Hook, &c.,....................[67]	7 00
86.	Fig. 79. Barometer arranged to use in connection with the air pumps, as a gauge, $3 00 and................	5 00
87.	Fig. 80. Syphon Gauge, in glass case, with stand, [3456] 2 50 and.............[7]	3 50
88.	Fig. 81. Pear Gauge, for determining the actual bulk of air exhausted from a bell-glass, (without sliding-rod,) [7]	3 00
89.	Fig. 82. Bell and Stand, for vacuo, [3] 1 25 and .... [7]	2 50
90.	Fig. 83. Apparatus illustrating the weight and buoyancy of air, gas, &c., (several experiments; see book,) $4 00 and ....[34 67]	6 00
91.	Fig. 84. Scales for weighing air, gas, &c.; brass beam, 18 inch; copper globe, 6 inch; scale pans and bows; sensitive to one tenth of a grain, ...	18 00
92.	Fig. 85. Stand, with graduated Scale Beam, and 6 inch Copper Globe, for weighing air, gas, &c.,..................	12 00
	Small size, as above, with 4 inch globe,................	8 00
93.	Fig. 86. Weighing Air and Specific Gravity Scales; 6 inch Copper Globe; 24 inch fine wood beam; has an elevating stand and binding-screw, to adapt to hydrostatic experiments,............[7]	12 00
94.	Fig. 87. Bell-glass graduated to cubic inches, Stop-cock and Connecter, for measuring air or gas for weighing; capacity, 200 cubic inches,.	4 00
	Graduated Bell-Glass as above, 100 cubic inches, with Cap, Cock, and Connecter,.....	3 00
95.	Fig. 88. Syphon in vacuo, with Bell-Glass, Tunnel, Cock, and Jet, two sizes, 4 00 and [7]	6 00
96.	Fig. 89. Glass Balloon and Car, in glass jar, three sizes; 15 inch jar, $3 00; 18 inch, $4 00; and 24 inch,.......	5 00
97.	Fig. 90. Hydrostatic Balloon, with tall jar and Bell-Glass; 18 inch,[34567] 4 00; 24 inch,	5 00
98.	Fig. 91. Glass Flask, with Cap and Stop-cock, for boiling water in vacuum, or under pressure, $2 00 and.......	3 00
	Small Thermometer to suspend in the flask, 75 cents and ..	1 00
	Spring Safety Valve, for the above flask, $1 00 and..... [2]	1 50
99.	Fig. 92. Double Transferrer, with six inch Plates, fourteen inch Bar, and three Stop-cocks; on mahogany stand, ...	15 00
	Double Transferrer, with five inch Plates, eight inch Bar, three Cocks, on Stand,....[7]	10 00
100.	Fig. 93. Single Transferrer; has a brass capped two-quart Bell-Glass, Stop-cock, Brass Plate, Jet, and small Bell-Glass; (is made up of parts before enumerated,) ....[34567]	6 00
101.	Fig. 94. Freezing Apparatus; 4½ inch, $1 25; 6 inch, $2 00; 8 inch, [345] 3 00;	

No. — Price.

10 inch, $4 00; 12 inch, 6 00; 15 inch; $8 00

102. Fig. 95. Freezing Apparatus, with Thermometer and tall glass with brass Cap and Sliding-Rod; 4½ and 6 inches, $4 00 and 6 00

103. Fig. 96. Apparatus arranged to freeze one quart of water at a time, with any of the five largest air pumps, ... 12 00

104. Fig. 97. Freezing Apparatus, with Tunnel, Stop-cock, and Jet; 8 inch, $4 00; 10 inch, $6 00; 12 inch, $8 00; 15 inch, ... 10 00

105. Fig. 98. Improved Water Cups, to use with freezing apparatus, from 15 cents each to 75

106. Fig. 99. Apparatus for freezing water by the evaporation of ether, $1 00 and.. 2 00

107. Fig. 100. Cryophorus in vacuo, with brass Plate; the water is frozen in the outer ball, from the condensation of the vapor in the ball with the bell-glass, $4 00 and.. 6 00

108. Fig. 101. Bell-Glass, with glass Bulb and Tube, and spirit Thermometer, for freezing mercury by the cold produced from the evaporation of ether, $4 00 and..................... 6 00

Tubes and Bulbs filled with mercury, for breaking, after being frozen, 15 to 25 cents each.

109. Fig. 102. Freezing Apparatus with Thermometer and Sliding-Rods, adapted to the larger pumps; 12 inches diameter, $8 00; 15 inches, ... 10 00

110. Fig. 103. Tunnel, Stop-cock, and Jet, for introducing mercury, acid, ether, alcohol, water, &c., into an exhausted bell-glass, $2 00 and...................... 3 00

111. Fig. 104. Apparatus for exploding gunpowder in vacuo; used also for other purposes; $3 00 and..... 5 00

112. Fig. 105. Lock for striking flint and steel in vacuo, $2 00 and 3 00

Leather Collars for Stop-cocks, assorted, per hundred, ... 50

Oil prepared to use with Philosophical Instruments, per ounce, in vial, ... 25

Brass Caps for bell-glasses, from one half to two inches diameter, from 15 to...... 50

No. — Price.

Iron Stop-cocks, to use with mercury; size and price as No. 16 and 17, page 340.

HYDROSTATIC AND HYDRAULIC APPARATUS.

1. Fig. 1. Equilibrium Tubes and Stand, best finish, ... $11 00
   Second quality, ... 2 00
2. Fig. 2. Hydrostatic Paradox and fixtures complete, best quality, largest size, ... 25 00
   Hydrostatic Paradox, as above, second quality, ... 18 00
   Hydrostatic Paradox, fixtures, without the Stand and Scale-beam, ... 8 00
   A set of Avoirdupois (brass) Weights, from one half to sixteen ounces, ... 5 00
   A set of Troy Weights, from one half to twelve ounces, .. 3 00
   Graduated Glass Jar, two hundred cubic inches, ... 2 00
3. Fig. 3. Glass Hydrometer, better finish, with weight adjusting to all liquids, ... 1 50
4. Glass Hydrometer, large size, zero or water mark in the centre of the scale, is adapted to all liquids, ... 2 50
5. Glass Hydrometers, cheap finish, graduated for water or ether, ... 1 00
6. Fig. 4. Hydrometer Jar, with foot and lip; ten cubic inches, $1 50; twenty cubic inches, $2 00; thirty cubic inches, $2 25; fifty cubic inches, ... 2 50
7. Plane Hydrometer Jars, ten inches high, 75 cts.; twelve inches, $1 00; fifteen inches, 1 25; twenty inches, ... 1 50
8. Fig. 5. Graduated Tubes, for specific gravity, ... 50
9. Fig. 5. Hydrostatic Bellows, twelve inches square, six feet brass tube, in two joints, ... 6 00
10. Fig. 6. Hydrostatic Bellows, best quality, double lined, extra tubes, &c., ... 8 00
11. Fig. 7. Hydrostatic Bellows, circular twelve inch, with six feet brass tube in two joints, 5 00
    Fig. 7. Hydrostatic Bellows, as No. 11, with extra glass tube, with sockets and tunnel, and inch square tube and tunnel, ... 8 00
12. Fig. 8. Forcing Pump, or Fire Engine, with Stand, Cistern, and Hose, ... 8 00
    Lifting Pump, glass Barrel, with Stand, Cistern, and Receiving Tunnel, ... 6 00

No.		Price.
	Both the above on one stand, with Cistern,............[3,7]	12 00
13.	Fig. 9. Archimedes Screw Pump, with Stand and Cistern,......................[7]	6 00
14.	Screw Pump, on a large scale, and more highly finished,..	10 00
15.	Fig. 10. Brass Syphon, with Suction Tube, Glass Jar, Stand, and Receiving Basin; largest size,...............	5 00
16.	Syphon and Suction Tube, as above,....................[7]	1 50
	Glass Syphon and Suction Tube,......................	1 25
	Wertemberg Syphon, of Glass, 50 cents, and..............	75
17.	Cylindrical Glass Jar, with Ball, Plate, and Hook, illustrating upward and downward pressure of fluids; small size, $2 00; large size,	4 00
18.	Syphon and Cup, or Tantalus's Cup,.....................	1 50
19.	Fig. 11. Vacuum Syphon, or Fountain Syphon, with Basins, $2 00 and	3 00
20.	Fig. 12. Hero's Fountain,....	6 00
21.	Fig. 13. Barker's Mill, $3 00 and......................	5 00
	Glass model of the Centrifugal Pump, $6 00 and	8 00
23.	Apparatus illustrating the laws of the spouting of fluids, $10 00 and...........	20 00
24.	Fig. 14. Working model of the Hydraulic Press, cheap finished, $20 00; best finished, ...[7]	25 00

Several pieces of apparatus, well adapted for Hydrostatic and Hydraulic illustrations, have been enumerated and figured in Pneumatics.

ELECTRIC APPARATUS.

No.		Price.
1.	An eighteen inch plate Electric Machine,............[3,4]	25 00
2.	A twenty-four inch plate Machine, ...[5,6]	50 00
3.	A thirty inch plate Machine,.[7]	75 00
4.	A thirty six inch plate Machine, ...	100 00
5.	A forty inch plate Machine,..	125 00
6.	A forty-eight inch plate Machine, ...	150 00
7.	Two forty-eight inch plates on one shaft; four pair of fifteen inch rubbers, and two negative conductors,......	300 00
8.	A fifty-five inch plate, with two pair of eighteen inch rubbers, and two negative conductors, ...	300 00
9.	Leyden Jars, one, two, three, and four quarts, $1, [3] 2, 3, and	4 00
10.	Leyden Jars, with ring and points, and crooked neck and ball, for suspending to conductor, one and two quarts, $1 25 and ....[6,7]	3 50
11.	Leyden Jars, with sliding Discharger, two and four quarts, $4 00 and	6 00
12.	Insulating Stand, with Jar and Electrometers, ...	4 00
13.	Diamond or Luminous Jars, two and four quarts, [3,4,5,6,7] 3 00 and..................	5 00
14.	Leyden Jars, with movable coatings, one and two quarts, $1 50 and ....[3,4,5,6,7]	3 50
15.	Double Leyden Jars, one and two quarts,.............[4,5,7]	3 50
16.	Electrometer Jars, one and two quarts, [3,4,5,6] 1 50 and..[7]	2 50
17.	Electric Batteries, four quart Jars, cased, [4] 6 00; six quart Jars, cased, $8 00; four two quart Jars, cased, $10 00; six two quart Jars, cased, [7] 14 00; six three quart tall Jars, cased, $18 00; twelve two quart Jars, cased,......	24 00
18.	Sliding Directing Rod, three and four feet long, [3,4,5,6] 2 00 and......................[7]	3 00
19.	Single Spiral Spotted Tube and Stand, [3,4,5,6] 2 50 and..[7]	3 00
20.	Set (7) Spiral Spotted Tubes and Revolving Arm, mounted on stand; two feet long, $15 00; three feet,........	25 00
21.	Stand for luminating Eggs, $2 00 and	3 00
22.	Luminous Letters, six and twelve inches square, on silk and in frame; *seen day or night;* per letter, 50 cents and......................	75
23.	Luminous Star, on glass, mounted, ...[7]	4 00
24.	Profile of Franklin, spotted on glass, and mounted,.......	4 00
25.	Insulated Director,..........	2 00
26.	Plane Discharger, ...[3,4,5]	2 50
27.	Jointed Discharger, large size,[6,7]	3 50
28.	Universal Discharger,.......[6,7]	6 00
29.	Universal Discharger, with movable balls, points, and pincers,....................	7 00
30.	Revolving Bell Glass, with point and ring, $2 00 and.[7]	2 50
31.	Lane's Sliding Discharger, $3 00 and	5 00
32.	Pith-ball Electrometer and stand, [3,4,5,6] 75 cents and....[7]	1 00
33.	Quadrant Electrometer and stand, [6] 2 00 and ....[7]	3 00
34.	Gold Leaf Electrometer, with evaporating cup and point, [6] 2 00 and ....[7]	3 00
35.	Improved Gold Leaf Electrometer, with evaporating cup, point, and condensing plates,	5 00

No.		Price.
36	Atmospheric Electrometer, (Kinnersley's)	6 00
37.	Insulating Stool, sixteen inches square, ...[3 4 5 6 7]	6 00
38.	Stand and Bell for pith-ball dancing, $1 00 and....... [7]	2 00
39.	Electric Bells, (3,) three inches diameter, ...[3 4 5 6 7]	3 00
40.	Set of nine Bells, mounted on a stand,..................	12 00
41.	Dancing Image Plates, eleven inches diameter, and suspended to prime conductor,....................[3 4 5]	2 00
42.	Dancing Image Plates, eleven inches, on adjusting stand, [6 7]	3 00
43.	Dancing Image Plates, on insulating and adjusting stand, ...	6 00
44.	Dancing Images; a pair, [3 4] 30 cents and................. [5 6 7]	50
45.	Pith-balls, from one to three fourths inch diameter, from [3 4 5] 25 cents per dozen, in box, to..................[6 7]	1 00
	Fancy colored Pith-balls, per doz., 30 cents to...........	1 50
46.	Electric Sportsmen and Birds, [3 4 5 6] 75 cents and..........[7]	1 00
	Electric Birds, per dozen, 50 cents and................	75
47.	Ratification, or Rat-killing Tube, $3 00 and..........	4 00
48.	Wax Cylinders and Handles, six, nine, and twelve inches long, [3 4 5 6 7] 1 00, 2 00, and	3 00
49.	Glass Friction Cylinders, capped and handled, twelve, eighteen, and twenty-four inches long, [3 4 5] 1 50, [6 7] 2 00,	3 00
50.	Sulphur Cone and Cup, 75 cents, and................	1 00
51.	Powder Bombs, [3 4 5 6] 1 25 and [7]	2 00
52.	Ivory Mortar and Ball, for decomposing oil, $2 00 and..	3 00
53.	Electric Cannons, mounted, $4 00 and................	6 00
54.	Thunder House and Fixtures, [3 4 5 6] 5 00 and .... [7]	6 00
55.	Gas Pistols, belonging to thunder house, ...[3 4 5 6 7]	50
56.	Brass Electric Pistol; has fixtures to use with Galvanic Apparatus, $2 00 and.....	3 00
57.	Hydrogen Gas Generator, or Platina Igniter, with Gas Detonating Jet, Platina Sponge and Jet, various sizes; two, four, and eight quarts, complete; [3 4 5] $3 00, [6 7] 4 00, $8 00, and.........	14 00
58.	Long Haired Man, [3 4 5] 50 cents, [6 7] 75 cents, and	1 00
59.	Electric Float Wheel and Point, [3 4 5 6] 1 00, ... [7]	1 50
60.	The Abbe Nolet's Globe, [5 6] 3 00 and.............. [7]	5 00
61.	Luminous Bell Glass, Points, and Sliding Rod, $3 00 and	5 00
62.	Balance Electrometer, large size,.....................	6 00
63.	Electric S, and Point, [3 4 5] 50 cents, [6 7] 75 cents, and......	1 00
64.	Compound Electric S, with Point and Stand, $2 00 and	3 00
65.	Electric S in vacuo, is arranged with articles before named,	
66.	Aurora Flasks, 1 00, 1 50, and	2 00
67.	Electric Bucket and Syphon, $1 00 and ....[7]	1 50
68.	Electric Swing and Image, $1 00 and..............[4 5 6 7]	2 00
69.	Electric Seasons Machine, *large size*, mounted on Insulating Stand,...........	6 00
70.	Electric Seasons Machine, smaller size, mounted on Insulating Stand, ...[6 7]	3 00
71.	Electric Seasons Machine, small size, with point and stand; stands in the centre hole of the prime conductor, ...[3 4 5]	2 00
72.	Electrophorus, eleven inches, mounted on Insulating Stand, with cover, and handle, and elastic bag, and jet, 6 00 and .... [7]	8 00
73.	Electric Spoons for igniting Ether, [3 4 5] 75 cents, ... [6 7]	1 25
74.	Northern Light, or Aurora Tubes, from three to eight feet long, and mounted, 6 00, 8 00, 10 00 and	12 00
75.	Magic Miser's Plate, plain and mounted, [5] 75 cents, $1 00, and ....[6 7]	2 00
76.	Electric Wheel and Inclined Plane, 2 00,............. [7]	4 00
77.	Electric Swan and Basin, 75 cents and................	1 00
78.	Revolving Glass Globe and Point, 50 cents and........	1 00
79.	Helix for Magnetizing Steel, 2 and.....................	3 00
80.	Apparatus for Decomposing and Recomposing Water,..	8 00
	Amalgam, per box, 25, 50, 75,	1 00

CHEMICAL APPARATUS.

No.		Price.
1.	Fig. 1. A Pair of Cylindrical copper Gasometers, 30 gallons capacity each bell, Compound Blow-pipe, with adjustable Holder,...........	150 00
2.	Pair copper Gasometers, 15 gallons each,................ [7]	60 00
3.	Pair copper Gasometers, 7 gallons each, ...[5 6]	35 00
4.	Pair tin Gasometers, 7 gallons each, ...[4]	25 00
5.	Fig. 6. Malleable Iron Retort, and tube, pint,............[5 6]	2 00

No. — Price.

6. Cast Iron Retort and Tube, quart, ...[7] 3 00
7. Flask and Screw Cap for Oxygen,...................... [4] 1 00
8. Lead Tube, with screws conducting gas, ...[4567] 1 50
9. Fig. 7. Lead Retort and Tube for Hydrogen, quart,...... 5 00
10. Fig. 10. Pair 13 inch Planished Reflectors, in cases which serve as stands, and iron ball and stand, ...[4567] 8 00
11. Fig. 12. Spirit Boiler, mounted to use with the Reflectors,..................[4567] 2 50
12. Fig. 70. Pair Cubes and Shields, for radiation and absorption of heat, ...[67] 2 00
13. Fig. 42. Pyrometer, with brass and iron expanding rod and two lamps, [456] 3 00........ [7] 3 00
14. Fig. 46. Lamp Stand, with four bows and binding screws,[4567] 2 00
15. Lamp Stand or Retort Holder, with shifting bows and two binders, ... 5 00
16. Conductometer, with iron, brass, copper, lead, tin, and glass conducting rods, ...[67] 2 00
17. Conductometer, of a cheaper form,.................... [45] 1 00
18. Fig. 37. Apparatus for non-conducting power of liquids, $3, and 4 00
19. Fig. 32. Platina Pendent Spoons and Rod,..........[67] 1 00
20. Copper Pendent Spoons and Rod, ...[567] 25
21. Fig. 33. Pendent Sockets for tapers, &c.,.............. 50
22. Fig. 34. Platina Forceps,.... 3 00
23. Fig. 48. Fire Syringe, 7 inch plane, and box tinder,...[4567] 1 50
24. Fig. 43. Fire Syringe, with stop-cock tinder cavity,.... 3 00
25. Fig. 60. Set 3 wire gauze for cups with flame,..........[4567] 75
26. Fig. 20. Plane Mouth Blowpipe, 50 cents and......... [7] 75
27. Fig. 21. Blowpipe, with condensing bulb, ... 1 50
28. Elevating Stands, with Table, Tripod, and Bughorn, ... [7] 1 50
29. Stands, with sliding screw clamps of wood for retort and tube holding, 3 and... 5 00
30. Gas-bag, with socket and stop-cock, 6 gallon, ...[567] 5 00
31. Hessian Crucibles, in nests of five,................... [67] 20
32. Fig. 22. Chemical Thermometer, 650⁰ jointed scale,..... 5 00
33. Chemical Thermometer, 450⁰, plane scale, ...[567] 2 50
34. Eig. 11. Spirit Lamp, with ground cap,............[4567] 1 00
35. Aphlogistic Lamp, with platina coil, $1 and .... [7] 2 00
36. Fig. 14. Air Thermometer, $2 and.................. 3 00
37. Fig. 16. Dropping Tube, [67] 25 cents and................. 30
38. Fig. 17. Dropping Tube, with Rubber Air Bag, ... 1 00
39. Fig. 15. Spirit Boiler, used with the hand, 75 cents and 1 00
40. Fig. 18. Graduated oz. measure, [5] 75 cents, [467] 1, and .. 1 25
41. Fig. 26. Graduated measure, 10 cubic inches,........[4567] 1 25
42. Fig. 23. Volta's Eudiometer, graduated,...... .... 1 50
43. Fig. 24. Hope's Eudiometer, graduated, ... 3 00
44. Fig. 25. Ure's Eudiometer, graduated,................. 2 50
45. Fig. 27. Graduated Cubic inch tubes, [7] 50 cents and ...... [7] 75
46. Test Tubes, [5674] 4, [5675] 5, [5676] 6, [5678] 8, [4567] 10, [4567] 12 inch, and 10 cts. to.............[4567] 30
47. Fig. 29. Stand and doz. assorted test tubes,.......... 2 00
48. Fig. 35. Bulb and Tube for condensation of mixed liquids,.................... [7] 75
49. Fig. 36. Two Bulbs and Tube for condensation, ... 1 00
50. Fig. 30. Glass Flasks, with ring necks for corks, half pint, [4567] 25 cents; pint, [4567] 35 cents; quart .....[4567] 50
51. Fig. 19. Glass Funnels, half pint, [4567] 25 cents; pint, [7] 35 cts. and quarts............50
52. Fig. 19. Flat Bottom Flasks, gill [567] 20 cents, half pint [567] 30 cents, pint [567] 40 cts., and quarts ....[567] 55
53. Fig. 72. Globe Receivers, with ring neck, tube, and stopper, half pint, [67] 35 cents; pint, [67] 45 cents; and quart, 55
54. Fig. 72. Tubulated Retorts, gill [4567] 25 cents, half pint [4567] 30 cents, pint [4567] 35 cents, and quart.......... [567] 50
55. Graduated 60 Drop. Tube on foot,...................... 75
56. Cast Iron Mercury Cisterns,.. 1 00
57. Fig. 8. Chemical Furnace, lined, rings or glass holders, tube holes, and sand bottles, [7] 10, 15, and 20 00
58. Iron Tube, adapted to Furnace, with screws, decomposing water, 75 cents and....... [7] 1 00
59. Glass Evaporating Dishes,[4567] 20 cents, [4567] 25 cents, [4567] 30 cents, and .... [67] 35
60. Porcelain Evaporating Dishes, nest of five, $1 50 and 2 00
61. Wedgwood Evaporating Dishes, nest of five, [7] 1 50 and.. 2 50
62. Glass Mortar and Pestles, 50 cents, 75 cents, and....... [7] 1 00

No.		Price.
63.	Porcelain Mortars and Pestles, [5,6,7] 1 25, 1 50, and....	2 00
64.	Iron Mortar and Pestle, 1 25, 1 50, and................	1 75
65.	Platina Spatulas, [7] 1 50, 2, and	2 50
66.	Steel Spatulas, 25 cents and..	50
67.	Hydrogen Balloons, 12 inch, 1; 15 inch, [4,5,6] 2; 18 inch, [7] 3; 20 inch, 4; and 24 inch, ...	6 00
68.	Woulded Rings for supporting retorts, flasks, evaporating dishes, &c., set of six, 1, and	1 50
69.	Assortment of Test Rods, eight, 50 cents and	75
70.	Glass Stirring Rods, six,...... [5,6,7]	75
71.	Fig. 43. Hydrogen Gas Generator, with gas jet, platina sponge, and long jet for detonating gas, one and two quarts capacity, 4 and......	6 00
72.	Fig. 44. Hydrogen Generator, in frame, with basement and fixtures, 8 quarts, 8; 12 quarts,................	12 00
73.	Glass Alembics, pint, [7] 1 75; quart, ...	2 50
74.	Boglana Vials, per dozen,.... [6,7]	1 00
75.	Prince Rupert's Drops, per doz., [6,7]	50
76.	Long-necked Matresses, half pint, [4,5,6,7] 30 cents; pint, . [4,5,6,7]	50
77.	Air Thermometer, tube and bulb, 36 inch, ...	50

APPARATUS FIGURED AND DESCRIBED IN PNEUMATICS, BUT USED IN CHEMISTRY.

