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THE well-named Metropolitan Museum of Art in New York has been finally opened to the public in its permanent quarters in the Central Park. The building is as yet only a fraction of what it is intended to be, and the same may be said of the collections which it shelters, but both have made a noble beginning, and both are sure to grow, with a rapidity of which there are now perhaps few indications. It does not yet appear,—perhaps no one has thought much about that point,—whether the future Museum is to be a collection pure and simple, like the British Museum and the Louvre, existing for its own sake; in other words, playing the part of a great and powerful dilettante, and a means of special study for scholars; or whether, like South Kensington, it is to be primarily an educational institution, embracing a great variety of artistic work, with the object of illustrating the whole field of art rather than of securing certain unapproachable treasures; in the same way that a good teacher with limited means would collect for his pupils as wide a range of examples as he could, instead of consulting his own selfish vanity by spending all his resources on one or two rarities, good for little but to excite the envy of his personal competitors. There is much to be said for either theory of administration. We have not forgotten Mr. Ruskin's savage attack on South Kensington and its pupils, who "saw everything and did everything, and misunderstood all that they saw, and misapplied all that they did," and no doubt there is a certain point to the sarcasm; but it is impossible, knowing the work which South Kensington has tried to do, to compare the "art manufactures," to use an unpleasant phrase, which were shown in the great Exhibition of 1851, with those that England now produces, without acknowledging its extraordinary influence and success. If South Kensington, with the help of its little band of enthusiastic and persistent teachers, to whom it owes more than it does to the lavish generosity of the Government, could accomplish so much for the comparatively inartistic and lymphatic English, we may expect a great deal in eager and impressive America, from the powerful stimulus of great central museums organized on a like plan as to form, with their subsidiary collections, efficient instruments in the hands of men who knew how to use them. The Kensingtonian influence and methods, however, have quite a sufficient foothold in the country; and what we may call the commercial culture of art, to which they tend, is sure to be looked out for. So that we are more anxious to see provision made for the special studies which the beginnings of the Metropolitan Museum seem to encourage, and in which Americans are most backward.

THE project for a World's Fair in New York in 1883 seems to gain strength. The passage by the Senate of Mr. Kernan's bill authorizing the formation of the corporation which is to carry it out is a decided step in advance, and the omens may be said to be in every way favorable. With the help of the energy and good judgment which characterized the Centennial exhibition, the new one would have even a greater prospect of success. The rank of New York as the centre of foreign com-

merce would perhaps enable it to draw from other countries exhibits rivalling those magnificent ones which gave such brilliancy to the Philadelphia fair, and at the present rate of internal development our own country will have much to show that will be new and interesting. The telephone, the phonograph, the electric light, the luminous paint, have all received their principal development within four years, and scores of new industries are talked of on all sides. The progress of manufacture, in the making of pottery, tiles and terra-cotta, for instance, has been no less than astonishing. Three years more will witness the substantial growth of many others. One enterprise, which has already attracted some attention, and which architects could do much to promote, is the proper exhibition of American building-materials. A correspondent in our issue of two weeks ago gives some interesting information in regard to certain stones, and such information, disseminated with the help of collections of specimens in a great exhibition, would be of great use to architects, besides being the means of increasing general prosperity, by originating new industries in regions whose mineral wealth now lies unnoticed underground. It is singular, to say the least, that we should, with our vast deposits of marble of all kinds, be obliged to continue importing from Italy great amounts of that material, and that out of the great variety of figured marbles which are used for fine work but half a dozen, and those the least beautiful, should be home products.

AFTER so many years of poverty and depression, the "knights of labor," "sons of toil," or whatever else they may be pleased to call themselves, seem to be having their day again. The first week in April has seen a general advance in wages almost everywhere. The piano-makers, after the successful issue of their contest with their employers, stipulated that their return to work should be put off for another day, in order that they might celebrate the joyful occasion by a picnic and ball. Whether these festivities were paid for out of the funds contributed by sympathizing fellow-workmen in other cities for the support of their families, or whether the masters were compelled to foot the bills, we do not hear. Mr. Steinway, however, contributed fifty dollars, and was invited to share the hospitality of his men. We are very ready to congratulate the workmen on any real improvement in their condition, believing that their prosperity is a guaranty for the prosperity of all; but when, after weeks of idleness, their victory is secure, and their work is waiting for them on their own terms, for men to throw away wantonly the earnings of a day, which they owe to their wives and families, still more to squander the money which other men have taken from their own living to relieve their fancied necessities, on "festivities," is a folly that leads to a diminishing respect for those who seem to have so little care for either their duties or their interests.

A VERY interesting report has been made to the Commissioners of the New York State Survey, by their special agents, Mr. Frederick Law Olmsted and Professor James T. Gardner, Director of the Survey, on the project, to which we have before called attention, for reserving an international park around the Falls of Niagara. The report, as presented to the Legislature, describes in detail their scheme for reclaiming the river banks above and below the Falls, removing the buildings and planting trees, so as to bring the place as far as possible back to its original condition. A large proportion of the buildings are miserable sheds, and the expense would not be very great. Bath Island, in the midst of the rapids, which is now nearly covered with the unsightly buildings of a paper-mill, would be cleared and replanted with trees, and a strip of land, varying from one hundred to eight hundred feet wide, would be acquired along the brink of the stream, all buildings on it torn down, and the whole restored, so far as possible, to a state of nature. Certain water-privileges must be allowed to remain, but it will be possible to place the mills which depend upon them at some distance from the water, the wheels only being sunk in pits near the edge; and the owners express a willingness to do what they can to co-operate with the Commissioners. The whole territory to be acquired on the American side is but seventy-seven acres,—a trifle compared with the advantage of securing it. In the report, the feature of the original proposition, which was to make the reclamation of the region on both sides of the river an international matter, is not

referred to, the suggestions of the Commissioners looking to independent action by the State of New York with regard only to its own side. This may be judicious. The Dominion is now committed to the restoration of the left bank, and if New York will take care of the right, the result will practically have been attained, without the delays, misunderstandings, and attempts at overreaching, which seem inseparable from mixed commissions.

BALTIMORE is running a race with New York in the matter of steam-heating, a large amount of pipe being ready to lay in the former city, so that when excavation is begun the work can go on rapidly. In order to prevent condensation of the steam in passing through the pipes, they are wrapped in rosin-sized paper and oakum, and jacketed with wood. The whole is tarred, but it looks as if the protection would be of a rather temporary character. The first lines are to be laid in Lexington and Charles Streets, which are closely packed with offices and stores, and form a favorable district for experimenting. Steam for cooking and motive purposes, as well as heating, will be furnished, and the company, it is said, guarantee that the cost will not exceed that of coal. We should, however, advise those who contract with the company to see that they get this guaranty in black and white. Baltimore is unusually well situated for such an enterprise; its compactness, and the steepness of its streets, compared with those of New York, affording facilities for easy distribution and also for the return of condensed water, which will, we think, be one of the most serious troubles.

ONE of the surprising things in the vital statistics, if we may call them so, of buildings, is the frequency with which court-houses are destroyed by fire. Not long ago we had to record the burning for the second time of a certain unfortunate example, and later despatches announce the destruction of the court-house and jail of Brown County, Texas, with the loss of several lives and the county records. How official carelessness can go so far as to intrust the records, on which depends the security of landed property, to an inflammable repository, we can hardly see. The requisite precautions for making a building reasonably fire-proof, — at least so much so that incendiary enterprises, such as this is said to have been, will have little chance of success, — cannot be difficult of attainment even in Texas, and a hole in the ground under the cellar floor, with a tin box set in it, would be better than nothing. We might say something in behalf of the helpless prisoners confined without means of escape; but so long as school-houses and tenement-houses remain what they are, it would be hopeless to urge the claims of criminals to a chance for their lives.

WITH the rapid extension of telephone communication, added to the ordinary growth of telegraphy in general, the business streets in our large cities have come to be filled at a certain level, with a maze of wires, whose presence is not always unobjectionable. In some cases it is said that chimneys have been overturned by the united strain of a number of tightly stretched wires fastened to them at an angle, and in certain recent fires the lines have been very seriously in the way of the ladders of the department, besides interfering with the fire-alarms by the crossing of the wires. Some steps have been taken toward the regulation of the lines, but except the efforts, which all parties are disposed to make, to avoid mutual injury as far as possible, nothing seems yet to have been done toward effectually remedying the evil. In Philadelphia, steps have been taken for compelling the laying of telegraph wires underground, and some of the telephone corporations propose to try subterranean lines.

THERE is some prospect of an interesting case being brought before the courts in Queen's County, N. Y. A certain draw-bridge was to be built across the stream which bounds Long Island City on the south, and an engineer was employed to make plans, which were carried into execution under a contract in which the party of the second part agreed to keep the bridge in repair for one year after its completion. The contract also required that the plans and directions of the engineer should be implicitly followed, and that the material should be of good quality. Soon after the structure was finished, and before it was paid for, the draw, loaded with a team of horses and a wagon, fell into the stream. The city authorities thereupon called upon the contractor to rebuild it, which he declines to do

and claims his pay as if nothing had happened, on the ground that the fall of the draw was the result of its improper design, with which he had nothing to do, and that having carried out exactly the instructions of the engineer, with good materials, he is only bound to make such minor repairs as every structure needs, not to stand surety for the engineer's mistakes. The case, so far as we can judge, much resembles that of *Thorn vs. the Corporation of London*, in which the contractors for the Blackfriars Bridge were compelled to incur heavy expenses through the defect or insufficiency of the plans and specifications furnished by the engineer, Mr. Cubitt. In the London case, the House of Lords decided that the Corporation did not warrant their engineer or his plans; that the contractors had as good an opportunity of judging of them as they had themselves, and that if they chose to sign the contract of which those plans and specifications formed a part, they could not look to the Corporation to make good their defects. Undoubtedly they would have had a good case against the engineer if he had shown want of reasonable skill or care; but Mr. Cubitt was dead, so that was out of the question. In the New York case, it is possible that some such action may be brought. If so, it will, we think, be the first one of the kind, and its conduct and decision will be of interest to all professional men.

ANOTHER law point has come up in Cincinnati. A certain owner of land on a steep grade, in laying his sidewalk, found it a saving of trouble to grade it at an inclination of one and one-half inches to the foot, the consequence being that when covered with ice it became difficult to stand or walk on. The city ordinance limits the slope of sidewalks to half an inch rise in every foot, and when a certain citizen, walking with due care upon this illegally steep grade, slipped and fell, and was thereby injured, he brought an action for damages against the proprietor of the land, together with the city. The city was dismissed from the case; we do not see why, since it ought to be held to some responsibility for seeing its own ordinances enforced; but the other defendant was held by the court to have constructively placed an obstruction in the highway, by heaping up his sidewalk in an unlawful manner, and therefore there was ground of action against him, as if he had put some actual obstacle in the path.

THE stand in favor of professional self-respect in regard to competitions, which, as we mentioned in our last issue, has been taken by a large number of English architects, meets already with an encouraging response from the public. The government of the Birmingham Eye and Ear Hospital recently invited plans for remodelling their building, sending a simple note to six architects, asking if they were willing to prepare competitive plans. One of the invited ones had the public spirit to ascertain the names of the others, and invited them to a conference, at which a joint letter was drawn up, in which all concurred, suggesting that the Hospital authorities should, in arranging their proposed competition, make the following terms: that each architect should be informed of the names of all the other invited ones; that a professional referee be appointed, the competing architects to have a voice in his appointment; that the proposed outlay be stipulated, and any design to be ruled out whose cost would in the opinion of the referee exceed by ten per cent the allotted sum; that only eighth-scale geometrical drawings in India-ink be admitted, all to be under motto; that no drawings be received after a certain date; and that twenty-five guineas be paid to each unsuccessful competitor. The Hospital managers promptly acceded to all these suggestions except the second, that an expert referee should be appointed; but the invited architects representing the advantage of employing such an expert, both to secure fairness in the award, and to guide the Hospital authorities as to the practicability of the plans, they consented to this condition also, reserving only the right to modify the approved plan if they thought necessary. This is a gratifying transaction: the sooner architects make up their minds to stand before the public as educated and honorable men, exercising a profession second to none in the demand which it makes for talent, attainment, and business capacity, and not as envious and unprincipled sketchers, who are honored by being invited to send designs for buildings without the smallest chance of being paid for their trouble, the better off they will be, and the more the public will appreciate their services.

A NEW EDITION OF REID ON CONCRETE.¹

CONSIDERING the immense advances which have been made of late years, almost from month to month, in the knowledge and use of concrete, a new and enlarged edition of the standard text-book on the subject is now most opportune and welcome. Perhaps experiments in concrete construction are now the most interesting of all subjects to architects, who, however, have generally acquired, from the mysterious and disastrous failures of some of the experiments, a distrust of the new material, which they will be glad to have replaced by more definite knowledge of its properties — its limitations as well as its capabilities.

The author compliments the Americans highly on the intelligence and success with which they have pursued the manufacture of concrete and cement, saying that in what he calls the block-system of concrete building, as well as in the applications of the same treatment to the formation of small articles, pipes, vases and so on, they are far in advance of the English, from whom they took their first lessons.

Beginning the treatise by a discussion of the separate ingredients from which concrete is made, we meet with some interesting observations on the manufacture and testing of Portland cement, which forms the matrix of nearly all European concretes, and in regard to which Mr. Reid is undoubtedly the best living authority. After repeating that under the present careless and ignorant system of cement manufacture in England it is essential to test every barrel of the material which is delivered for use in important structures, he devotes a chapter to descriptions of the various testing machines, the principle of all of which is sufficiently familiar. Among other tests, however, is a very simple one, well suited to the wants of architects, who need only an approximate result, and cannot well afford the cost of expensive machines. This consists in mixing samples of pure cement with water, and pressing them into a mould 10 in. by 1½ in. by 1½ in. When set, which will be in one to six hours according to the character of the cement, the block is to be placed in water, where it remains seven days. At the end of that time it is taken out, and tried by placing it on supports 9½ inches apart, and gradually applying a load of 150 pounds at its centre. "If more than one out of three blocks are broken within one minute of the application of the load, the cement from which the sample is taken is to be at once rejected." The weight of 150 pounds so applied is equivalent to a tensile strain of 355 pounds per square inch of section, which would be a rather severe test for the Portland cement often used here; but the experiment is easily modified.

Another test which he insists upon at some length is the sifting of the cement. In his opinion it is uneconomical to use a cement of which at least 95 per cent will not pass through a sieve having 5,000 meshes to the square inch, for the reason that in a coarsely ground cement the larger particles act simply as sand, diminishing the effective portion of the cement, — that which is so finely ground as to be capable of coating the coarser particles to which it is added — by just so much.

The tensile test alone reveals nothing about the fineness of the grinding. On the contrary, the briquettes made from a coarse cement generally show a higher tensile strength than those of the same cement more finely ground, the coarser particles, like sand, actually strengthening the mass to some extent. When mixed with sand or gravel, however, the fine cement is far superior. In one remarkable series of tests, two samples of the same cement were tried, one ground to pass through 6,000 meshes per square inch, the other 32,000 meshes. The briquettes of the coarser cement, mixed neat and kept under water seven days, bore 833 pounds per square inch, while the finer cement broke at 617 pounds per square inch. With equal quantities of cement and sand, the tensile strength of the two samples was about equal; with two sand to one cement, the finer was 25 per cent stronger; and with 10 sand to one cement, the fine sample gave more than double the strength of the coarse, bearing 111 pounds to 53 for the latter, after seven days immersion.

These enormous tensile strengths, it should be remarked, were obtained with German Portland cement from the "Stern" cement works at Stettin, Pomerania, of whose quality Mr. Reid speaks in the highest praise, as is certainly natural. The illustration which the experiments give of the effect of fine grinding is most instructive.

After some remarks on the use of mixtures of different kinds of cement, or of Portland cement with lime, which he decidedly condemns, the author takes up aggregates, that is, the gravelly or stony constituents of concrete; then passes on to the concretes themselves.

Among his descriptions are some interesting ones of the American manufactures, in which he finds much to praise, and which are here generally known only in their results, the process, being little discussed. The well-known "Union stone" is, it appears, made with a peculiar cement, obtained by adding chloride of magnesium to oxide of magnesia, which is formed by calcining the native carbonate, or magnesite, found in various parts of the States. The mineral, after being calcined and ground, is mixed dry with sand, marble or soap-stone powder, emery powder, or any similar substance, and then moistened with solution of chloride of magnesium, passed through a pug-mill, and then tamped into moulds. In three or four days the block is hard enough for use. The proportion of cement is very

small, in some of the products only five per cent and the strength very great, considerably exceeding that obtained in a similar manner with Portland cement.

The once celebrated "Frear stone," made with sand, hydraulic cement and a solution of shellac, is mentioned, but with some expression of doubt as to the enduring quality of the shellac ingredient.

