THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. IX. Copyright, 1881, JAMES R. OSGOOD & CO. NO. 275.

APRIL 2, 1881.

Entered at the Post Office at Boston as second-class matter.

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FURTHER accounts of the conflagration which destroyed the great dry-goods store "Le Printemps," in Paris, show that the catastrophe was probably due to the accidental kindling of gas which had escaped from a broken pipe. So rapidly did the flames spread that in nine hours after the first alarm nothing remained of the inside of the enormous building, eight stories in height, and a part of the walls had fallen. The property loss is now estimated at two millions of dollars, and a letter from Paris says that this dreadful destruction is largely due to the wretched inefficiency of the fire department. This is by no means the first time that complaint has been made of the fire-service in Paris. To say nothing of the inadequate supply of water for such purposes, the engines used are of a very primitive construction, as compared with our splendid apparatus; and the efficiency of our organization, which has been perhaps regarded as conveying a humiliating confession of our flimsy methods of construction, is hardly likely to meet with general imitation elsewhere for the present. One might think that the insurance companies, twenty of which will have to bear the whole loss by the burning of the "Printemps," would be disposed to promote measures of protection, but these have found out on the other side of the Atlantic, as well as this, that by taking advantage of the calamity to advance rates on all the other dry-goods warehouses in the place, they can in a few years recoup themselves at the expense of the policy-holders, with a reasonable prospect of a large profit in addition.

ANOTHER evidence that foreign modes of construction are not always so much superior to ours as is commonly supposed may be found in the destruction of the new theatre at Nice, which caught fire from escaping gas, as is supposed, and burned so fiercely and rapidly as to cut off the escape, not only of a large part of the audience, but of many persons on the stage. The fire broke out early in the evening, before the auditorium was filled, but at least one hundred and fifty persons are known to have perished. The building stands by itself on the shore of the Mediterranean, so that there was an opportunity for arranging ample means of exit, but the corridors within the building were narrow, dark and tortuous, and were soon choked by the struggling crowd. As in the Brooklyn Theatre, but one or two occupants of the upper gallery were able to escape. Nice was once a part of Italy, and the Italian traditions of incombustible building may have tended to the neglect of those appliances for subduing fires which no French city can afford to do without, for it seems that in default of better means, lines of men were formed to pass buckets of water, dipped from the sea close by, to throw upon the fire, an expedient which seems positively childish, although it is still usual on the Continent. It will surprise some persons to learn that the burning of a theatre is nearly as common an occurrence in Europe as in America. Of course, the number of such buildings is much greater there, but the list of casualties for the last ten years shows that those burned were almost equally divided between the two sides of the Atlantic.

THE Brush Electric Light Company has undertaken to light certain streets in Cincinnati by means of six or more towers two hundred feet high, containing immense lamps, the current for which is to be supplied by means of an engine of one hundred and twenty-five horse-power. The company has applied for permission to open the streets and lay tubes for conveying the wires, but requests also to be allowed in case of necessity to suspend them from the poles belonging to the Bell Telephone Company. The telephone directors very naturally make objection to this, on the ground that accidents have already occurred from the proximity of telephone to electric-light wires, and that to expose their subscribers to the risk of having the energy requisite for supplying these huge lamps suddenly diverted through their bodies would be extremely imprudent. They call attention also to the fact that the telephone wires are frequently cut by firemen in order to raise ladders against burning buildings, and suggest that if the electric-light wires were to be confused with the others the danger to persons handling them would be very great. Another remark is made, which those who use telephones will find interesting, that the current induced upon the telephone wires by the proximity of the others would manifest itself by confused noises in the instruments, interfering very much with their proper use. The influence of an ordinary telegraph has been felt so strongly in a telephone wire strung on the other side of the street that one familiar with the Morse alphabet could read by sound in the telephone the messages passing through the other line, and electric-light wires make their proximity known by a sharp, trumpet-like noise.

TWO instances of the miserable folly with which workmen sometimes throw away their own and their children's bread at the beck of noisy agitators who have their private interests to serve, are reported recently. The spinners of the Chace Mill, in Fall River, have instituted a strike, with all the usual accompaniments of picketing the factory, sending warnings to other manufacturing centres, drawing relief from their poor fellow-workmen, and appealing to the city for support as paupers, for the sole reason that seven members of the Union, notorious for their turbulence and mischief-making propensities, have been discharged from the mill. Although the secretary of the Union, by proclamations alternately insolent and whining, seems to be endeavoring to lash his less instructed fellows into some act of violence, it can hardly be long before their children, if not themselves, will ask whether they are acting the part of men in allowing a few noisy demagogues to persuade them into abandoning both their duty — to labor for their families — and their right — to be paid for their labor — for the sake of gratifying the private revenge or conceit of persons who would not lift a finger to aid them in return. There can be but one answer to the question, and although it is almost too late to expect so much independence among the deluded work-people of Fall River, one can hardly help hoping that advantage may be taken of the opportunity to administer a sharp rebuke to the professional agitators who have so long cursed the city. The other case of organized and wanton resistance to wholesome rules has just occurred in Chicago, where a certain firm of stove founders revived an old regulation, by which any moulder who was careless enough to turn out a casting weighing over ten per cent more than the pattern, was obliged to melt it again, or suffer a small deduction from his wages. This rule, intended as much to secure good workmanship as to prevent waste of valuable iron, certainly involved no hardship to a decently attentive man, but the moulders chose to regard it as an infringement of their right to botch their work at other people's expense, and struck in a body. Few persons, we think, would regret to see the connection of such men with the trade permanently severed.