Stop-cocks. See No. 16, Fig. 10.

Screw Coupling, (5,) Nos. 18 to 22.

Gallows Connecters and Tips, Nos. 23 and 24

Hose for conducting Gas, No. 25, Fig. 19.

Sliding Rods and Brass Plates, No. 26, Fig. 20.

Transferring Pump, double acting, No. 14, Fig. 8.

Bell Glasses, (40,) No. 29, Fig. 23, to No. 34, Fig. 28.

Hydrogen Bubble Pipe, No. 58, Fig. 51.

Strong Glass Condensing Chamber, with screw cap for showing the chemical effect produced on various substances subjected to atmospheric or gas pressure.

Condensation Gauge for glass chamber, No. 55, Fig. 48.

Bell Glass, cap, cock, and plate, for transferring air or gas, No. 100, Fig. 93.

Evaporating Dishes, Fig. 98.

Bell Glasses, with screw cap, and graduated to cubic inches, from 100 to 300, No. 94, Fig. 87.

Gas Pistols. See Electricity.

Scales, with 5 inch steel boxed beam, pair two and a half inch pans, set of weights from half a grain to 6 drams, cased, included in apparatus, No. 91, Fig 84.

Larger, and more highly finished Scales, for use in Laboratory, 18 inch beam, No. 91, Fig. 84.

STEAM.

Fig.		Price.
	Steam Balls for exploding by candle, doz.,............. [4,5,6,7]	50
1.	Steam Ball and Jet, brass.. [4,5,6,7]	1 50
2.	Wollaston's Illustration of Low Pressure Steam Engine, copper globe boiler, cylinder, piston and rod, handle and safety-valve,.. [4,6,7]	3 00
3.	Working Model of the Upright High Pressure Steam Engine complete,............	35 00
4.	Section Model of the High Pressure Steam Engine, 18 inch beam,................	25 00
5.	Marcet's Steam Globe, 5 inch diameter, lower half of *iron*, and not injured by mercury, a 36 inch condensation gauge and scale, a steam thermometer in brass case, a safety-valve adjustable from one to twelve atmospheres' pressure, a 7 wick copper lamp and stop-cock to start revolving jet, steam-gun, &c.,................ [6,7]	25 00
5.	Marcet's Steam Globe, 6 inch diameter, with large fixtures as above, steam gun, jet for charging Leyden Jar with electricity from steam, insulating stand for all,....	50 00
6.	Chamberlain's Steam Flask with screw cap, stop-cock, safety-valve, steam thermometer, inside, spirit lamp and stand for all,.......... [7]	8 00

NOTE. The Hose connects this steam flask with the air pump, to show the boiling point to vary with the pressure of the atmosphere.

7.	Working Model of the Horizontal High Pressure Steam Engine, complete in all its parts, ...	50 00

AN ASSORTMENT OF CHEMICAL SUBSTANCES,

In quantity and kind, adapted to use with the several sets of Apparatus for a Course of Experimental Lectures.

[4,5] 10, [6] 15, [7] 20 to $25 00

1. Sulphuric Acid,
2. Muriatic "
3. Nitric "
4. Sulphuric Ether,

5. Liquid Ammonia,
6. Alcohol,
7. Naphtha,
8. Nitrate of Barytes,
9. Muriate of "
10. Sodium,
11. Potassium,
12. Iodine,
13. Phosphorus,
14. Nitrate of Silver,
15. Nitrate of Ammonia,
16. Carbonate of "
17. Muriate of "
18. Oxalic Acid,
19. Pure Chlorate of Potassa,
20. Granulated Zinc,
21. Black Oxide of Manganese,
22. Prussiate of Potash,
23. Bicarbonate of Soda,
24. Fluor Spar,
25. Pulverized Steel,
26. " Iron,
27. " Brass,
28. " Copper,
29. " Tin,
30. " Lead,
31. " Zinc.

MAGNETIC, ELECTRO-MAGNETIC, GALVANIC, &c.

Pair ten inch Bar Magnets and Armatures, in case,........ [6]3 00
Single Bar Magnet and Keeper, [3,6,7]1 00
Compound Magnet, twelve inch,.. [7]2 50
U Magnet and Armature, [1,2,3,4]50 cents, and [3,5]1 00,......... 2 00
U Magnet and Wheel Armature, .[6,7]3 00
Double U Magnet and Armature, 3 00, and 5 00
Wheel Armature for Double Magnet, ... 1 00
Round Bar Armature, [3,4,6]25 cents, and .... [5,7]50
Y Armature, [3,4]50 cents, and ... [5,6,7]75
Star Armature, [3,4,6]75 cents, and [5,7]1 00
Magnetic Needle, six inch, and Stand, [1,2,3,4,5,7]1 00, and.... [6]1 50
Galvanic Battery, 25, 50, and 100; pair of *cast* zinc plates, four by six inches, in copper cells; are freed from acid solution by being raised one inch with crank windlass; are a very efficient decomposing and igniting battery, [7]25 00, 45 00, and 90 00
Sulphate of Copper Battery, 8 by 9½ inches, ... [6]8 00
Sulphate of Copper Battery, 6 by 9 inches,................. [4,5]6 00
Sulphate of Copper Battery, 4 by 5¼ inch,................ [1,2,3,7]3 00
Powder Cup, brass,.......... [3,4,5,6,7]50
Voltaic Pistol, used in electrics, &c., [6]3 00 and .... [7]4 00
Electro, or wound Iron Magnets, plain, [3]1 00; [4,5]2 00; and [7]5 00
Electro-Magnets, mounted in frame, with Armature, 10 00 and................. 15 00
Electro-Magnet, mounted in frame, with Armature and Lever to sustain 1000 pounds with small Battery,........ 25 00
Electro Coil and Hemispheric Magnets, with ring-handles, [1,2,3]2 50, [4,5,6,7]3 50, and.... 5 00
Magnetizing Helix, on Stand, and round bar,............[3,4,5,6,7]3 00
Pair of Coils to separate from the Magnet, 2 50 and.......... 5 00
Orsted's Galvanometer, ... [7]4 00
Galvanometer, compass form,[3,4,5,6,7]3 00
A seven inch Terrestrial Helix, used with needle, dipping, reversing poles, &c., [3,4]1 50 and .... [5,6,7]2 00
Galvanometer, mounted on tripod stand, with adjusting screws, 6 00
De la Rive's Ring or Floating Battery, ... [5,6,7]1 25
Lever Beam Electro-Magnetic Engine, 10 00 and........... 15 00
Horizontal Revolving Armature Engine, ... 10 00
Revolving Magnet Bell Engine, [6,7]12 00
Revolving Electro-Magnet, between poles of Steel U Magnet, [3,4,5,6,7]5 00 and....... 6 00
Thermo-Electric Revolving Arch, between poles of Steel U Magnet, with Lamp,.... [4,5,6,7]5 00
Separable Helices, or Apparatus for Analysis of Shocks, Decomposing Water, &c.,... [6,7]12 00
Horizontal Electro-Magnetic Apparatus for Shocks, with Vibrating Armature or Breakpiece, for medical use, &c., [3,4]5 00, [5]6 00, [6]7 00, and.. 8 00
Shocking Handles, with binding screws, ...[3,4,5,6,7]1 50
Set (4) Connecting Wires,.....[3,4,5,6,7]50
Magneto-Electric Machine, with five eighteen inch Magnets, and a large compound revolving wire Armature, all substantially mounted, and sufficiently powerful to decompose water, [7]40 00 and 50 00
Decomposing Cell, with tubes for collecting gases, mixed or separate, [6,7]3 00 and 5 00

NOTE. The above list of magnetic apparatus comprises only the more important instruments for the illustration of principles in this branch of science; and also affords as wide a range of prices as consists with liberal size, improved construction, and good mechanism.

GEOMETRY, &c.

	Price.
Set of eight mahogany Solids, illustrating Cube Root, Plane and Solid Measure, &c. .... [1,2]	1 25
Set of twelve Solids, viz., Cylinder; Oblique Cylinder; Prism, three sides; Prism, six sides; Cone; Pyramid; Frustrum of Cone; Frustrum of Pyramid; Sphere; Hemisphere; Oblate Spheroid; Prolate Spheroid,... [1,2]	1 00
Set of ten Parallelopipeds, papered and numbered with reference to "Holbrook's Geometry,"............... [1,2]	1 00
Set of regular Solids, made of pasteboard, on cloth, cut and strung so as to be drawn into solid form,............ [1,2]	1 00
Set of five Geometrical Transposing Frames............ [1,2]	1 00
Numeral Frame, ... [1,2]	1 25
A sheet of forty Geometrical Illustrations,.................. [1,2]	02

INDEX

TO THE SETS OF APPARATUS SELECTED FROM THE FOREGOING CATALOGUES.

To notice all the articles composing the various sets, it will be necessary to look with care through the entire Catalogue. The sets will, of course, be subject to modification by the purchaser.

Set No. 1, marked [1] against the price of each article,................	$50 00
" " 2, " [2] " " " "	100 00
" " 3, " [3] " " " "	250 00
" " 4, " [4] " " " "	400 00
" " 5, " [5] " " " "	500 00
" " 6, " [6] " " " "	700 00
" " 7, " [7] " " " "	1000 00

BOOKS, EXPERIMENTAL, ILLUSTRATIVE, AND EXPLANATORY, WITH PRICE CATALOGUES.

"Chamberlain's Pneumatic Experiments," with one hundred and twenty wood cut illustrations and two hundred experiments, with notes and explanations,..	75
"Chamberlain's Electric Illustrations and Experiments," seventy illustrations, with notes, &c.,..	50
"Chamberlain's Illustrated *Price* Catalogue of Mechanics, Optics, Astronomical, Pneumatic, Hydrostatic, Electric, Chemical, Galvanic, Magnetic, Electro-Magnetic, &c.,..	75
"Francis's Chemical Experiments," with one hundred and fifty wood cut illustrations and two thousand one hundred and forty-nine experiments,	2 00
"Davis's Manual of Magnetism," with some two hundred cut illustrations and experiments,...	1 25

NOTE. All of the Instruments are illustrated by Wood Cuts, and such descriptions and dimensions given as will enable the purchaser to judge correctly of the general character of the Instruments.

TERMS, CASH.

NO DISCOUNT TO AGENTS.

Prices uniform and definite; and such as will afford only a manufacturer's profit.

Boxes, packing, and shipping, two and a half per cent. on the amount of the bill, if over one hundred dollars.

Insured against breakage by transportation for two and a half per cent.

Insured against the dangers of the seas, from one to two and a half per cent.

ILLUSTRATIONS

OF

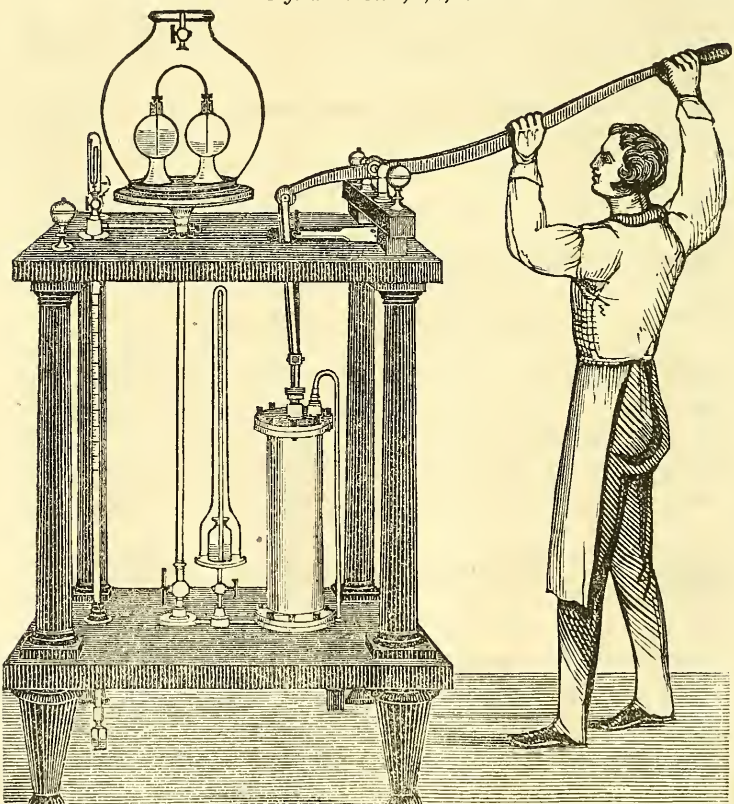
PHILOSOPHICAL INSTRUMENTS

MANUFACTURED AND SOLD BY

N. B. CHAMBERLAIN,

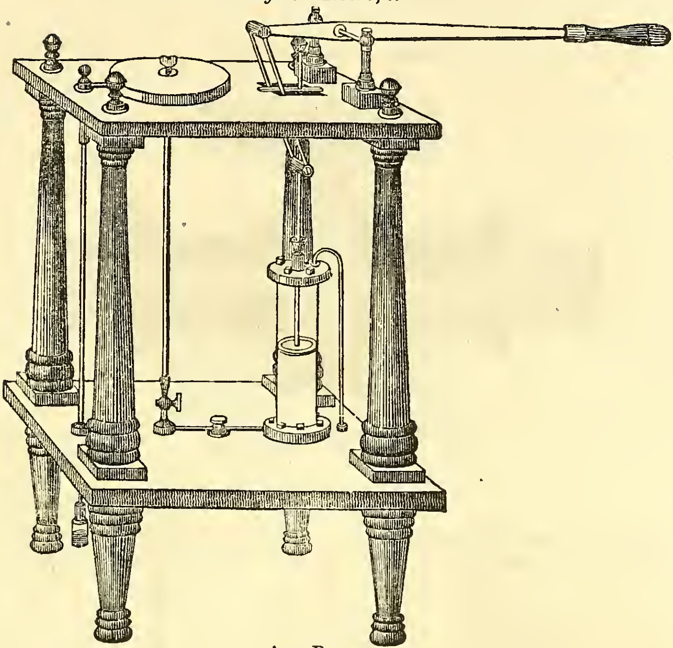
BOSTON, MASS.

Pneumatics.—Chamberlain's American Air Pump.
Fig. 1.—Nos. 1, 2, 3, 4.



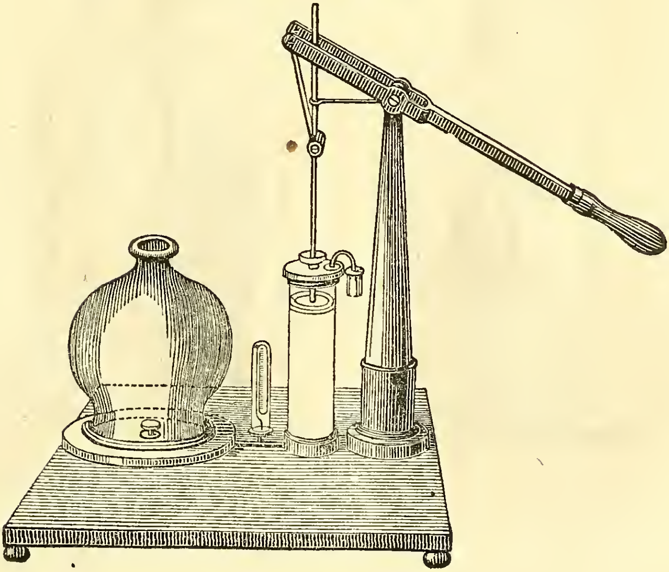
Air Pump.

Fig. 2.—Nos. 5, 6.

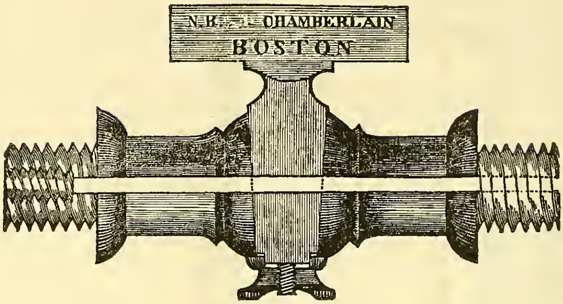


Air Pump.

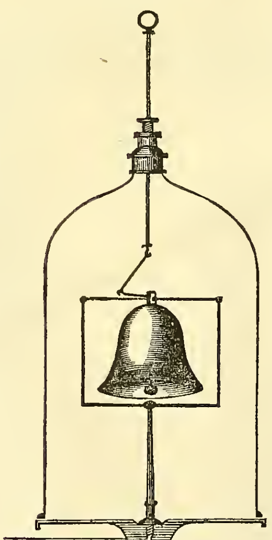
Fig. 4.—No. 10.



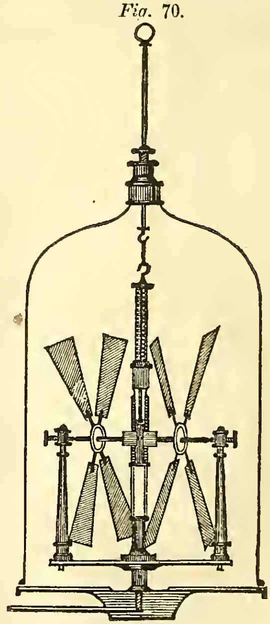
THREE INCH STOP-COCK
Fig. 10.



BELL IN VACUO.
Fig. 82.

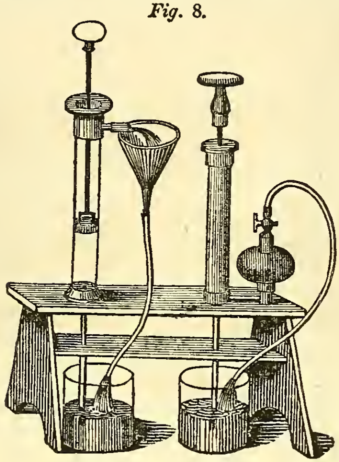


VANE AND MILL IN VACUO
Fig. 70.



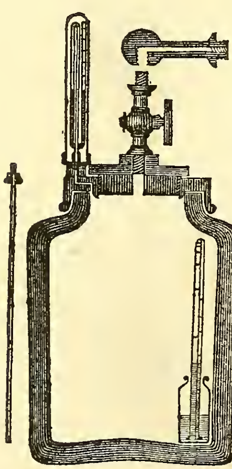
Hydrostatics. — Lifting and Forcing Pumps.

Fig. 8.



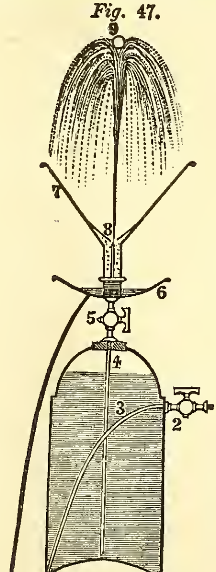
Pneumatics. — Improved Glass Condensing Chamber.

Fig. 55.



Pneumatics. — Copper Condensing Chamber and Fixtures.

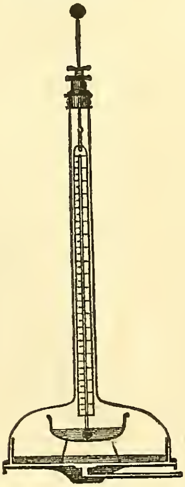
Fig. 47.



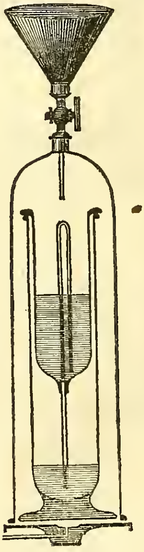
CHAMBERLAIN'S BAROMETER AND EXPANSION APPARATUS.
Fig. 78.

TALL CONICAL GUINEA AND FEATHER GLASS.
Fig. 71.

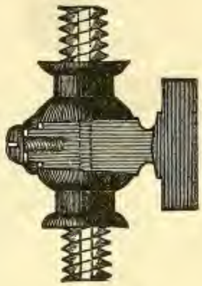
FREEZING APPARATUS WITH THERMOMETER.
Fig. 95.



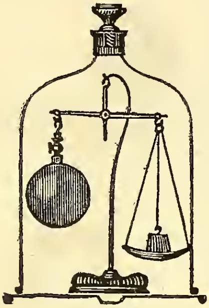
SYPHON IN VACUO.
Fig. 88.