The remainder of the book is taken up with English concretes and artificial stones. Perhaps the most noticeable feature of the later processes is the extensive use of silicate of soda. Portland cement and crushed granite form the substance of the stone blocks, drain-pipes, or paving-slabs, but when hard enough to be handled they are placed in a bath of silicate, which does not appear to increase their ultimate hardness, but very much hastens the hardening action, so that the manufacturer can send off his goods in a few weeks after the order, without needing to carry an enormous stock, to allow the articles the necessary months or years needed for the gradual crystallization by the old methods.

This industry is rapidly assuming vast proportions in England. Beside the adaptations of concrete to floors, in which we keep even pace with our transatlantic cousins, there are found uses for the material in England yet untried here. One quotation will illustrate this, beside at once satisfying curiosity regarding a much-talked-of building, and awakening a still stronger desire to know more of the new world of construction of which the book gives us a glimpse.

All the architectural world remembers Mr. Norman Shaw's singular design for the Queen Anne house on the Rue des Nations at the Paris Exposition of 1878. Some had a vague idea that it was a concrete construction, but probably few understand exactly what that construction, now apparently well known in England as the "Lascelles system," consisted in.

To abridge the description as much as possible: the structure was framed of wood, precisely like our houses of timber, but the studs, instead of being enclosed with boards nailed to them, were clothed on the outside with slabs of concrete, one inch thick, screwed to them. The slabs were made beforehand, and shipped ready for screwing on.

But the most peculiar part of the description is yet to come. To all appearance, the house was built of very smooth and fine red brick, in old English bond, exquisitely rubbed and jointed. This was, however, only an appearance. The pretended bricks were really slips of a very fine concrete, colored red, one-quarter of an inch thick, 2½ inches high, and 4½ or 9 inches long, according as they represented headers or stretchers, all stuck to the outside of the concrete slabs with Portland cement. As the author says, "the result is an external surface superior to any attainable through the agency of rubbed brick or terra-cotta."

That may be, and yet we are somewhat at a loss to understand why the Frenchmen should have made Mr. Lascelles a Chevalier of the Legion of Honor for such an invention. Perhaps, as Mark Twain says, "few escape that decoration," and Mr. Lascelles was not born to be one of the lucky ones.

ILLUSTRATIONS OF THE HISTORY OF ART.¹

As the pen is mightier than the sword, to the student of art the pencil is mightier than the pen. But a student who wishes to have an illustrated record of his art often has to buy a great amount of descriptive text which he does not need, and so is able to secure fewer illustrations for his means with loss of usefulness to his library. The modern device of collecting and stringing on a new thread a collection of cuts originally made for various uses has been utilized to the relief of this difficulty by the well-known publisher, Seemann, of Leipzig, who has collected from existing works illustrations which form a consecutive history of art, including architecture, in parts which have from time to time found their way to this country. Lately Messrs. L. Prang & Co., of Boston, have been publishing an authorized American edition under the editorship of Mr. S. R. Koehler, and it will no longer be so difficult to answer the common question, Where can I find an illustration of this or that well-known building? It will be fairly safe to refer the questioner to this atlas of the history of art; for although the illustrations are drawn chiefly from the works of Kugler, Lübke, Burckhardt, Overbeck, Dohme, C. von Lützow, Falke, Woltman, etc., which, by the very large number of German buildings that are illustrated, gives a decided German flavor to the whole work, the range of subjects is large, and in certain directions the collection is fairly complete. At all events, it is such a collection as has not as yet its parallel, and, although the American edition is somewhat more costly than the original, it is not too high-priced for purchase by a student of art and architecture. It is, moreover, such a work as even those who have no desire to read or study may find pleasure in, especially if they have travelled with observing eyes.

The idea is so good that it is strange that it has never before been carried out, but it is a pity that both the original and the reproduction should have stopped so far short of their possibilities. The limitations, however, are probably inevitable in a project whose execution depends rather on what can be found ready to the hand, than on what is to be desired; and it is a remarkable witness to the abun-

¹ A Practical Treatise on Concrete, its Varieties and Constructive Adaptation. By Henry Reid. New Edition. London and New York: E. & F. N. Spon, 1879.

¹ Illustrations of the History of Art, Architecture, Sculpture, and the Industrial Arts among the Nations of Antiquity. A Series of Illustrations chronologically arranged, and forming an Atlas to be used with any Work on the History of Art. Authorized American edition, published under the supervision of Mr. S. R. Koehler. Boston: L. Prang & Co., 1879. Parts I, II, III, IV. Price \$1.50, \$2.25, \$2.00, \$1.75.

dance of fair illustrations of almost everything in our day, that a publisher should have been able to lay his hand on such a series of cuts as these. The *lacuna* are particularly noticeable when the student, tolled on by the really satisfactory way in which ancient art has been represented, and by the full treatment of German and even Italian art, looks for a similar abundance of French, English and Spanish examples, and finds that of the great English cathedrals, York, Lincoln, Lichfield and St. Paul's alone are shown in exterior views, while only some half-dozen of the others are represented by a plan, a bay, or some detached piece of detail; while no cathedral save St. Paul's is shown in plan and elevation. France and Spain are more fairly treated.

The editor, evidently not an architect, seems to have confined his editorial functions to the mere translating of the titles and brief descriptive notes of the original, — which themselves sometimes show the need of an architect's supervision — as, for instance, where "*kreuzgewölbte*" is translated in one place "cross-arched," and in another, more properly, "groined," or where the ordonnance of a church interior is called the "interior system," or where, in several places, a building is ascribed to "the Transition Style," as if the term indicated a definite style in vogue at a definite period. The same lack of architectural oversight allows "corble-table" to pass uncorrected even in the numerous errata which are appended to each part, and may serve to excuse the extraordinary position given to the base of a pillar of the Church of St. Nizaire at Carcassonne. While speaking of the faults of commission, we may mention a want of consistency and method in the matter of proper names, which is common enough nowadays, but is none the less disagreeable, and always looks unscholarly. For instance, we find the "Forum Romanum," the "Theatre of Marcellus," and the "Teatro Comico" on successive pages; so, too, we have "St. Mark's Cathedral," and the "Library of San Marco;" we find even this mongrel title, "San Paolo before the Walls."

Some faults of omission are the more regrettable because the opportunities for avoiding them are evident, and the editor, without going much beyond the function which was assigned him, might have enhanced the value of his work very materially. One of the crying faults of the original is the lack of cross-reference between the cuts; for in order to accommodate cuts drawn from divers sources to the page of the atlas before us, portions of the same building are scattered here and there upon different pages wherever a space of appropriate size chanced to be left, so that much time is lost in determining whether or not a certain feature is represented. Even with the index which is to be supplied hereafter, cross-references would be of great use. There is, too, a want of geographical precision in stating the *locus standi* of a building; thus, on a page of German, Scandinavian, and English buildings we find examples of work at Jerichow, Ratzeburg, Raeskild, Dobrilugk, Stoneleigh, Loches, etc., which may all be German or all Scandinavian for anything that is said to the contrary. It would have been of great service, too, if the source from which a given illustration is drawn had been mentioned in each case, so that the student might know where to turn to satisfy the curiosity excited by this very interesting collection.

It was not to be expected that, inasmuch as the illustrations were borrowed from all sorts of sources, they should have any common scale, though there are cases, such as the parallel collection of cathedral plans on Plate 77, where this lack is seriously felt. In most cases the scale of each illustration is shown by an annexed graphic scale, but as this is expressed sometimes in *ellen*, sometimes in metres, and sometimes in feet, English, French, and German, it rather befogs than enlightens the understanding.

We have mentioned these defects and deficiencies, not to discredit the work or the conscientious labors of the editor, but because they are obvious shortcomings in what must be a really useful book, and some of them such as we may hope to see remedied or avoided in the parts which are still to be published, and in the volume of descriptive text which is to follow them.

The parts we have examined treat of (1) the architecture, sculpture, and industrial arts of antiquity, (2) early Christian, Romanesque, Gothic, and Mohammedan art, (3) Renaissance and modern art, and (4) Oriental and modern European art, while Part V., with sixty plates, will be devoted entirely to the history of painting.

As we have said, the collection is interesting and valuable, and as the price is not high we hope that students will try to possess it. Now that the undertaking is to a certain extent an accomplished fact, we should be glad to see Herr Seemann and the American publishers follow out the scheme, and issue from time to time supplementary parts which shall contain much of the old material that is now omitted, and such fresh illustrations as may be gleaned from the constant publication of new works in art.

PORTLAND CEMENT.¹ I.

I BELIEVE it is some forty years since Professor Donaldson made some very interesting and exhaustive experiments with Roman cement, and with the septaria from which that cement is made. Roman cement was then employed in almost every building of importance, while what is now known as Portland cement had scarcely emerged from the laboratory and was practically unknown. The introduction of this then new cement, it is needless to say, was met on all sides with great opposition, but its eminently hydraulic properties and great

strength eventually asserted themselves, until at the present time Portland cement is synonymous with strength. But like all manufactures which assume large proportions there are unfortunately both good and inferior cements to be met with; and as the strength of a concrete or mortar must depend not only on the quality and properties, size and shape of its aggregates, and the means employed for their amalgamation, but also on the strength and quality of the cement, I propose in this paper to speak solely of the primary source of strength, namely, the cement.

The recognized tests for Portland cement are its weight per struck bushel, the fineness to which it is ground, its color and its tensile strength. With the exception of the tensile strength, which is an absolute test, these tests are really only problematical, for it is evidently possible to obtain a material that in weight, color and fineness may approximate to the standard required in Portland cement, and yet not be cement. Hence a bad or a damaged cement may possess all these requisite qualities, and yet fail in the crucial test of strength. It is also possible, but in a minor degree, to have a cement that is of the required strength, but would yet fail to give the results expected of it when made into concrete or mortar.

From experiments extending over a considerable period, the results of which are given in the accompanying tables, I hope to be able by (1) determining the work which a cement has to do, and (2) by considering separately the properties which it should possess to attain that object, to arrive at such results as will be of value to both users and manufacturers.

Concrete or mortar being a combination of aggregates which are united into a compact mass by means of the cement, it follows: that the cement should possess strength; that it should be so finely ground as to thoroughly intermingle with and separate all the aggregates used, thus cementitiously uniting each particle; that it should set fairly quickly, and that it should neither expand nor contract during setting.

Without describing the manufacture of cement, which is carried out in various ways according to the nature of the raw materials used, it may be considered, for the purposes of this paper, a combination of carbonate of lime, silica and alumina in certain proportions. These ingredients are obtained in different localities in various forms. Thus, on the Thames, the white chalk, which is nearly a pure carbonate of lime, is used in combination with Medway mud, which contains the silica and alumina. In many works on the Medway the gray chalk is substituted for the white, and Gault clay is used instead of the Medway mud. At Folkestone and other places on the south coast, similar materials are used. At Harwich, Newcastle-on-Tyne and Stockton-on-Tees, a local blue clay which contains the requisite proportions of silica and alumina is used in combination with chalk, which is imported generally from the Thames. In the North of France—in the neighborhood of Neufchatel and Devres—a natural cement-earth is found, generally at the foot of the chalk hills. This material, which much resembles gray chalk in appearance, contains in many instances the exact proportions of lime, silica and alumina for the production of a high-class cement. At Rugby, in Somersetshire and other parts of England, the blue lias formation supplies the requisite ingredients, the stone and shale being found in layers of from a few inches to as many feet in thickness, one above the other. At Madras a cement is made from lime produced from sea-shells, used in combination with a river mud; and I have lately been consulted respecting the manufacture of cement from somewhat similar materials, namely, coral lime and a river mud, found on the opposite side of India. At Rio de Janeiro also similar raw materials are used. In Derbyshire the immense limestone hills may be made available for conversion into cement, in combination with a tufa which is also found in the locality. In Buckinghamshire, on an estate on which I am at present engaged, there has been found a deposit of a natural cement-earth, which lies immediately under the surface and averages about ten feet in thickness, lying directly on the Oxford clay; with it is intermingled a considerable quantity of a nodular limestone.

It would be needless to enter more fully into the geology of Portland cement manufacture, but it may be taken that wherever carbonate of lime, silica and alumina are met with, in a fairly-easy convertible form, there Portland cement can be made. But with each variety of material, different means must be employed for attaining the desired end; and to describe the process of manufacture in each case would take up more time than is at our disposal. The process may, however, briefly be divided into three stages, thus: the thorough mechanical combination of the raw materials, their calcination, and the reduction of the clinker by grinding to the Portland cement of commerce.

From this very cursory glance at the materials from which Portland cement can be made, and the mode of manufacture, it will readily be seen that there are many causes which may materially affect the result of the cement produced: the quality of the raw materials themselves, their amalgamation in correct proportions, their perfect mechanical combination, the proper calcination of the combination, the perfect reduction of the clinker to a fine powder, and lastly the careful storage and cooling of the cement before it is used.

Of the causes of many of the results which may be met with, it is impossible to more than allude to, but, assuming that the raw materials have been well chosen,—an imperfect amalgamation of them will probably produce a blowing cement; the use of an undue quantity of lime will produce the same result, combined with slow-setting powers, while the use of too much clay will produce a quick-setting cement, that will contract. Having secured the perfect amalgamation of the

¹ A paper by Mr. Henry Faija, Associate M. Inst. C. E., read before the Royal Institute of British Architects, February 23, 1880.

raw materials in the proper proportions, similar results may be obtained from imperfect calcination: thus a lightly-burned cement will be quick-setting, and an over-burned cement slow.

Having regard, therefore, to the number and combination of circumstances which present themselves for consideration, when it is required to divine the causes which produce certain results, I propose to treat solely with the peculiarities and properties which developed themselves during the experiments made with certain samples of cement, and to deduce from these results certain data which may be of service in judging of the quality of a cement for the purposes for which it is required.

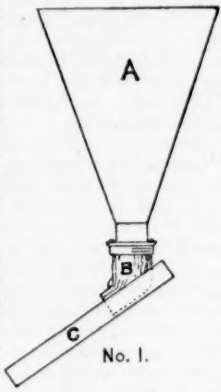
The quality usually required of cement is in accordance with the standard set by the Metropolitan Board of Works in the regulations relating to concrete buildings, thus: That "the Portland cement shall be of the very best quality, ground extremely fine, and weighing not less than 112 lbs. to the struck bushel, and capable of maintaining a breaking weight of 350 lbs. per square inch, after being made in a mould and immersed in water during the interval of seven days."

It must be admitted that, taken as a specification for cement, this regulation is rather vague; and as in all matters appertaining to the testing of cement great exactitude is required, and that a uniform and standard apparatus should if possible be adopted, I think that the Metropolitan Board of Works have it in their power, by somewhat enlarging on this regulation, to lead to the abolition of many abuses, and thus tend to the elucidation of many seemingly contradictory results.

As the weight per struck bushel of a cement must evidently vary according to the means employed to fill the measure, it is essential that it should always be filled in the same manner. The apparatus which I use, and which I think meets all requirements, is in accordance with the diagram

No. 1. A is a circular funnel perfectly smooth into which the cement is placed; at the small end stocking B, which leads the zinc shoot C, placed 55°, the lower end of the inches above the top of the measure D, placed firm floor, on which there is never in any way touched during the process of filling, nor until after it has been carefully struck with a straight edge. When filling the measure the stocking may be held in the hand so as to regulate the run of the cement from the funnel.

In a paper I read before the Institution of Mechanical Engineers, in January, 1875, when referring to the weight of cement, I said: "A



iron hopper or on the inside, be weighed is it has a canvas the cement into at an angle of shoot being five the measure. on a perfectly is no vibration,

TABLE No. I.

	Residue per cent after sifting through sieve having 2,500 meshes per sq. inch.	Weight per struck bushel.	Tensile strength on section 1 inch square.		
			7 days.	28 days.	
No. 1. Cement as delivered from manufactory,	25	lbs. 114	lbs. 535	lbs. 661	
No. 2. Do. ground to all pass sieve 2,500 meshes,	Nil	104	572	not taken	
No. 3. Cement as delivered	16	116	509	650	
No. 4. Do. ground	Nil	109	542	675	
No. 5. Cement as delivered	14	116½	476	662	
No. 6. Do. ground	Nil	112	505	710	
No. 7. Cement as delivered	33	118½	693	728	
No. 8. Do. ground	Nil	105	666	810	

light cement is generally a weak one, though it may be of the requisite fineness; at the same time, a heavy cement if coarsely ground is also weak, and will have no carrying capacity for sand. As the more the clinker is burned, the harder and heavier it becomes, and therefore more difficult to grind in the millstones, the heavy cements to be met with are almost invariably coarse ones; and as an under-burned cement from its softness will be ground fine enough, but will be found deficient in weight, it will be seen that the weight, unless taken in conjunction with the fineness, is no test as to the quality of the cement."

This opinion I have found confirmed by subsequent experiments, the results of some of which are given in Table No. I. In each case the cement was weighed and tested as delivered, and also when ground so that all would pass through a No. 50 sieve. The tensile strengths given are in each case an average of ten briquettes.