WE have to report the occurrence of labor troubles occurring among a class which has hitherto been exempt from these, among the other inconveniences of civilization. Fifty Indians, it appears, belonging to the Caughnawaga tribe, who were employed by their chief in working a mine belonging to him, struck for an advance of twenty-five cents per day in their wages, which have hitherto amounted to one dollar a day only. More than this, they have so far adopted the practices of their more enlightened brethren as to stipulate that an additional twenty-five cents shall be paid them on and after a given date, some weeks hence. It is a little startling to hear of a savage chief whose pay-roll amounts to fifteen thousand dollars a year, and whose warriors find thirty dollars a month insufficient to maintain them in a suitable style of paint and feathers, but under the circumstances both parties are perhaps fortunate in living among the peaceful inhabitants of the Dominion. Not long ago a strike took place among the laborers on a Virginia railroad, which the conservative residents of the neighborhood undertook to settle by the methods peculiar to that region. Turning out in a body, well armed with shot-guns and revolvers, they drove the discontented laborers back to their tip-carts and shovels, and stood guard over them until they were satisfied that there would be no more attempts to escape or change the established order of things.

The Board of Health of Newton, Mass., has issued a set of regulations which are in some respects better than any we have yet seen. Some parts of the city are just now in that stage of suffocation with their own foulness which succeeds the introduction of an abundant water-supply, and precedes the construction of sewers, and the only questionable regulation of the Board, — that which permits the construction of cesspools at a distance of not less than two rods from a well or cellar, — is no doubt a matter of necessity, since the lots are small, and citizens can neither be compelled to buy land at thirty or forty cents per square foot in order to increase the space between their cesspools and wells, nor to discontinue the use of the latter and bring the city water into their dwellings at their own expense. Aside from this unavoidable, but probably temporary permission, the rules are simple and easy to enforce, and combine to a remarkable degree that comprehension of the peculiar needs of the place, with a good knowledge of modern sanitary science, which gives value to such provisions. One of the best regulations is a rather unusual one on this side of the ocean. The Board requires that before any work of plumbing or drainage is undertaken in any building, a complete plan of all the pipes, traps, cesspools and other items shall be submitted to the City Engineer, for his approval or modification, as the case may be, and that no work shall be carried out except in accordance with a plan so approved or modified.

A discussion has been going on in the columns of the *Metal Worker* regarding the right of plumbers to charge for materials in their bills at the list prices, keeping for themselves the discount, or difference between these and the actual cost, which is in many cases very considerable. For instance, the discount from the list price of cast-iron pipe has been as much as seventy per cent, and on wrought-iron tubes and earthenware drain-pipes nearly as much. If then a plumber, in presenting an account for days' work and materials furnished, as is customary, charges these items at the list price, he simply pockets surreptitiously the amount of the discount, which he has done nothing to earn, and which he can only obtain by abusing the confidence of his employer, who is ignorant of the system, and supposes himself to be merely reimbursing the other for actual outlay. We are glad to see that the editor of the *Metal Worker* totally discountenances such practices, comparing plumbers to architects in their relation to their employer, and urging the propriety of their charging for personal services, in the same way as architects, engineers or other experts, and in a similar manner directing their client's expenditures for labor and materials without any attempt to appropriate his money without his knowledge in the shape of "profits" or "discounts." Nothing would do so much to improve the standing of good plumbers in the community as the adoption of this view. The itching for secret gains which is so strong in many men, and to which the dealers pander by refusing to communicate their discount sheets to those out of the trade, is itself a disqualification for any advisory or confidential position, and so long as this is indulged by plumbers, they must expect to be classed with those toward whom the only safe attitude is one of distrust.

A scientific investigation has recently been made into a matter which many plumbers and others have had presented to them in various ways, but which has been hitherto unexplained. It seems that in Germany the underground telegraph wires are often carried through lead pipes, and in renewing some wires in one of the large cities, the pipes were found to be corroded irregularly, the points of greatest corrosion being afterwards ascertained to coincide with certain places where the cable passed in contact with lime mortar or cement. Taking this circumstance as a point of departure, Dr. Rossel has studied the action of various substances upon lead, and finds that while carbonated lime exercises no action on the metal, the hydrate, as it exists in mortar, attacks it with considerable energy, and if moisture is present, a sheet one-thirtieth of an inch thick may be eaten through in a year. The lead is converted into a basic carbonate, which flakes away, leaving holes and indentations. This corresponds perfectly with the phenomenon, with which many plumbers are familiar, of the corrosion which takes place in traps or lead-lined tanks into which plastering mortar is allowed to fall. We have in mind one case where a cistern of considerable size, lined with lead, and exposed to the dropping of particles of lime from the plastering overhead, was eaten through year after year, to the great perplexity of the owner and his plumber, who could find no explanation in treatises on chemistry for such action.

A correspondent of the *British Architect*, who signs himself "Lex," explains the legal view of the relation between an architect and his client in regard to the commissions or perquisites which the former may have an opportunity of receiving without the knowledge of the latter. According to this authority, the relation between a person about to build and his architect involves a trust. "The client, not feeling himself competent to act for himself, appoints the architect his trustee to guard his interests and protect him from injury of every kind. Should the client suffer through the architect's default, the latter is liable under the statute of frauds to a criminal prosecution, and if he is convicted of malversation of trust he may be imprisoned at the discretion of the judge." "If," he goes on to say, "in the conduct of his client's affairs, an architect arranges to receive any remuneration for giving business to any one without the concurrence of that client, the law assumes a corrupt intent, and an architect would probably find it very difficult to purge himself to the satisfaction of the court." In illustration of the principle "Lex" supposes that a surveyor is asked his charge for preparing bills of quantities, and answers, two and one-half per cent, which he will divide with the architect. The architect replies that he does not wish to share the fee, and the surveyor says his charge will be one and one-half per cent; and that he had mentioned two and one-half because many architects expected to receive part. "When a client," he says, "under such circumstances pays two and a half per cent, he is, not to put too fine a point on it, robbed of one per cent, and his architect, being *particeps criminis*, is guilty of fraud, has betrayed his trust, and done what he can to discredit his profession." Every honorable architect will acknowledge that this is perfectly true. Among us, we believe that architects suffer more from the annoyance of ill-judged attempts to influence them by offers of unearned fees than their clients do from their yielding to the temptation, but if there should be unfaithful and dishonest ones, the reputation of the profession as well as justice demands that they should be made examples of.