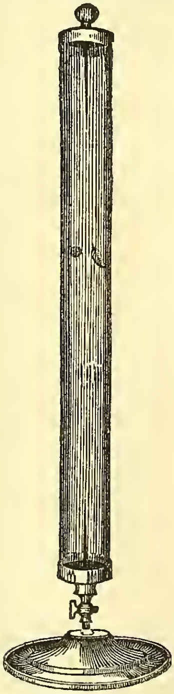
ONE AND A HALF INCH STOP-COCK.
Fig. 11.



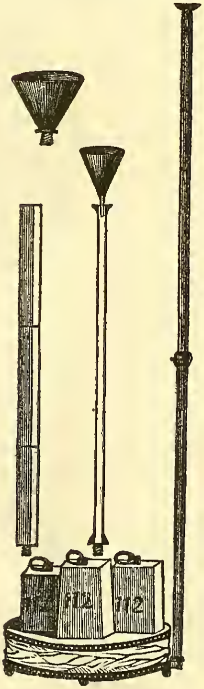
WEIGHT AND BUOYANCY OF AIR.
Fig. 83.



GUINEA AND FEATHER TUBE, OR NORTHERN LIGHT TUBE.
Fig. 72

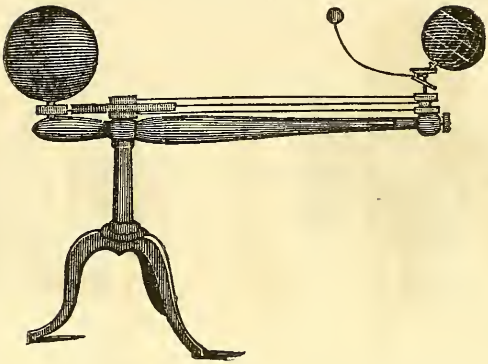


Hydrostatics. — HYDROSTATIC BELLOWS.
Fig. 7.



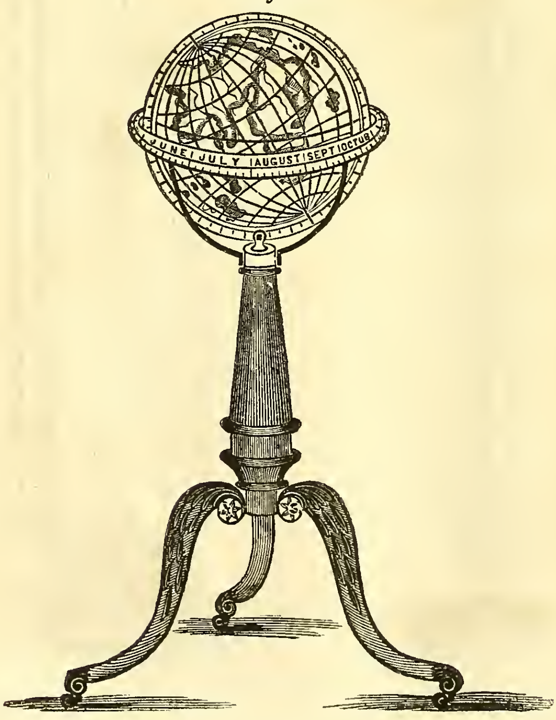
SEASONS MACHINE — *Brass Mounted.*

Fig. 21.



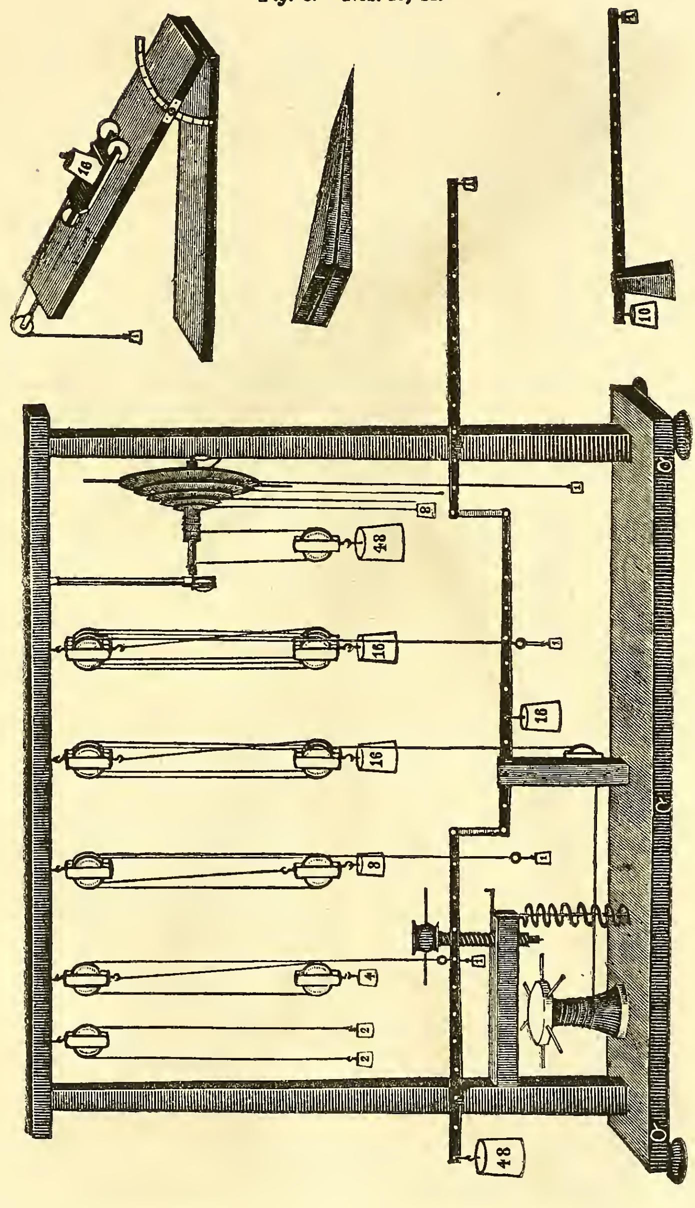
IMPROVED HIGH MOUNTED GLOBE.

Fig. 22.

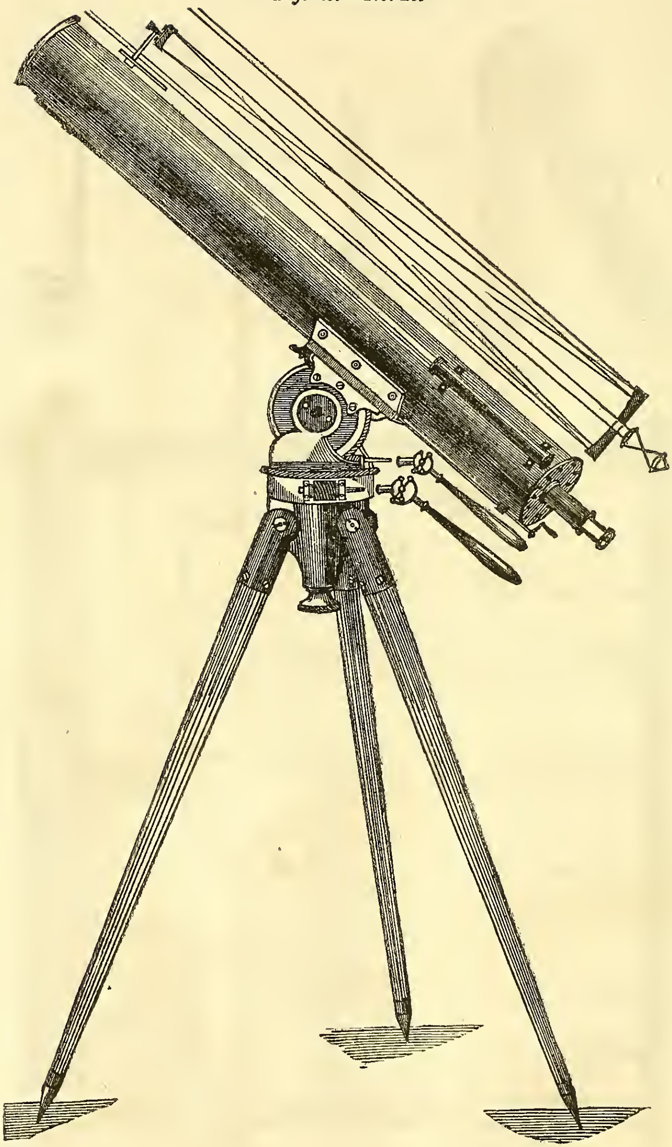


MECHANICAL POWERS.

Fig. 8.—Nos. 10, 11.

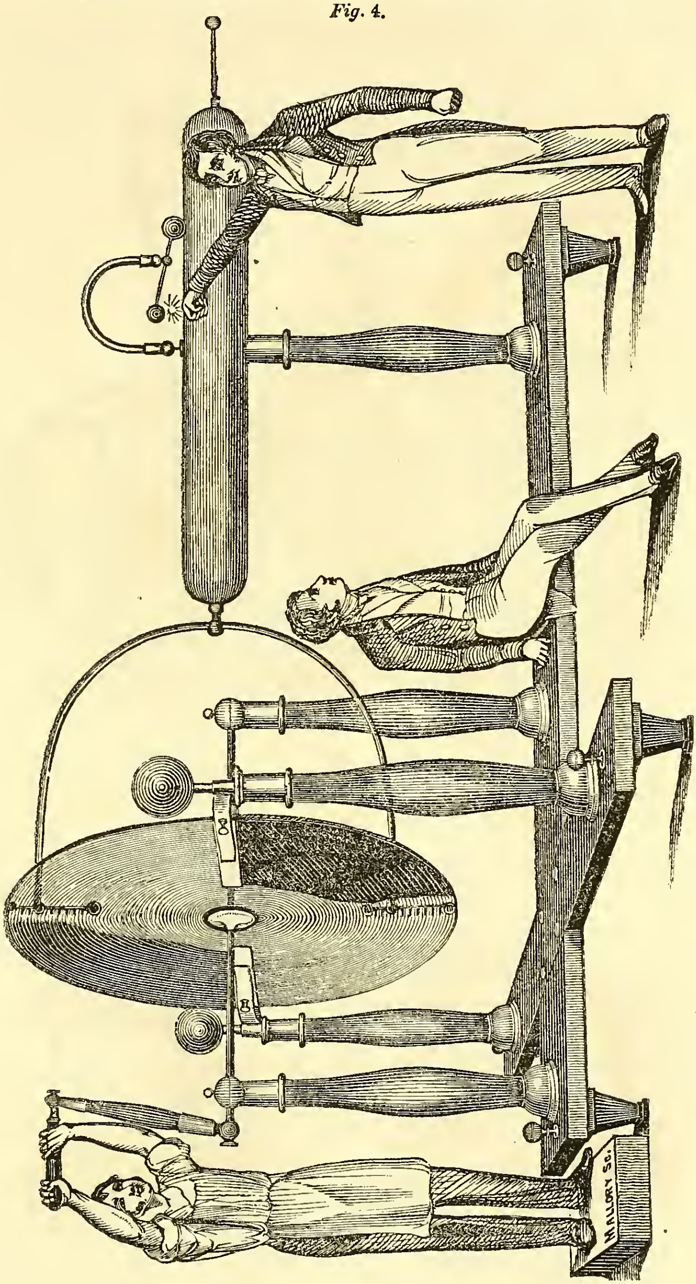


REFLECTING TELESCOPE.
Fig. 16.—No. 26.



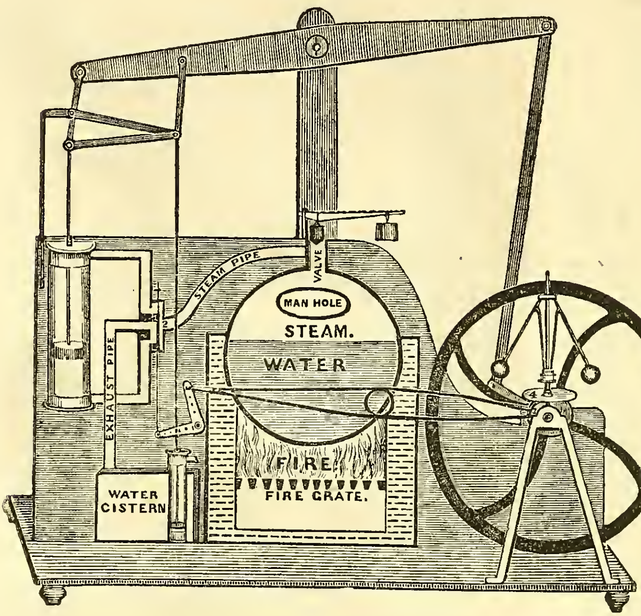
Electrics. — Fifty-five Inch Plate Electric Machine.

Fig. 4.



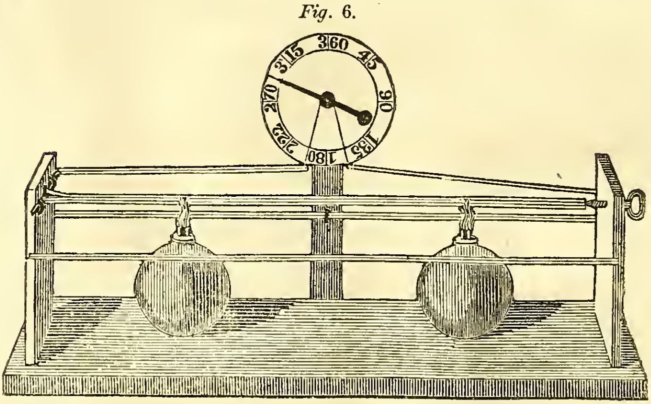
Section Model of the High Pressure Steam Engine — Eighteen and Twenty-four Inch Beam.

Fig. 5.

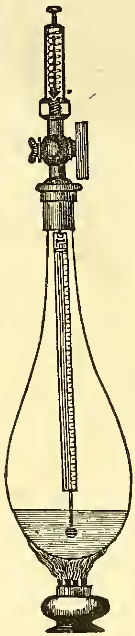


Pyrometer, with Lamps and Brass and Iron Expanding Rods

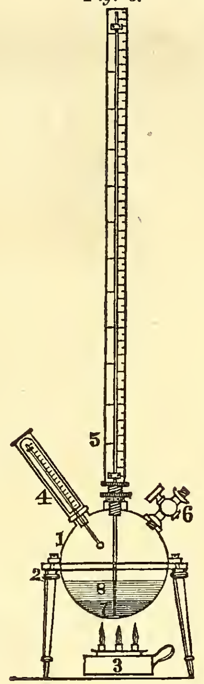
Fig. 6.



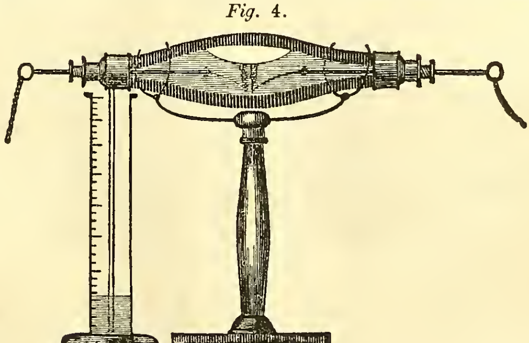
Chamberlain's Steam Flask, with Cap, Cock, Safety-Valve, Thermometer, Stand, and Lamp.
Fig. 2.



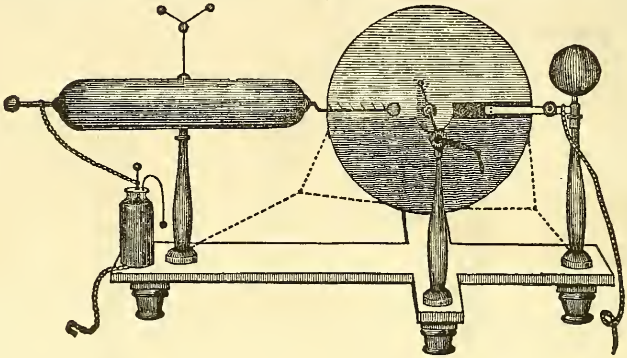
Marset's Steam Globe, with tall Pressure-Gauge, Steam Thermometer, Stop-Cock, Safety-Valve, and Copper Lamp.
Fig. 3.



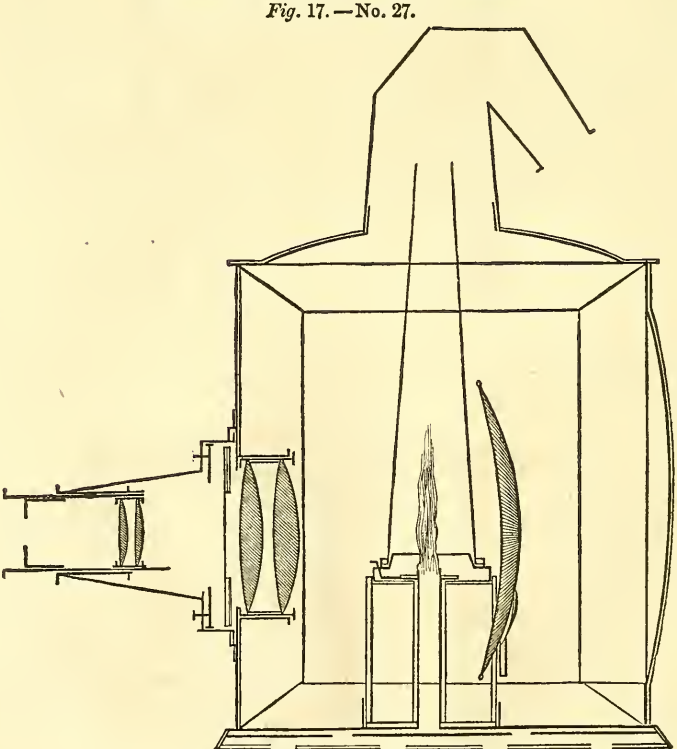
Decomposing and Recomposing by Galvanism or Electricity.
Fig. 4.



Electrics.—EIGHTEEN INCH PLATE ELECTRIC MACHINE.
Fig. 1.

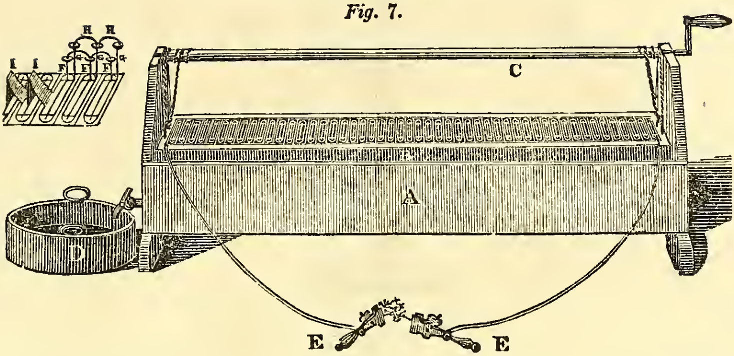


Optics.—IMPROVED MAGIC LANTERN.
Fig. 17.—No. 27.



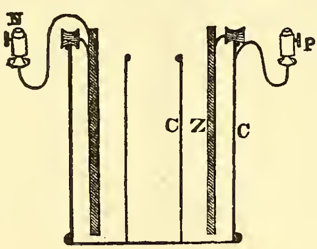
GALVANIC BATTERY.

Fig. 7.



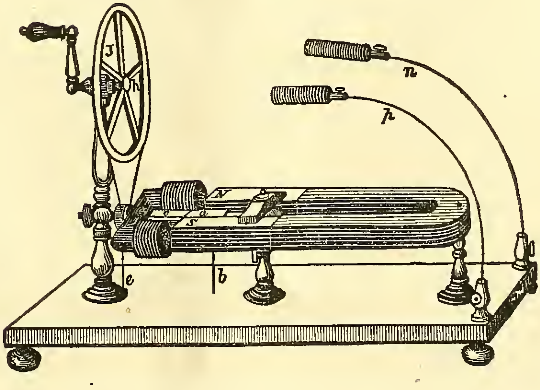
CYLINDRICAL BATTERY.

Fig. 8.

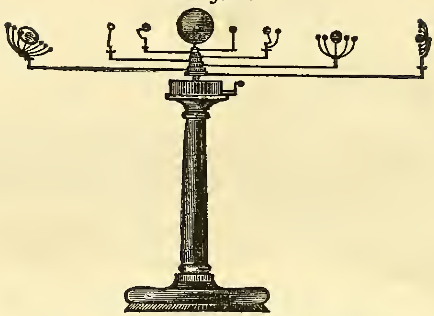


MAGNETO-ELECTRIC MACHINE.

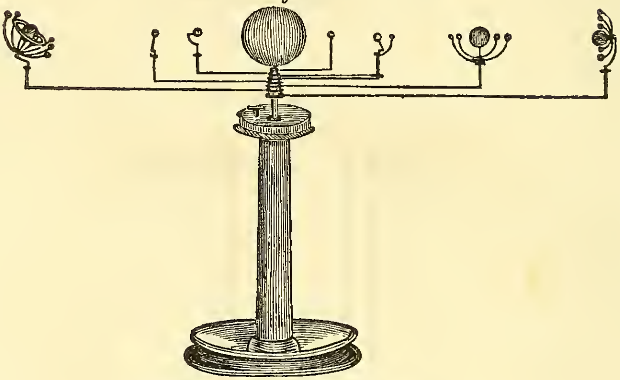
Fig. 9.



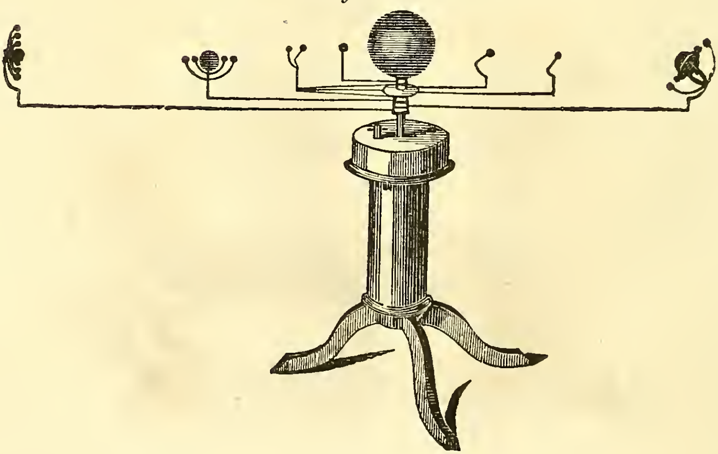
ORRERY — *Motion by Crank.*
Fig. 18.