By examining these results, we find, first, that by fine grinding the weight per struck bushel is reduced, and, secondly, that the tensile strength is increased, both at the expiration of seven days and twenty-eight days from the time of gauging.

That the weight per bushel should be less, is what would naturally be expected, as it is evident that the finer particles are less dense than the coarse, and also that they fall lighter into the measure. That the fineness to which a cement is ground should affect the tensile strength in so marked a degree, may be accounted for by the fact that the coarse particles in a cement have practically no cementitious property, being little better than so much sand.

To prove this the following experiments were made with the core or coarse particles in a cement:—

1. The residue that would not pass through a 625-mesh sieve was gauged with water, and at the expiration of seven days was found to be merely held together in a mass similar to so much sand having a slight admixture of loam.
2. That which passed through the 625-mesh sieve, but would not pass through the 2,500-mesh sieve, was gauged in a similar manner, and at the expiration of the same time was found to be in a similar condition.
3. That which passed through the 2,500-mesh sieve, but would not pass through a 4,900-mesh sieve, being gauged in the same manner, was, at the expiration of the same time, found to be in a similar condition.

These experiments were made with a cement that was perfectly set in thirty minutes after gauging. In each of these cases the pats could be crumbled to pieces between the finger and thumb, and the granulations were the same in size and shape as before the water was put to them, thereby proving that the granulations themselves had no power of setting, but were simply held together by the infinitesimal particles of finely-ground cement from which it was impossible to separate them. It therefore seems that the granular portion, or the core of a cement, has really a deleterious effect on its strength, and for all practical purposes may be considered only as so much sand.

TABLE No. II.

	Sample No. 1.		Sample No. 2.		Sample No. 3.	
	7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
Cement as delivered from works,	lbs. 535	lbs. 661	lbs. 509	lbs. 650	lbs. 481	lbs. 650
Ditto all ground to pass No. 50 sieve,	572	—	542	675	505	710
Siftings only passed through No. 50 sieve,	547	697	573	668	452	629

Table No. II. gives the results of further experiments made with the same object. It will be seen that in samples Nos. 1 and 2 the cement was actually improved by extracting the core that would not pass the No. 50 sieve; but sample No. 3, which was a very finely-ground cement, slightly deteriorated; and it will be further noticed that all three samples were improved by fine grinding. Though in this paper I am not going into the strength of mortars, it would be well to say that the fine grinding would give a more decided advantage in the case of mortars than in neat cement.

Many people, even some manufacturers, consider the core to be the backbone of the cement, and to a certain extent they are in the right, but the result of these experiments proves that to be of value it must be ground. It is naturally the hardest-burned particles which form the core, those which the mill-stones have been unable to grind, through their being of a harder nature than the rest of clinker. The core, therefore, as core, is really only so much sand in the cement, but when ground acts in most instances beneficially, and improves the quality of the cement.

Table No. III. gives the results of experiments made with eight samples of cement, showing the specific gravity, weight per bushel, fineness, tensile strength at 7 and 28 days, and the increase per cent between those dates. If we examine the specific gravity and weight per bushel in conjunction with the fineness to which the cement is ground, it will be seen that a heavy weight per bushel and a heavy specific gravity denote a well-ground cement—while a heavy weight per bushel and a light specific gravity denote a badly-ground cement.

It has been proposed to substitute the specific gravity for the weight per bushel when testing cement; but it must be remembered that the object of testing cement is not only to determine the actual strength of the cement at a given date, but to be able to form a fairly accurate opinion as to its probable behavior in practice. I therefore think that to do away with the weight-per-bushel test would be, to say the least, undesirable, as when taken in conjunction with the fineness a very fair opinion can be formed of the value of a cement,—an opinion which can be confirmed by afterwards taking the specific gravity; in fact, the specific gravity, weight per bushel and fineness

bear a certain relative proportion to each other, indicating either a light or heavily burned cement. By again referring to Table III. we find that the cements having a light specific gravity are quick-setting cements, which in seven days have already attained great strength, but which show but little improvement afterwards, while

TABLE No. III.

No.	Specific gravity.	Weight per struck bushel.	Residue per cent.		Tensile strength per square inch.		Increase per cent.
			No. 25 sieve.	No. 50 sieve.	7 days.	28 days.	
		lbs.			lbs.	lbs.	
1	3.09	116	2	16	509	650	27.7
2	3.00	116½	4	13	400	550	37.5
3	3.00	116½	0	14	471	594	26.1
4	2.99	118	4	28	605	772	27.6
5	2.96	116	4	26	586	767	30.9
6	2.95	113½	3	33	473	558	17.9
7	2.90	111	7	30	701	718	2.4
8	2.90	118½	8	33	693	728	5.0

those having a heavy specific gravity are slower in setting, and at seven days do not show such good results, but continue to improve for a longer period.

It is unfortunately impossible to lay down an absolute rule by which to determine the value of a cement. Almost every property, whether to its advantage or disadvantage, which it possesses, may be traced to more than one cause, and therefore might lead to opposite results in practice; and when it is remembered that an opinion to be of any practical utility must be given in a few days, and before the cement is required for use, it becomes entirely a matter of experience and thorough knowledge of the process of manufacture, to be able to give a reliable opinion as to the suitability of a cement to the work for which it is intended, by reference only to the problematical tests.

THE ILLUSTRATIONS.

THE CONY FEMALE ACADEMY, AUGUSTA, ME. MR. G. J. F. BRYANT, ARCHITECT, BOSTON, MASS.

The first story and basement are to be of brick with stone finish and mullions for the windows. The tower will be of brick as far as the corbelled cornice, the upper open feature being of wood. The rear projection has two stories, to accommodate the assembly hall in the second story, but the remainder will have but one story and a half.

DINING-ROOM INTERIOR. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

DESIGN FOR THE TOWN HALL AT STOUGHTON, MASS. MR. T. M. CLARK, ARCHITECT, BOSTON, MASS.

HOUSE OF CASIMIR WERK, ESQ., WESTWOOD, O. MR. E. ANDERSON, ARCHITECT, CINCINNATI, O.

This building is to a great extent made fire-proof by the use of iron beams, and ceilings of artificial stone built in position in monolithic form, an example which might be followed to advantage by those building homesteads, as the additional cost in this building over the ordinary methods of wood construction was only about \$3,000. The interior finish throughout is of hard wood.

AMERICAN INSTITUTE OF ARCHITECTS.

At a late meeting of the New York Chapter of the American Institute of Architects, the following resolution, moved by Mr. Bloor, was adopted:—

"This Chapter learns with sincere regret of the recent decease of Mr. Joseph Sands, a member of the Society, in its highest grade, since its organization, and for some ten years previously, and until his fatal illness, a Fellow of the American Institute of Architects.

"Although Mr. Sands's professional engagements, and especially his prominent and active relations to a noted ecclesiastical organization, — the foundation and promotion of which, it is understood, were largely due to him, — have deprived the Chapter of his frequent participation in its current business, his invariable promptness in meeting his other obligations to the Society, and the steady example he has set of faithfulness to his profession and of a high standard in the practice of it, have not been lost to discriminating observers, whether inside or outside of its ranks.

"Mr. Sands's devotion to higher interests than the reputation and profits of a secular pursuit, his prolonged ill health, and his early taking off, have each, doubtless, contributed to prevent the consummation that might fairly have been predicated of his professional qualifications, but more than enough has been produced to indicate the loss sustained by American architecture in his death."

FOX AND COCKS.

A FABLE FOR ARCHITECTS.

BY THE AUTHOR OF "THE AMBASSADOR EXTRAORDINARY."

Dedicated disrespectfully to the Competition Committee of the Royal Institute of British Architects and printed in the *Builder*.

SAID Madame the wife of Monsieur the Fox, one day, "*Mon cher*, it is necessary that one should be in the fashion."

"*Bon*," replied Monsieur the Fox, "*très bon*."

"One must wear over one's shoulder —" said Madame.

"Over the *left* shoulder, probably," interposed Monsieur, displaying all his beautiful teeth.

"Over one's *shoulder*," said Madame, with severity, "a bunch of the feathers of the cock. Hasten thou, therefore, *mon ami*, to the yard of the poultry, and purchase for me one."

"Thou shalt have," replied Monsieur the Fox, "a hundred."

"Thou art pleased to be merry," said Madame, "but one will suffice; and let it be, *mon cher*, a modest one, befitting our modest fortune."

"Do not fear," said Monsieur, "*ma petite*, thou shalt have the best."

"Alas!" sighed Madame, "one cannot always afford the best."

"They shall cost thee —" said Monsieur the Fox, again displaying all his beautiful teeth, "the whole hundred of these bunches of the feathers of the cock shall cost thee — *exactly nothing*."

Remembering the sagacity of Monsieur, Madame smiled.

Through a gap in the fence of the yard of the poultry they surveyed the scene within, these two.

"*O ciel!*" exclaimed Madame, "what nobles!" For in the sun Messieurs the Cocks were strutting about so gallantly in their fine feathers of green and gold, that the eyes of Madame began to glisten. "*Mon Dieu!*" she said again, "who would not be a cock!"

Monsieur the Fox applied his mouth to a convenient orifice in the fence, and cried in a great sonorous voice. "*Cock-a-doodle-doo!*" said Monsieur the Fox. The effect upon the poultry was electrical. Fired by the challenge, which each one accepted as addressed to himself, not a cock in the company but at once answered it with the utmost courage and vehemence, till the whole world echoed with their crow.

"Messieurs the Cocks," said Monsieur the Fox, displaying all his beautiful teeth as he disclosed himself to their view with a profusion of polite obeisances, "behold in me a patron! Behold in Madame one who is ravished with the sight of your beautiful tails."

"*Vive Madame!*" cried the whole assembly.

"For Madame," said Monsieur, "it is necessary to be in the fashion. Madame would wear over her shoulder, — over the *left* shoulder, in all probability — a bunch of those exquisite feathers. For the satisfaction of Madame, therefore (and no less for the pleasure and advantage of Messieurs), I desire to do myself the honour to institute a little very amiable competition. Who shall produce the bunch of beautiful tail-feathers which shall best deserve the honor of Madame's preference? To that happy one I will do myself the pleasure of presenting a little very amiable premium. It shall be — one barleycorn!"

"Monsieur," replied the assembled Fowls, "thou art too gracious. Madame is much too gracious. Do us the honor not to mention the barleycorn. We live by Glory, not by Barley!" Monsieur the Fox showed all his beautiful teeth.

"But," said the spokesman of this enchanted crowd, "in order to complete our happiness, grant us one little very amiable boon."

"It is granted," said Monsieur the Fox, "freely."

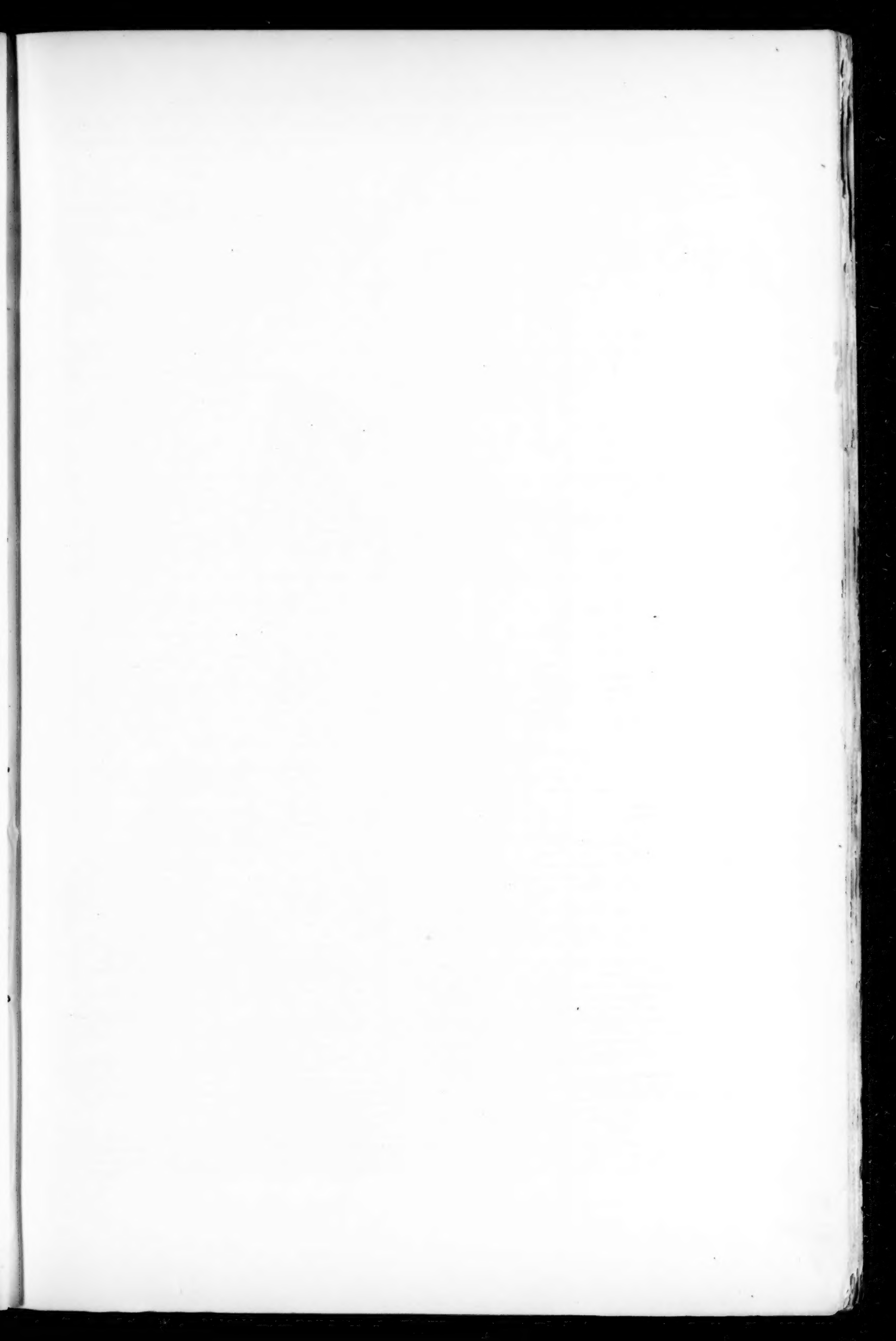
"In order that we may enjoy the satisfaction of experiencing perfect impartiality, — that is to say, that every cock of us may be cocksure of conquering all other cocks, — behold Monsieur the superannuated rooster on yonder perch! Let him be Monsieur the Professional Adjudicator, and instead of a dozen of paltry chickens, with never a tail amongst them to swear by, Madame shall have a hundred princely chanticleers competitors for her favor, and every one of them with feathers fit to flaunt upon Olympus!"

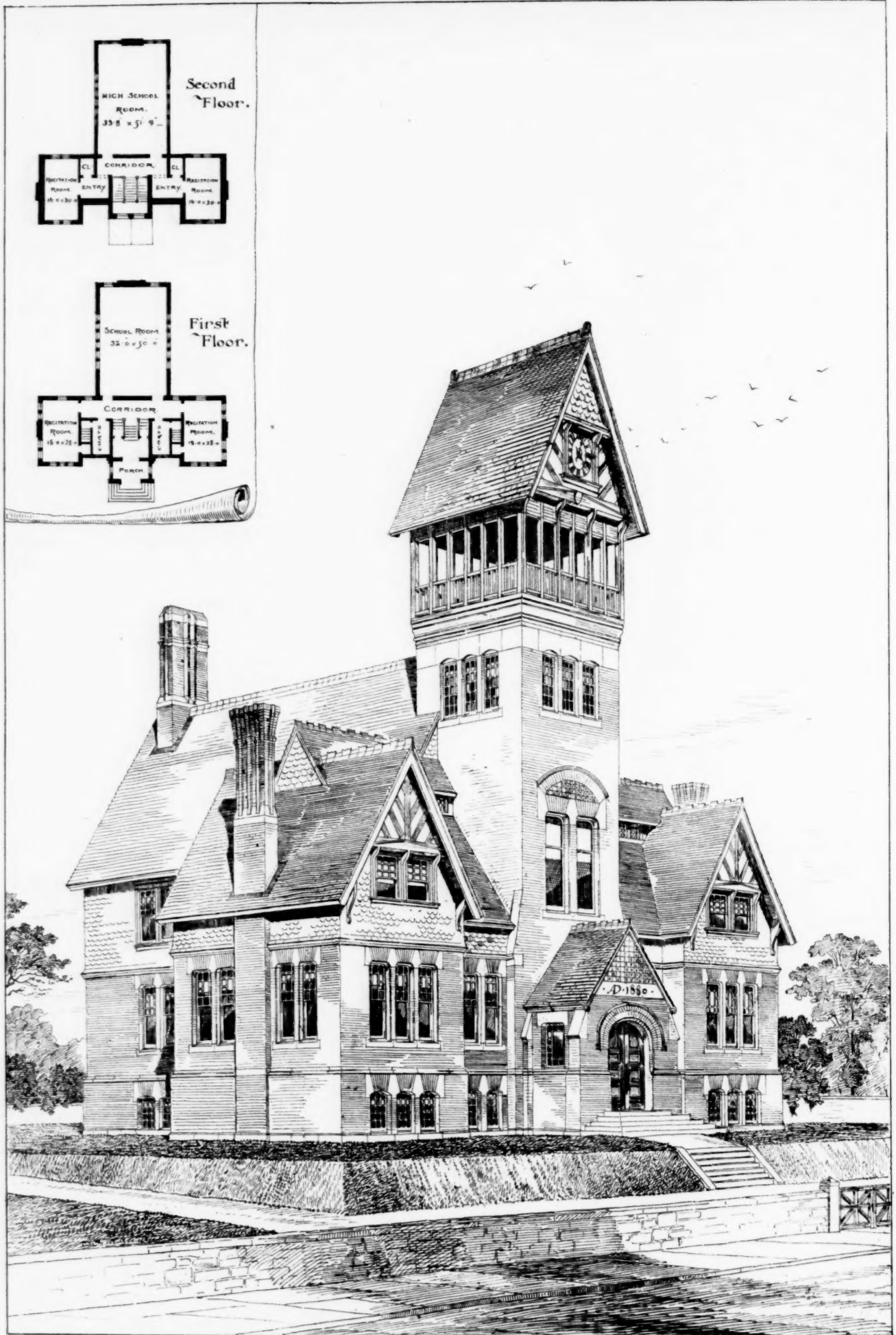
"Descend thou, then," said Monsieur the Fox, affably "— Monsieur the Professional Adjudicator, descend; and do me the favor to enjoy the honor which I confer upon thee." And the Fowl descended from his perch with exceeding alacrity, and rejoiced in his honor after the way of all the world.