Considerable alarm has been excited in Chicago with regard to a disorder of the bowels, apparently epidemic, which is thought to have originated from the use of a cheap kind of oleomargarine, made from uncooked lard. Pork-fat being abundant and cheap in the great pork-packing centres, it is natural that an attempt should have been made to use it for the manufacture of artificial butter, in the same way that beef-fat is employed in other places, but it appeared on trial that the lard on being thoroughly melted lost its "grain," and a better product, so far as appearance went, was obtained with fat nearly in the raw state. Lard, especially when raw, is one of the most indigestible fats, and would alone be likely to cause disturbance of the digestive organs, but physicians fear much worse consequences if the consumption of the porcine butter should become general. To say nothing of the bad effect which pork is thought to have upon scrofulous constitutions, the danger of introducing entozoa into the system by the use of the raw fat is a very real and imminent one. It is true that the cysticerci or embryos of the tape-worm, which form the dangerous element in measly pork, are large enough to be detected and strained out of the softened lard, but the eggs from which the cysticercus is produced are excessively minute, and might easily be introduced into the fictitious butter. If the number were small, they would do no great harm, as they would not pass beyond the cysticercus stage, but when consumed in large quantity, the number of embryos may be so great as to form, when collected in the soft parts of the body, as is generally the case, large and fatal tumors. There is, again, a strong probability that trichinæ may escape into the fat from the fibrous portions of muscle which are separated in the rendering process, thus giving rise ultimately to one of the worst and most fatal forms of disease known.

BUILDING SUPERINTENDENCE.—IV.

THE THIRD AND FOURTH VISITS.

VERY soon after these affairs have been agreed upon it will be necessary to make another visit to the building, to see that the execution is rightly begun.

We find the excavation finished, the blasting done under the tower, the collecting well and pipe completed, and the foundation-wall under that part already some five feet high. There is no other stone-work started, and thinking it a little strange that this, the most difficult point of the work, should have been begun first, we examine the wall minutely. The inside face looks all right, the stones being perhaps a little small; but that may be the way the stone runs. Outside, the gravel has been filled in nearly to the top of the stone-work. We borrow a crowbar and force it into the gravel outside the wall in several places. Except a softness of the material, which shows that it has not been properly rammed, or "puddled" by wetting it thoroughly, so as to pack it closely into its place, we observe nothing out of the way until we approach the corner, where for some feet the bar, instead of sinking its full length, close to the outside of the wall, strikes against the solid rock not far down. We call the foreman and ask him if the foundation-wall stands entirely clear of the ledge. He hesitates, and finally replies that the ledge, after being cut away through part of the thickness of the wall, showed such a "nice flat top" that it seemed a pity to excavate it any farther, and he had therefore built up a thin wall against it as high as the top, and then built out over the rock to make the full thickness of the wall as shown on the plans. He adds, with great apparent confidence, that "nothing can be better for part of the wall than the solid rock."

This explanation is specious, but in practice is dangerously misleading. In a wall so built, the water will find its way either through the imperceptible seams of the ledge or over its top into the body of the masonry, keeping it constantly damp. Moreover, there is a serious risk that under the heavy weight of the tower, the thin lining wall built up against the ledge, but in no way bonded to it, would separate from it and fall away, leaving the superincumbent masonry most insecurely supported.

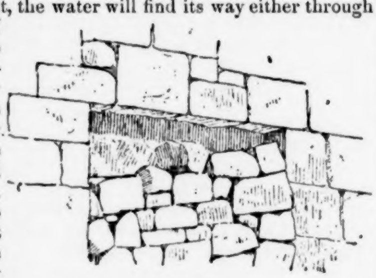


Fig. 28.

There is, besides, the certainty that the foundation-wall, built partly on unyielding rock, and partly of small stones laid in compressible mortar, will settle unequally, and crack, perhaps dislocating the masonry above, and at least opening an inlet for moisture. The work must therefore be immediately taken down to the very foundation, and the ledge cut away so as to leave ample space for the whole thickness of the cellar wall down to the footings, with seven or eight inches additional room outside the masonry to enable it to be properly pointed, and for packing in behind it a screen of gravel, which will intercept and carry safely down to the drains whatever water may ooze through the veins of the rock. The workmen will probably profess never to have heard of a foundation in which the bank was not intentionally cut just to coincide with the outside line of the wall, so that this could be built up directly against it, thereby saving them all the trouble of selecting stones for this side, so as to have it smooth; plumbing it, to get it vertical; and pointing it, so as to have it impervious. It is true that this is the common method of cheap builders, but it is not, and should not be, countenanced in work of any importance, even in dwelling-houses, except of the lightest and cheapest kind.

Outside Face of Foundation-Walls.

A wall built in this way (Fig. 29) is neither safe nor satisfactory. The joints at the back, being concealed, are usually devoid of mortar, or if any is put in, it falls out again, so that a gradual compression of the outer portion is liable to take place, as the weight of the superstructure increases, bulging the inner face of the wall toward the cellar, and the unfilled cavities next the bank collect the water which trickles down by them, and conduct it into the heart of the masonry, while the projecting points of the larger stones imbed themselves in the earth, so that when this freezes and expands, the wall is often lifted as if by a number of short levers, dislocating the joints and making channels for moisture through them. It is actually much more important to have the outside of a cellar wall smooth than the inside. If the stones are selected so as to show a good face on the outer surface, the joints well filled with cement mortar, and pointed with due care as the work proceeds, holding the trowel used for pointing *obliquely*, so as to "weather" the joint, as the workmen say (Fig. 30), any moisture which runs out from the bank, or descends from above, and flows down over the outer face of the wall, will, when it meets a joint, drip off, falling on the inclined surface of cement, by which it will be conducted safely over the edge of the next stone to run down and drip off again, until it reaches the bottom, where it passes off in the drain, without having been able anywhere to penetrate into the masonry. This essential point in construction is one of the hardest to enforce. It is so habitual with ordinary workmen to neglect the portions which will be concealed, and expend their skill on the visible inner surface, that some explanations given to individual men will be necessary, especially of the proper method of pointing, besides a good deal of watching, to see that the directions are followed.