ORRERY — *Motion by Winding Spring.*
Fig. 19.

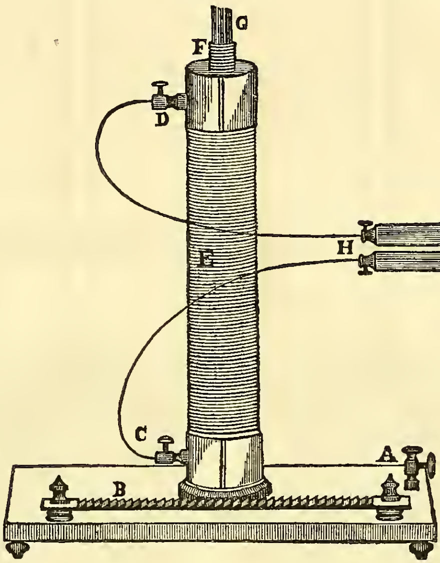


BRASS-MOUNTED SPRING ORRERY.
Fig. 20.



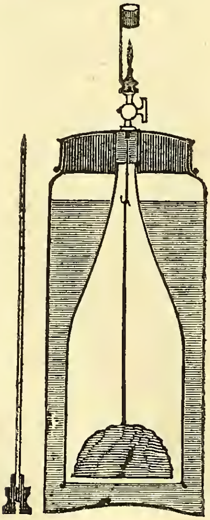
APPARATUS FOR ANALYSIS OF SHOCKS OR SEPARABLE HELICES.

Fig. 10



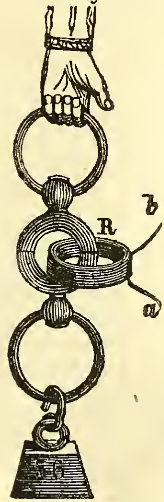
Electricity. — GAS GENERATOR, WITH JET AND PLATINA SPONGE, DETONATING JET, &c.

Fig. 49.

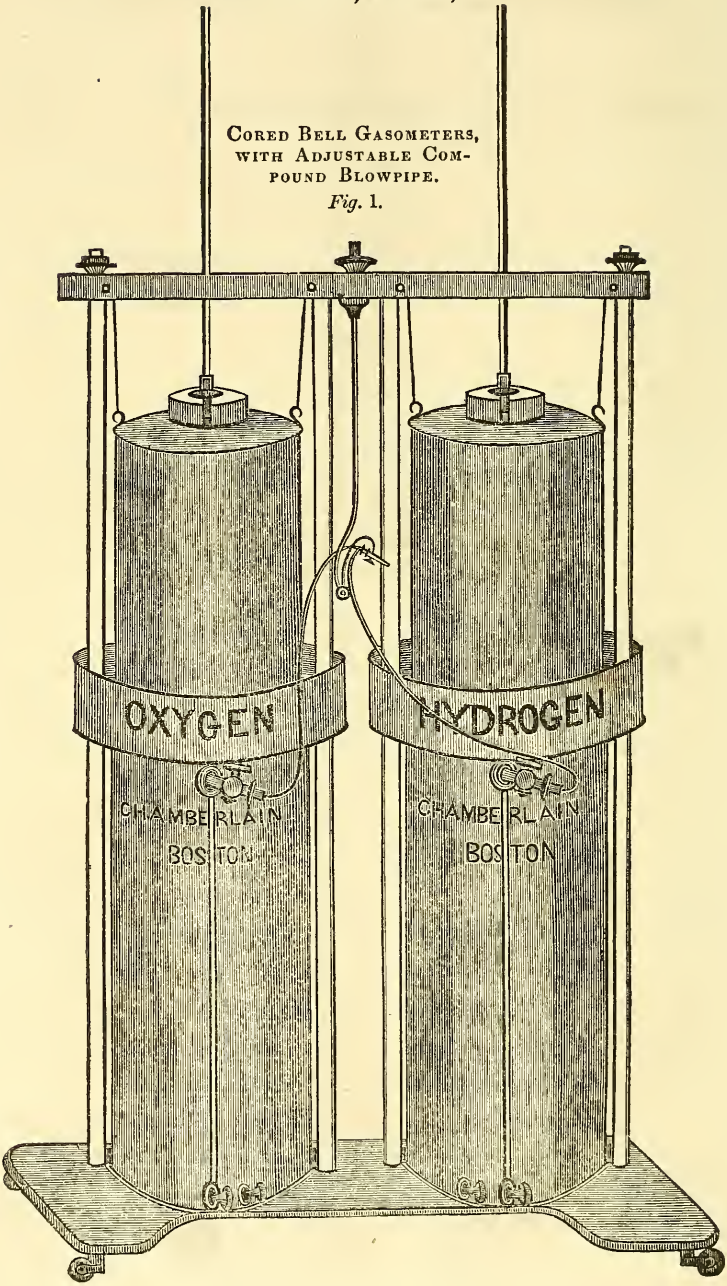


Galvanism. — HELIX AND HEMISPHERIC MAGNETS.

Fig. 11.



CHEMICALS, STEAM, &c.



Cored Bell Gasometers, with Adjustable Compound Blowpipe.

Fig. 1.

PHILOSOPHICAL APPARATUS,

SELECTED FROM

CHAMBERLAIN'S ILLUSTRATED AND DESCRIPTIVE CATALOGUES,

AND ARRANGED IN SETS CORRESPONDING TO THE SUMS ANNEXED.

[It will be seen that the highest cost and largest sized instruments have not been incorporated into sets, as such instruments are generally requred for institutions having more or less good apparatus of a small class, that is made more valuable by being used in connection with an efficient Air Pump or Electric Machine.]

SET OF PHILOSOPHICAL APPARATUS.

No. 1, marked [1] in Catalogue.

Cohesive Attraction Plates,......	1 00
Cohesive Attraction Lead Hemispheres, ...	1 00
Set of six Capillary Attraction Tubes,.........................	1 50
Set of six Collision Balls, in frame,	3 00
Set of Centre of Gravity, Centre of Motion, Centre of Magnitude, Common Centre, &c.,..........	7 00
Set of eight Cube Root Solids,...	1 25
Set of twelve Geometrical Solids,.	1 00
Set of ten Parallelopipeds,.......	1 00
Set of five Regular Solids,.......	1 00
Set of five Geometrical Transposing Frames,..................	1 00
Sheet of Geometrical Illustrations,	20
Numeral Frame,.................	1 00
Prism,..........................	2 00
Set of six Lenses,................	6 00
Terrestrial Globe, ...	2 00
Seasons Machine,................	7 00
Orrery, ...	7 00
Cylindrical Electro-Galvanic Battery,.........................	3 00
Helix and pair of Hemispheric Magnets, ...	2 50
Magnetic Needle and Stand,.....	75
	$50 00

SET OF PHILOSOPHICAL APPARATUS.

No. 2, marked [2] in Catalogue.

Cohesive Attraction Plates,......	1 00
Lead Hemispheres, for Cohesive Attraction, ...	1 00
Capillary Tubes, ...	1 50
Collision Balls and Frame, ...	4 00
Centre of Gravity Apparatus,....	7 00
Mechanical Powers,.............	35 00
Set of six Lenses, ...	6 00
Prism,..........................	2 00
Compound Microscope,..........	10 00
Orrery, ...	10 00
Seasons Machine,...............	7 00
Terrestrial Globe,...............	5 00
Cube Root Solids,...............	1 25
Twelve turned Solids,...........	1 00
Ten Parallelopipeds,.............	1 00
Five regular Solids,..............	1 00
Five Transposing Frames,.......	1 00
Sheet Geometrical Diagrams,....	20
Numeral Frame,.................	1 00
Cylinder Electro-Galvanic Battery,	3 00
Helix and Armatures,...........	2 50
U Magnet and Armature, ...	50
Magnetic Needle and Stand,.....	75
	$100 00

SET OF PHILOSOPHICAL APPARATUS.

No. 3, marked [3] in Catalogue.

*Air Pump,	25 00
*Bell Glass, Screw Capped,	3 50
*Freezing Apparatus,	4 00
*Expansion,	75
Straight Glass Jar,	75
*Hand Glass,	75
*Tall Bell Glass and Jar,	3 00
*Mercury Tunnel,	75
*Glass Pan for do.,	25
Hemispherical Cups,	5 00
Upward Pressure Apparatus,	6 00
Set Screw Couplers,	2 50
Bell for Vacuo,	1 25
*Sliding Rod,	1 25
*Sheet Rubber Bag,	1 25
*Artificial Fountain,	4 00
*Guinea and Feather Tube,	6 00
*Barometer Apparatus,	3 00
*Weighing and Buoyancy of Air,	5 00
Syphon Vacuum Gauge,	2 50
Inertia Wheel,	1 00
*Philosophical Water Hammer,	3 00
*Condenser,	5 00
*Condensing Chamber and Cock,	3 50
Air Gun Barrel,	1 00
*Revolving Jet,	1 25
*Exploding Cup, Cap and Cock,	2 00
*Hose and Jet,	1 00
*Straight Brass Jet,	50
Stopcock Collars,	25
Pair Water Pumps,	12 00
Mechanical Powers,	35 00
Centre of Gravity Apparatus,	7 00
Electric Machine, 18 inch Plate,	25 00
Two quart Leyden Jar,	2 00
Diamond Jar,	3 00
Movable Coatings Jar,	3 00
Electrometer Jar,	1 50
Discharger,	2 50
Directing Rod,	2 00
Spiral Tube,	2 50
Bells,	3 00
S. and Point,	50
Pithball Electrometer,	50
Images and Plates,	2 50
Insulating Stool,	6 00
Box Pithballs,	25
Sportsman and Birds,	75
Powder Bomb,	1 25
Thunder House and Fixtures,	5 00
Hydrogen Generator,	3 00
Long-Haired Man,	50
Wheel and Point,	1 00
Seasons Machine,	2 50
Ether Spoon,	75
Wax Friction Cylinder,	1 00
Glass Friction Cylinder,	1 00
Box Amalgam,	25
Cylindrical Electro Battery,	3 00
Electro Magnet,	1 00
Electro Coil and Armatures,	2 50
Powder Cup,	50
Pair of Magnetic Needles and Stands,	2 00
Bar Magnet,	1 00
U Magnet and Armature,	1 00
Terrestrial Helix,	1 50
Revolving Electro Magnet,	5 00
Magnetizing Helix,	2 50
Compound Helices, with vibrating Armature for Shocks,	5 00
Pair Handles, for Shocks,	1 50
Set of Connecting Wires,	50
Galvanometer,	3 00
Pneumatics and Hydraulics,	$107 00
Electrics,	71 00
Mechanics, &c.,	42 00
Magnetics, &c.,	30 00
	$250 00

SET OF PHILOSOPHICAL APPARATUS.

No. 4, marked [4] in Catalogue.

Collision Balls,	3 00
Mechanical Powers,	35 00
Set of Eye Models,	12 00
Prism,	1 00
Compound Microscope,	10 00
Orrery,	10 00
Seasons Machine,	7 00
Pair ten inch Globes,	20 00
Double Barrel Air Pump,	35 00
Eight inch brass capped Bell Glass,	3 50
Tall Bell Glass and Jar,	3 00
Freezing Apparatus,	4 00
Expansion Apparatus,	75
Hand Glass,	75
Mercury Tunnel,	1 00
Glass Pan, for Mercury,	25
Straight Jar, for Bell Glass,	75
Hemispherical Cups,	5 00
Upward Pressure Apparatus	6 00
Dozen Bursting Squares,	1 50
Cap Valve for do ,	25
Wire Guard for do.,	75
Set of Screw Couplers,	2 50
Bell for Vacuo,	1 25

Sliding Rod,	1 50
Sheet Rubber Bag,	1 25
Artificial Fountain,	4 00
Float Wheel,	1 00
Bacchus Illustration,	1 50
Guinea and Feather Tube,	6 00
Water Hammer,	3 00
Barometer Apparatus,	3 00
Weight and Buoyancy of Air,	6 00
Vacuum Gauge	2 50
Condensing Pump,	5 00
Condensing Chamber and Cock,	3 50
Air Gun Barrel,	1 00
Revolving Jet,	1 25
Jet Paradox Tunnel,	1 50
Water Pan and Tube,	75
Plate Paradox and Disks,	1 00
Pipe Paradox and Balls,	1 00
Water Hose,	1 00
Brass Jet,	50
Exploding Cup and Cock,	2 00
Stopcock Collars,	25
Pair Water Pumps and Fixtures,	12 00
Electric Machine, 18 inch Plate,	25 00
Battery of four quart Jars,	6 00
Double Jar,	3 50
Diamond Jar,	3 00
Movable Coatings,	3 00
Electrometer Jar,	1 50
Discharger,	2 50
Directing Rod,	2 00
Spiral Tube,	2 50
Bells,	3 00
Pithball Electrometer,	50
S. and Point,	50
Pair Plates and Images,	2 50
Box Pithballs,	25
Insulating Stool,	6 00
Sportsman and Birds,	75
Powder Bomb,	1 25
Thunder House and Fixtures,	5 00
Hydrogen Generator,	3 00
Long-Haired Man,	50
Float Wheel and Point,	1 00
Seasons Machine,	2 50
Ether Spoon,	75
Wax Friction Cylinder,	1 00
Glass Friction Cylinder,	1 50
Electric Swing and Image,	2 00
Gasometers and Fixtures,	25 00
Flask, screw-capped for Oxygen,	1 00
Lead Conducting Tube,	1 50
Reflectors and Iron Ball,	6 00
Spirit Boiler for do.,	2 50
Pyrometer, Rods, and Lamps,	3 00
Conductometer and Rods,	1 00
Fire Syringe and Tinder,	1 50
Set of Wire Gauze,	50
Lamp Stand,	2 00
Spirit Lamp,	1 00
Grad. Oz. Measure,	1 00
Ten cubic inch do.,	1 00
Test Tubes, six,	75
Flasks, three,	75
Funnel,	20
Retorts, tubulated, three,	80
Evaporating Dishes, three,	60
Hydrogen Balloon,	2 00
Pair long-necked Matrasses,	60
Dozen Candle Bombs,	50
Dozen Prince Rupert's Drops,	50
Steam Globe and Jet,	1 50
Wollaston's Steam Apparatus,	3 00
Chemical Substances,	10 00
Electro Cylinder Battery,	6 00
U Magnet and Armature,	50
Electro Magnet,	1 00
Bar Armature,	25
Y Armature,	75
Star Armature,	75
Magnetic Needle and Stand,	1 00
Powder Cup,	50
Coil and Hem. Armatures,	2 50
Magnetizing Helix,	3 00
Terrestrial Helix,	1 50
Revolving Magnet,	5 00
Vibrating Shocker,	5 00
Shocking Handles,	1 50
Set of Connecting Wires,	50

Pneumatics,	124 75
Electrics,	80 00
Chemicals,	68 20
Magnetics, &c.,	29 75
Mechanics, &c.	98 00
	$400 00

SET OF PHILOSOPHICAL APPARATUS.

No. 5, marked [5] in Catalogue.

Collision Balls,	4 00
Mechanical Powers,	35 00
Centre of Gravity,	7 00
Set of Eye Models,	12 00
Prism,	1 00
Microscope,	12 00
Orrery,	10 00
Seasons,	7 00
Pair of Globes,	30 00
Air Pump,	40 00
Open Swelled Bell Glass,	4 50
Brass screw-capped Bell,	3 50
Straight Jar for do.,	1 00
Freezing Apparatus,	4 00
Tall Bell Glass and Jar,	3 00
Expansion Apparatus,	75
Swelled Hand Glass,	1 00
Hemispherical Cups,	5 00
Upward Pressure Apparatus,	6 00
Dozen Bursting Squares,	1 50
Cap Valve for do.,	25
Wire Guard for do.,	75
Set of Screw Couplers,	2 50
Bell for Vacuo,	1 25
Sliding Rod for do.,	1 25
Sheet Rubber Bag, &c.,	1 25

Artificial Fountain, &c.,	4 00
Mercury Tunnel,	1 00
Glass Pan for Mercury,	30
Guinea and Feather Tube,	6 00
Barometer Apparatus,	3 00
Weight and Buoyancy of Air,	6 00
Syphon Vacuum Gauge,	2 50
Float Wheel,	1 00
Water Hammer,	3 00
Condensing Chamber and Cock,	3 50
Condenser,	5 00
Air Gun Barrel,	1 00
Revolving Jet,	1 25
Plate Paradox and Disks,	1 00
Pipe Paradox and Balls,	1 00
Hose and Water Jet,	1 00
Brass Jet,	50
Leathers for Stopcocks,	50
Exploding Cup, Cap, and Cock,	2 00
Jet Paradox and Balls,	1 50
Water Pan and Tube,	75
Pair of Water Pumps,	12 00
Electric Machine, 24 inch Plate,	50 00
Battery,	8 00
Double Jar,	3 50
Diamond Jar,	3 00
Movable Coatings,	3 00
Electrometer Jar,	1 50
Directing Rod,	2 00
Discharger,	2 50
Spiral Tube,	2 50
Pithball Electrometer,	50
Insulating Stool,	6 00
Set of Bells,	3 00
Dancing Image Plates,	2 00
Pair of Dancing Images,	50
Box of Pithballs,	50
Sportsman and Birds,	75
Powder Bomb,	1 25
Abbe Nolet's Globe,	3 00
Thunder House and Fixtures,	5 00
Hydrogen Generator,	3 00
Long-Haired Man,	50
Float Wheel and Point,	1 00
S. and Point,	50
Seasons Machine,	2 50
Ether Spoon,	75
Miser's Plate,	1 50
Electric Swing and Image,	1 00
Box of Amalgam,	25
Gasometers and Fixtures,	35 00
Retort for Oxygen,	2 00
Conducting Gas Tube,	1 50
Reflectors on Stands,	5 00
Spirit Boiler,	2 50
Barometer and Lamps,	3 00
Lamp Stand,	2 00
Conductometer	1 00
Pendent Spoon,	25
Fire Syringe and Tinder,	1 50
Set of Wire Gauze,	50
Gas Bag and Cock,	5 00
Chemical Thermometer,	2 50
Spirit Lamp,	1 00
Graduated Measure,	1 00
Test Tubes, six,	75
Flasks, three,	1 00
Funnel,	20
Flasks, flat bottom, three,	75
Tub. Retorts, six,	2 00
Evaporating Dishes, three,	75
Two Wedgwood do.,	50
Mortar and Pestle,	1 00
Hydrogen Balloon,	2 00
Stirring Rods,	25
Matrasses, two,	60
Candle Bombs, dozen,	50
Steam Globe, brass, with Jet,	1 50
Chemical Substances,	10 00
Electro Battery,	8 00
Bar Magnet,	1 00
U Magnet and Armature,	1 00
Electro Magnet,	2 00
Bar Armature,	25
Y Armature,	75
Star Armature,	75
Pair of Needles,	2 00
Powder Cup,	50
Coil and Hem. Armatures,	2 50
Magnetizing Helix,	3 00
Galvanometer,	3 00
Terrestrial Helix,	1 50
Revolving Electro Magnet,	5 00
Analysis of Shocks Apparatus,	12 00
Shocking Handles,	1 50
Set of Connecting Wires,	50
Thermo-Electric Arch,	5 00
Decomposing Cell,	3 00
Pneumatics,	135 30
Electrics,	110 00
Chemicals,	85 55
Mechanics, &c.,	118 00
Electro Magnets,	51 25
	$500 10

SET OF PHILOSOPHICAL APPARATUS.

No. 6, marked [6] in Catalogue.