See now these inflated Poultry! Not a cock of them all but is capering about like a half-mad cock, and plucking forth with pain unspeakable his best tail-feathers; so that in a little time behold the whole array of them marshalled before Madame the wife of Monsieur the Fox, and Monsieur the Professional Adjudicator, each one carrying his bunch triumphant in his hand.

As for Madame, she knew no more which to prefer amongst so many bunches of beautiful feathers of the cock than would she have known which to choose of the six-and-twenty stanches of Cologne; but there was a handsome young chanticleer who had gained her ear on the sly, and she had resolved that none but his bunch of feathers should be selected, come of it what might!

Monsieur the Adjudicator, on the other hand, whose ear was deaf to all blandishments under the sun (for his senses, if the truth may be told, were getting a little mouldy), happening to discover a bunch which reminded him of his grandfather's tail, would think of nothing else but the preferring of this. And thus there arose a little very

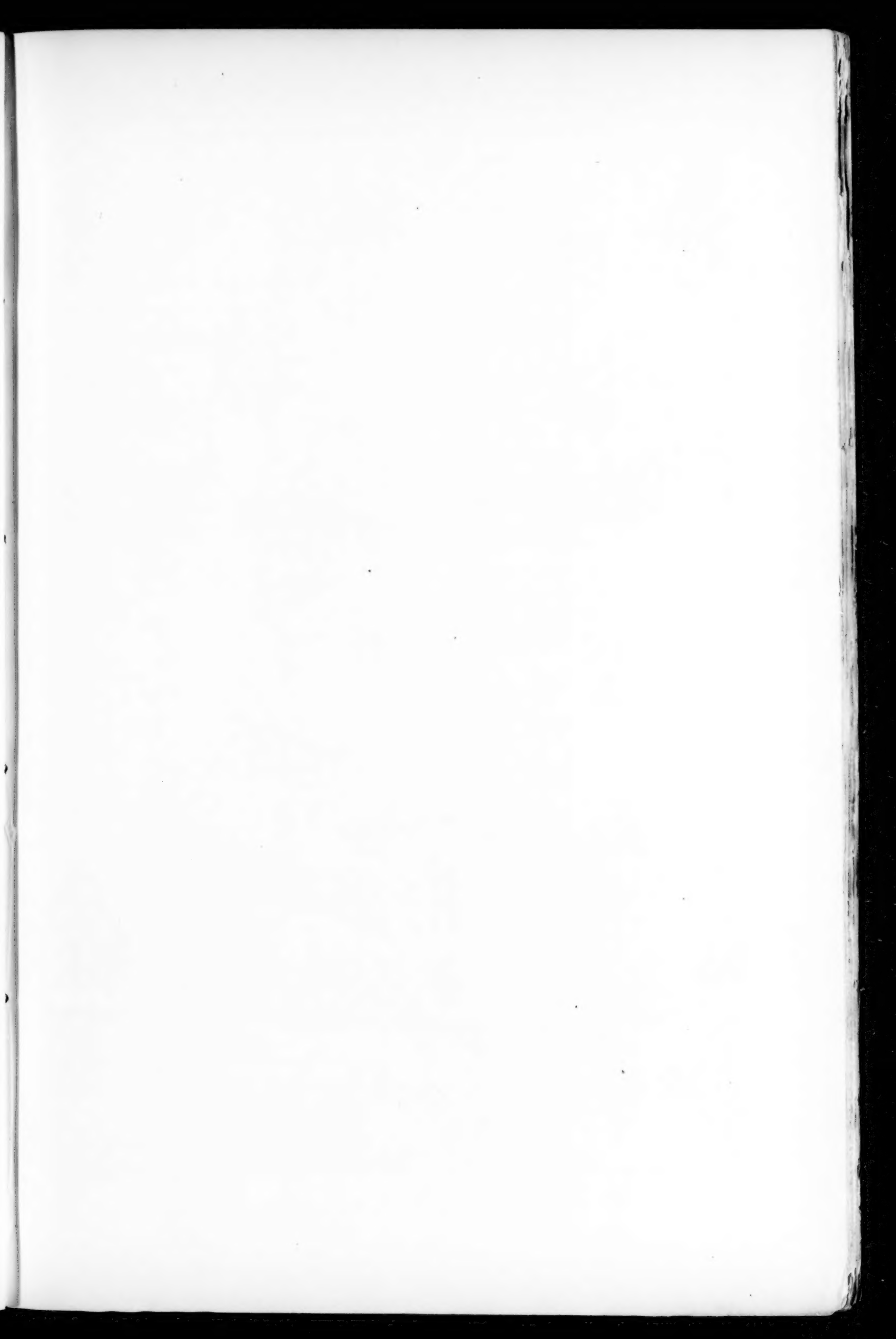


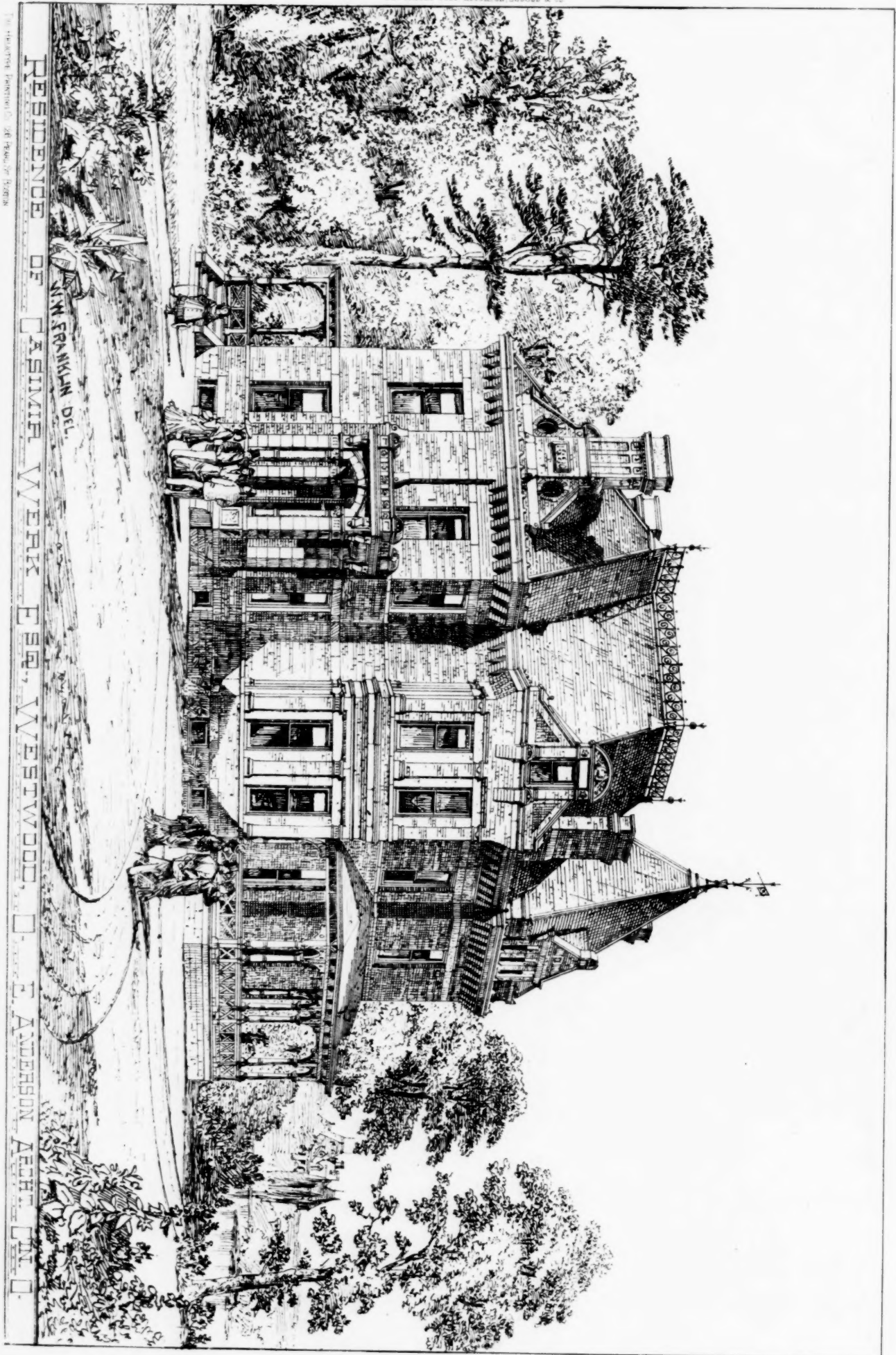


Cony Female Academy * Augusta Maine.

C. J. F. BRYANT Architect.

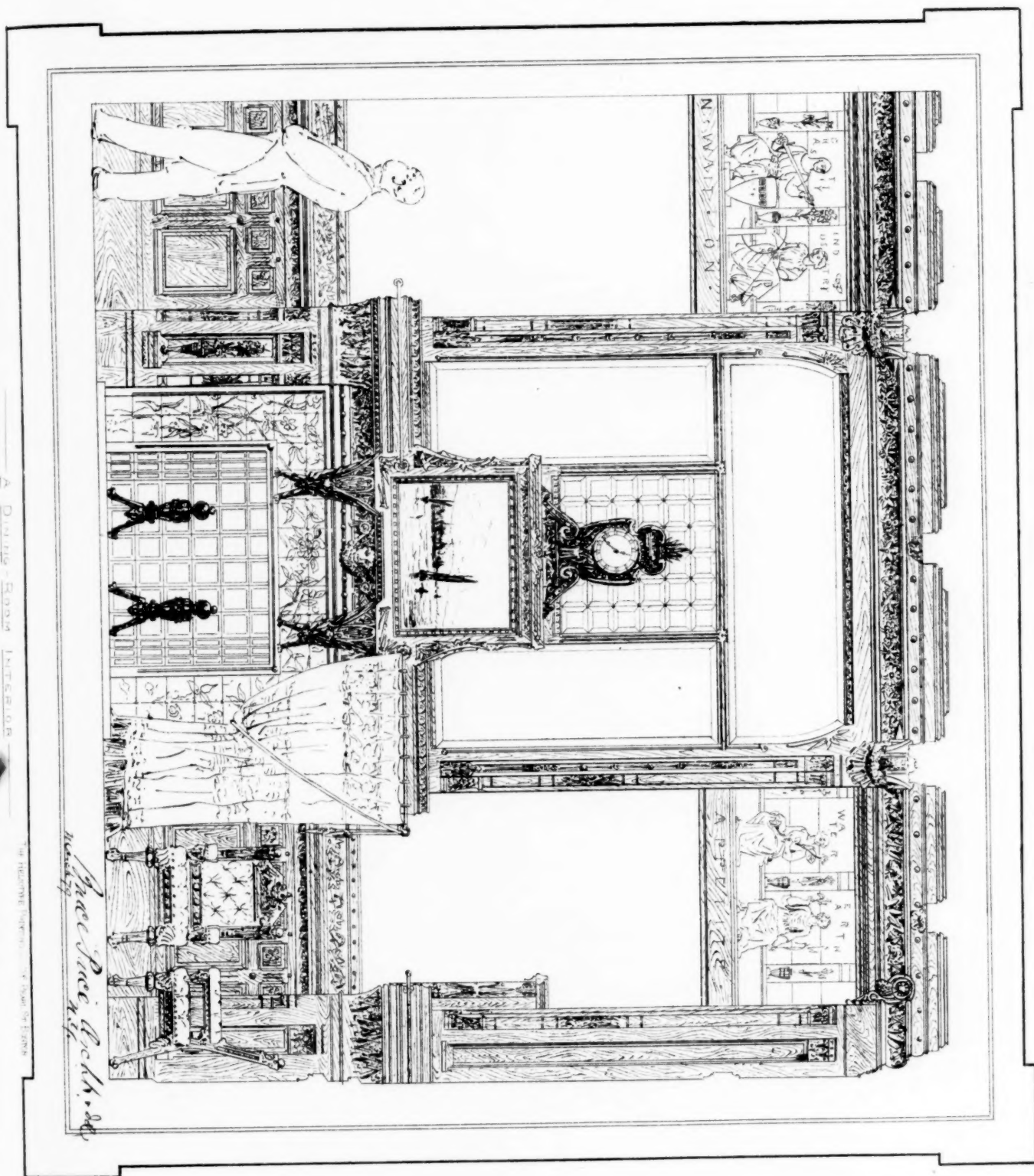
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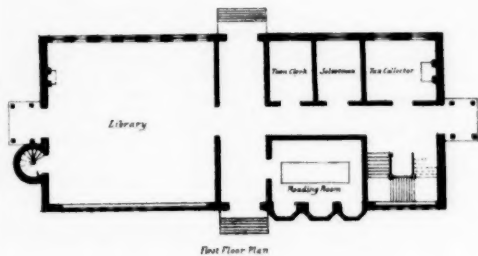




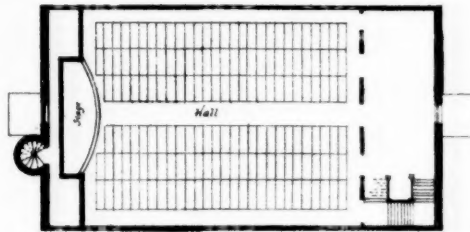
RESIDENCE OF CASIMIR WERK ESQ. WESTWOOD, D. C. E. ANDERSON ARCHT. CHICAGO

W. FRANKLIN DEL.





First Floor Plan



Second Floor Plan



THE HELIOTYPE PRINTING CO. OF NEW YORK, N.Y.

DESIGN FOR THE TOWN-HALL AT STOUGHTON MASS.

T. M. CLARK ARCHT.

amiable difference of taste, which presently engendered such heat that it was well the whole world was not consumed in the blaze!

Inflamed with indignation that could not be controlled, and raising with one accord a crowd of mutual defiance which the very clouds re-echoed with dismay, behold the whole company of the infatuated competitors now rushing upon each other with fury inexpressible! Needless it is to say that, in an instant of time, not a bunch of their feathers but was trampled ignominiously in the mire. But alas! this was the least of it. Exasperated with anger that increased every moment, and reckless of consequences to the end as they had been from the beginning, they tore each other's combs, plucked off each other's wattles, pecked out each other's eyes, and, ere one could call upon Heaven for help, had so mauled each other with spur and beak, that nothing remained of the struts and crows of the invincible but the spasms and gasps of the vanquished!

But the sorriest sight in the scene was Monsieur the Professional Adjudicator. Unfortunate Fowl! Assailed by all and defended by none, he was found in the midst of the field as flat as a pancake, without a hair on his head or a breath in his body.

During the progress of these events, Monsieur the Fox shook with laughter till his beautiful teeth rattled in his head. But at the close, as he wiped his eyes with his tail, he gave utterance to the following very amiable reflection:—

MORAL.—For the favor of a Fox, and the prize of a Barleycorn, there will always be foolish ones to fight.

THE POSSIBLE DANGERS OF STEAM-HEATING.

MR. W. J. BALDWIN, of Elmira, N. Y., writes as follows to the *Scientific American* in criticism of the views on the danger of the ignition of wood-work by steam-heating pipes, which were lately advanced by Mr. Edward Atkinson, of Boston:—

It would be well to define the difference between seasoned wood, charred wood, and charcoal.