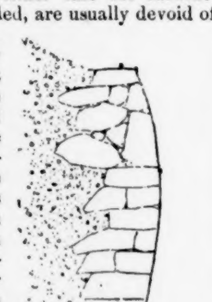


Fig. 29.

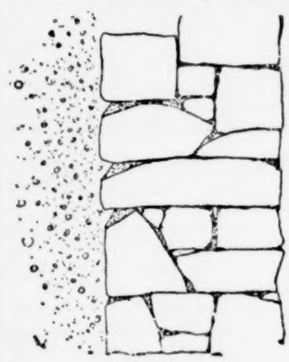


Fig. 30.

Having given the requisite orders for taking down the objectionable masonry, excavating the ledge properly, and rebuilding in the manner described, we will pursue our tour around the building. Close by we come to the pits prepared for the concrete piers which are to extend the foundation of the west wall down to the rock. The sides of the deepest holes are sustained by a shoring of planks and beams, and the contractor is awaiting orders to put in the concrete. We examine the pits to make sure that the ledge is exposed at the bottom, and clear of clay, which would prevent the concrete from attaching itself to the rock. The deepest excavation, we find, has struck a spring, which runs copiously over the surface of the ledge at the bottom, and the contractor says, with reason, that the cement will be washed out of his concrete as fast as he puts it in. There is a remedy for that; but before beginning the concreting we must test the quality of the materials. Meanwhile, we send a boy to fetch a dozen yards of oiled cotton cloth.

Concrete Making.

In accordance with our previous directions, the contractor has screened the gravel which he proposes to use, and the finer part is heaped up on one side of a large plank mortar-bed, while the coarser pebbles are piled on the other. The fine gravel, or rather sand, when rubbed in the hand gives a dry, crackling sound, and is prickly to the skin. We wet some of it, and grasp a quantity. On opening the hand it will not retain its shape, but falls down loosely, and does not soil the skin. It is therefore sharp and clean, suitable to be used for mortar or concrete without washing. If it should happen that the sand is very fine, it may still be used, if sharp and clean, but the proportion of fine sand by measure to a given quantity of cement should be less than that of coarse, and the coarser kinds are much to be preferred. The rounded pebbles screened out of the gravel are free from earth or clay, but some dust clings to them, which would prevent the perfect adherence of the cement to their surface, and we direct them to be thoroughly washed by throwing buckets of water over them.

Sand.

Some officious individual has added to the heap a quantity of the angular fragments of disintegrated rock from the tower foundation, but these, although excellent in shape, we find to be somewhat coated with the clay which has been washed into the rock seams, and therefore unfit for concrete unless washed clean. This would be a long process, since any admixture of clay clings very persistently to sand or stone, and is very injurious unless entirely removed, so, as we have an ample supply of cleaner material at hand, we order all the clayey fragments to be taken away.

The cement is next to be passed upon. Of this we find ready for us a large number of barrels, bearing a great variety of brands, and gathered from the stocks of all the local dealers within reach. Among them are casks from the Newark Lime and Cement Company, F. O. Norton & Co., Connolly & Shafer, the James Cement Company, besides a few barrels with other marks. The mason is in a hurry to begin, so we tell him to use at once any of the F. O. Norton or the Newark cement that has not been damaged. The first cask of these which is opened contains a crust of hardened cement three or four inches thick, but the enclosed portion remains in its normal state of fine powder. We order the crust to be rejected, but allow the inner portion to be used. The other barrels seem uninjured. Meanwhile, casting an eye now and then on the mortar mixers to see that they put conscientiously one shovelful of cement to two of sand, and thoroughly mix the dry sand and cement before adding water, we proceed to test roughly all the brands of cement before us with which we are not familiar.

Testing Cement.

Masons have various ways by which they profess to form an opinion of the goodness of cement. Some dip their hands or arms into the barrel, and if the powder feels warm they pronounce it good; others taste it, and if it bites the tongue they call it suitable for use, the strength of the cement being supposed to be proportional to the intensity of the bite; and there is another common belief that the dark colored Rosendale cement is stronger than the light. It is needless to say that all these tests are simply worthless; in fact, they are principally employed to impose upon modest young architects, who can sometimes be deceived by such mysterious performances, the result of which is sure to be in accordance with the interests of the party applying the tests.

Let us cast aside these divinations, and taking a handful of cement from an average barrel of each of the brands, mix it with water into a cake, put it in the sun, or in any dry place, for half an hour or more, till it acquires such a consistency as to be barely indented by the pressure of the end of a match or a stick of equal size, cut square, and weighted by resting a brick upon it. Place the cakes in some regular order, so that the different varieties of cement of which they are made can be distinguished, and as fast as they reach the requisite hardness, put them into a tub of water, till all are immersed. Note the time required for each one to reach its first "set" in the air. Finally, make a second series of cakes, and leave them exposed to the air, without immersion.

By this time a batch of concrete is mixed; the sand and cement have been thoroughly mingled until no lumps of cement or sandy streaks can be discovered in the heap, water is then added, not in too great quantity, but enough to give a pudding-like consistency to the mass, and the whole is well stirred and shovelled over again; then the stones, which have been well wet before putting them into the mortar, are added, and all mixed quickly, but thoroughly. If well mixed, the bulk of pebbles may be double that of the mortar. The object of wetting the stones before adding them is to wash off the light dust which very rapidly settles on them, and prevents the adherence of the cement. The moisture of the mortar would wash the stones clean by long stirring, but time is of importance, and it is best and easiest to dash on a few buckets of water at first.

Laying Concrete in Water.

We begin with the deepest pier of concrete, — the one which has to be laid in a stream of running water. Taking the oiled cotton, which has by this time been brought, we fashion it into a large, rude bag, nearly water-tight, which is taken down into the hole and filled with concrete. The water rises around the edge, but not enough to overflow the mass, and after packing the concrete solidly down into its place by means of a wooden rammer, we leave this, and proceed to put a layer into each of the other excavations, throwing it in from the top, so as to compact the mass by the momentum of the fall, as it is not easy to reach it with wooden rammers. After dividing the material already mixed among all the piers, the concreting should be stopped for the day, and the men put on other work, as we are more likely to obtain a compact mass by putting it in the pits in twelve-inch layers on successive days than by filling in the whole body at once. The holes should be covered with boards to prevent rain from washing in sand on top of the layers already deposited.