Collision Balls,	4 00
Centre of Gravity Apparatus,	7 00
Mechanical Powers,	35 00
Lenses,	6 00
Prism,	2 00
Microscope,	12 00
Orrery	25 00
Seasons Machine,	7 00
Globes,	30 00
Magic Lantern,	25 00
Astronomical Slides,	20 00
Air Pump,	75 00
Open Swelled Bell Glass,	4 50
Brass capped Bell Glass, 8 inch,	3 50
Straight Jar for do.,	1 00
Tall Bell Glass and Jar	3 00

Freezing Apparatus,	5 00
Expansion do.,	1 00
Swelled Hand Glass,	1 00
Hemispherical Cups,	7 00
Upward Pressure Apparatus,	9 00
Dozen Bursting Squares,	1 50
Cap Valve for do.,	25
Wire Guard for do.,	75
Set of Screw Couplers,	2 50
Bell for Vacuo,	1 25
Sliding Rod for do., &c.,	1 50
Sheet Rubber Bag, &c.,	2 00
Artificial Fountain,	4 00
Bacchus Illustration,	1 50
Mercury Tunnel,	1 00
Guinea and Feather Tube,	6 00
Water Hammer, Cap, and Cock,	3 00
Barometer Apparatus,	7 00
Weight and Buoyancy of Air,	7 00
Copper Condensing Chamber and Cock,	3 50
Condensing Pump,	5 00
Air Gun Barrel,	1 00
Jet Paradox and Balls,	1 50
Cock and Int. Ext. Jets for do.,	1 50
Revolving Jet,	1 25
Plate Paradox and Disks,	1 00
Pipe Paradox and Balls,	1 00
Water Hose and Jet,	1 00
Brass Jet,	50
Water Pan and Tube,	75
Bladder, Cup, Cap, and Cock,	2 00
Stopcock Leathers,	50
Pair of Water Pumps,	12 00
Hydrostatic Bellows,	8 00
Electric Machine, 24 inch Plate,	50 00
Battery of four Jars,	10 00
Atmospheric Jar,	3 00
Diamond Jar,	3 00
Movable Coatings,	3 00
Electrometer Jar,	1 50
Directing Rod,	2 00
Jointed Discharger,	3 50
Universal Discharger,	6 00
Spiral Tube,	2 50
Pithball Electrometer,	75
Insulating Stool,	6 00
Set of Bells,	3 00
Dancing Image Plates,	3 00
Pair of Dancing Images,	50
Box of Pithballs,	50
Sportsman and Birds,	75
Powder Bomb,	1 25
Wax Friction Cylinder,	1 50
Glass Friction Cylinder,	1 50
Quadrant Electrometer,	2 00
Gold Leaf Electrometer,	2 00
Thunder House and Fixtures,	5 00
Hydrogen Generator,	4 00
Long-Haired Man,	50
Float Wheel and Point,	1 00
S and Point,	75
Abbe Nolet's Globe,	3 00
Seasons Machine,	3 50
Igniting Spoon,	75
Miser's Plate,	2 00
Bucket and Syphon,	1 00
Electric Swing and Image,	2 00

Box of Amalgam,	50
Pair of Gasometers and Fixtures,	35 00
Oxygen Retort,	2 00
Lead Conducting Tube,	1 50
Pair of Reflectors,	8 00
Spirit Boiler,	2 50
Radiating Cubes,	2 00
Pyrometer,	3 00
Lamp Stand,	2 00
Conductometer,	2 00
Pendent Spoons,	1 25
Fire Syringe and Tinder,	1 50
Set of Wire Gauze,	75
Large Gas Bag and Cock,	5 00
Crucibles,	20
Chemical Thermometer,	2 50
Spirit Lamp,	1 00
Dropping Tube,	20
Graduated Measure, Oz.,	1 00
Measure, ten cubic inches,	1 25
Six Test Tubes,	75
Flasks, six,	2 20
Tunnel, Glass,	25
Flat Flasks, three,	1 25
Globe Receivers, two,	80
Tubular Retorts, six,	2 50
Glass Evaporating Dishes, three,	60
Wedgwood Mortar and Pestle,	1 00
Hydrogen Balloon,	2 00
Stirring Rods, three,	25
Bologna Vials, six,	50
Rupert's Drops, dozen,	50
Matrasses, two,	70
Candle Bombs, dozen,	50
Steam Globe and Jet,	1 50
Wollaston's Steam Apparatus,	3 00
Marset's Steam Globe,	25 00
Chemical Substances,	15 00
Sulphate Copper Battery,	8 00
Bar Magnet,	1 00
U Magnet and Wheel,	3 00
Bar Armature,	25
Y Armature,	75
Star Armature,	75
Magnetic Needle and Stand,	1 00
Powder Cup,	50
Voltaic Pistol,	3 00
Electro Magnet,	5 00
Coil and Hem. Magnets,	3 50
Magnetizing Helix,	3 00
Galvanometer,	3 00
Terrestrial Helix,	2 00
De la Rive's Ring,	1 25
Bell Engine,	12 00
Revolving Electro Magnet,	5 00
Thermo-Electric Arch,	5 00
Analysis of Shocks Apparatus,	12 00
Shocking Handles,	1 50
Connecting Wires,	50
Decomposing Cell,	3 00
	173 00
Pneumatics, &c.,	200 00
Electrics,	122 00
Chemicals,	130 95
Magnetics, &c.,	75 00
	$700 00

SET OF PHILOSOPHICAL APPARATUS.

No. 7, marked [7] in Catalogue.

Set of Collision Balls,	6 00
Centre of Gravity Apparatus,	7 00
Whirling Machine, &c.,	8 00
Mechanical Powers,	35 00
Set of Lenses,	6 00
Prism,	2 00
Compound Microscope,	18 00
Orrery,	25 00
Pair 13 inch high-mounted Globes,	40 00
Magic Lantern,	25 00
Astronomical Illustrations,	20 00
Seasons Machine,	7 00
Air Pump,	85 00
Bell Glass, open, swelled,	6 00
Bell Glass, brass capped,	3 50
Tall Bell Glass and Jar,	3 00
Freezing Apparatus, 12 inch,	6 00
Expansion Apparatus,	2 00
Hand Glass, swelled,	1 00
Bladder Cup, Cap, and Cock,	2 00
Hemispherical Cups,	7 00
Upward Pressure Apparatus,	9 00
Dozen Bursting Squares,	1 75
Cap Valve for do.,	25
Wire Guard for do.,	1 00
Set of Screw Couplers, five,	2 50
Bell for Vacuo,	1 25
Sliding Rod for do.,	2 00
Vane Mill for Vacuo,	7 00
Sheet Rubber Bag, &c.,	2 00
Artificial Fountain and Jets,	4 00
Tall Bolthead and Cap,	1 50
Bacchus Illustration,	3 00
Mercury Tunnel,	1 00
Guinea and Feather Tube,	7 00
Water Hammer, Cap, and Cock,	3 00
Chamberlain's Barometer,	7 00
Vacuum Gauge,	3 50
Weighing Air Apparatus,	15 00
Buoyancy of Air Apparatus,	6 00
Double Transferrer,	10 00
Straight Jar,	1 00
Pear Gauge,	3 00
Syphon in Vacuo,	4 00
Glass Condensing Chamber,	10 00
Double Acting Condenser,	8 00
Air Gun Barrel,	1 25
Revolving Jet,	1 25
Stopcock, Int. and Ext. Jets,	2 00
Jet Paradox Tunnel, &c.,	1 50
Water Pan and Tube,	75
Plate Paradox and Disks,	1 25
Pipe Paradox and Balls,	1 25
Water Hose and Jet,	1 00
Straight Brass Jet,	75
Condensation Gauge Syphon,	3 00
Condensation Gauge Globe,	1 50
Condensation Gauge, graduated,	1 50
Dozen Crushing Squares,	1 00
Dozen Sinking Globes,	50
Bell for Condensed Air,	1 25
Thermometer for Condens. Cham.,	1 00
Stopcock Leathers,	50
Pair of Water Pumps,	12 00
Hydrostatic Bellows,	8 00
Hydrostatic Press,	20 00
Thirty inch Plate Machine,	85 00
Battery, six Jars,	14 00
Double Jar,	4 00
Diamond Jar,	3 00
Movable Coatings,	3 00
Atmospheric Jar,	3 00
Electrometer Jar,	2 50
Sliding Directing Rod,	3 00
Jointed Discharger,	3 50
Universal Discharger,	7 00
Spiral Spotted Tube	3 00
Spotted Star,	4 00
Revolving Bell Glass,	2 00
Pithball Electrometer,	1 00
Quadrant do.,	3 00
Gold Leaf do.,	3 00
Insulating Stool,	6 00
Stand, Bell, and Dancing Balls,	2 00
Set of Bells, three,	3 00
Dancing Image Plates,	3 00
Pair of Dancing Images,	50
Assortment of Pithballs,	1 00
Electric Sportsman and Birds,	1 00
Wax Friction Cylinder,	2 00
Glass Friction Cylinder,	2 00
Powder Bomb,	2 00
Thunder House and Fixtures,	6 00
Brass Cannon, &c.	4 00
Hydrogen Generator,	4 00
Long-Haired Man,	75
Float Wheel and Point,	1 50
Abbe Nolet's Globe,	5 00
Electric S and Point,	1 00
Electric Bucket and Syphon,	1 50
Electric Swing and Image,	2 00
Electric Seasons Machine,	3 50
Electrophorus and Fixtures,	8 00
Electric Igniting Spoon,	1 00
Miser's Plate,	2 00
Inclined Plane and Wheel,	4 00
Pair of Gasometers,	60 00
Iron Retort for Oxygen,	3 00
Lead Conducting Tube,	1 50
Pair of 13 inch Reflectors, in case,	8 50
Spirit Boiler for do.,	2 50
Pair of Radiating Cubes,	2 00
Pyrometer, Rods, and Lamps,	4 00
Two Lamp Stands,	4 00
Conductometer, six Rods,	2 00
Pair of Pendent Spoons,	1 25
Fire Syringe and Tinder,	1 50
Set of Wire Gauze, three,	75
Blowpipe,	50
Elevating Stand, &c.,	1 50
Large Gas Bag and Stopcock,	5 00
Set of Crucibles,	20
Chemical Thermometer,	2 50

Spirit Lamp,	1 00
Aphlogistic Lamp,	2 00
Dropping Tube,	25
Graduated Oz. Measure,	1 00
Measure, ten cubic inches,	1 25
Dozen Test Tubes, assorted,	1 50
Graduated Tube, cubic inch,	50
Condensation Tube,	75
Flasks, six, assorted,	2 20
Glass Funnels, two,	60
Flasks, flat bottom, six,	2 50
Globe Receivers, two,	80
Tubular Retorts, six, assorted,	2 50
Chemical Furnace,	10 00
Iron Tube for Decomposing,	1 00
Evaporating Dishes, three,	75
Wedgwood do., five,	1 50
Glass Mortar and Pestle,	1 00
Wedgwood do.,	1 25
Platina Spatula,	1 50
Hydrogen Balloon,	3 00
Stirring Rods, Glass, six,	75
Bologna Vials, dozen,	1 00
Prince Rupert's Drops,	50
Matrasses, three, assorted,	1 10
Alembic,	1 75
Steam Balls, dozen,	50
Brass Steam Globe and Jet,	1 50
Wollaston's Steam Apparatus,	3 00
Marcet's Steam Globe and Fixtures,	25 00
Chamberlain's Steam Flask and Fixtures,	8 00
Sul. Copper Battery,	3 00
Bar Magnet and Keeper,	1 00
U Magnet and Wheel Armature,	3 00
Bar Armature,	50
Y Armature,	75
Star Armature,	1 00
Magnetic Needle and Stand,	1 00
Galvanic Battery,	25 00
Powder Cup,	50
Voltaic Pistol,	4 00
Electro Magnet,	5 00
Coil and Hem. Magnets,	3 50
Magnetizing Helix,	3 00
Galvanometer,	3 00
Orsted's Galvanometer,	4 00
Terrestrial Helix,	2 00
De la Rive's Ring,	1 25
Bell Engine,	12 00
Revolving Electro Magnet,	5 00
Thermo-Electric Arch,	5 00
Analysis of Shocks Apparatus,	12 00
Shocking Handles,	1 50
Connecting Wires,	50
Magneto-Electric Machine,	40 00
Decomposing Cell,	3 00

Mechanics, Astronomical, Optics, &c.,	200 00
Pneumatics,	250 00
Electrics,	210 00
Chemicals,	200 00
Galvanic, &c.,	100 00
	$1000 00

Set of Chemical Substances, for use with the above Apparatus,	20 00

NOTE.—See page 347, Apparatus, figured and described in Pneumatics, but used in Chemistry.

Apparatus for Warming.

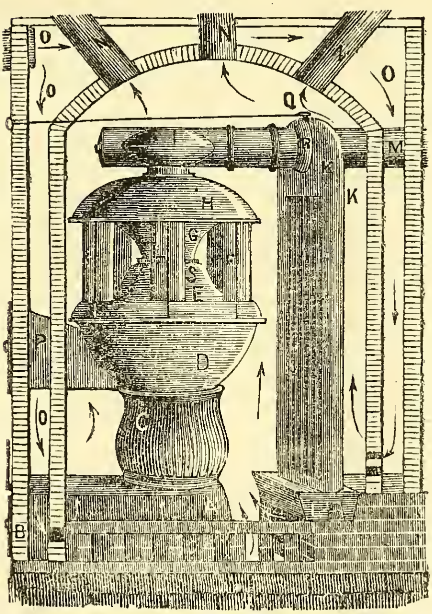
The thorough ventilation, the constant and regular change of the atmosphere of a school-room cannot be secured by simply providing flues or openings, however judiciously constructed and placed, for the escape of the air which has become impure from the process of breathing or other causes. These flues will not work satisfactorily, unless a mode of warming the room is adopted by which a large supply of pure fresh air, properly heated, is flowing in to supply the place of that which is escaping by means of the flues. Among the various modes of warming school-rooms and public halls, which we have seen in full and successful operation, we select a few, in addition to those described in other parts of the work, as worthy of the particular attention of committees and others, who are looking round for a heating apparatus. We shall use the cuts and description by which the patentees and venders have chosen to make their several modes of warming known to the public, without intending to decide on the relative merits of any one mode,

Culver's Hot-Air Furnace.

Patented and Manufactured by Culver & Co., 52 Cliff-street, New York.

Culver's Hot-Air Furnace, as described in the following diagram and explanations, is intended for hard coal, to be set in double walls of brick masonry in cellar or basement, below the rooms to be warmed.

Figure 1.



A. Iron or Brick Ash Pit.
B. Ash Pit door.
C. Pot, or coal Burner, with or without *soapstone* lining.
D. Fire Chamber.
E. Lower half of Tubular drum.
F. Elliptical tubes.
G. Upper half of Tubular drum.
H. Top of Tubular drum.
I. Cap and smoke pipe.
K. Flat Radiator.
L. Water bason or evaporator.
M. Smoke pipe to chimney.
N. Conductors of Hot Air.
O. Cold air conductor and chamber.
P. Feed door.
Q. Hot-Air chamber.
R. Damper in globe with rod attached.
S. Pendulum valve for cleaning.

→ Shows the direction of the currents of hot or cold air.

Culver & Co. also make, and put up, various sizes of Portable Furnaces, with metallic coverings, suitable for counting rooms, stores, school-rooms and small houses, warming the rooms in which they stand, as well as others in the same building, and they can be removed in summer as conveniently as stoves.

Figure 2.

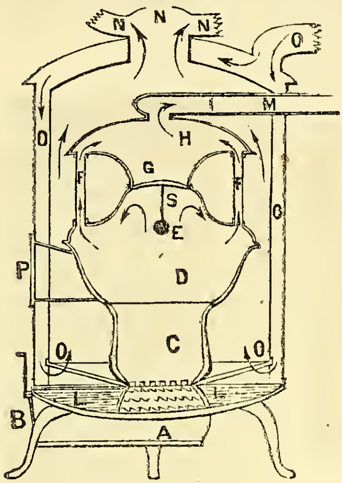


Figure 3.

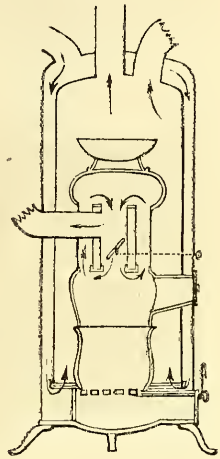


Figure 2 represents a section of large size Portable Furnace or double casings of sheet iron or zinc. The same letters for reference are used as in Fig. 1.
Figure 3 represents a smaller size Portable Furnace, with two metal coverings and an evaporating dish standing upon the top of the drum.

The peculiarities and advantages of the Furnace are thus set forth:

1. Its compact, convenient and beautiful form.

2. Its great *durability;* being in all its parts of cast iron, set within walls of brick masonry. The *pot* or burner being whole, is found by experience to be more durable than those made of rings or segments, and entirely prevents the admission of gas into the hot-air chamber.

3. The great radiating surfaces of this Furnace exceed those of any other, and being nearly all perpendicular, and so arranged as to afford no chance for the soot, light coal ashes or dust to collect on the plates and prevent the transmission of heat through them, for it must be obvious to every thinking mind, that if a radiating surface is of a zig-zag, or any other form that prevents the descent of dust or soot in a perpendicular line, it will certainly collect dust upon it, and just so much surface thus covered is destroyed for radiating purposes, and in the same proportion will a greater consumption of fuel be required to produce a given result.

These furnaces are so constructed that heat acts actively upon those surfaces within, and produces the immediate and powerful heating of the cold air that is admitted to the outer surface from the atmosphere, through the tubes for that purpose.

4. The great economy in the use of fuel, making and controlling more heat than by any other process of using it.

5. The *joints* of this Furnace are so constructed that the expansion and contraction of the metal cannot open them to admit gas into the hot-air chamber, and it can be cleaned of soot and ashes easily, without the necessity of taking down or breaking a joint; its action is simple, as easily understood and managed as a cylinder stove, and as readily repaired and kept in order, and the manner of "removing the deposits" is entirely novel and most efficient.

6. The constant current of the pure atmosphere into the air chamber, with

the evaporation for tempering it to any degree of humidity, gives a fine healthful ventilation, and a soft summer temperature, suited to the most delicate constitution, and without injury to the building or furniture.

The above described Air Heaters are manufactured and sold, wholesale and retail, by Culver & Co., who, when required, set them in double walls of brick masonry, with cast iron smoke pipe to chimneys, and conductors of hot air, of double cross tin, terminating with registers in the rooms, and secured safely from fire by tin or soap-stone linings.

Figure 4.

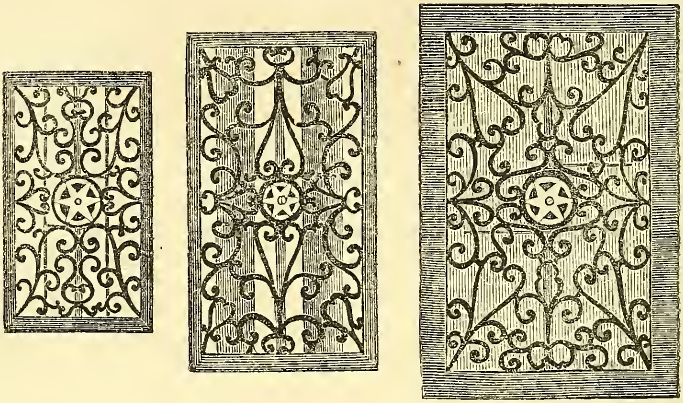


Figure 4 represents patterns of scroll work Registers manufactured by Culver & Co., and put in with their furnaces if desired. The registers have valves under the surface, which are easily controlled by means of the star centers. They can be used for ventilating purposes as well as for admitting warm air.

The following directions are given in Culver & Co.'s Circular for the use of their Furnace.

Directions for Use.—In kindling the fire, the valve should be opened by drawing out the Damper Rod R, so as to let the smoke pass directly through smoke pipe M to chimney.

Shavings, pine wood, or charcoal, should be thrown into the pot or coal burner C, and when well ignited, put in about half a hod of coal, and as soon as it also becomes ignited, fill the pot two thirds full of coal, and push the damper R partly in, so as to regulate the draught and heat as may be necessary. The valve may be entirely closed, if need be, so as to retain the heat, making it to pass through the Flat Radiator K.

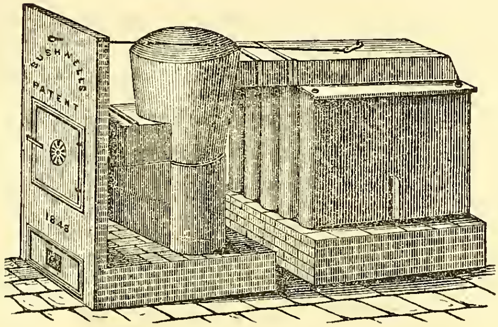
In moderate weather, when little heat is wanted, put two shovels full of ashes on the centre of the fire, and by regulating the draught, you can make one fire last 24 hours without any alteration; and when you wish to renew the fire, poke out a portion of the ashes, and put on fresh coal, without turning the grate.

In cold weather, however, to secure a brisk fire, the crank should be turned so as to empty the pot entirely of ashes, and commence a new fire at least once in 24 hours.

When there is too much heat generated, the ash-pit door, B, should be closed entirely, and the damper rod partly drawn out, and if this is not sufficient, the Register in feed-door P may be opened; the heat in the different rooms may be regulated by opening or closing the Registers; all the Registers however should never be closed at the same time, unless the water door is opened to let out the hot air.

The cold-air conductor, O, should always be open when the Furnace is in operation.

Bushnell's Hot Air Furnace.



Patented and Manufactured by Ezra Clark, Jr., 61 *Front street, Hartford.*

This invention was projected by the Rev. Dr. Bushnell, of Hartford, Conn., for his own use, and by his consent patented in his name, though he disclaims having or retaining any legal interest in it, or title to income from it.

In this furnace the fire-pot or burner differs from others, in the fact that the feeding-trunk opens directly into the fire, close upon the grate, and not above the fire, allowing the fire to be stirred above the grate and through the feeding-trunk itself. A stiff poker is pushed under the fire, along the top of the grate, and then is borne down, as a lever, throwing up the coals and allowing the ashes to fall through. The dead coals and cinders will thus be thrown up by the action of the poker, and may be taken off by a claw or a small iron rake. The fire being cleared in this way, the grate need never be dropped, and the dirty process of riddling will be avoided. The ash-door being always shut when the fire is stirred, the tender will not be enveloped in a cloud of ashes. The fire, too, may be *stirred* and cleared when it is in full action, as well as at any other time, and the coals will never be rattled down into a close state by the agitation, so as to choke the fire, but will always be thrown up into a light and open condition, so as to facilitate the combustion.

The radiating part of this furnace, that which extracts the heat, is distinguished by the fact that the cold air is passed into the furnace chamber through horizontal iron tubes or trunks, between which, as composing the sides of upright tubes or trunks, the hot gas of the fire is circulating and giving up its heat as it passes off into the chimney; so that the cold air, in its coldest state, is brought in direct contact with the heated furnace, and is actually heated before it escapes into the chamber of the furnace. Whereas if the heated surface were left to act only upon the mixed and already half-heated air of the chamber, in the ordinary way, the difference of temperature between it and the air in contact would be smaller, and therefore less heat be given out by the same amount of surface.

While, too, the air is passing one way to be heated inside the iron trunks, the hot gas is passing the other way to be cooled on the outside, that is, up and down the upright trunks, and thus the mean difference of temperature is kept the greatest possible at every point. The greatest amount of heat will be communicated in this way, by the least amount of iron surface; that is, in the cheapest manner possible. Meantime the construction is such that the radiator will clear itself, never requiring to be disturbed until it is worn out. Thus it may stand from season to season, always ready for use.

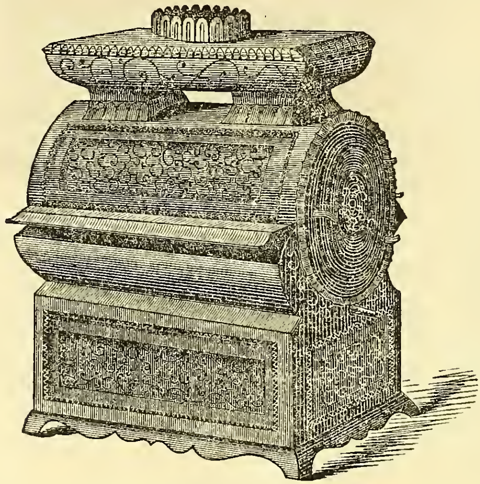
The fire-pot or burner can be furnished with or without soap-stone or fire-brick lining.