The first admits of no degree: it is simply wood with the sap and the excess of moisture, above what would be incidental to the hygro-metric state of the atmosphere, removed.

The second admits of degree, and is wood with the hydrocarbons partly driven off, according to the completeness of the charring.

The third admits of no degree, and is nearly pure carbon and ashes.

I inclosed a two-inch cube of white pine wood within a small gas-pipe retort, with a bit of solder (one-third tin and two-thirds lead) and a bit of sheet-lead, and placed the retort in a boiler-tube for five days, boiler going day and night. At the end of that time the wood was pure charcoal, the solder was melted, and the lead was not, which goes to show pure charcoal can be made at a temperature between 500° and 612° Fahrenheit. To prove the above was pure charcoal, i. e., that all the hydrocarbon was driven off, I raised the temperature of the retort to about 1,200°, but could not drive off any more gas.

In October, 1877, I inclosed pine laths against the shell of a horizontal boiler, and covered them with a course of bricks on edge. The pressure of steam in this boiler has been 40 to 60 pounds day and night since, except one day a month for cleaning. The ends of the laths that came out to the air and flush with the brickwork are not nearly as dark as hemlock-tanned leather, and the darkest part I could find which was entirely covered with brick is not as dark as roasted coffee. This goes to show charcoal cannot be made at 300° Fahrenheit, after two and a half years, under the most favorable circumstances, with a furnace fire only five feet beneath it. To prove that this wood was not charcoal, I placed it in a retort, and drove off gas that burned with nearly as much light as illuminating gas when it leaves the retort.

In experiments on the ignition of charcoal, I found that the charcoal made in the boiler-tube would not redden at the melting point of lead (612° Fahrenheit), but would at a lower temperature than zinc (770° Fahrenheit.) My mode of operation was this: I passed a gas-pipe through a fire, and blew pure air through the pipe. I also prepared myself with long slender strips of solder (half-and-half, and one-third tin and two-thirds lead), and with strips of lead and zinc, and pine shavings, and small pieces of the laths and charcoal. The pure charcoal would not redden in the same blast that just melted the lead, but did in a blast which melted it rapidly. When held in a blast which melted solder (one-third tin and two-thirds lead, melting temperature about 500° Fahrenheit), it showed no signs of fire or redness.

The lath, which was two and a half years in contact with the boiler under a course of brick, would become charcoal in a temperature which melted half-and-half solder, but would not get a spark on it until I increased the temperature to where the needle of lead bent and dropped. So too with a nicely prepared splinter of white pine, in which I could see no deviation in the action from the splinter of the lath; they all became charred in the blast which melted half-and-half solder, but would not take on a spark until the lead melted.

With a blast that fused a metal 19 parts tin, 31 lead, and 50 bismuth, melting temperature about 212° Fahrenheit, I could not turn tissue paper brown.

Gunpowder held in the blast which melted the lead did not explode until after the lead melted. It gave off a slight blue sulphur-

ous light first, then the lead melted, and an instant after the powder exploded.

The statement I made in my first letter I now repeat, "that the temperature at which wood and charcoal fire is between 500° and 700° Fahrenheit," and that the purer the charcoal, the higher the temperature required.

Illuminating gas will not take fire from a cherry-red poker, but will from a bright red one. The gas of wood, crude petroleum, soft coal, or any other hydrocarbon, will not take fire when escaping hot from the retort. With a cherry-red poker I have tried the three mentioned.

I now wish to say that it was not my intention to make any of the readers of your journal careless in construction, and I would be sorry should my remarks be the cause of loss to any of them.

I will comment on the points in Mr. Atkinson's letter as they occur, and will then try to show where the real danger lies in the use of boilers and steam-pipes.

Is it not more likely that the wood of the "open boiling keir"¹ was darkened in color by the oxide of iron from the nails than charred by the temperature of boiling water at atmospheric pressure, conducted through the length of the nails into the wood? and is not this rusty appearance often taken for charring?

The "fine charcoal" under some conditions might be classed with damp cotton, slack of soft coal, or lampblack; but while workmen are allowed to carry matches in their vest-pockets, it would be safer to associate it with the matches, especially in the face of all the steam-pipes that are packed in charcoal, and one in particular in California, through which where high-pressure steam is carried 2,600 feet into a mine packed in charcoal.

The steam-pipe "through the sill" prepared it for fire by drying it, and the dropping of a match, the fire from a cigar, or the superheating of the steam by getting low water in the boiler, could start it into active combustion. The same remarks will apply to the floor beam.

"Oiled waste cotton or wool, and greasy overalls," have taken fire from being locked in a tool-chest, without the aid of a steam-pipe.

I will now endeavor to show why any one, whether insured or not, should comply with the requirements of the underwriters with regard to steam-pipes and boilers, especially the latter.

When a journeyman, working in New York city, I was sent to John Hecker's house, in great haste, to see what the matter was with the steam-heating apparatus. As soon as I entered the hall door I "smelled a burned boiler," and when I reached the boiler-room I saw one. The generator was a sectional pipe boiler, and was red-hot, with the pipes badly warped, and the fire still in the furnace. Upon investigation I found that the hair-felt and canvas covering was charred through, the latter being as brown and crisp as burned leather for a distance of about fifteen feet, and beyond that, for about fifteen more, it showed signs of charring, lessening with the distance. It surprised me the house did not take fire, for, instead of having steam at a maximum density in the pipes, it was at first superheated (cause, very little water in the boiler), and as the pressure found vent through the burned boiler (as some of the tubes were burned through), it must have been red-hot air or gas which filled the pipes, and nothing but the want of circulation prevented it from carrying the heat to the small uncovered pipes throughout the house.

This is not the only case that came under my notice. The First National Bank of Pittsburgh had nearly the same experience when the janitor, in the fall of the year, fired two horizontal multitubular boilers for three hours (8 A. M. to 11 A. M.) before he discovered anything wrong. He then came to look for me, and did not find me until 1 P. M. The boilers were still hot, and the uncovered pipes near the boilers were turned blue-black, the same as if they had just left the welding furnace and cooled; but where they were covered, the composition did not fall off, it being one of the lime and asbestos mixtures. Another case was a private house in Detroit, where the blow-off cock was opened maliciously, and the Chalmers-Spence covering was charred and destroyed, and had to be replaced on the boiler, and for about six feet beyond it on the main steam-pipe.

I cite the above to show there is danger from superheated steam-pipes, and though the superheating of pipes is not an everyday occurrence, it is safe to say they are more frequent than boiler-explosions.

FRENCH MEDIEVAL ART IN ITALY.

[The following extracts are from private letters from an English architect now travelling in Italy, and touch upon matters that will attract our readers.]

FLORENCE.

"I AM just going down to Rome for a few days, and then on to Palermo, to have a careful look at the Norman and Byzantine work which was being done there when Niccolò Pisano went to the Sicilian Province with Frederic II., before he did his pulpit. I feel sure of this: that he brought back with him to Pisa a French sculptor, one who was a far better sculptor than he was himself. For the

¹This was a wooden keir in a bleachery, which, becoming rough on the inside through constant use, was coated with a layer of concrete held in place by keying onto the protruding heads of nails that had been driven into the sides of the keir for this purpose. After the keir had been in use for some time it was discarded in favor of another apparatus, and broken up. It was then found that the wood-work of the keir was apparently charred through, and it was assumed that the nails had so conducted the heat of the boiling contents of the vat as to char the wood-work.

lion which this Norman carved for the Niccola pulpit is incomparably finer sculpture than the other two evidently executed by Niccola. The capitals and vases are pure French, the cusped arch an adaptation by Niccola of French Gothic as used (I believe) at Palermo.

"Niccola evidently was very eclectic, easily impressed by new influences, always ready to adopt new forms which he came across. He soon cast off what he borrowed from the Normans, keeping only the cusp, — never even caring for the pointed arch, while he retained for a long while a strong feeling for Roman forms, which really form the basis of his own individual work. The strongest work of his, and that showing his own individuality when most free from extraneous influence, is the Deposition over the west door at Lucca (the Duomo), now being cast for Mr. Ruskin. This, though now much mutilated, is a most wonderful piece of work, and shows much more (I think), what a strong man he was than the pulpit at Pisa. I have been carefully tracing the progress of sculpture from his first work at Pisa to the last work of the Pisani on the Baptistery doors here. It is most interesting."

PALERMO.

"I have come down to Palermo for a day or two, to trace, if possible, what there was of French Gothic here when Niccola Pisano came south in 1221-32. I cannot find a trace of any cusped arch prior to 1328, though the pointed arch is used here as early as 1132. Nor can I find any mouldings, or sculptured capitals in any way resembling those introduced in the pulpit at Pisa. The man who worked with Niccola on this pulpit was not brought from the South, but must have come from the North to Pisa, probably sent for by Niccola on his return to Pisa because he so admired the Norman work at Naples, and in Palermo, the Norman capital. The Gothic never took seed here, but was merely grafted on the Saracenic and Greek architecture, very soon running into all manner of extravagances, and then disappearing altogether. Florence seems to be the only place in Italy in which the pointed style is naturalized and shows sign of its vitality by its growth. Everywhere else it remained just as it was introduced, or else died out.

"Since I have been in Florence, I have found out by help of the Keeper of the Archives a good deal about the building of the Campanile and Duomo, of which I can tell you this now. Giotto made a design for the whole Campanile, and built the foundations and first story, *i. e.*, up to the cornice level with the head of the central statue over the door. Andrea Pisano built the next story, and was then turned off because he did not please the Florentines. Jacopo Talenti built the remaining three stories, Arnolfo working the marble for him. You will hear more of this Arnolfo, when we come to speak of the Duomo. In the details each man's work is distinctly traceable. This Talenti was a great master architect: he designed most of the external work of the Duomo."

WATERFORD CATHEDRAL SPIRE.

PROBABLY many of our professional readers have experienced difficulty, in works of reconstruction, in arriving at a complete agreement with the contractor as to the actual amount of demolition and rebuilding necessary. The builder may consider that an uncondemned section of the fabric is so far dangerous that he declines to take the responsibility of building upon it; while the architect, although convinced that he is acting within the bounds of prudence, not unnaturally objects to this shifting of the onus on to his shoulders, lest he should be made answerable for negligence or bad workmanship occurring without the knowledge of either the contractor or himself, which might affix an unjust stigma on his professional character. One of these awkward differences of opinion between architect and builder recently occurred in the rebuilding of the spire of Waterford (Protestant) Cathedral, and has resulted in the satisfactory vindication of the architect's opinion. At the last meeting of the Diocesan Council of Waterford, a letter was read from their architect, Mr. J. Franklin Fuller, F. S. A., of Brunswick Chambers, Dublin, announcing the successful completion of the cathedral spire. The old spire was faced with flags, laid against a brick cone; and some of these were broken by the corrosion of the iron cramps, others had slid and fallen. A contract was entered into with a local builder, to repair and point the old spire; but after fixing the scaffolding, he reported that the stone-work could not be repaired. In this Mr. Fuller, on re-inspection, agreed; and the spire was taken down, and a contract for a new one of well-bedded masonry signed. The builder now reported that the tower itself was unsafe, and refused to build, except at the architect's risk. Mr. Fuller not unnaturally declined to accept such a responsibility, and, to end a dead-lock, suggested that the builder should be compensated for material and loss of contract, offering his own fees to meet the expense. This was adopted, and the architect then offered to take all risk and get a new spire built, if he might enter into a fresh contract with one of two builders whom he named, and appoint his own clerk-of-works. He was allowed to have his own way as to both builder and foreman, the latter being Isaac Abraham. The spire was successfully rebuilt on the tower reputed to be dangerous, and, although surrounded at the time by scaffolding, withstood the test of the gale which caused the Tay-bridge disaster. After hearing the letter in which these facts were recorded, the Chapter of Waterford passed, at the instance of the Dean, a motion in which they congratulated Mr. Fuller on the successful termination of the undertaking, and thanked him for having generously remitted his fees as architect. — *The Building News*.

ANOTHER WESTERN COMPETITION.

DES MOINES, IOWA.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — As you have on various occasions published notices of "Western competitions" perhaps the following narration of one, that the architects of this city have just experienced, may be of interest to your readers, especially to that portion among the younger members of the profession whose course, like the star of empire, is Westward.

Not less than two years ago, the society known as the Fifth Street Methodists — one of the wealthiest congregations in the city — began to agitate the question of building. No little time was spent, and no small sum of money lost, by purchasing and again changing various lots on which to build the proposed structure; but this part of the programme was definitely settled some two months ago, by the choice of a piece of ground adjoining the parsonage, queer and irregular in shape. A financial committee was next appointed, of whose doings I need not write, except to note the significant remark of one of the thousand-dollar contributors, whose gift was subscribed on condition "that the plans adopted should be satisfactory to himself;" another equally liberal gentleman, after learning this, made his subscription on the same terms. Their labors done, the committee on plans was next appointed, consisting of a bishop, a pastor, three lawyers, one editor, a builder, and a merchant, an array of talent that was supposed to be abundantly sufficient to secure just the plan wanted. But among the above-named persons, were the two conditional subscribers, the object of which was perhaps not so well understood by any, as by certain expectant competitors. At this point the architects of this city, five in number, were notified, if they had designs to submit for their consideration, or preferred to prepare competitive sketches, they could do so, but must send them in by noon Tuesday, Feb. 22; said designs must be based on a maximum cost of \$35,000, and must be without cost to the committee, *save* good will.

As the proposed structure was to be the largest and costliest in the city, several of the architects entered on the work of preparing their plans, with an unusual amount of energy and zeal, this being a chance to display their abilities in the ecclesiastical line, such as had never before presented itself: so on the day appointed, all the designs were sent in, some finished in brilliant colors, others in rough pencil, evidently prepared in haste, and others, too, prepared far in advance, bore the evidence of considerable handling, being the work of those said to be on the inside track. At the first meeting of the committee architects were excluded, they desiring to examine the plans privately; a subsequent meeting was next announced, at which the various competitors were notified to appear, and explain their individual designs in detail, discourse with them on acoustics, heating and Ventilation, and other questions that they might choose to propound, all of which accrued and resulted in the appointment of the final meeting at which one of the plans was to be adopted.

The time arrived, and the various plans were again discussed, but the longer they examined, the more convinced they were that none of the submitted designs completely met their ideas, although several of the members seemed decidedly in favor of adopting certain plans. The committee, finding it impossible to adopt a plan, now began to consider the advisability of selecting an architect who should draw the plans according to their specific instructions, having now determined on quite a different location for the building, and having learned all about church architecture, from a source already explained, and from certain books on church building in the hands of some of them, they being moreover all smart men, lawyers, doctors, etc. At this turn, the real contest began. The session being strictly private, the character and abilities of proposed candidates were now discussed by the different members; the builder especially, being thoroughly acquainted with all the architects, and their methods of doing business, ability, etc., was given special attention, speaking of each in rotation, and when he came to speak of a certain prominent but youthful practitioner, he declared him incompetent; at this unfortunate statement, one of the lawyers, sprang to his feet, declared that statement improper, and wrong, and demanded its retraction, but the stubborn builder declined, and said he was ready to prove the charge; upon this, the indignant lawyer became more indignant. Considerable confusion followed. However, a final vote was taken, resulting in the choice of the one whom the builder had recommended. The indignant lawyer though angry did not interfere with the appointment of a committee to wait on the chosen architect, prescribe conditions, and report his acceptance, all of which were complied with by that party, who was then advised to appear at the next meeting, and receive instructions. He did so, but upon his entering their presence, the indignant lawyer demanded his withdrawal, after which he proceeded to organize the committee as a court, to try the unfortunate builder for libel. Upon the day appointed, all members were present; the builder reiterated his charge, produced his evidence and witnesses. The libelled candidate, accompanied by the indignant lawyer, declared the statements false, and proceeded to prove his ability as an architect by numerous statements from prominent State officials, and some builders, and among other things stated as evidence of competence that he had spent seven millions. The trial occupied two sessions; meeting after meeting followed, but the friends of the chosen architect held their ground, no ballot being attempted by the opposition, who finally gained sufficient strength to rescind the former action, and through manœuvres peculiar to lawyers, — especially those of honorable standing,

— wound up the disgraceful affair, by securing the adoption of the following proposition: "The cheapest man out of three selected architects shall do the work." The architects were required to send in their written propositions, for making complete plans, specifications, details, and superintendence: the result of which was, that the work was given to one who throughout the contest had but one vote, but that one was from a "conditional subscriber," and the architect accepted the work for one per cent, thus defeating all competitors on the basis of economy, instead of real merit, which fact will doubtless check their zeal in all future competitions, if not prove disastrous to the establishment of an honorable profession in the West.

HENRY F. LIEBEE.

A QUESTION OF PRIVILEGE.