The next day, after our regular preliminary tour, first outside and then inside the building, we examine the samples of cement which we made up the day before and laid aside. The specimen of the Newark Lime and Cement Company's cement left twenty-four hours in the air is found to be quite hard, and breaking the cake with a slight pulling strain, much as if it were a stick of candy, we find it to possess a very sensible tensile strength, and the two halves separate with a clean fracture instead of crumbling. The cake of the same brand left in water retains its shape, and has increased considerably in firmness. The cement may therefore be pronounced good, as is usual with that brand.

The F. O. Norton samples, both in water and in air, show similar qualities in at least an equal degree; and all the barrels of this brand which on being opened show no signs of caking are accepted.

The sample in air from the barrels marked "James Cement Co." is quite hard, harder than either of the two preceding, and a slight bluish efflorescence, like mould, has already begun to appear on its surface, but the specimen left under water has crumbled into a soft heap.

Of the Connolly & Shafer manufacture, the portion left in the air retains its shape, but has not acquired much consistency: it crushes in the fingers like clay. The sample in water is nothing but mud.

It does not necessarily follow, because this last variety sets slowly, that it is essentially bad, but it will be unsafe to use in our concrete, and inconvenient in the masonry, so that unless a second sample should show much better qualities, we will discard all the barrels of that brand.

The James cement, which sets quickly and hard in air, but under water breaks up and crumbles, should be rejected for the concrete, but may be used for the masonry. If the rapidity of its setting should interfere with its convenient use, as will very likely be the case, especially in hot weather, it should be mixed with a small portion of lime.

If none but James cement should be obtainable, or other brands having similar characteristics, let the superintendent try whether a sample of it mixed with half its bulk of slaked lime and made into a ball will set hard under water; if so, it may be safely used in that way, even for concrete.

Some of the quickest-setting Rosendale cements, when immersed in water without having previously acquired a certain degree of hardness in the air, will set rapidly, and immediately crumble again, and never acquire any subsequent consistency. With such it is often found that the addition of a small quantity of lime will confer upon it the qualities of the better cements, causing it to set perfectly under water, and improving it for use in air by retarding the setting slightly. With the very slow-setting cements little can be done unless there is time to wait for them. They may do for adding to lime mortar in stonework above ground, where it is desirable to harden the mortar, but for foundations, on which the weight is to be rapidly added, or in work under water, it is best to avoid the use of any cement whose setting is found to be uncertain or long delayed.

It is unnecessary to say that these tests are by no means such as would be used for engineering work of importance, but they will do well enough for rough determinations, and an ample margin of strength is, or should be, always left in the smaller operations of construction. More accurate methods of judging will be described in treating of city buildings.

In the course of our preliminary tour around the works we noticed with surprise that one of the concrete piers was already finished, and the top nicely smoothed over, and having completed the tests of the cement, we return to inquire into the matter, taking the foreman with us. We examine the ground closely, and notice some stray pebbles dropped around the edge of the hole, and some such dialogue takes place as the following: —

Superintendent: — "Mr. Foreman, how did you get this pier done so soon?"

Foreman: — "Well, sir, we hurried a little on this pier, because we wanted it to git set before it rained, and" —

Superintendent: — I left word to put in only twelve inches of concrete at a time in each pier."

Foreman: — "O law, sir, that aint no way to build a pier. There aint no one can tell me nothin' about concrete. That's as nice a job of concrete as ever" —

Superintendent (remembering the scattered pebbles): — "You didn't put the stones in dry and then grout them, did you?"

Foreman (slightly taken aback): — "Well, sir, perhaps, — yes, we did: you see, that is the best way to do where you have such coarse sand, and then" —

Superintendent: — "Get some one here and take that all out. It is impossible to tell now how much cement there is in it, but it has not begun to set, so if you will take it back to the pen and add a shovelful of cement to every two shovelfuls of this, and mix it well, I will let it pass to put into all the piers twelve inches thick."

Foreman (deferentially): — "Yes, sir, anything you say, sir."

Setting Footing-Stones.

Pursuing our way after this little episode we come to a squad of men laying footing stones for the clerestory wall on the gravelly bottom. These must be carefully looked after, for the weight of the clerestory wall being concentrated on the piers of the arcade will try the strength of the foundation very seriously. The drawings show a continuous foundation-wall, but no inverted arches, it being impossible to get the necessary abutment for these without considerable additional expense, and it is therefore necessary that the masonry of the foundation should be well bonded together longitudinally, so as to receive the pressure as a solid mass; otherwise the settlement will be greater under the piers, and the work will be dangerously dislocated.

Most of the footing-stones on the ground are good flat pieces, but here and there are some misshapen lumps, and one of these, just as we come up, is suspended to the derrick boom, ready to lower into its place. The men have tried faithfully to hollow out a basin in the gravelly bottom of the trench to fit the irregularities of the stone, but when this is lowered into its place, it rocks unsteadily. It is raised again, and the bed remodelled. This time the stone fits better, but is still unsteady. The men are discussing whether to let it go as it is, or try again, when the superintendent comes up, and stepping upon the stone rocks it until he is satisfied that there are no large cavities beneath. Sending for buckets of water, he directs fine gravel to be heaped around the stone, picking out all pebbles and lumps, and the water to be then thrown on, pailful after pailful, or, still better, a stream from a hose to be directed upon the mass. The water settles away through the sand, searching out all cavities into which it can flow, and carrying particles with it wherever it goes, which gradually compact themselves in the hollows under the stone until it can no longer be moved. This puddling process is continued a little longer, to make sure that a full and perfect bed is formed under the stone, and directions are given to do the same with all the levellers which have uneven beds.

Puddling with Water.