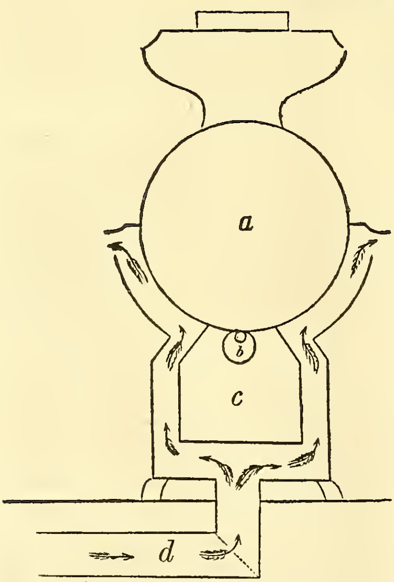
Ezra Clark, Jr., also manufactures a *Ventilating School-House Stove*, invented by Dr. Bushnell, and constructed on the same principle as his Hot Air Furnace, but intended to burn wood. Fresh air is introduced from outside the building by a flue below the floor, and is warmed before it is discharged into the school-room. The stove is placed in the school-room, and occupies a space of not more than two and a half feet square. The exterior is finished in a handsome style, and the cost is low.

Mott's Ventilating School-Stove, for burning wood or coal.

Patented and Manufactured by J. L. Mott, 264 *Water-street, N. Y.*

By this stove the room is warmed by conducting a supply of moderately heated pure air from without, as well as by direct radiation from the upper portion of the stove.





A. Air Chamber, for coal or wood.
B. A revolving grate with a cam process, by which the ashes are easily detached and made to drop into the ash-pit below.
C. Ash-Pit, by which also the draft can be regulated. and the stove made an air-tight.
D. Duct, or flue under the floor, by which fresh air from without is admitted under and around the stove, and circulates in the direction indicated by the arrows.

This stove works admirably in the new school-house in Jefferson District, in the town of Glocester, R. I. The smoke pipe, after leaving the room, is encircled in its passage through the attic and roof, by a box, which extends below into the school-room, in a manner nearly similar to that described on page 71.

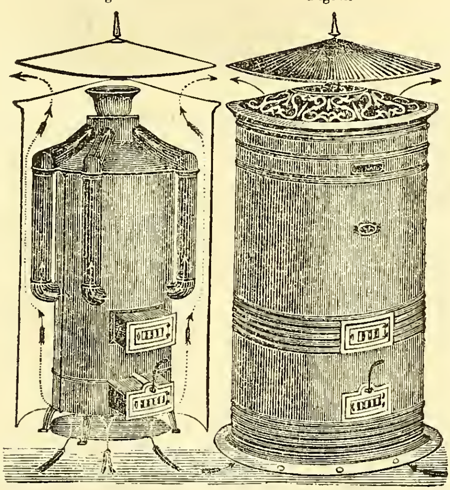
Since the first edition of this volume was issued, the stove and furnace described in the Report on the *Boston Mode of Ventilation*, on pages 154, 155, have been somewhat modified by the original patentees, so as to increase the radiating surface, and thereby secure greater economy in the consumption of the fuel. We therefore insert the new drawings, with descriptions abridged from the printed Circulars of Mr. Chilson.

The Boston Ventilating Stove and Portable Ventilating Furnace.

Patented March 10th, 1848, by Henry G. Clark, M. D., and manufactured by Gardner Chilson, Boston.

The Boston Ventilating Stove is composed of two cylinders, the inner (Fig. 1,) containing a fire chamber, which is lined with soapstone or fire brick, and is fitted with additional smoke-pipes to increase the radiating surface, while the outer (Fig. 2,) constitutes a chamber for warming the air, which is introduced into it beneath the inner cylinder by a flue from out of doors, and flows out at the top, to which there is a movable cap, or distributor attached, by which the opening is enlarged or diminished, and thus the supply and temperature of the air admitted can be easily regulated.

Fig. 1 Fig. 2.



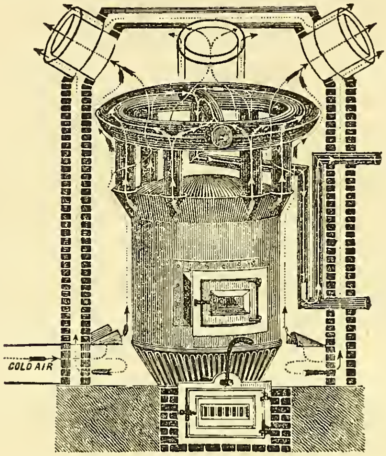
The *dark* arrows show the course of the air in its passage from the opening underneath the stove, through the air-chamber, into the apartment. The light arrows show the circulation of the *smoke* through the various radiating pipes.

This stove is made of three sizes, varying in price from twenty-five to forty dollars. It received a *silver medal* at the Fifth Exhibition of the Massachusetts Charitable Mechanic Association, and has been introduced with signal success into many school-houses in Boston, Charlestown, and other places.

This stove can be advantageously used as a hall stove and as a portable furnace, under circumstances which will not admit of a brick inclosure.

CHILSON'S AIR-WARMING AND VENTILATING FURNACE.

Patented and Manufactured by Gardner Chilson, Boston.



The construction of the *Air-Warming and Ventilating Furnace* was projected by the inventor, to obviate the serious, if not fatal, objections, so generally made, to the use of furnaces for warming apartments, where a fresh, healthful atmospheric air is required. From long experience in putting up furnaces, in which coal was consumed in deep iron pots and the air which they warmed was made to pass over a large extent of iron surface, made and kept red-hot, he found that the occupants of the rooms thus warmed, complained that the air was not unfrequently filled with the gases of the burning coal, and was at all times dry and stagnant, causing, especially to persons of a nervous temperament, disagreeable sensations to the whole system, such as dizziness of the head, headache, inflammation of the eyes and lungs, dryness of the lips and skin, &c. He found, too, by his own experience and observation in the manufacture and use of furnaces of this kind, that there was an unnecessary consumption of coal, when burnt in deep, straight and narrow pots, causing the coal to melt and run to cinders, and at the same time burning out the pots, and loosening the joints of the furnace, by which the deadly gases escaped into the air-chambers, and hence into the apartments above. These objections, both on the score of health and expense, the inventor claims that he has thoroughly obviated in his *Air-Warming and Ventilating Furnace*, and at the same time preserved all the advantages heretofore realized from this mode of warming buildings. The advantages of the Furnace are—

1. The fire-pot is constructed on the most economical and philosophical principles. It is broad and shallow,—at least twice as broad and one third as deep as the common fire-pot;—is one third smaller at the bottom than at the top, and is lined with fire-brick or soap-stone. Thus the fire-bed is deep enough to keep the coal well ignited with a slow but perfect combustion, while the entire heat from the fuel is given out to act upon the radiating surface alone and the fire-pot can never become red-hot, and does not require renewal. This plan for burning coal is original with the inventor, and has met with universal approbation.

2. The radiating surface is large, and so placed that it receives the immediate and natural action of the heat, and at the same time imparts its heat in the

most direct and uniform manner to the fresh air from without, without suffering waste by absorption from the outer walls of the air-chamber.

3. The air-chamber is large, and the fresh air is admitted and discharged so readily and uniformly that no portion of the radiating surface can ever become overheated; and a delightful summer temperature is maintained in the rooms.

4. The joints of the furnace are so constructed, that, even if the iron-work was liable, like other furnaces, to crack from extreme expansion, by being overheated, (which it is not,) the gas from the burning coal cannot escape into the air-chamber.

5. There are no horizontal inner surfaces on which dust and soot can gather, which do not, at the same time, clean themselves, or admit of being easily cleaned.

6. The grate in the fire-pot is so constructed, that the ashes can be easily detached, and the combustion facilitated.

7. It has stood all the test which sharp rivalry and the most severe *philosophical* practical science could apply to it, and has thus far accomplished all that its inventor promised, and when tried in the same building with other furnaces, has uniformly received the preference.

Dr. Bell, Superintendent of the McLean Asylum for the Insane, who has given this whole subject his particular attention, in his Essay on the *Practical Methods of Ventilating Buildings*, published in the proceedings of the Massachusetts Medical Society for 1848, remarks as follows:

"The character of any variety of the hot-air furnace is measured, in my judgment, by the simplicity of its construction, its non-liability to be brought to an undue degree of heat in any part, and its ready receipt and emission of air. That made by Mr. Gardner Chilson, of Boston, with an air-chamber of brick, and an interspace of two or three feet in width, appears to me to combine all the essentials attainable of this mode of heating air, more fully than any other which has fallen under my observation."

In 1847, the School Committee of Boston sanctioned, by a unanimous vote, the introduction of this furnace into the new school-houses to be erected in that city, on the recommendation of a sub-committee, to which the whole subject of warming and ventilating the school-rooms had been referred. The following is the recommendation referred to.

"Your Committee have made themselves acquainted not only with all the Furnaces which have been manufactured in this place, and its neighborhood, but with all those which have been exhibited here recently. Most of them show much ingenuity of contrivance and excellence of workmanship; but are all, so far as we can judge, inferior, in many respects, to the one invented by Mr. Chilson, a model and plans of which we now exhibit, and recommend as superior to all others.

It is simple in its structure, easily managed, will consume the fuel perfectly, and with a *moderate* fire. It is fitted for wood or coal. The fire-place is broad and shallow, and is lined with soapstone or fire-brick, which not only makes it perfectly safe and durable, but modifies very materially the usual effect of the fire upon the iron pot.

The principal radiating surfaces are wrought iron, of a suitable thickness for service, while at the same time the heat of the smallest fire is communicated immediately to the air-chamber. The mode of setting this Furnace we consider essential; more especially the plan of admitting the air to the furnace at its lowest point, as it then rises naturally into the apartments above. This process commences as soon as the temperature is raised even a single degree. The outer walls remain cold; the floor above is not endangered, and the whole building is rapidly filled with an atmosphere which is at once salubrious and delightful."

This Ventilating Furnace may be seen in the Mayhew, Dwight, Hancock, Boylston, Bowdoin, and Ingraham school-houses, in Boston; also in several new school-houses in Cambridge, Roxbury, Dorchester, Springfield, in the Blind Asylum and House of Industry, South Boston, and in hundreds of private houses in Boston and its vicinity.

INDEX.

DAVIES' SYSTEM OF MATHEMATICS.

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DESIGNED FOR SCHOOLS, ACADEMIES, AND COLLEGES.

BY CHARLES DAVIES, LL.D.

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(a)

TO THE FRIENDS OF EDUCATION.

The publishers of this series of mathematical works by Professor Charles Davies, beg leave respectfully to ask of teachers and the friends of education a careful examination of these works. It is not their intention to commend, particularly, this Course of Mathematics to public favor; and especially, it is not their design to disparage other works on the same subjects. They wish simply to explain the leading features of this system of Text-Books—the place which each is intended to fill in a system of education—the general connection of the books with each other—and some of the advantages which result from the study of a uniform series of mathematical works.

It may, perhaps, not be out of place, first, to remark, that the author of this series, after graduating at the Military Academy, entered upon the duties of a permanent instructor in that institution in the year 1816, and was employed for the twenty following years in the departments of scientific instruction. At the expiration of that period he visited Europe, and had a full opportunity of comparing the systems of scientific instruction, both in France and England, with that which had been previously adopted at the Military Academy.

This series, combining all that is most valuable in the various methods of European instruction, improved and matured by the suggestions of more than thirty years' experience, now forms the only complete consecutive course of Mathematics. Its methods, harmonizing as the works of one mind, carry the student onward by the same analogies and the same laws of association, and are calculated to impart a comprehensive knowledge of the science, combining clearness in the several branches, and unity and proportion in the whole. Being the system so long in use at West Point, and through which so many men, eminent for their scientific attainments, have passed, it may be justly regarded as our National System of Mathematics. Scholars and students who have pursued this course, will everywhere stand on the highest level with reference to the estimates which themselves and others will form of this part of their education.

The series is divided into three parts, viz. : First—Arithmetical Course for Schools. Second—Academical Course. Third—Collegiate Course

The Arithmetical Course for Schools.

I. PRIMARY TABLE-BOOK.
II. FIRST LESSONS IN ARITHMETIC.
III. SCHOOL ARITHMETIC. (Key separate.)

PRIMARY TABLE-BOOK.

The leading feature of the plan of this work is to teach the reading of figures that is, so to train the mind that it shall, by the aid of the eye alone, catch instantly the idea which any combination of figures is intended to express.

The method heretofore pursued has aimed only at presenting the combinations by means of our common language : this method proposes to present them purely through the arithmetical symbols, so that the pupil shall not be obliged to pause at every step and translate his conceptions into common language, and then retranslate them into the language of arithmetic.

For example, when he sees two numbers, as 4 and 8, to be added, he shall not pause and say, 4 and 8 are 12, but shall be so trained as to repeat 12 at once, as is always done by an experienced accountant. So, if the difference of these numbers is to be found, he shall at once say 4, and not 4 from 8 leaves 4. If he desires their product, he will say 32 ; if their quotient, 2 : and the same in all similar cases.

FIRST LESSONS IN ARITHMETIC.

The First Lessons in Arithmetic begin with counting, and advance step by step through all the simple combinations of numbers. In order that the pupil may be impressed with the fact that numbers express a collection of units, or things of the same kind, the unit, in the beginning, is represented by a star, and the child should be made to count the stars in all cases where they are used. Having once fixed in the mind a correct impression of numbers, it was deemed no longer necessary to represent the unit by a symbol ; and hence the use of the star was discontinued. In adding 1 to each number from 1 to 10, we have the first ten combinations in arithmetic. Then by adding 2 in the same way, we have the second ten combinations, and so on. Each ten combinations is arranged in a separate lesson, throughout the four ground rules, and each is illustrated either by unit marks or a simple example. Thus the four hundred elementary combinations are presented, in succession, in forty lessons,—a plan not adopted in any other elementary book.

SCHOOL ARITHMETIC.

This work begins with the simplest combination of numbers, and contains all that is supposed to be necessary for the average grade of classes in schools. It is strictly scientific and entirely practical in its plan. Each idea is first presented to the mind either by an example or an illustration, and then the principle, or abstract idea, is stated in general terms. Great care has been taken to attain simplicity and accuracy in the definitions and rules, and at the same time so to frame them as to make them introductory to the higher branches of mathematical science. No definition or rule is given until the mind of the pupil has been brought to it by a series of simple inductions, so that mental training may begin with the first intellectual efforts in numbers

The Academic Course.

I. **THE UNIVERSITY ARITHMETIC.** (Key separate.)
II. **PRACTICAL GEOMETRY AND MENSURATION.**
III. **ELEMENTARY ALGEBRA.** (Key separate,)
IV. **ELEMENTARY GEOMETRY.**
V. **DAVIES' ELEMENTS OF SURVEYING.**

Those who are conversant with the preparation of elementary text-books, have experienced the difficulty of adapting them to the wants which they are intended to supply. The institutions of instruction are of all grades from the college to the district school, and although there is a wide difference between the extremes, the level in passing from one grade to the other is scarcely broken. Each of these classes of seminaries requires text-books adapted to its own peculiar wants; and if each held its proper place in its own class, the task of supplying suitable text-books would not be so difficult. An indifferent college is generally inferior, in the system and scope of instruction, to a good academy or high-school; while the district-school is often found to be superior to its neighboring academy.

Although, therefore, the University Arithmetic and the Practical Geometry and Mensuration, have been classed among the books appropriate for academies, they may no doubt be often advantageously studied in the common-school; so also with the Algebra and Elementary Geometry. The Practical Geometry and Mensuration, containing so much practical matter, can hardly fail to be a useful and profitable study.

DAVIES' UNIVERSITY ARITHMETIC.

The scholar in commencing this work, is supposed to be familiar with the operations in the four ground rules, which are fully taught both in the First Lessons and in the School Arithmetic. This being premised, the language of figures, which are the representatives of numbers, is carefully taught, and the different significations of which the figures are susceptible, depending on the places in which they are written, are fully explained. It is shown, for example, that the simple numbers in which the unit increases from right to left according to the scale of tens, and the Denominate or Compound Numbers, in which it increases according to a different scale, belong in fact to the same class of numbers, and that both may be treated under a common set of rules. Hence, the rules for Notation, Addition, Subtraction, Multiplication, and Division, have been so constructed as to apply equally to all numbers. This arrangement is a new one, and is deemed an essential improvement in the science of numbers

In developing the properties of numbers, from their elementary to their highest combinations, great labor has been bestowed on classification and arrangement. It has been a leading object to present the entire subject of arithmetic as forming a series of dependent and connected propositions; so that the pupil, while acquiring useful and practical knowledge, may at the same time be introduced to those beautiful methods of exact reasoning which science alone can teach.

Great care has been taken to demonstrate fully all the rules, and to explain the reason of every process, from the most simple to the most difficult. The demonstration of the rule for the division of fractions, on page 147, is new and considered valuable.

The properties of the 9's, explained at page 93, and the demonstration of the four ground rules by means of those properties, are new in their present form, and are thought worthy of special attention.

In the preparation of the work, another object has been kept constantly in view; viz., to adapt it to the business wants of the country. For this purpose, much pains have been bestowed in the preparation of the articles on Weights and Measures, foreign and domestic—on Banking, Bank Discount, Interest, Coins and Currency, Exchanges, Book-keeping, &c. In short, it is a full treatise on the subject of Arithmetic, combining the two characteristics of a scientific and practical work.

Recommendation from the Professors of the Mathematical Department of the United States Military Academy

In the distinctness with which the various definitions are given—the clear and strictly mathematical demonstration of the rules—the convenient form and well-chosen matter of the tables, as well as in the complete and much-desired application of all to the business of the country, the "University Arithmetic" of Prof. Davies is superior to any other work of the kind with which we are acquainted. These, with the many other improvements introduced by the admirable scientific arrangement and treatment of the whole subject, and in particular those of the *generalization* of the four ground rules, so as to include "simple and denominate" numbers under the same head, and the very plain demonstration of the rule for the division of fractions—both of which are, to us, *original*—make the work an invaluable one to teachers and students who are desirous to teach or study arithmetic as a science as well as an art.

(Signed,) D. H. MAHAN, Prof. Engineering.
W. H. C. BARTLETT, Prof. Nat. Phil.
A. E. CHURCH, Prof. Mathematics.

United States Military Academy, Jan. 18, 1847.

PRACTICAL GEOMETRY AND MENSURATION.

The design of this work is to afford schools and academies an Elementary Text-Book of a practical character. The introduction into our schools, within the last few years, of the subjects of Natural Philosophy, Astronomy, Mineralogy, Chemistry, and Drawing, has given rise to a higher grade of elementary studies; and the extended application of the mechanic arts calls for additional information among practical men. In this work all the truths of Geometry are made accessible to the general reader, by omitting the demonstrations altogether, and relying for the impression of each particular truth on a pointed question and an illustration by a diagram. In this way it is believed that all the important properties of the geometrical figures may be learned in a few weeks; and after these properties have been once applied, the mind receives a conviction of their truth little short of what is afforded by rigorous demonstration. The work is divided into seven books, and each book is subdivided into sections.

In Book I., the properties of the geometrical figures are explained by questions and illustrations.

In Book II. are explained the construction and uses of the various scales; and also the construction of geometrical figures. It is, as its title imports, Practical Geometry.

Book III. treats of Drawing. Section I., of the Elements of the Art; Section II., of Topographical Drawing; and Section III., of Plan Drawing.

Book IV. treats of Architecture—explaining the different orders, both by descriptions and drawings.

Book V. contains the application of the principles of Geometry to the Mensuration of Surfaces and Solids. A separate rule is given for each case, and the whole is illustrated by numerous and appropriate examples.

Book VI. contains the application of the preceding Books to Artificers' and Mechanics' work. It contains full explanations of all the scales—the uses to which they are applied—and specific rules for the calculations and computations which are necessary in practical operations.

Book VII. is an introduction to Mechanics. It explains the nature and properties of matter, the laws of motion and equilibrium, and the principles of all the simple machines.

ELEMENTARY ALGEBRA.

This work is intended to form a connecting link between Arithmetic and Algebra, and to unite and blend, as far as possible, the reasoning on numbers with the more abstract method of analysis. It is intended to bring the subject of Algebra within the range of our common schools, by giving to it a practical and tangible form. It begins with an introduction, in which the subject is first treated mentally, in order to accustom the mind of the pupil to the first processes; after which, the system of instruction assumes a practical form. The definitions and rules are as concise and simple as they can be made, and the reasonings are as clear and concise as the nature of the subject will admit. The strictest scientific methods are always adopted, for the double reason, that what is learned should be learned in the right way, and because the scientific methods are generally the most simple.

ELEMENTARY GEOMETRY.

This work is designed for those whose education extends beyond the acquisition of facts and practical knowledge, but who have not the time to go through a full course of mathematical studies. It is intended to present the striking and important truths of Geometry in a form more simple and concise than is adopted in Legendre, and yet preserve the exactness of rigorous reasoning. In this system, nothing has been omitted in the chain of exact reasoning, nothing has been taken for granted, and nothing passed over without being fully demonstrated The work also contains the applications of Geometry to the Mensuration of Surfaces and Solids.

SURVEYING.

In this work it was the intention of the author to begin with the very elements of the subject, and to combine those elements in the simplest manner, so as to render the higher branches of Plane Surveying comparatively easy. All the instruments needed for plotting have been carefully described, and the uses of those required for the measurement of angles are fully explained. The Conventional Signs adopted by the Topographical Bureau, and which are now used by the United States Engineers in all their charts and maps, are given in full. An account is also given of the manner of surveying the public lands; and although the method is simple, it has nevertheless been productive of great results. The work also contains a Table of Logarithms—a Table of Logarithmic Sines—a Traverse Table, and a Table of Natural Sines—being all the Tables necessary for Practical Surveying

The Collegiate Course.