TO THE EDITOR OF AMERICAN ARCHITECT:

Dear Sir,—I should be glad of a reply in regard to the following matters of office routine, in the columns of the *American Architect*, if deemed of sufficient interest.

(1) Is it the right, or is it only the custom, for an assistant to place his name with "del." affixed on finished drawings which he has made for his employer?

(2) If only a custom, is the privilege often denied?

(3) In the case of students who are paid a limited sum per year, is it customary to exact extra labor of them without additional compensation?

A reply to these queries will be considered a favor.

If the subject is deemed of sufficient importance, a few subscribers would like to see one or more articles in the *American Architect* on "The proper relation of employers to assistants and students."

If thought best to publish the queries proposed, please do so over the signature of

Yours truly,

"A SUBSCRIBER."

[We should say that it is clearly a privilege, and not a right, of a salaried draughtsman, to sign his name to the drawings which he makes for his principal. It is a privilege often allowed to draughtsmen whose skill enables them to claim consideration from the architects who employ them. Every draughtsman may if he chooses demand it as one of the conditions of his service, as he may any other privilege; his success in securing it will depend on his value to his employer; but the drawing is, in the ordinary practice, the property of the employer, made for his service, under his direction, and the draughtsman has no right to put anything whatever upon it except by his authority or permission.

When an architect's drawings are signed by the draughtsman, it often means that he is not the fixed employee of the architect, but is established in an independent business, and employed "by the job." If such a draughtsman is in the habit of signing his work, we question whether the employer has any defence against this—we doubt, that is, whether he could refuse payment on account of the signing, which is his only means of constraint—except by stipulation in advance. The signing, however, is in any case an assumption of privilege, like the sewing of a tailor's label into a coat, not the exercise of a right; and the architect may, if he chooses, erase the signature, as he may any part of the drawing, the question being in reality one of comity rather than one of rights. Where hours are counted, as in the case of men who are paid by the day, there is no excuse for asking for extra service without extra pay, and most architects are careful not to ask it in any case, except where it is justified by a confidential relation between themselves and their draughtsmen. In the case of mere students, that is to say unskilled learners, we imagine few architects expect it. There is probably no usage sufficiently fixed to be cited as general.

As to question 3—The pressure of an architect's work is apt to be more or less irregular, and architects often expect, we think, that their salaried assistants will be willing now and then to help them through a pinch with extra labor. Such labor is to be looked on distinctly as a favor, not a thing to be exacted, and favors on one side are reasons for favors on the other. An architect may of course abuse his opportunities in this way, and abuse of them is a grievance to which the draughtsman is not bound to submit. When such extra labor is prolonged or frequent, it justifies a demand for extra pay. When the demand becomes justifiable, is a question to be settled by special understanding, and one of the many that call for mutual concession and forbearance.

EDS. AMERICAN ARCHITECT.]

THE STOPPAGE OF FIRES IN WALLS AND FLOORS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir,—Under the above heading in your issue of March 6, your correspondent "Subscriber" asks several questions, the answers to which will be found advertised on page vii, of the same number, whereas the most important point in fire-proofing seems to have escaped her notice,—the air-space between roof and top-floor or attic-ceiling.

This space, which is provided to afford level ceilings under a slanting roof, is absolutely inaccessible in case of fire. If ceiling and roof were compact or close together, the spreading fire from an adjacent building would have no hiding-place, as in this air-space, and, if burning through the roof, might be attacked from within; whereas, with the air-space the roofing-beams may be partially consumed by fire before the top-floor or attic ceiling gives way or shows what is going on above it. If the conflagration or fire starts from below, or within the house, this air-space is treacherous to the firemen who may be on the roof, because the pent-up fire will not give timely warning.

Allow me to offer a suggestion on another subject, which, dealing

with façades or exteriors, may be perhaps of more interest to your professional subscribers:—

During active business season the down-town streets of New York frequently present the spectacle of a "jam" or dead lock—which under my own observation lasted once in last December for nearly two hours. That is to say, a dray or cart standing corner of West and Courtlandt Streets would have to wait that long before it could be hauled some ten blocks further, say to the Erie Chambers' Street depot. As our down-town streets intersect at right angles,—the lateral streets leading straight onto about a dozen ferries—the city of New York should rebuild the two corner houses opposite each ferry, making them round-cornered, and increasing the width of roadway accordingly. This is all the relief necessary.

Respectfully,

E.

THE STOPPAGE OF FIRES IN WALLS AND FLOORS.

MONTREAL, March 31, 1880.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir,—The following information may be of some use to your correspondent on the above subject, which appeared on page 98, No. 219.

All wood-work in houses, such as beams, joists, rafters, laths, the under side of flooring, etc., if well saturated with two or three coats of silicate of soda, diluted sufficiently to make a wash, is rendered almost unflammable; at any rate, sufficiently so to give ample time to subdue incipient fire. The sheds in the dock-yards in Great Britain are washed over with this solution. If a coating of chloride of calcium is passed over the silicate of soda, before it is dry, the combination forms a silicate of lime. Silicate of soda and chloride of calcium are the principal ingredients used in the manufacture of Ransom's artificial stone.

If between partitions, and all hollow spaces, four rows of brick-work were laid in cement, and bricks carried from under the flooring to the ceiling joists, so as to cut off draughts, and check the course of a fire, it would not only be a fire-guard, but effectually exclude vermin.

For the information of your lady correspondent, it may be as well to mention that silicate of soda (water-glass) is simply dissolved flint, and when coated over wood, enters into its pores, and forms a film of glass on the surface. It, and chloride of calcium are quite cheap substances, and can be obtained at any wholesale drug house in Boston or New York.

Yours truly,

F. N. BOXER,
Editor Scientific Canadian.

PUBLICATIONS RECEIVED.

SEWAGE DISPOSAL. By Henry Robinson, M. Inst. C. E., F. G. S., F. R. G. S., Author of "Purification of Water-carried Sewage." London and New York: E. & F. N. Spon. Price \$1.50.

NOTES AND CLIPPINGS.

GROWTH OF CREMATION.—Crematories, it is stated, are to be built during the spring in the vicinity of Chicago and New Orleans, and there is a plausible rumor that a stock company is now forming to build two in the neighborhood of New York. In each of these cases the undertaking is the work of speculators who propose to take advantage of the increasing number of people who, whether from sentimental or sanitary reasons, would prefer burning to burial. There is no reason why a cremation company should not make a fair profit as well as cemetery joint-stock companies or undertakers; and here is little doubt that, as soon as the disagreeable notoriety now attending the rite is removed, it will be preferred by many persons, especially of the more educated classes. Experimenters in crematory buildings should profit by the failures and successes of their pioneer, Dr. Le Moyne. In the first place, there is no reason why the rite or the place of its observance should be made so coarse and repugnant in outward detail as they are at Washington, Pa.: where the furnace resembles the corner of an iron mill, and all religious observances are forbidden. The stern old reformer thought to commend his innovation by its simplicity, cheapness, and disregard of all symbolic or devotional ceremony. The cost of Dr. Le Moyne's crematory did not exceed \$2,500. Improvements in the construction of the furnace have been made in Italy since that at Washington was built, which the new experimenters will do well to examine closely before building. In some furnaces in Europe gas is used as the heating power; in others the body is subjected to the action of steam before it is sealed up in the retort, by which means it is claimed the bones are reduced wholly to ashes. The operation, too, need not be made an expensive one to those who choose to use it for their dead, to yield the owners of the furnace a fair profit. In Dr. Le Moyne's crematory the whole cost of each incineration was covered by \$10; a charge of \$25 would pay the company a fair percentage on their money invested.—*New York Tribune*.

THE CAPACITY OF SOME CHURCHES.—*Le Technologiste* states that the largest European churches will contain, in round numbers,—whether seated or standing is not clearly indicated,—the following numbers of persons:—

St. Peter's, Rome	54,000
Milan Cathedral	37,000
St. Paul's, Without, Rome	25,000
St. Sophia, Constantinople	23,000
Notre Dame de Paris	21,000
Cathedral of Pisa	13,000
St. Mark's, Venice	7,000

THE EFFICIENCY OF THE WATER-SEAL TRAP.—A paper by Dr. Neil Carmichael, M.D., describing an investigation into the trap and water-closet system, was read lately before the Philosophical Society of Glasgow, and has since been published. He supports the theory that the particles ordinarily found in sewer air are not emanations from infectious diseases, and are not capable of originating them. What is more, he maintains that germs do not pass through a sound water-trap, and, therefore, that water-traps are, for the purpose for which they are employed, that is, for the exclusion from houses of injurious substances, perfectly trustworthy. They exclude, he says, the soil-pipe atmosphere to such an extent, that what escapes through the water is so little in amount and so purified by filtration as to be perfectly harmless. Dr. Carmichael attributes the influences which sometimes arise where there are sinks and water-closets to the soil-pipes. One of his experiments demonstrated that a pin-point hole in a soil-pipe allows the passage of germs and other particles in considerable quantity, and a hole of that size is a source of danger. The whole paper deserves attention just now, when so many sanitarians believe in the inefficacy of sealed traps. Dr. Carmichael's experiments appear to have been conducted in the most painstaking manner, and while he is urgent in his recommendations, he is not to be reckoned among the alarmists. — *The Architect*.

CURIOUS SUIT ABOUT A STATUE.—A special to the New York *World* says: Clark Mills, the sculptor, is having trouble over the equestrian statue of Jackson, cast in the same mold as those at New Orleans and Lafayette Square here, which he has agreed to erect upon Capitol Hill, Nashville, next month. The statue is on his country place, which is leased to J. G. Garland. When Mr. Mills attempted to remove it a few weeks ago, Garland procured an injunction restraining him. This was dismissed by the court, but another was immediately filed reciting that Garland had leased the place as a country resort, and that the bronze was the principal attraction. Mr. Mills put in a counter claim that, although he had leased the place at \$20 a month, he had not been able to collect rents for several months, and that, moreover, there was no provision in the lease respecting the bronze. Mr. and Mrs. Garland thereupon brought two suits against Mr. Mills for trespass, fixing the damages, respectively, at \$95 and \$90. The matter rested there until yesterday, when Mr. Mills applied to police head-quarters for two officers to accompany him to Garland's within a few days for the purpose of enabling him to remove the bronze unmolested.

THE LONDON TIMES ON THE MONROE DOCTRINE.—The London *Times* in an article on the Panama Ship Canal, says: "The Monroe doctrine, even in its most restrictive shape, has never been admitted into the law of nations. Certainly no such extreme interpretation has yet been attempted to be fastened upon it by Americans as it is made to bear in President Hayes's message to Congress and the resolution of the select committee of the House of Representatives. According to these two statements, had the Colombian Confederation itself taken charge of the project, the United States would have been justified in prohibiting the work. That the United States, by furnishing the money, should obtain a special right to watch over the safety and peaceful use of the new channel, is what Europe, and particularly Great Britain, would most of all desire; but the world is entitled to ask the United States to make up their mind either to let M. de Lesseps do the thing himself with the resources at his command, or to charge themselves with the task."

FOUNDATIONS FOR MACHINERY.—Mr. W. H. Delano, in a paper read before the British Institution of Civil Engineers, spoke of the use of asphalt for the foundations of machinery, notably for those running at high speeds, the asphalt having the valuable quality of absorbing vibrations. This was instanced in the case of a Carr disintegrator, which, being mounted in a pit lined with bituminous concrete, was worked at 500 revolutions per minute without sensible tremor, whereas, with the former wooden mountings on an ordinary concrete base, the vibration was excessive, and extended over a radius of 25 yards. In the Paris Exhibition of 1878 there was shown a block of bituminous concrete, weighing 45 tons, forming the foundation of a Carr disintegrator used as a flour-mill, and making 1,400 revolutions a minute, a speed which would have been impracticable on an ordinary foundation. Extensive applications of the material for this purpose are made in France, especially in connection with steam-engines and steam-hammers.

THE CHURCHES OF PARIS.—*Le Technologiste* states that there are in Paris sixty-four churches, ten temples, two synagogues, seven Protestant churches, and three consistorial establishments. The value of the buildings belonging to the Catholic faith amounts to \$39,804,705; the value of those owned by the Protestants is \$1,907,577; while the Jewish synagogues are valued at \$888,597, which makes a total value of \$42,600,879. To this is to be added \$1,223,268,—the value of painting, sculptures, stained glass, and other objects of art.

A FLOATING RAILWAY.—The latest plan for crossing the dreaded English Channel is embodied in a model now before the Admiralty for a monster floating railway-station, which is to carry trains across the Channel at the rate of fourteen knots an hour. It is stated that "each train would provide accommodations for 2,000 passengers," which would require sixty or more railway-carriages.

THE ENGLISH AND THE MAORIS.—A competitive examination of five English children and five Maori children, held recently, shows that Macaulay's New Zealander will probably be a very intelligent archaeologist, and will be able to put two and two together perhaps more readily than Dr. Schliemann. The investigation showed that while the English children could read better, the Maoris could write better; that the Maoris were better grammarians than the English; while in arithmetic the Maoris answered twenty-two out of thirty questions, and the English children could answer only fourteen.

THE PERSONNEL OF THE PARIS SEWERS.—About five thousand men are regularly employed in the sewers of Paris.

THE DANGERS OF THE PANAMA CANAL.—Mr. Robertson, of Louisiana, has discovered the true aim of M. de Lesseps and his fellow-schemers, and has invoked the aid of Congress against their infamous designs by introducing the following resolution:

Whereas, The warm stream of the Atlantic before entering the Gulf of Mexico, strikes against the eastern coast of the Isthmus of Panama, and would continue to the Pacific but for the existence of that narrow barrier; and

Whereas, After leaving the Gulf it flows across the Atlantic past the coast of Great Britain, creating the temperate climate of that country, which otherwise would have the cold climate of Labrador; and

Whereas, It is an admitted scientific fact that a tide-level canal of sufficient width across Panama would change the course of the Gulf Stream, and thereby freeze out an English-speaking nation; and

Whereas, The United States would thereby lose its chief foreign market, which loss would not be counterbalanced by the new markets opened by an inter-oceanic canal; therefore

Resolved, That we emphatically reaffirm the Monroe Doctrine, and that we will bring it to bear against the inhuman designs of France in thus attempting to destroy her chief European rival, and injure the commerce of the United States.

We may now expect to see the English-speaking nation converted to the Monroe doctrine.

RUBENS.—A committee report just presented to the Municipal Council of Antwerp contains the following particulars about the works of Rubens. Altogether Rubens produced 2,719 works of art, among which 228 were sketches and 484 drawings. Of all these works, 829 have never been copied, 690 are only known by copy, and 294 seem lost. To possess as complete as possible a collection of the master's works, the city of Antwerp will have to obtain copies of 536 pictures and to collect 921 engravings. The cost of a complete Rubens collection, such as was recommended by the Artists' Congress in 1877, would amount to 30,000 francs, and this sum has been voted by the Municipal Council and the Belgian Government. Surely, however, this sum must be inadequate.

A FRENCH CRYSTAL PALACE.—A scheme to build a magnificent Crystal Palace on the ruins of the Palace of St. Cloud is, the *Figaro* asserts, under consideration by the French Government. It would be surrounded by a model farm and a botanical garden, with conservatories and an aquarium, and would contain a museum, library, gymnasium, observatory, and galleries for art exhibitions. The cost is estimated at 15,000,000 francs.

RUSSIAN BARRACKS.—A range of barracks, which are the largest buildings of the kind in Russia, and perhaps in the world, has been lately completed at Moscow. The facade is 3,500 feet long, and the blocks are all three stories high. Separate blocks—connected by corridors—are provided for the accommodation of the men, for instructional and drill purposes, for sick quarters, and for the officers. The rooms for the men are of large size, the ceilings being supported on light iron pillars, with windows on both sides, while all parts of the buildings are provided with very perfect arrangements for warming them by means of hot air, and also for insuring adequate ventilation. Each company has a mess-room separated altogether from the sleeping-room of the men, and a large and commodious kitchen. Water is carried throughout the building. In a separate block rooms are set apart for officers' clubs.

MR. RUSKIN'S SHEFFIELD MUSEUM.—The proposal to raise a shilling subscription with which to enlarge Mr. Ruskin's museum has been received with great favor, says the London *Times*. It was Mr. Ruskin's intention to have borne the expense himself, but now that will be unnecessary. A rough plan has been prepared by Mr. Ruskin of what he would like; but whether it shall take the form of a new wing or a separate gallery has not yet been decided. Mr. Ruskin intends to place in the new building rare prints, pictures, casts, and sculptures. The casts are from celebrated pieces of sculpture at the angles of the Ducal palace, and also St. Mark's Cathedral in Venice, which were taken at Mr. Ruskin's own cost by the permission of the Italian Government. They have not yet been seen by the public. The style of sculpture varies from the Ninth to the Fourteenth Century. Mr. Ruskin has also commissioned an artist to paint the west front of St. Mark's Cathedral at a cost of £500; and the picture, it is expected, will be placed in the new gallery.