Where the bottom of the trench is clay or rock, a thick layer of cement mortar should be spread to bed the footing-stones in, for the purpose of filling up all cavities between the substratum and the stone, but in gravelly soil the puddling with water is often much better than the bed of cement, especially with stones of very irregular shape. This expedient for filling in cavities under and around masonry is capable of still more extended use. The writer once knew a case where a church tower had been nearly completed upon a foundation badly built and with joints only half-filled with mortar. The tower began to settle, and the contractor for the superstructure, a man distinguished for his boldness and ingenuity in emergencies, sent for the town fire-engine and a quantity of fine sand, and putting the sand into the tower cellar, kept the engine playing upon it for half a day. The floods of water found their way out through every crevice, and wherever the water went the sand followed, until all the cavities were packed full. It was heroic treatment, certainly, but effectual; the settlement ceased, and the tower stands perfect to this day.

Foundation Stone.

Let us look at the stone delivered on the ground for foundation-walls. It is of various kinds, some pieces being slaty, some tough, with rounded surfaces, like fragments of boulders, as they probably are. Many blocks of the greenstone from the tower excavation are to be seen, and these should be examined with suspicion, for fear of almost invisible cracks, which will let the water soak slowly through, besides unfitting the stone to resist a strain. To test them, they should be struck with a hammer. If they ring clearly, they are good; a seam, even if invisible, will betray itself by the dull sound which follows the blow. The boulder stones are usually good, if not too much rounded. One side, at least, should be quite flat, to form the bed. Slate stones vary in different localities. In some places they are of immense strength if placed flat in the wall, and form admirable material; in others, especially in eastern Massachusetts, the tendency to cleavage in the secondary planes, across the laminæ, is so decided that the stones, although apparently sound and strong, will break across after being placed in the wall, as soon as the weight of the superstructure comes upon them. This is a most annoying defect, as the stones cannot then be taken out, and the parts often separate a quarter of an inch or more, making a seam which it is difficult to close by pointing. The only way, when a tendency is noticed in the stone to break up into fragments of regular crystalline form, is to avoid using it in long flat pieces, for lintels, bond-stones or templates, or in any other position where it will be subjected to a cross strain. The softer lime and sand stones, when used for foundations, are much less liable to such defects, but being somewhat absorbent, special pains must be taken to isolate them from the banks of the excavation by a backing of sand or gravel, and to provide for thoroughly intercepting and draining off the moisture which might come in contact with them.

An inspection should now be made of the lime, and opportunity should be taken to inquire into and criticise the methods that the foreman proposes to employ in mixing the mortar for the upper portion of the masonry.

Lime.

The barrels have, we find, been piled on a slightly elevated spot, the ground descending in all directions, so that water may not during heavy rains run down against them. Boards have been placed underneath, to keep them from the dampness of the ground, and a covering of boards has been laid on top, to shelter them from storms. This would not be sufficient protection in ordinary cases, but the contractor tells us that he intends to build up the foundations of the chancel at once, and lay the floor over them, which will give him a dry place for storing materials, and we acquiesce in this arrangement. Two or three of the casks in the pile have burst open, and looking in we see some of the lumps in them crumbled down into soft powder, while others are hard, but remain inert when dipped in water. These are damaged casks, and must be rejected as worthless, however good the original quality of the lime may have been. A large part of the barrels are marked "ground lime," and contain a dingy-colored lime in powder. This, if not damaged, will make good mortar, although it slakes quietly, and if not pulverized will not slake at all. The mortar of common ground lime is slightly hydraulic, and will harden under water. In general, the hydraulic limes, which will harden under water, or in damp situations, without admixture of cement, slake quietly, and need to be ground after burning, while the fat limes, such as are used for plastering, slake energetically, and are better kept in lumps, so that they may not be slaked by the moisture of the air, while the mortar made from them hardens slowly in the air, and under water, or in damp soils, never, unless cement is added to the mixture, which is usually done where they are used for masonry.

There is one singular exception to this rule among the American limes, of which we shall perhaps find some examples in our miscellaneous heap of barrels. Let us open that old flour-barrel, without mark of any kind. We discover it to be filled with a black substance, in lumps resembling cinders. This black lime is made from a beautiful pink marble, and slakes fiercely in water, making a dark-colored mortar, which sets like a strong cement. Two or three other casks, containing white lime, are destitute of brands, and their contents should be tested by putting a few lumps from each into water. The lime from one slakes quickly, but only superficially, leaving a hard core. It is therefore underburnt, and must be rejected and sent off the ground. The lumps of core, if allowed to get into the mortar, would be liable to swell afterwards and crack the joints or throw off the pointing. Another barrel contains overburnt lime, which remains inactive for a long time in the water, even when powdered, at last slaking slowly. This must also be discarded; it is less valuable than so much sand.

The other barrels are stencilled "Rockland," "Rockport," "Canaan," "Glens Falls," "Thomaston," or other well-known brands, and if not damaged by water or by gradual air-slaking, are probably all good enough for making stone mortar with an admixture of cement.

In mixing the mortar the foreman should be persuaded, if possible, to put on all the water for a batch of lime at once, instead of by successive buckets, with intervals of stirring between, thereby chilling the lime as fast as it begins to heat.

Mortar.

Even filling the pen with a hose is too long a process for securing the best results; with very active lime the most successful mode is to pour it in a mass from a large cask. The proper quantity of water is one and a half barrel to each barrel of average lump lime, and this should be measured as accurately as possible. If too much is added, the mortar will be thin; if too little, it will be thick and become difficult to work as the slaking proceeds, so that the mixer will add more water to the mass, thereby chilling it and putting a stop to the slaking process, and a granular, lumpy mortar will be the result.

Much of the labor of stirring would be saved, and the quality of the mortar improved, by covering the pen, as soon as the lime lumps have been evenly spread over the bottom and the requisite proportion of water added, with a canvas or tarpaulin, and leaving it to itself for half an hour or so, during which time the confined steam and heat, aiding the action of the water, will reduce the whole to a smooth, uniform paste.

On no account should the lime be slaked on the bare ground or in a hollow made by an embankment of sand. Such practices, though they still linger in country districts, have long been obsolete in all places where good workmanship is held in honor. A water-tight pen of planks, about four feet by seven, must be made, with plank bottom, and sides about ten inches high. This will give room for treating one cask of lime at a time.