I. DAVIES' BOURDON'S ALGEBRA.
II. DAVIES' LEGENDRE'S GEOMETRY AND TRIGONOMETRY.
III. DAVIES' ANALYTICAL GEOMETRY.
IV. DAVIES' DESCRIPTIVE GEOMETRY.
V. DAVIES' SHADES, SHADOWS, AND PERSPECTIVE.
VI. DAVIES' DIFFERENTIAL AND INTEGRAL CALCULUS.

The works embraced under the head of the "Collegiate Course," were originally prepared as text-books for the use of the Military Academy at West Point, where, with a single exception, they are still used. Since their introduction into many of the colleges of the country, they have been somewhat modified, so as to meet the wants of collegiate instruction. The general plan on which these works are written, was new at the time of their appearance. Its main feature was to unite the logic of the French School of Mathematics with the practical methods of the English, and the two methods are now harmoniously blended in most of our systems of scientific instruction.

The introduction of these works into the colleges was for a long time much retarded, in consequence of the great deficiency in the courses of instruction in the primary schools and academies: and this circumstance induced Professor Davies to prepare his Elementary Course.

The series of works here presented, form a full and complete course of mathematical instruction, beginning with the first combinations of arithmetic, and terminating in the higher applications of the Differential Calculus. Each part is adapted to all the others. The Definitions and Rules in the Arithmetic, have reference to those in the Elementary Algebra, and these to similar ones in the higher books. A pupil, therefore, who begins this course in the primary school, passes into the academy, and then into the college, under the very same system of scientific instruction.

The methods of teaching are all the same, varied only by the nature and difficulty of the subject. He advances steadily from one grade of knowledge to another, seeing as he advances the connection and mutual relation of all the parts: and when he reaches the end of his course, he finds indeed, that "science is but knowledge reduced to order."

DAVIES' BOURDON.

The Treatise on Algebra by M. Bourdon, is a work of singular excellence and merit. In France it is one of the leading text-books. Shortly after its first publication it passed through several editions, and has formed the basis of every subsequent work on the subject of Algebra.

The original work is, however, a full and complete treatise on the subject of Algebra, the later editions containing about eight hundred pages octavo. The time given to the study of Algebra in this country, even in those seminaries where the course of mathematics is the fullest, is too short to accomplish so voluminous a work, and hence it has been found necessary either to modify it, or to abandon it altogether. The Algebra of M. Bourdon, however, has been regarded only as a standard or model, and it would perhaps not be just to regard him as responsible for the work in its present form.

In this work are united the scientific discussions of the French with the practical methods of the English school, so that theory and practice, science and art, may mutually aid and illustrate each other. A great variety of examples have also been added in the late editions.

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The work of Professor Parker, it is confidently believed, fully meets that requirement. It is also very full in the general facts which it presents—clear and concise in its style, and entirely scientific and natural in its arrangement. The following features will, it is hoped, commend the work to public favor.

1. It is adapted to the *present state* of natural science; embraces a wider field, and contains a greater amount of information on the respective subjects of which it treats, than any other elementary treatise of its size.

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6. It presents the most important principles of science in a larger type; while the deductions from these principles, and the illustrations, are contained in a smaller letter. Much useful and interesting matter is also crowded into notes at the bottom of the page. By this arrangement, the pupil can never be at a loss to distinguish the parts of a lesson which are of primary importance; nor will he be in danger of mistaking theory and conjecture for fact.

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9. A full description is given of the Magnetic Telegraph, and the principles of its construction are fully explained.

10. For the purpose of aiding the teacher in conducting an examination through an entire subject, or indeed, through the whole book, if necessary, all the diagrams have been repeated at the end of the work, and questions proposed on the left-hand page immediately opposite. This arrangement will permit the pupil to use the figure, in his recitation, if he have not time to make it on the black-board, and will also enable him to review several lessons and recall all the principles by simply reading the questions, and analyzing the diagrams.

From the Wayne County Whig.

After a careful examination of this work, we find that it is well calculated for the purpose for which it is intended, and better adapted to the state of natural science at the present time, than any other similar production with which we are acquainted. The design of the author, in the preparation of this work, was to present to the public an elementary treatise unencumbered with matter that is not intimately connected with this science, and to give a greater amount of information on the respective subjects of which it treats, than any other school-book of an elementary character. The most remarkable feature in the style of this work is its extreme brevity. In the arrangement of the subject and the manner of presenting it, there are some peculiarities which are, in our opinion, decided improvements. The more important principles of this interesting science are given in a few words, and with admirable perspicuity, in a larger type; while the deductions from these principles, and the illustrations are contained in a smaller letter. Much useful and interesting matter is also given in notes at the bottom of the page.

This volume is designed expressly to accompany the *Boston School Set of Philosophical Apparatus;* but the numerous diagrams with which it is illustrated, are so well executed and so easily understood, that the assistance of the Apparatus is hardly *necessary* to a thorough knowledge of the science. The trustees of the Lyons Union School having recently procured a complete set of the above Apparatus, this work will now be used as a text-book in that institution.

Leicester Academy, *April* 12, 1848.

Messrs. A. S. Barnes & Co.:

Sirs:—I have examined Parker's Natural Philosophy, and am much pleased with it. I think I shall introduce it into the academy the coming term. It seems to me to have hit a happy medium between the too simple and the too abstract. The notes containing facts, and showing the reasons of many things that are of common occurrence in every-day life, seem to me to be a valuable feature of the work.

Very respectfully, yours, B. A. SMITH.

From the New York Evening Post.

Professor Parker's book embraces the latest results of investigation on the subjects of which it treats. It has a separate title for the laws of heat, or Pyronomics, which have been lately added to the list of sciences, as well as electro-magnetism and magneto-electricity. The matter is well arranged, and the style of statement clear and concise. The figures and diagrams are placed side by side with the text they illustrate, which is greatly for the convenience of the student. We cheerfully commend the book to the favorable attention of the public.

From the Albany Spectator.

This is a school-book of no mean pretensions and of no ordinary value. It is admirably adapted to the present state of natural science; and besides containing engravings of the Boston school set of philosophical apparatus, embodies more information on every subject on which it treats than any other elementary work of its size that we have examined. It abounds with all the necessary helps in prosecuting the study of the science, and as its value becomes known it cannot fail to be generally adopted as a text-book.

From the Newark Daily Advertiser.

A work adapted to the *present* state of natural science is greatly needed in all our schools, and the appearance of one meeting all ordinary wants must be hailed with pleasure by those who feel an interest in the cause of education. Mr. Parker's work embraces a wider field, and contains a greater amount of information on the respective subjects of which it treats, than any other elementary treatise of its size, and is rendered peculiarly valuable by the introduction of the science of Pyronomics, together with the new sciences of Electro-Magnetism and Magneto Electricity. We have seldom met with a work so well adapted to the convenience of study and recitation, and regard as highly worthy of commendation the care which the author has taken to prevent the pupil from mistaking theory and conjecture for fact. We predict for this valuable and beautifully printed work the utmost success.

From the New York Courier and Enquirer

"A School Compendium of Natural and Experimental Philosophy," by Richard Green Parker, has just been issued by Barnes & Co. Mr. Parker has had a good deal of experience in the business of practical instruction, and is, also, the author of works which have been widely adopted in schools. The present volume strikes us as having very marked merit, and we cannot doubt it will be well received.

New York, *May*, 1848.

Messrs. A. S. Barnes & Co.:

Gent. :—I have no hesitation in saying that Parker's Natural Philosophy is the most valuable elementary work I have seen: the arrangement of the subjects and the clearness of the definitions render it an excellent adjunct to a teacher. For the last seven years I have used it in various schools as a text-book for my lectures on Natural Philosophy, and am happy to find that in the new edition much important matter is added, more especially on the subjects of Electricity and Electro-Magnetism.

With respect, Gentlemen,

Your obedient servant,

GILBERT LANGDON HUME,

Teacher of Natural Philosophy and Mathematics in N. Y. city.

New York, *May* 2, 1848.

We have used Parker's Compend of Natural Philosophy for many years, and consider it an excellent work on the various topics of which it treats.

Yours, &c. FORREST & McELLIGOTT,

Principals of the Collegiate School.

From the Lynchburg Virginian.

The volume before us strikes us as containing more to recommend it than any one of its class with which we are acquainted. It is adapted to the *present state* of natural science; embraces a wider field, and contains a greater amount of information on the respective subjects of which it treats, than any other elementary treatise of its size. It contains descriptions of the steam-engine, stationary and locomotive, and of the magnetic telegraph. It embraces a copious account of the principles of electricity and magnetism, under all their modifications, and is embellished by a vast number of illustrations and diagrams. There is appended a series of questions for examination, copious and pertinent

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Recommendation from Professor Mahan.

I have very carefully looked over Professor Gillespie's Manual of Road-Making. It is, in all respects, the best work on this subject with which I am acquainted; being, from its arrangement, comprehensiveness and clearness, equally adapted to the wants of Students of Civil Engineering, and the purposes of persons in any way engaged in the construction or supervision of roads. The appearance of such a work, twenty years earlier, would have been a truly national benefit, and it is to be hoped that its introduction into our seminaries may be so general as to make a knowledge of the principles and practice of this branch of engineering, as popular as is its importance to all classes of the community.

(Signed,)

D. H. MAHAN,

Professor of Civil Engineering in the Military Academy of the United States.

From a Report of a Committee of the American Institute.

This work contains in a condensed form, all the principles, both ancient and modern, of this most important art; and almost every thing useful in the great mass of writers on this subject. . . . . . Such a work as this performs a great service for those who are destined to construct roads—by showing not only what ought to be done, but what ought not to be done; thus saving immense outlay of money, and loss of time in experiments. . . . . The committee therefore, recommend it to the public.

From the American Railroad Journal.

The views of the author are sound and practical, and should be read by the people throughout the entire length and breadth of the land. . . . We recommend this Manual to the perusal of every tax-payer for road-making, and to the young men of the country, as they will find useful information in relation to each department of road-making, which will surely be useful to them in after-life.

From Silliman's American Journal of Science.

If the well-established principles of Road-Making, which are so plainly set forth in Prof. Gillespie's valuable work, and so well illustrated, could be once put into general use in this country, every traveller would bear testimony to the fact that the author is a great public benefactor.

From the Journal of the Franklin Institute.

This small volume contains much valuable matter, derived from the best authorities, and set forth in a clear and simple style. For the want of information which is contained in this Manual, serious mistakes are frequently made, and roads are badly located and badly constructed by persons ignorant of the true

principles which ought to govern in such cases. By the extensive circulation of such books as that now before us, and the imparting of sound views on the subject to the students of our collegiate institutions, we may hope for a change for the better in this respect.

From the Albany Cultivator.

The author of this work has supplied a desideratum which has long existed. Perhaps there is no subject on which information is more needed by the country in general than that of Road-Making. Prof. Gillespie has taken up the subject in a proper manner, beginning the work at the right place, and prosecuting it in systematic order to its completion.

From the New York Tribune.

It would astonish many "path-masters" to see how much they don't know with regard to the very business they have considered themselves such adepts in. Yet all is so simple, so lucid, so straight-forward, so manifestly true, that the most ordinary and least instructed mind cannot fail to profit by it. We trust this useful and excellent volume may find its way into every village library if not into every school library, as well as into the hands of every man interested in road-making. Its illustrations are very plain and valuable, and we cannot doubt that the work will be a welcome visiter in many a neighborhood, and that bad roads will vanish before it.

From the Newark Daily Advertiser.

This elaborate and admirable work combines in a systematic and symmetrical form the results of an engineering experience in all parts of the Union, and of an examination of the great roads of Europe, with a careful digestion of all accessible authorities. The six chapters into which it is divided comprehend a methodical treatise upon every part of the whole subject; showing what roads ought to be in the vital points of direction, slopes, shape, surface, and cost, and giving methods of performing all the necessary measurements of distances, directions, and heights, without the use of any instruments but such as any mechanic can make, and any farmer use. Bridges, Railroads, and City Streets are also treated of at length and with good sense.

From the Vermont Chronicle.

To selectmen and others who may have any thing to do with these improvements, we would earnestly recommend the book named above. The author is a man of science, (Professor of Civil Engineering at Union College,) and his work embraces a full discussion of both the principles and practice of Road-Making A little study of this work may often lead to results of importance to whole towns and counties.

From the Home Journal.

The author of this book holds a quill so skilful and dainty in light literature, that we were not prepared with laurels to crown him for a scientific work; but we see, by the learned critics, that this fruit of his study of his profession as an engineer, is very worthy of high commendation, and a valuable addition to the useful literature of the day.

MRS. EMMA WILLARD'S

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WILLARD'S
HISTORY OF THE UNITED STATES.

The large work is designed as a Text-Book for *Academies* and *Female Seminaries:* and also for *District School* and *Family Libraries.* The small work being an *Abridgment* of the same, is designed as a *Text-Book for Common Schools.* The originality of the plan consists in dividing the time into *periods*, of which the beginnings and terminations are marked by important events; and constructing *a series of maps illustrating the progress of the settlement of the country, and the regular advances of civilization.* The *Chronographic Chart*, gives by simple inspection, a view of the divisions of the work, and the events which mark the *beginning* and *termination* of each period into which it is divided. A *full chronological table* will be found, in which all the events of the History are arranged in the order of time. There is appended to the work the *Constitution of the United States*, and a series of questions adapted to each chapter, so that the work may be used in schools and for private instruction.

The *Hon. Daniel Webster* says, of an early edition of the above work, in a letter to the author, "*I keep it near me, as a Book of Reference, accurate in facts and dates.*"

WILLARD'S AMERICAN CHRONOGRAPHER,

DESIGNED TO ACCOMPANY WILLARD'S HISTORY OF THE UNITED STATES.

To measure time by space is universal among civilized nations, and as the hours, and minutes, and seconds of a clock measure the time of a day, so do the centuries, tens, and single years of this Chronographer, measure the time of American History. A general knowledge of chronology is as indispensable to history, as a general knowledge of latitude and longitude is to geography. But to learn single dates, *apart* from a general plan of chronology addressed to the eye, is as useless as to learn latitudes and longitudes without reference to a map. The eye is the only medium of permanent impression. The essential point in a date, is to know the *relative* place of an event, or how it stands in time compared with other important events. The scholar in the school-room, or the gentleman in his study, wants such a *visible plan of time* for the study of history, the same as he wants the visible plan of space, viz., a map for the study of geography, or of books of travels. Such is the object of *Willard's Chronographer of American History.*

Extract from a Report of the Ward School Teachers' Association of the City of New York.

The Committee on Books of the Ward School Association respectfully report:

That they have examined Mrs. Willard's History of the United States with peculiar interest, and are free to say, that it is in their opinion decidedly the best treatise on this interesting subject that they have seen. * *

As a school-book, its proper place is among the first. The language is remarkable for simplicity, perspicuity, and neatness; youth could not be trained to a better taste for language than this is calculated to impart. The history is so written as to lead to geographical examinations, and impresses by practice the habit to read history with maps. It places at once, in the hands of American youth, the history of their country from the day of its discovery to the present time, and exhibits a clear arrangement of all the great and good deeds of their ancestors, of which they now enjoy the benefits, and inherit the renown. The struggles, sufferings, firmness, and piety of the first settlers are delineated with a masterly hand.

The gradual enlargement of our dominions, and the development of our national energies, are traced with a minute accuracy, which the general plan of the work indicates.

The events and achievements of the Revolution and of the last war, are brought out in a clear light, and the subsequent history of our national policy and advancement strikingly portrayed, without being disfigured by that tinge of party bias which is so difficult to be guarded against by historians of their own times.

The details of the discovery of this continent by Columbus, and of the early settlements by the Spaniards, Portuguese, and other European nations, are all of essential interest to the student of American history, and will be found sufficiently minute to render the history of the continent full and complete. The different periods of time, together with the particular dates, are distinctly set forth with statistical notes on the margin of each page,—and these afford much information without perusing the pages.

The maps are beautifully executed, with the locality of places where particular events occurred, and the surrounding country particularly delineated. These are admirably calculated to make lasting impressions on the mind.

The day has now arrived when every child should be acquainted with the history of his country; and your Committee rejoice that a work so full and clear can be placed within the reach of every one.

The student will learn, by reading a few pages, how much reason he has to be proud of his country—of its institutions—of its founders—of its heroes and statesmen: and by such lessons are we not to hope that those who come after us will be instructed in their duties as citizens, and their obligations as patriots?

Your Committee are anxious to see this work extensively used in all the schools in the United States.

(Signed,)

SENECA DURAND,
EDWARD McELROY,
JOHN WALSH.

The Committee would respectfully offer the following resolution:

Resolved, That Mrs. Emma Willard's History of the United States be adopted by this Association, and its introduction into our schools earnestly recommended.

At a meeting of the Board of the Ward School Teachers' Association, January 20th, 1847, the above Resolution was adopted.—(Copied from the Minutes.)

From the Boston Traveller.

We consider the work a remarkable one, in that it forms the best book for general reading and reference published, and at the same time has no equal, in our opinion, as a text-book. On this latter point, the profession which its author has so long followed with such signal success, rendered her peculiarly a fitting person to prepare a text-book. None but a practical teacher is capable of preparing a *good* school-book; and as woman has so much to do in forming our early character, why should her influence cease at the fireside—why not encourage her to exert her talents still, in preparing school and other books for after years? No hand can do it better.

The typography of this work is altogether in good taste.

From the Cincinnati Gazette.

Mrs. Willard's School History of the United States.—It is one of those rare things, a good school-book; infinitely better than any of the United States Histories fitted for schools, which we have at present. It is quite full enough, and yet condensed with great care and skill. The style is clear and simple—Mrs. Willard having avoided those immense Johnsonian words which Grimshaw and other writers for children love to put into their works, while, at the same time there is nothing of the *pap* style about it. The arrangement is excellent, the chapters of a good length; every page is dated, and a marginal index makes reference easy. But the best feature in the work is its series of maps; we have the country as it was when filled with Indians; as granted to Gilbert; as divided at the time the Pilgrims came over; as apportioned in 1643; the West while in possession of France; the Atlantic coast in 1733; in 1763; as in the Revolution, with the position of the army at various points; at the close of the Revolutionary War; during the war of 1812–15; and in 1840: making eleven most excellent maps, such as every school history should have. When we think of the unintelligible, incomplete, badly written, badly arranged, worthless work of Grimshaw which has been so long used in our schools, we feel that every scholar and teacher owes a debt of gratitude to Mrs. Willard. Miss Robins has done for English History, what Mrs. Willard has now done for American, and we trust these two works will be followed by others of as high or higher character. We recommend Mrs. Willard's work as better than any we know of on the same subject; not excepting Bancroft's abridgment. This work, followed by the careful reading of Mr. Bancroft's full work, is all that would be needed up to the point where Bancroft stops; from that point, Pitkin and Marshall imperfectly supply the place, which Bancroft and Sparks will soon fill.

From the United States Gazette.

Mrs. Willard is well known throughout the country as a lady of high attainments, who has distinguished herself as the Principal of Female Academies, that have sent abroad some of the most accomplished females of the land.

The plan of the authoress is to divide the time into periods, of which the beginning and the end are marked by some important event, and then care has been taken to make plain the events of intermediate periods. The style is clear, and there appears no confusion in the narrative. In looking through the work, we do not discover that the author has any early prejudices to gratify. The book, therefore, so far as we have been able to judge, may be safely recommended as one of great merit, and the maps and marginal notes, and series of questions, give additional value to the work.

From the Newburyport Watchman.

An Abridged History of the United States: By Emma Willard.—We think we are warranted in saying, that it is better adapted to meet the wants of our schools and academies in which history is pursued, than any other work of the kind now before the public.

The style is perspicuous and flowing, and the prominent points of our history are presented in such a manner as to make a deep and lasting impression on the mind.

We could conscientiously say much more in praise of this book, but must content ourselves by heartily commending it to the attention of those who are anxious to find a good text-book of American history for the use of schools.

From the Albany Evening Journal.

Willard's United States.—This work is well printed on strong white paper, and is bound in a plain substantial manner—all-important requisites in a school-book. The text is prepared with equal skill and judgment. The memory of the youthful student is aided by a number of spirited illustrations—by no means unimportant auxiliaries—while to lighten the labors of the teacher, a series of questions is adapted to each chapter. Nor is its usefulness limited to the school-room As a book of reference for editors, lawyers, politicians, and others, where dates and facts connected with every important event in American History may be readily found, this little book is truly valuable.

WILLARD'S
UNIVERSAL HISTORY IN PERSPECTIVE.

ILLUSTRATED WITH MAPS AND ENGRAVINGS.

THIS WORK IS ARRANGED IN THREE PARTS, VIZ:

ANCIENT, MIDDLE, AND MODERN HISTORY.

1. Ancient History is divided into six periods—comprising events from the Creation, to the Birth of our Saviour.

2. Middle History, into five periods,—from the Christian Era, to the Discovery of America.

3. Modern History, into nine periods,—from the Discovery of America, to the present time. Each period marked by some important event and illustrated by maps or engravings.

The following resolution was offered and adopted at a meeting of the Ward School Teachers' Association of the City of New York, January 20th, 1847.

Resolved, That the Ward School Teachers' Association of New York considers Willard's Universal History as a book essentially adapted to the higher classes of schools on account of its vivacity, lucidness, and intelligent mode of arrangement, of dates and questions, and that such a work has long been wanted, and as such will endeavor to introduce it into their respective schools, and warmly recommend it to public patronage.

Extract of a Letter from Mr. Elbridge Smith, late Principal of the English High School of Worcester, Mass.

I have recently introduced "Willard's Universal History in Perspective," into the school under my care. I am much pleased with it, and think it superior to any other work of the kind.

(Signed,)

ELBRIDGE SMITH.

Worcester, June 5, 1847.

From Professor Charles B. Haddock of Dartmouth College, and School Commissioner of the State of New Hampshire.

I am acquainted with Mrs. Willard's Histories, and entertain a high opinion of them. They are happily executed, and worthy of the long experience and eminent character of their author.

(Signed,)

CHARLES B. HADDOCK.

Dartmouth College, Hanover, Dec. 11, 1846.