A PERUVIAN BRONZE STATUE.—At the last meeting of the Académie des Inscriptions, at Paris, M. Léon de Rosny stated that a bronze statue, the head surrounded by a solar aureola, had been found in an Indian burial-ground at Trujillo, in Peru. The inscription on it is, in M. de Rosny's opinion, undoubtedly Chinese, but of an archaic character, and may signify "He who governs the Kingdom." If this be authentic, it would point to intercourse between China and the ancient Peruvian Empire.

NATATORIUM.—Work is progressing rapidly on the new Natatorium on Howard Street, Baltimore, Md., which will measure 68 feet by 248 feet. The swimming pool will be 40 feet by 140 feet, and from 3 feet to 10 feet 6 inches deep. The walls of the pool will be built of Falls-road stone, 4 feet thick at the bottom, and 2 feet 6 inches at the top; the whole is cased and lined with a nine-inch brick wall laid in Portland cement, making the total thickness of wall 4 feet 9 inches. The bottom of pool will be puddled with 12 inches of puddling clay, over which are two layers of brick, the whole being lined with Portland cement. The water will be kept a uniform temperature of 80° in summer and 75° in spring and autumn, by means of boilers placed in the basement of the building. The entire cost will be \$60,000. Messrs. Dixon and Carson are the architects and superintendents.

A RELIC OF THE TAY BRIDGE DISASTER.—One of the cars of the Edinburgh & Glasgow Railway which fell from the Tay Bridge, was picked up by fishermen on the western coast of Norway.

BUILDING INTELLIGENCE.

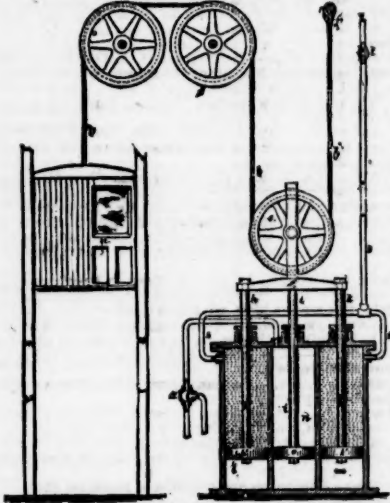
[Reported for The American Architect and Building News.]

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

224,574. ELEVATOR.—Seth H. Bevins and William H. Phillips, New York, N. Y. The car, of any desired character, is raised and lowered by a wire rope, *b*, passing over the pulleys *c* and *d*, and below the pulley *e*, and then led up to the fixed attachment *f*. The head-block *g* is connected with the pulley *e*, and to it three



piston-rods are connected to insure a parallel movement and a proper distribution of the forces applied to the car. The piston-rods *h* and *k* pass into the cylinders *l* and *m*, and are provided with the pistons *h'* and *k'*, and the piston-rod *i* passes into the cylinder *n*, and is provided with the piston *o*. Steam under pressure is admitted above the piston *o*, and is regulated by a valve. The cylinders *l* and *m* are supplied with water by the pipes *p*. *t* is a valve or cock to open or close the pipe *s*, and is operated from the elevator. At the same time the cock *r* is operated in the following manner: The column of water and its pressure upon the pistons *h'* and *k'* need not be sufficient to sustain the car when empty. Hence when the valve *t* is open the car will descend and force the water out of the cylinders *l* and *m*, up through the pipe *s* into the tank or reservoir, and when the cock *r* is closed the water will be held so that the car remains immovable. When the car is to be raised the valve *t* is opened simultaneously with the cock *r*, and the pressure of steam in the cylinder *n* forces down the piston *o* and raises the car. This motion, however, is partially controlled by the extent to which the valve *t* is opened to admit water, because the car cannot move faster than the water flows into the cylinders *l* and *m* without producing a vacuum that the steam pressure could not overcome. When the car is to be held, the steam is shut off, and the valve *t* closed. When the car is to descend the valve *r* closes the steam-inlet and opens the exhaust, and the valve *t* is opened to whatever extent is desired for speed of movement. If desired, steam may be admitted to the cylinder *n* beneath the piston to increase the speed of the descending car and force the water back into the reservoir.

225,921. LATHE.—James Davies, and Foster B. Childester, Jersey City, N. J.
225,945. BRICK OR BUILDING-BLOCK, AND METHOD OF LAYING THE SAME.
225,946. FORCE-PUMP.—Henry Reece, Lincoln, Neb.

225,963. WATER-METER.—Charles H. Bacon, Boston, Mass.

225,969. SASH-CORD GUIDE.—Frank S. Clarkson, Baltimore, Md.

225,980. HINGE.—David A. Green and James H. Roberts, Rushville, Ind.

225,991. COMPOUND FOR ARTIFICIAL STONE.—Archibald K. Lee, Philadelphia, Penn.

225,995. BRICK AND TILE MACHINE.—James W. Penfield, Willoughby, Ohio.

226,011. COMMODE.—William J. Winghart, New York, N. Y.

226,023. WATER-METER.—Albert Borklet, Cincinnati, Ohio.

226,033. SASH-FASTENER.—Charles M. Burns, Jr., Philadelphia, Penn.

226,042. LOCK-HINGE.—Matthew S. Cummings, Philadelphia, Penn.

226,043. DRILL.—John L. Bryant, Hillsdale, Mich.

226,045. SHUTTER-WORKER.—Henry J. Dickerson, Appleton, Wis.

226,056. LATHING AND PLASTERING.—Walter J. Garvey, St. Louis, Mo.

226,074. CHIMNEY-FLUE AND SHIELD.—Andrew T. Jackson, Cotton's Store, Ala.

226,075. TRY-SQUARE.—Horace Johnson, Crittenden, N. Y.

226,077. ELEVATOR.—Benjamin B. Keyes, Chelsea.

226,100. ELEVATOR.—Charles R. Otis, New York, N. Y.

226,101. EXTENSION TOWER.—Daniel M. Pfantz, Philadelphia, Penn.

226,123. KNOB-ATTACHMENT.—Alpha M. Smith, Tampico, Ill.

226,130. SCROLL-SAW.—Delay F. Sutton, Rochester, N. Y.

226,139. EASEL.—Isaac Wilkins, Jr., Green Point, N. Y.

226,147. SASH-HOLDER.—Jacob B. Teagley, Indianapolis, Ind.

9,130. HOLLOW AUGUR (Re-issue).—Weston Smith, Three Tons, Penn.

9,131. Same.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—Since the last report thirty-three building permits have been issued, but the following, only, are of sufficient importance to be mentioned:—

Anthony Wahl, three-sty brick building, 263 Gay St., between Matt and Aisquith Sts.

John Black, 2 three-sty brick buildings on High St., between Helen and Gay St.

John Black, three-sty brick building on Aisquith St. near Paint Lane.

John Maxwell, addition to dwell., Calvert St., between Franklin and Centre St.

Jacob Heinmiller, addition to dwell., 104 Myrtle Ave., between Hoffman and Dolphin Sts.

Christian Muhly, 2 three-sty brick buildings, 391 and 393 Charles St.

Nathan Frank & Sons, four-sty warehouse, Milliken St., between Spring and Eden Sts.

Casper Wolf, 2 three-sty brick buildings, on Camden between Sharp and Hanover Sts., each 16'6" x 62'.

Henry Plack, 2 three-sty brick buildings, cor. George and Fremont Sts.

A. A. Rheinhardt, 7 three-sty brick buildings, Bolton St., commencing at cor. of Lawrence St.

Messrs. Sharp & Dohme, four-sty brick and iron warehouse, 267 Pratt St., between Howard and Eutaw, 18' x 70'.

Mrs. F. W. Bennett, three-sty dwell., 28 S. Mulberry St., near Charles St.

R. W. Baldwin, a four-sty brick and stone warehouse, cor. Harvard and Lombard St.

ASYLUM.—The Trustees of Bay View are asking for an appropriation of \$50,000, to construct a new building in addition to the present buildings. The trustees state that the present accommodations are entirely inadequate, and that it is necessary that they should have a new building.

HOUSE.—Messrs. Dixon & Carson are the architects for two suburban residences now building for Mr. Mr. Eugene Poultney and J. I. Middleton, of Baltimore. Cost, \$4,000 each.

HOUSE OF CORRECTION.—An appropriation of \$40,000 has been made to the House of Correction, \$20,000 of which is to be expended in work-shops, roads, and drainage.

PIER.—The Northern Central Railway Company is to build a new steamship pier near the Canton Elevator, 120 by 400 feet, and a bulkhead 320 feet long will also be built. Messrs. S. H. and T. F. Adams are the contractors. Cost, \$40,000.

TRUCK-HOUSE.—An ordinance appropriating \$15,000 for a new truck-house in Northwest Baltimore has passed both branches of the City Council.

Boston.

BUILDING PERMITS.—Since our last report the building permits granted are as follows:—

Brick.—Franklin St., cor. Pearl Place, 1 store, 78' x 108', five stories; S. S. Woodcock, architect; A. P. Morse and H. B. Taylor, owners.

338 Beacon St., for H. Stackpole, 1 dwell., 25' x 60', three stories; Webster and Dixon, builders.

2107 Washington St., for May & Gardner, 1 dwell., 19' x 37', three stories; B. C. Bennett, builder.

Wood.—Quincy St., Ward 21, for C. Lathrop, 1 dwell., 27' x 31'; S. H. L. Pierce, builder.

Elm St., Ward 24, for D. Simonds, 1 dwell., 23' x 34'; C. A. Kirkpatrick.

Grand Junction Wharf, 1 freight-house, for B. & A. R. R., 68' x 447'; A. H. Glover, builder.

Washington St., for Metropolitan R. R. Co., stable, 62' x 112'; J. Quirk, builder.

P St., cor. E. First, for South Boston R. R., 1 storage of cars, 60' x 151'.

60 W. First St., for Boston Machine Co., 1 shop, 52' x 90'; Holbrook & Harlow, builders.

Virginia St., Ward 20, for J. W. Smith and L. Covington, 2 houses, 24' x 32'; Gunn & Hutchings, builders; J. H. Besarick, architect.

Washington St., Ward 23, 1 dwell., 22' x 32'; A. F. Quigley, owner and builder.

Glendale St., Ward 20, for W. H. Sayward, 1 dwell., 28' x 34'.

Schuyler St., Ward 21, for W. E. Eaton, 1 dwell., 28' x 42'; J. W. Hill, builder.

Washington St., Ward 23, for I. H. Gray, 2 dwells., 19' x 29'; T. G. Tobin, builder.

Brooklyn.

BUILDING PERMITS.—A Stockholm St., 1 two-sty frame dwell., 22' x 35'; cost, \$2,300; owner, Henry Ropke, 320 Evergreen Ave., builder, H. C. Bauer.

North Fifth St., No. 205, three-sty frame tenement, 25' x 50'; cost, \$3,900; owner, Peter Carel, on premises; builders, Ulrich Maurer and Michael Metzzen.

Washington Ave., 2 three-sty brown-stone dwells., 20' x 45'; owner and builder, William C. Bowers, 283 Lafayette Ave.; architects, Parfitt Bros.

Pulaski St., 4 two-sty frame dwells., 15' x 32'; cost, \$2,200 each; owner, W. Buskin; builder, John B. Cavanella.

Franklin Ave., 1 two-sty brick shop, 25'6" x 32'; cost, \$1,500; owner, Myron C. Rush.

Myrtle St., 1 two-sty brick stable, 34' x 60'; cost, \$4,000; owners, Meltzer Bros., Myrtle St.; architect, John Platte; builders, B. Rauth & Bro. and Jno. Rueger.

Pulaski St., 1 two-sty brick stable, 50' x 100'; cost, \$5,500; owners, Gluck & Scharmann, Pulaski St.; architect, J. Platte; builders, William Rauth and Jno. Rueger.

Seigel St., 1 five-sty brick factory, 100' x 50'; cost, \$10,000; owner, Martin Worn; architect, Jno. Platte.

Seigel St., 1 three-sty brick drying kiln, 25' x 30'; cost, \$3,000; owner, Martin Worn; architect, J. Platte; builder not selected.

ALTERATIONS.—Vine St., No. 13, interior alterations; cost, \$2,300; owners, Valentine & Bergen, 15 Fulton St.; architect, G. L. Morese; builder, J. Hart.

Willoughby St., cor. Adams St., front and rear walls altered; cost, \$3,000; owner, James Howell, Adams St.; architect, W. A. Mundell; builder, B. Gallagher.

CONVENT.—An endeavor is making to secure the land bounded by Clinton, Waverley, Willoughby, and Myrtle Avenues as a site for a new Roman Catholic convent.

Chicago.

BUILDING PERMITS.—Third Ave., freight depot, 60' x 351', for the Chicago and Western Indiana Railroad Company; cost, \$32,000.

Rucker and Huron Sts., improvements on Bethel Church; cost, \$2,000.

Franklin and Randolph Sts., five-sty warehouse for Field, Leiter & Co.; cost, \$65,000.

Wood St., No. 392, three-sty factory for Naman, Wanbrandt & Co.; cost, \$3,600.

Western Ave. and Twelfth St., two-sty dwell., for John Busin; cost, \$3,000.

Wallace and Thirtieth Sts., three-sty public school-house; cost, \$30,000.

New York.

BUILDING PERMITS.—One Hundred and Thirty-sixth St., for S. A. McMurry, B. W. Warren, architect, 2 three-sty brick dwells., 17'6" x 48', to cost \$10,000.

596 Lexington Ave., for Dr. T. G. Thomas, Silliman & Farnsworth, architects, D. C. Weeks & Son, builders, a six-sty brick dwell., 25'7" x 90'; cost, \$50,000.

38 White St., for Thos. Thatcher, Jno. McIntyre, architect, 1 five-sty brick store, 25' x 100'; cost, \$30,000.

Eighty-fourth St., for Geo. W. Eggen, Chas. Kinkel, architect, Frederick Holdrick, builder, two-sty brick store, 41' x 68', to cost \$2,500.

227 E. Fiftieth St., for Wm. B. Rockwell, A. B. Ogden, architect, 1 brown-stone and brick flat; cost, \$13,000.

22 Willet St., Henry Ruel, owner, Julius Boeckel, architect, 1 brick tenement; cost \$5,500.

CORRECTION.—The cost of the house for Mrs. C. L. Anthony, Mr. James Stroud, architect, was wrongly given in our last issue, as \$2,000 instead of \$20,000.

ALTERATIONS.—Broadway, No. 12, upper story to be raised, also internal alterations; cost, \$4,000; owner, A. Newbold Morris; architects, McKim, Mead, & White.

Broad St., Nos. 78 and 80, new elevator and interior alterations; cost, \$12,000; owners, H. H. Popham & Co.; architect, Stephen D. Hatch.

Avenue A, No. 229—new front wall and storefront; cost, \$1,100; owner—Mayer; architect, Jobst Hoffman.

John St., No. 42, to be raised to five stories; cost, \$2,000; owners, C. E. Larned and Reuben Ross.

Crosby St., No. 90, interior alterations; cost, \$2,000; owner, John Simpson; architect, John B. Snook.

Madison Ave., No. 118, five-sty brick extension on rear, 25' x 38', also interior alterations; cost, \$16,500; owner, William Bond; architect, Arthur Gilman; builder, James Thompson.

Fifth Ave., No. 149, stable, two-sty brick extension; cost, \$2,400; owner, Bradish Johnson; architects, D. & J. Jardine; builder, Samuel Lowden.

Madison Ave., No. 540, two-sty brick extension on rear, 14' x 25'; cost, \$2,500; owner, S. J. Drake; architects, D. & J. Jardine; builder, Bartlett Smith.

Grand Boulevard, to be raised to three stories, also one-sty brick extension, 21' x 17'; cost, \$3,800; owner, Mrs. S. F. Chaffin; architect, L. J. O'Connor.

Hester St., cor. Allen St., new store front; cost, \$4,000; owner, Mrs. Mary Boyle; builder, James Doig, Jr.

Bridge St., No. 20, one-sty brick extension; cost, \$2,000; owner, John Schermerhorn; builder, D. McLeod.

Liberty St., No. 89, damage by fire to be repaired; cost, 2,400; owner, estate of Uriah J. Smith; builder, Elward Smith.

Eighth Ave., Nos. 205 and 207, front wall to be rebuilt, also internal alterations; cost, \$3,000; owners, Ph. and Wm. Ebling; architect, A. Pfund.

ACADEMY OF MUSIC.—At a meeting of the stockholders last week it was proposed to build a new Academy "up town," but, after deliberation, it was decided to enlarge the seating capacity of the present building, and one of two plans submitted will probably be acted on.

FACTORY.—Mr. George B. Pelham has prepared plans for a factory and warehouses for Messrs. Decker Bros., the piano manufacturers.

HOUSE.—Interest is felt in the erection of the house on Fifth Avenue, corner of Thirty-fifth Street, which is being built for a daughter of Wm. Astor. Not only the style but the materials are new to Fifth Avenue. The first story is of brown-stone in the rough; above, the front is of brick, with hammered brown-stone finish. The style is severe and simple, in the early Italian Renaissance style. The cost is estimated at about \$80,000. Messrs. McKim, Mead & White are the architects.