After the lime is slaked and all the lumps reduced to smooth paste, it should stand as long as possible before mixing with the sand, which may, if the lime is good, be added in the proportion of two parts of sand to one of the lime paste.

There is a common error that cement will take more sand than lime. This arises from the fact that in mixing cement it is generally allowable, unless great strength is required, to add sand to the dry cement powder in the proportion of three to one, or, as the mixture is usually effected, one shovelful of cement to three of sand, whereas for lime mortar the rule of two parts by measure of sand to one of lime *paste* cannot be exceeded without injury; but as the crude lime swells in slaking to about two and a half times its original bulk, a quantity of sand equal to double the amount of hydrated paste would represent five times the bulk of the original lime lump. If the cement were mixed with water before adding the sand, which would be impossible, on account of its rapid setting, the result would be the same, since the cement expands very slightly, if at all, in slaking.

Our specifications require that the mortar for foundations should be made with "one-half cement." Let the contractor and his men understand that this means one cask of cement to each cask of lime; not one-half a barrel of cement to one of lime, as some masons pretend to interpret it.

The lime mortar alone will stand for weeks unchanged, but the addition of cement causes it to set in a few hours; it should therefore be mixed only as required for immediate use. Some judgment and observation will be needed to make sure that the cement is added in the proper proportion, unless it is mixed with the sand previous to adding this to the lime, which is not practicable unless it can be used immediately, since the cement would slake by absorption of moisture from the air on standing. The mixture should be thoroughly made, which will be shown by the uniform color of the mortar and the absence of streaks or spots.

Specifications are sometimes so loosely drawn as to omit all mention of the mortar. In such cases the character of the mixture and the proportion of materials will depend greatly upon local custom, but the practice of mixing the lime for mortar of foundation-walls with at least one-half its bulk of hydraulic cement is so universal and so necessary, where ground lime or some other variety having hydraulic properties cannot be procured, that it should be required in all cases where mortar is used below the ground surface. In wet or springy soils, or for heavy buildings, the dose of cement should be equal to that of lime.

As for the quality of materials, neither law nor custom presume any but the best to be intended where nothing is said to the contrary in the specifications. Under no pretext can damaged or inferior lime or cement, or loamy sand, be imposed by a builder upon his employer.

STRENGTH OF FIRE-PROOF FLOORS.

The term, fire-proof floor, is here understood to mean a floor constructed of some fire-proof material, supported on or between rolled-iron I-beams. There are three principal kinds of fire-proof material in general use; viz., brick, hollow terra-cotta tile, and hollow blocks manufactured from the hydraulic lime of Teil.

The method of designing a floor constructed of either of these materials is essentially the same, and as the brick floor is the most common, I will take up that in detail, and afterwards speak of the strength of the other materials.

The common way of making a fire-proof floor of brick is to use rolled-iron I-beams placed 4 to 8 feet apart, and fill in between them with brick arches, which rest on the flanges. When this method is pursued, care should be taken that the bricks of which the arches are composed are of good shape, and very hard. The arches need not be over 4 inches thick for spans from 4 to 8 feet, except for about a foot at each springing, where they should be 8 inches thick for spans between 6 and 8 feet; and care should be taken to form the skew-backs quite solid, and square to the line of pressure. The most desirable span for the arches is between 4 and 5 feet, and the rise should be about one-eighth of the span, or 1½ inches to the foot.[1] In designing such a floor as the above, it is only necessary to calculate the strength of the iron beams, as the brick arches, if properly constructed, are always strong enough to support any load that, in all probability, would ever come upon the floor.

The method of calculating the size of the iron beams is merely to determine the exact load they will have to carry, and then to find the required size of the beam to carry that load.

The weight of a brick arch with cement filling is generally taken at 70 pounds per superficial foot of floor. The superimposed load will of course be the same as that for wooden floors, viz.: 120 lbs. per square foot for floors in public buildings, 75 lbs. for floors in dwellings, and 250 lbs. for floors in first-class stores. The weight of the

[1] *Transverse Strains*, p. 345.

iron beams themselves is so considerable that it must be subtracted from the safe load, to get the true bearing load.

The load that an iron beam will have to carry in this kind of a floor, then, may be represented by the expression

$$c \times L \times (f + 70) + \text{weight of beam itself},$$

in which c denotes the distance between the centres of the beams in feet; L, the length of the beams between supports in feet, and f the superimposed load per superficial foot.

Having obtained the value of this expression, minus the weight of the beam, we must proceed to find the size of beam which will carry this load. Table I, gives the safe distributed load in pounds for a span of one foot, of the Union Iron Mills and Trenton beams, and to obtain the safe load for any span, it is only necessary to divide the safe load for one foot by the given span in feet. The safe distributed load for a span of one foot we will call the *co-efficient* of the beam, then from the considerations given above, we shall have: —

$$\text{Co-efficient in lbs.} - \text{weight of beam} = c \times L^2 \times (f + 70). \quad (1)$$

and

$$c = \frac{\text{co-efficient in lbs.} - \text{weight of beam}}{L^2 \times (f + 70)}. \quad (2)$$

Example: What sized Trenton I-beam would be required in the floor of a first-class store, the beams to have a span of 12 feet, to be 4 feet apart apart, and to be filled in between with brick arches?

By Formula 1, we find that the co-efficient — weight of the beam = $4 \times 144 \times (250+70) = 184{,}320$ lbs. Now, if we look in Table I, under Trenton beams, we shall find that the beam whose co-efficient comes next above 184,320 lbs. is the "9-inch heavy," whose co-efficient is 189,000 lbs. The weight of the beam would be 340 lbs., hence the 9-inch heavy beam is amply strong enough for the purpose.

TABLE I. — STRENGTH OF ROLLED-IRON I-BEAMS.

Calculated with a factor of safety of 3.