FULTON & EASTMAN'S PENMANSHIP,

Illustrated and expeditiously taught by the use of a series of Chirographic Charts, a Key, and a set of School Writing-Books, appropriately ruled.

I.

CHIROGRAPHIC CHARTS,

IN TWO NUMBERS. (Price 5.00.)

Chart No. 1, EMBRACES PRIMARY EXERCISES, AND ELEMENTARY PRINCIPLES IN WRITING.

Chart No. 2, EMBRACES ELEMENTARY PRINCIPLES FOR CAPITALS COMBINED, AND ELEMENTARY PRINCIPLES FOR SMALL LETTERS COMBINED.

II.

KEY TO CHIROGRAPHIC CHARTS;

Containing directions for the position at the desk, and manner of holding the pen.—Also for the exact forms and proportions of letters, with Rules for their execution. (Price 25 cents.)

III.

SCHOOL WRITING-BOOKS.

IN FOUR NUMBERS. (Price 12½ cents each.)

From the Trustees of the Union School, Lyons, N. Y.

The undersigned, trustees of the Union District School of the town of Lyons, take this method of expressing their approval of "Fulton's Principles of Penmanship." They have seen the system in operation, during the past year, in the school with which they are connected, and are fully satisfied of its great superiority over all other systems heretofore used. The "Chirographic Charts," upon which are drawn in large size the different letters and parts of the letters of the alphabet, proportioned in accordance with the rules laid down by the author for the formation of each letter, and which, when suspended, can be seen from all parts of a school-room of ordinary size, they regard as an especial improvement upon, and advantage over, other modes of teaching this art. While the labor of the teacher is by this means lightened a hundredfold, from the fact that the directions and rules thus illustrated, can be explained to a whole class at once, the benefit to the scholar is proportionally increased. The charts being made the property of the district, a uniformity is established in this branch of instruction, and the continual changes in books and methods of teaching, which have heretofore given occasion to so much just complaint on the part of parents and guardians, and which have been so prejudicial to the pupil, are entirely avoided.

The brief space necessarily allotted to a notice of this kind, will not permit the undersigned to say all they might say with truth in praise of Mr. F.'s system of instruction. They therefore conclude with the remark that it meets their entire approbation, and they cordially commend it to the favorable notice of the friends of education generally, and would recommend its adoption by academies and common schools in this and in other states.

A. L. BEAUMONT
ELI JOHNSON,
DE WITT PARSHALL.

Dated Lyons, N. Y., April 5th, 1847.

NEWARK, *March* 3, 1848.

I have examined with much care Fulton's System of Penmanship, lately published by Messrs. A. S. Barnes & Co., of New York. My attention has been called to the subject of teaching penmanship in our public schools, from the very manifest want of any system that seemed at all suited to the character of our Ward Schools. Mr. Fulton's system I deem to be the best I ever saw, and I have no hesitation in recommending it. There is an exactness about Mr. F.'s method of teaching this art, which seems to defy the possibility of pupils becoming any thing but accomplished proficients.

I have taken means to procure the introduction of one set of the charts and a number of the copy-books in our schools as an experiment, and so well satisfied am I that the system is what we need, that I shall use early measures to have them introduced more extensively.

Yours, &c., JNO. WHITEHEAD,
Commissioner of Public Schools for the city of Newark.

From the Superintendent of Monroe County, West District.

MR. LEVI S. FULTON:

Dear Sir:—I am well pleased with the examination of your series of "Chirographic Charts, for the purpose of illustrating and teaching the principles of Penmanship." One of the greatest obstacles in the way of the scholar's improvement in our schools, is the frequent change of teachers. Under the instruction of every new teacher, the scholar commences to learn a new hand, by attempting to copy that of the teacher: the consequence is, that he rarely obtains a good permanent hand. His efforts so often failing of success, he becomes discouraged, and ready to abandon the exercise as a vexatious and hopeless task.

By the use of your charts, applying the principles as taught in your book, the teacher and pupil will be very much aided in the exercise; the teacher illustrating the principles from the chart, and the pupil practising upon them.

I rejoice that you have so arranged these principles, that the art of good penmanship will be placed within the reach of all who desire to attain this necessary accomplishment, and I will indulge the hope, that your works may obtain that extensive circulation which their merits so richly deserve.

Desiring your best success in this praiseworthy undertaking, I shall ever remain your most obedient and humble servant,

JULIUS A. PERKINS,
County Superintendent, Monroe co., West District.

Spencerport, Dec. 26, 1846.

LEVI S. FULTON, Esq.:

Dear Sir:—Your theory and practice of Penmanship, which I have had several opportunities to see tested and applied, is, in my opinion, truly philosophical, and fully justifies the high estimate formed of it by all to whom it has been exhibited.

I have examined the plan of your proposed publication, and entirely approve of it. It seems to me that such a work is greatly needed, and that its adoption as a text-book would greatly facilitate the acquisition of a beautiful but hitherto vexatious branch of education.

REV. O. R. HOWARD, A. M.,
(Late) Principal of Fairfield Academy.

Lyons, Dec. 1, 1846.

PENFIELD, *Jan.* 31, 1848.

Dear Sirs:—It is with pleasure I inform you that your *Chirographic Charts* are in use in the Union School of this village, with admirable success. Serious difficulties which presented themselves to the learner of writing by the old system (imitation merely) are entirely overcome.

The fixed rules for the formation of each principle separately, and most especially the general arrangement of your Charts, are *desiderata* hitherto unreached by any system of penmanship with which I am acquainted.

In my humble opinion, they must meet with universal approbation.

Very respectfully, yours, &c., WM. D. SHUART.

MESSRS. FULTON & EASTMAN:

Dear Sirs:—I have carefully examined your *Chirographic Charts* and *Key*, and am pleased to find your system of penmanship one that at once recommends itself by its perfection and simplicity—requisites indispensable to successful application in our schools, and for a lack of which, others have proved failures. As teachers themselves are not unfrequently inferior penmen, and have gained their own knowledge of this branch of education by a random practice, they are wholly unable to impart it to their pupils. Your system obviates this difficulty, by giving the teacher a resource from which to supply his own deficiency, and hints for the successful application of whatever knowledge of the art he may possess.

Your charts are in use in the Union and Select schools of this village, and also in other schools of this town and county, and with the happiest success. The scholars, charmed with the novelty which the system continually presents, and the ease with which they master its principles, vie with each other in their efforts to excel, and are rewarded by acquiring a beautiful "hand" and neat mechanical execution—and at the same time, the teacher is relieved from the perplexing practice of *random* teaching, so universal in our schools.

JAMES M. PHINNEY,
County Superintendent, Monroe Co., East Dist.

Penfield, Nov. 1, 1847.

From the Rochester Monthly Educator.

We believe that Mr. Fulton is the first author who has attempted to teach the art of penmanship *by rule*. Heretofore, *imitation* has been almost the sole principle used to direct the student in acquiring a knowledge of chirography, and as every teacher has a system peculiar to himself, no uniform plan of instruction could be successfully introduced into our common schools. Mr. Fulton has rendered an essential service to the cause of education, in perfecting a system which does not, at every change of teacher, require a variation in the handwriting of the pupil. One advantage which must result to the teacher from the use of these charts, is the great amount of time and labor that will be saved thereby—the old method of writing separate copies for each scholar being entirely dispensed with We feel confident that teachers and parents who will take time to examine this system of penmanship must be convinced of its superiority over all others.

FULTON & EASTMAN'S BOOK-KEEPING.

A PRACTICAL SYSTEM OF BOOK-KEEPING BY SINGLE ENTRY.

Containing three distinct forms of books, adapted for the Farmer, Mechanic, and Merchant—to which is added a variety of useful forms for practical use, viz.: Notes, Bills, Drafts, Receipts, &c. &c.: also a Compendium of Rules of Evidence applicable to Books of Account, and of Law in reference to the Collection of Promissory Notes, &c. By Levi S. Fulton and G. W. Eastman, authors of a complete System of Penmanship.

Rochester, *Feb.* 12, 1848.

L. S. Fulton, Esq.:

Dear Sir:—I have examined with much satisfaction your System of *Book-Keeping*, and take pleasure in recommending its adoption to my immediate friends and others.

It is simple and easily reduced to practice, and possesses a peculiar adaptation to the wants of the community for which you design it.

The plan for Merchants' Books, which I examined more critically than other portions of the work, is very neat, compact, and economical, and must ensure a great degree of accuracy in keeping accounts.

I believe your work will meet the present wants of community.

Very respectfully, your friend, ELIJAH BOTTUM,
Book-keeper for John M. French & Co.,
Rochester, N. Y.

I have examined Messrs. Fulton & Eastman's "Practical System of Book-Keeping by Single Entry," and am pleased with the work. As a branch of Education, Book-Keeping is well deserving a high estimation; and, I will add, there is none of equal importance and utility more generally neglected, particularly in our public schools.

The work above alluded to, is plain, simple, and comprehensive, and well adapted to meet the wants of the business community. In many respects I deem it superior to any other work of the kind with which I am acquainted. I shall recommend it to the schools under my charge.

JOHN T. MACKENZIE,
Lyons, *May* 8, 1848. Town Superintendent.

Fulton & Eastman's Book-Keeping.—We had supposed that, in the multiplicity of works on Book-Keeping, hardly any thing valuable remained to be suggested by later authors, should any such present themselves. But we have been convinced of our short-sightedness in examining the work with the above title, now before us. The work is principally designed for schools—for common schools—but should be in the hands of every Farmer, Mechanic, and Merchant in the land. It opens with a system of account-keeping for farmers, followed by one for mechanics, and this, in turn, by an admirable and comprehensive system of mercantile Book-keeping, which, for its simplicity, and time and labor savin properties, possesses advantages over all other systems with which we are acquainted. These advantages are thus set forth by the authors in their preface, and an examination of the work will convince any man competent to judge, that they are not over-estimated:

"It [the system spoken of] saves more than one-third of the time in journalizing, and at least three-fourths of the labor in posting. It requires but twelve lines in the Ledger to post a year's business, while in the ordinary way as many pages may be necessary. In settling with a person at the end of a year, you have only to refer back to twelve places in the Journal to show him all the items of his account, whereas in the ordinary manner of keeping books you might have to refer to five hundred."

Part II. of the work, which was prepared by a distinguished member of the bar, comprises "rules of evidence and general rules of law in relation to bills of exchange, promissory and chattel notes, checks, books of account, &c., together with a large number of forms *useful to all classes* of business men; such as deeds. bonds, mortgages, bills of sale, powers of attorney, bills of exchange, notes, receipts, &c.

This invaluable work contains 232 pages of duodecimo, is printed in the best style of Messrs. A. S. Barnes & Co., of New York, on an excellent quality of paper, and is afforded at the very low price of 50 cents per copy.—*Wayne Co. Whig.*

LYONS, *May* 8, 1848.

I have examined "Fulton & Eastman s Book-Keeping," and regard it as a useful work on the subject of which it mainly treats. Its methodical arrangement, its simple and ready modes of keeping accounts, adapted to the business of the Farmer, Mechanic, or Merchant respectively, and the neat style in which it is executed, recommend very strongly its use in primary institutions of learning, and especially in common schools. It is to be hoped that its general introduction as a school-book, will cause the art of Book-keeping to be regarded as one of the indispensable requisites of what is termed a good English education.

JAMES C. SMITH.

From the Albany Spectator.

FULTON & EASTMAN'S BOOK-KEEPING.—New York: A. S. Barnes & Co., 1848.

We are very much pleased with the design and execution of this work. It is exceedingly practical; being by single entry, containing three different forms ot books, for the Farmer, the Merchant, and Mechanic. To these are added notes, bills, drafts, receipts, and a compendium of rules of evidence applicable to books of account, and of law in reference to the collection of promissory notes. A work of such a character, and of so much practical value, speaks for itself, and stands in need of no commendation from us to ensure it a large sale among *all* classes.

SCIENCE OF THE ENGLISH LANGUAGE.

CLARK'S NEW ENGLISH GRAMMAR.

A Practical Grammar, in which Words, Phrases, and Sentences are classified, according to their offices, and their relation to each other: illustrated by a complete system of Diagrams. By S. W. Clark, A. M. Price 50 cts.

From the Rahway Register.

It is a most capital work, and well calculated, if we mistake not, to supersede, even in our best schools, works of much loftier pretension. The peculiarity of its *method* grew out of the best practice of its author (as he himself assures us in its preface) while engaged in communicating the science to an *adult* class; and his success was fully commensurate with the happy and philosophic design he has unfolded. *Technicality*, as technicality, our author unceremoniously discards, and substitutes on the pupil's part *rational practice* in ascertaining the *office* of words in sentences, rather than the usual mode of perplexing his memory with their mere names and *forms.*

From the New York Tribune.

"The Science of the English Language—A Practical Grammar, in which Words, Phrases, and Sentences are classified according to their offices and their relation to each other. Illustrated by a complete system of Diagrams. By S. W. Clark, A. M.," is a new work which strikes us very favorably. Its deviations from older books of the kind are generally judicious and often important. We wish teachers would examine it.

From the Courier and Enquirer.

"A Practical Grammar of the English Language" by S. W. Clark, A. M., has just been published by Barnes & Co. It is prepared upon a new plan, to meet difficulties which the author has encountered in practical instruction. Grammar and the structure of language are taught throughout by analysis, and in a way which renders their acquisition easy and satisfactory. From the slight examination, which is all we have been able to give it, we are convinced it has points of very decided superiority over any of the elementary works in common use. We commend it to the attention of all who are engaged in instruction

From A. R. Simmons, Ex-Superintendent of Bristol.

Mr. Clark:

Dear Sir:—From a thorough examination of your method of teaching the English language, I am prepared to give it my unqualified approbation. It is a plan original and beautiful—well adapted to the capacities of learners of every age and stage of advancement. Believing that the introduction into our Common Schools and Academies of a text-book on grammar containing your SYSTEM and METHOD will greatly facilitate the acquisition of the science of the English language, I respectfully suggest that it be permitted to come before the public.

Respectfully yours,

A. R. SIMMONS, Grammar Teacher.

Bristol, August 28, 1847

From the Geneva Courier.

Mr. Clark's Grammar is a work of merit and originality. It contains an etymological chart by which the mode, tense, &c., of a verb, or the gender, person, &c., of a noun, or the different forms of any part of speech, can be determined at a glance. It also embraces a system of Diagrams, which illustrate very simply and satisfactorily the relation which the different words of a sentence bear to each other. The student of grammar must be greatly assisted by the introduction of these helps, which furnish grammar to the eye as well as to the mind.

From the Geneva Gazette.

This work is the production of a successful teacher in our own county, and has grown out of the necessities which have appeared to the writer to exist, in order to present the science of Grammar in a proper manner to the attention of the scholar. The work has been prepared for publication by the author at the solicitation of teachers of high character. The design is, in many respects, original, but appears to be based on sound philosophical principles; and the work is most certainly worthy of the close attention and examination of teachers.

From the Ontario Messenger.

In mechanical execution, the book is a good one; and if we may hazard an opinion, we should say the method the author has adapted for teaching grammar, is in advance of any thing of the kind we have ever seen. His plan of using Diagrams in explaining the structure of sentences, is a feature in this work, which, among many others, strikes us favorably, and which, we believe, is calculated to present at one glance, what many pages of written matter in the grammars now in use do not contain in an intelligible form. Geometry can be taught without figures, and geography without pictures or maps; but no one in our day would think of learning either of these sciences without the aid of figurative representations; and we see no good reason why this " system of diagrams" is not equally useful in the study of grammar. The brevity, perspicuity, and comprehensiveness of this work are certainly rare merits, and alone would commend it to the favorable consideration of teachers and learners. Take it altogether, we think it a work in accordance with the spirit of the age, and we wish the author success in his labors of improvement.

From the Seneca Observer.

It is, in our opinion, a valuable work; the best calculated of any which has fallen under our notice to impart interest to a study not usually very attractive. We commend this work to the notice of our teachers: we are confident it will be favorably received by them.

Clark's Grammar I have never seen equalled for *practicability*, which is of the utmost importance in all school-books.

S. B. CLARK,
January, 1848. Principal of Scarborough Academy, Maine

The Grammar is just such a book as I wanted, and I shall make it *the* text-book in my school.

WILLIAM BRICKLEY,
February, 1848. Teacher, of Canastota, N. Y

From Professor Brittan, Principal of the Lyons Union School.

MESSRS. A. S. BARNES & CO.:

I have, under my immediate instruction in English Grammar, a class of more than fifty ladies and gentlemen from the Teachers' Department, who, having studied the grammars in common use, concur with me in expressing a decided preference for "Clark's New Grammar," which we have used as a text-book since its publication, and which will be retained as such in this school hereafter.

The distinguishing peculiarities of the work are two; and in these much of its merit consists. The first, is the logical examination of a sentence as the first step in the study of language, or grammar. By this process the pupil readily perceives that words are the instruments which the mind employs to perfect and to express its own conceptions; that the principal words in a sentence may be so modified in their significations by other words and by phrases, as to express the exact proposition or train of thought designed to be communicated; and that words, phrases, and sentences may be most properly distinguished and classified according to the office they perform.

The other distinguishing peculiarity of the work is a system of Diagrams; and a most happy expedient it is to unfold to the eye the mutual relation and dependence of words and sentences, as used for the purpose of delineating thought.

I believe it only requires a careful examination by teachers, and those who have the supervision of our educational interests, to secure for this work a speedy introduction into all our schools. Yours very truly,

N. BRITTAN.

Lyons Union School, February 21, 1848.

From H. G. Winslow, A. M., Principal of Mount Morris Union School.

I have examined your work on Grammar, and do not hesitate to pronounce it superior to any work with which I am acquainted. I shall introduce it into the Mount Morris Union School at the first proper opportunity.

Yours truly, H. G. WINSLOW.

From S. N. Sweet, Esq., Counsellor at Law.

Professor Clark's new work on Grammar, containing Diagrams illustrative of his system, is, in my opinion, a most excellent treatise on "the Science of the English Language." The author has studiously and properly excluded from his book the technicalities, jargon, and ambiguity which so often render attempts to teach grammar unpleasant, if not impracticable. * * *

The inductive plan which he has adopted, and of which he is, in teaching grammar, the originator, is admirably adapted to the great purposes of both teaching and learning the important science of our language.

SAMUEL N. SWEET, Author of "Sweet's Elocution."

Whitesborough, January 10, 1848.

From H. O'Dell, Esq., Teacher and Ex-Superintendent of Hopewell.

S. W. CLARK:

Sir:—I have examined your Grammar, and have no hesitation in recommending it to those engaged in teaching the youth of our country as *the* work on the subject of grammar which the present age of improvement demands. I have introduced it into my school, and find it admirably adapted to *wake up the minds* of the students of grammar, especially the younger portion.

Yours, H. O'DELL.

CHAMBERS' EDUCATIONAL COURSE.

NEW AMERICAN EDITIONS,

FROM THE REVISED AND IMPROVED EDINBURGH EDITION.

BY D. M. REESE, M.D., LL.D.

These Works, published under the direction of the Messrs. Chambers, of Edinburgh, who are known in Great Britain and America by their numerous and valuable publications, are intended especially for schools, and for the diffusion of intelligence on all scientific and practical subjects. They have secured for the authorship of this series the labors of some of the first Professors in Scotland in the several branches. The different volumes are numerously illustrated, and will be found to be admirably adapted, as Text-Books, and also as Library Books, for the Schools and Families of the United States.

I. TREASURY OF KNOWLEDGE.

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VII. ELEMENTS OF ZOOLOGY.

THEORY AND PRACTICE OF TEACHING;

OR,

THE MOTIVES AND METHODS

OF

GOOD SCHOOL-KEEPING.

BY DAVID P. PAGE, A.M.

LATE PRINCIPAL OF THE STATE NORMAL SCHOOL, ALBANY, NEW YORK.

CONTENTS.

This work has had its origin in a desire to contribute something towards elevating an important and rising profession. Its matter comprises the substance of a part of the course of lectures addressed to the classes of the Institution under my charge, during the past two years. Those lectures, unwritten at first, were delivered in a familiar, colloquial style,—their main object being the inculcation of such practical views as would best promote the improvement of the teacher. In writing the matter out for the press, the same style, to considerable extent, has been retained,—as I have written with an aim at usefulness rather than rhetorical effect.

If the term *theory* in the title suggests to any mind the bad sense sometimes conveyed by that word, I would simply say, that I have not been dealing in the speculative dreams of the closet, but in convictions derived from the realities of the schoolroom during some twenty years of actual service as a teacher. Theory may justly mean the *science* distinguished from the *art* of Teaching,—but as in practice these should never be divorced, so in the following chapters I have endeavored constantly to illustrate the one by the other.

SCHOOL ARCHITECTURE;

OR,

CONTRIBUTIONS TO THE IMPROVEMENT OF SCHOOL-HOUSES

IN THE

UNITED STATES.

BY HENRY BARNARD,

COMMISSIONER OF PUBLIC SCHOOLS IN RHODE ISLAND.

CONTENTS.

From the Vermont Chronicle.

Mr. Barnard, when Secretary of the Board of Commissioners of Common Schools in Connecticut, devoted much time to School-houses, lectured upon the subject, and published his views in the School Journal, which he then edited. Since that date, (1841,) his Essay has been repeatedly published, each time with additional plans and descriptions. Parts of it have been extensively copied, and its influence has been felt in all parts of the country. He has now enlarged it to a handsome volume, which is published in a style becoming its importance and excellence. No other writer on the subject is to be compared with Mr. Barnard for the fulness and variety of his materials, and the completeness of his work in regard to all the points that are to be considered in the building and furnishing of school-houses.

Mr. Barnard does not confine himself to any one plan, but exhibits fully a great variety of excellent models for buildings, seats, desks, warming, ventilating, &c., &c., for Primary Schools, High Schools, Normal Schools; with numerous cuts and descriptions of buildings and parts of buildings in use in places where most attention has been given to the subject. At the close we have nearly a hundred pages on school apparatus and library, care of school-houses, school-regulations, books on education, suggestions for improvement, &c. The whole book is replete with information, and we heartily recommend it as one that ought to be accessible in every school-district. No school-house should be built or altered without consulting it.

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