OFFICE-BUILDING.—The Liverpool, London and Globe Insurance Co. have accepted the plan of Mr. S. D. Hatch for their new building.

STOCK EXCHANGE.—The building Committee of the Stock Exchange invited Mr. R. M. Hunt, Mr. R. H. Fenwick, Mr. N. Le Brun, Mr. Arthur Gilman, and Messrs. Peabody & Stearns to submit designs for

their new building. Mr. Le Brun has not put in designs, and the Committee are yet undecided which plans to accept.

STORE.—Messrs. D. & J. Jardine have drawn plans for a five-story store, 25 by 200 feet, No. 370 Broadway. The front is to be of brick with stone finish.

Milwaukee.

BUILDING PERMITS.—The following building permits have been issued since our last report:—
Henry Buertrlin, Wisconsin St., frame dwell.; cost, \$3,700.

Mr. Kielin, Fourth St., frame dwell.; cost, \$1,450.
C. J. Donaldson, Hanover St., frame dwell.; cost, \$3,400.

B. J. Donaldson, Mineral St., frame dwell.; cost, \$1,550.
G. Templin, Second Ave., 2 frame dwells.; cost, \$7,000.

T. A. Chapman, Cass St., additions to dwell.; cost, \$2,500.
C. Schucknett, East Water St., brick store; cost, \$5,000.

Alex. Mitchell, Third St., augur-bit factory; cost, \$2,500.

Philadelphia.

ARMORY.—The First Regiment National Guard has bought a site for its new armory at the corner of Broad and Callowhill Sts. The building will cost about \$120,000.

BUILDING IN MARCH.—The total number of permits issued during March was 482, an increase of 98 over those issued during the corresponding month, 1879, their character being as follows:—

Alterations and additions, 98; back buildings, 55; two-story dwellings, 124; three-story dwellings, 126; one-story stores and dwellings, 8; two-story stores and dwellings, 4; three-story stores and dwellings, 15; four-story stores and dwellings, 3; five-story stores and dwellings, 3; factories, 13; stables, 18; hall, 1; shops, 8; engine-houses, 2; boiler-house, 1; offices, 6; depots, 2; school-houses, 1; store-houses, 2; dye-houses, 2; dry-houses, 2; picker-houses, 3; packing-house, 1; brewery, 1; public house, 1; hotel, 1; kiln-house, 1; and 1 library.

CATHEDRAL.—The Cathedral of St. Peter and St. Paul is to be completed in accordance with the original design of the architects, Messrs. Le Brun and Runge.

STORE.—A four-story brick and iron store, 24 by 286 feet, will be built at 718 Market St., for Messrs. Schwartz & Graf.

Providence, R. I.

HOUSE.—Mr. John A. Bennett is building a frame dwelling at the corner of High Street and Baker Avenue. Cost, about \$8,000. Work to be done by the day. No architect.

OFFICE BUILDING.—Mr. Caleb G. Burrows is about to build a brick and stone block on High Street, to contain stores, offices and hall, at a cost of about \$23,000; architect, C. F. Wilcox; contractors, for the mason's work, John Briggs; carpenter's work, John K. Harris.

STORE.—George H. Slade and wife will build a four-story brick block, corner of Eddy and Washington Streets. Clifton A. Hall, architect. Cost estimated at \$45,000. Foundations are being put in by day work.

Oakland, Cal.

HOUSES.—Mrs. Ketter is building two frame houses. Cost, \$3,600 each. S. and J. Newcom are the architects.

MARKET-HOUSE.—Mr. Potter proposes to build a new market-house between Thirteenth and Fourteenth Streets. It will run through the block from San Pablo to Broadway.

STORE.—Smith & Doe are building a one-story brick building. Cost, \$3,500.

St. Louis.

BUILDING PERMITS.—Forty-four permits have been issued for the week ending April 2, 1880. Twelve of these are for frame structures of slight importance. Of the rest, those worth \$2,500 and over are as follows:—

Owners.	Use.	Stories.	Rooms.	Cost.
City of St. Louis.	Engine House.	4	3	\$5,000
William T. Semp.	Cooling & Ice-Hse.	3	8	100,000
B. F. Young.	Dwelling.	3	8	5,000
Collier White L'd Co.	Elevator.	1	6	6,000
C. S. McMann.	Store and Rooms.	3	10	5,000
Helen A. B. Corton.	Dwelling.	3	20	10,000

General Notes.

AMHERST, MASS.—The new hotel, corner of Broadway and Amity Streets, is now nearly completed; it measures 90 by 103 feet, and is of brick and stone. Cost, \$30,000. Esty & Hurd, of Boston, architects.

BINGHAMTON, N. Y.—E. P. & C. B. Smith are building a brick block on Court Street. It will be 40 by 140 feet deep, four stories above the basement. William D. Stephens, contractor.

Geo. L. Crandall has commenced work on a building on Commercial Avenue, which is to be 43 by 60 feet, three stories above the basement, to be built of brick. T. L. Lacey, architect, for both buildings.

There is a great deal of activity in the building business this spring.

We are to have a new depot for the Erie and Western Railroad, 180 feet long, built of brick. Design by a New York architect.

BOONE, IO.—Mason Bros. are building a store, 24 by 90 feet.

CALVERTON, MD.—The corner-stone of St. Edward's Catholic Church was laid last week. Mr. Edward Brady is the architect. Cost, \$8,000.

CLINTON, MASS.—The house for Mr. H. M. Bigelow is being entirely remodelled, at a cost of \$5,000. Messrs. Esty & Hurd, of Boston, are the architects.

GREENVILLE, O.—One of the capitalists of this town, J. W. Spayd, expects to build at least fifty dwellings this summer.

LAKE BLUFFS, ILL.—The Northwestern Railway Company proposes to build a new depot for the association.

LEXINGTON, KY.—Clay, Tar & Co. are building a large warehouse on the Frankfort Pike.

LOUISVILLE, KY.—W. C. Arterburn, seven one-story frame dwellings on Twentieth Street, between Madison and Chestnut Street. Cost, \$3,200.

The Cave Hill Cemetery Company, a two-story brick and stone building at the cemetery gateway. Cost, \$12,800.

Mrs. Zinsmeister, a one-story brick dwelling, corner of Twenty-second and Grayson Streets. Cost, \$1,500.

MEDFORD, MASS.—Corner of Main and South Streets, is to be built a fire-engine house of brick and free-stone, measuring 60 by 70 feet, with tower 14 feet square and 96 feet high, in the "Queen Anne" style. Cost, about \$14,000. The architects, Messrs. Wait & Cutter, of Boston, are now ready for estimates.

NEW BEDFORD, MASS.—The Grace Church Society has raised \$15,000 towards building a new church.

NEWPORT, R. I.—Arthur B. Mumford is building on School Street, a two-story dwelling house. J. D. Johnson, builder.

Dudley Newton, architect, is building for his own use a cottage on Division Street. J. D. Johnson, contractor.

PAWTUCKET, R. I.—Benjamin Smith, carpenter and builder, is building for himself a house, at a cost of about \$4,000. Plans furnished by Walker & Gould, of Providence, R. I.

Workmen are clearing the site for the new opera-house on Main Street.

PITTSBURGH, PA.—Mr. E. M. Butz, architect, is building a large store for Gen. Mumford on Liberty St., and another large building for Mr. Edward Gregg.

RUSHVILLE, IND.—Mr. D. A. Bohlen of Indianapolis is the architect of the new church which is building at a cost of \$8,000.

RUSSELL, MASS.—A new school-house is to be built at Salmon Falls.

SACO, ME.—A new church, 30 by 50 feet, is about to be built here. The foundation has been put in.

SAN FRANCISCO, CAL.—The repairs and alterations of the Old City Hall have cost \$17,841.72, although the original contract called for the expenditure of \$1,040.

SANTA FE, U. T.—A \$6,000 theatre is to be built here.

SCITUATE, MASS.—The foundation for the Unitarian church will be ready for the sills by the 1st of April.

SHELTON, CONN.—Mr. Wm. Wilkinson is building a wooden house for himself, costing \$8,000. Plans by Brown & Stillson, of New Haven.

Radcliffe Bros. are about making an extensive addition to their mill, from plans by C. T. Beardsley, Jr.

SOUTH READING, PA.—Work has begun on a new hotel, to cost \$30,000.

ST. PAUL, MINN.—A new three-story building will be built this season on West Ninth Street, for St. Joseph's Orphan Asylum.

THOMASTOWN, CONN.—Messrs. Plum & Atwood are building a brass mill, 60 by 172 feet of brick. Mr. Aaron Thomas is building a frame house on Orchard Street, costing \$2,500, from plans by Robert W. Hills, of Waterbury, Conn.

TOWSONTOWN, MD.—Work on the Sheppard Asylum has been resumed.

TURNER'S FALLS, MASS.—The Methodists are preparing to build a new church.

VINCENNES, IND.—The new opera-house is under the charge of Mr. J. H. Stem, architect, of Indianapolis. Mr. Stem is also building a house for Mr. Samuel Gimble, which will cost \$8,000.

WARASH, IND.—The new County Jail will cost \$17,000.

WALLINGFORD, CONN.—A brick church is being built here by the Catholic society, to be called the Church of the Holy Trinity, costing about \$50,000. Plans by Messrs. Brown & Stillson, New Haven, Conn.

Wallace Bros. are about building an addition to their factory of brick, costing \$7,000. Brown & Stillson, architects.

WASHINGTON COURT-HOUSE, O.—J. F. Ely will rebuild his elevator that was burned a week ago.

WATERBURY, CONN.—Mr. W. E. Risley will build a house and bath, and Mr. E. A. Pierpont is to commence a fine house. Palliser, Palliser & Co., architects, Bridgeport, Conn.

WAPAKONETA, O.—Thomas Moss and C. F. Herbst are each preparing to erect new buildings on Auglaize Street.

WESTFIELD, MASS.—The Episcopal Society is negotiating for a site on the corner of Washington and King Streets, for a new chapel.

WICKFORD, R. I.—Mr. Robert J. Fitch has commenced to build a two-story dwelling house on Union Street. Mr. Sanford B. Monroe, builder.

WINSTED, CONN.—Mr. Robert W. Hills, of Waterbury, has just completed the plans for a three-story frame block, 70 by 70 feet, for the Winsted Real Estate Co., costing about \$8,000.

WOLCOTTVILLE, CONN.—The Congregational Society are about building a chapel of wood. Robert W. Hills, of Waterbury, architect.

YANTIC, CONN.—Winslow Williams has foundations in for a house 105 by 60 feet; first story granite; shingle work above; slate roof. Cost, \$25,000. H. B. Beardslee, of Milford, builder. Palliser, Palliser & Co., architects, Bridgeport, Conn.

Industrial.

BAINBRIDGE, IND.—Messrs. Dooley, Gordon & Co., will this season build a flour and grist mill.

BELLAIRE, O.—Beazle, Moore & Co. will very soon break ground for their new foundry and machine shops.

BEVERLY, MASS.—Lorenzo Barker is building a tobacco shop, 170 by 51 feet, and five stories high.

CLINTON, MASS.—The Wire Cloth Company is to build a new mill, 150 by 56 feet, for weaving, a new

blacksmith's shop, and an additional 36 feet to the side of the present tower.

DANBURY, CONN.—Foster Bros., are soon to build a hat factory. The main building is to be 130 by 26 feet, three stories high; the make shop, 60 by 20 feet, one story; the coloring shop, 60 by 20 feet, one story; the hardening shop, 40 by 20 feet, two stories.

DAYTON, O.—The ground has been broken on First Street, corner of Madison, for Pinneo & Daniels' new wheel works. The building will be of brick, four stories high, and 50 by 150 feet.

HIGGANUM, CONN.—The Russell Manufacturing Company is building a building, 40 by 100 feet.

HOULTON, ME.—Kinney & Watson are building a starch factory, the main building, 50 by 80 feet, and two dry-houses, 30 by 60 each.

HOLYOKE, MASS.—Munn & Baugh, are to build a machine shop, 80 by 35 feet.

LAURENS, N. H.—H. H. Abel is building a large machine shop on Lake street, while F. P. Holt will soon build an addition to his hosiery mill.

MIDDLETOWN, O.—The Tylus Paper Company is building a new bleach house.

NEW BEDFORD, MASS.—The foundation wall of the new silver-plating works at the east end, where it crosses the shore, is nearly completed.

NEW BRIGHTON, PENN.—The foundation for the new Novelty Works has been commenced. The foundry is to be a brick building, 40 by 160 feet.

PAWTUCKET, R. I.—The Conant Thread Company are building an addition, ninety feet long, to their "No. 2" mill.

The new American File Works is building a machine shop, 35 by 125 feet.

PHILADELPHIA, PA.—Hornor Bros. are building a very large factory at the corner of Fourth Street and Lehigh Avenue.

PORTSMOUTH, N. H.—The Portsmouth Shoe Factory Company and the Whitcomb Shoe Manufacturing Company, of Mechanic's Falls, Me., have consolidated, and will build a factory here, 160 by 42 feet.

SOUTH ABINGTON, MASS.—Miller Cook, Jr., is to build a boot and shoe factory, at a cost of about \$6,000.

SOUTH GARDINER, MASS.—S. Bent & Brothers are building a new factory, the main part to be 51 by 40 feet, two stories high, with basement.

SUTHERLAND FALLS, VT.—A building, 58 by 105 feet, is to be built by the Sutherland Falls Marble Co.

TROY, N. Y.—G. B. Cluett, Bro. & Co., are to build a new shirt factory.

VERSAILES, KY.—Nathan Harris is building a malt house, 65 by 120 feet.

VERONA, PA.—A new glass factory is building at Verona Station, on the Allegheny Valley Railroad, by John Agnew, of the Southside.

WATERBURY, CONN.—The Waterbury Brass Co. is building a brick mill, 125 by 75 feet.

Blake & Johnson are building a machine shop of brick, three stories, 93 by 60 feet.

Benedict & Burnham are building a brass-mill, 35 by 94. The Waterbury Clock Co. are building a frame factory, three stories, 85 by 36 feet.

WEST AUBURN, ME.—James Munroe & Co. are to build an addition to their shoe factory, 85 by 36 feet, 3 stories, with a boiler-house attached, 29 by 21 feet.

Bids and Contracts.

BELLEFONTAINE, O.—John Rouner, of Dayton, has the contract for the new building of the Opera Block Co.

BOSTON, MASS.—The Boston Water Board has awarded the contract for furnishing brass, iron and composition castings needed by the Cochituate and Mystic departments, to the Davis & Farnum Manufacturing Company, of Waltham, at three cents per pound; the only other bidders being the South Boston Iron Company, at three and one-half cents per pound.

CHARLESTOWN, W. VA.—The State Board of Public Works has awarded the contract for building the new State Capitol to H. H. Shepard, who built the present Capitol in Wheeling. The building will probably cost a quarter million. The present letting calls for \$150,000. The building under contract must be finished May 1, 1884.

GREENFIELD, MASS.—The Greenfield Power Co. have given the contract for their new building to Pierce & Austin.

NEWBURYPORT, MASS.—The contract for the new Ocean Mill has been awarded to Hon. Albert Currier.

NEW YORK, N. Y.—The Collins company of Blue Hill, Me., has the granite contract for the United States Barge Office.

The contract for the office buildings for the Astor estate, Nos. 21 and 23 West Twenty-sixth street has been awarded to Messrs. D. C. Weeks & Son for \$60,000.

PATRIVILLE, IND.—John Walker of Aurora, Ind., is furnishing the brick for Mr. Jacob Harris's house.

PHILADELPHIA, PA.—The public buildings commissioners have let the contract for brick for the interior work for this year to the Excelsior Brick and Stone company.

PROVIDENCE, R. I.—The contract has been taken by Moulton & Ingraham to build a large brick and stone block for William Groveson, on Eddy Street, near Broad. The architects are Messrs. Stone & Carpenter. Cost, about \$18,000.

SPRINGFIELD, O.—The contract has been awarded for building the new Western School-House, the total cost to be \$13,413.45.

ST. LOUIS, MO.—The contract for the iron work on the United States custom-house has been awarded to the Phoenix Iron Co. of Trenton, N. J.

VERSAILES, KY.—Matthew Jett, of Frankfort, has the contract for building the new court-house. Amount, \$11,795.

WATERBURY, CONN.—The contracts for Mr. Tucker's house is let. C. H. Fogg, carpenter; M. Rigney, mason, Bridgeport, Conn.; T. M. Walker & Co., sash and doors, Springfield, Mass.; Bennett & Eadie, mantels and interior work, Bridgeport, Conn. Geo. M. Lany, slating and terra-cotta, Bridgeport, Conn.

WILLIAMANTIC, CONN.—The contract for building marble for Shea's new block has been awarded to the Sutherland Falls Marble Co.