Union Iron Mills Beams.			Trenton Beams.		
Designation of Beam.	I. Weight per yard in lbs.	II. Safe distributed load for a span of 1 ft. in lbs.	Designation of Beam.	I. Weight per yard in lbs.	II. Safe distributed load for a span of 1 ft. in lbs.
15 inch, heavy..	201	848,000	15 inch, heavy..	200	748,000
15 " light...	150	658,000	15 " light...	150	551,000
12 " heavy..	180	582,000	12¼ " heavy..	170	511,000
12 " light...	126	416,000	12¼ " light...	125	377,000
10½ " heavy..	105	308,000	10½ " heavy..	135	360,000
10½ " light...	94.5	276,000	10½ " light...	105	286,000
10 " heavy..	114	328,000	9 " extra...	125	268,000
10 " light...	90	278,000	9 " heavy..	85	189,000
9 " heavy..	90	246,000	9 " light...	70	152,000
9 " light...	71.25	206,000	8 " heavy..	80	168,000
8 " heavy..	81	198,000	8 " light...	65	135,000
8 " light...	66	164,000	7 " 55 lbs..	55	101,000
7 " heavy..	60	132,000	6 " 120 lbs..	120	172,000
7 " light...	54	124,000	6 " 90 lbs..	90	132,000
6 " heavy..	48	90,400	6 " heavy..	50	76,800
6 " light...	40.5	76,600	6 " light...	40	62,600
5 " heavy..	36	51,400	5 " heavy..	40	49,100
5 " light...	30	43,800	5 " light...	30	38,700

TABLE II. — SHOWING THE REQUIRED SIZE OF TRENTON ROLLED I-BEAMS (FILLED IN BETWEEN WITH BRICK OR FLAT ARCHES) FOR FLOORS IN FIRST CLASS STORES.

Calculated to sustain a load on the floor of 250 lbs. per superficial foot.

TRENTON ROLLED I-BEAMS.

Span in feet.	Distances between centres of beams, in feet. 4		5		6	
	Designation of Beam.	Weight in lbs.	Designation of Beam.	Weight in lbs.	Designation of Beam.	Weight in lbs.
6..	5 inch heavy..	80	6 inch light...	80	6 inch heavy..	100
7..	6 " light...	93.3	6 " heavy..	116.7	6 " 90 lbs..	210
8..	6 " 90 lbs...	240	6 " 90 lbs..	240	6 " 90 lbs..	240
9..	6 " 90 lbs...	270	6 " 90 lbs..	270	6 " 120 lbs.	360
10..	6 " 90 lbs ..	300	6 " 120 lbs.	400	9 " heavy..	283.3
11..	6 " 120 lbs.	440	9 " heavy..	311.7	9 " extra...	458.3
12..	9 " heavy..	340	9 " extra ..	500	10½ " light...	420
13..	9 " extra...	541	10½ " light...	455	10½ " heavy..	585
14..	9 " extra...	583.3	10½ " heavy..	630	12¼ " light...	583.3
15..	10½ " light...	525	12¼ " light...	625	12¼ " heavy..	850
16..	10½ " heavy..	720	12¼ " heavy..	906.7	12¼ " heavy..	906.7
17..	12¼ " light...	708.3	12¼ " heavy..	963.3	15 " heavy..	1133.3
18..	12¼ " heavy..	1020	15 " light...	900	15 " heavy..	1200
19..	12¼ " heavy..	1076.7	15 " heavy..	1266.7	15 " heavy..	1266.7
20..	15 " light...	1000	15 " heavy..	1333.3		
21..	15 " heavy..	1400	15 " heavy..	1400		
22..	15 " heavy..	1466.7				
23..	15 " heavy..	1533.3				
24..						
25..						

Note. — The calculation of this table is based on the safe loads for the different beams, given in the handbook published by the New Jersey Steel and Iron Company, of Trenton, N. J.

If any one should desire to calculate the safe load of a rolled-iron I-beam, they can do so by the following formula: —

$$\text{Safe distributed load in lbs.} = \frac{112{,}000 \times d}{12\,L}\left(\frac{A_1}{6} + \frac{A \times d_1^{\,2}}{d^2}\right) \quad (3)$$

where L denotes the span of the beam in feet; d, the whole depth of the beam; d_1, the effective depth between centre of gravity in flanges; A, the area of one flange; and A_1, the area of the web.

Iron beams for floors with arches should have a bearing on the wall of about 8 inches.

To save the trouble of going through the work of Formula 1 every time it is desired to find the size of beam needed in a so-called first-class store, I have calculated Table II, which shows the size of Trenton rolled I-beams for floors in that class of buildings, for distances between centres of 4, 5 and 6 feet. The application of this table is too simple, I think, to need any explanation.

Owing to lack of space, a table for the Trenton beams only can be given, but if it is desired to use the Union Iron Mills beams, the required beam can be found by first finding the required size of Trenton beam, and then, looking in Table I, find the Union Iron Mills beam whose co-efficient is equal to or just above that of the Trenton beam. Thus, if we found that in a certain floor a 12¼-inch light Trenton beam would be of the requisite strength, and we wished to use a "Union" beam, we simply look in Table I, and find the "Union" beam whose co-efficient is equal to or just above that of the 12¼-inch light Trenton beam. This beam we find to be a 12-inch light beam, and hence we can employ it instead of the Trenton.

DEFLECTION OF ROLLED I-BEAMS.

The deflection of a rolled I-beam at the centre, under a distributed load, the beam being supported at both ends, may be found by the formula: —

$$\left.\begin{array}{r}\text{Deflection}\\ \text{in inches,}\end{array}\right\} = 0.013 \times \frac{\text{Load} \times l^3}{26{,}000{,}000 \times I}, \quad (4)$$

l, being the length of span *in inches*, and I, the moment of inertia. The moment of inertia and other properties of the Union Iron Mills and Trenton beams was given in an article on Strength of Beams, published in the *American Architect* for April 24, 1880. When it is desired to use an I-beam which shall not deflect more than a certain amount under a given load, it will be necessary to use Formula 4.

According to the calculations of the engineer of the New Jersey Steel and Iron Company, the beams in Table II will not deflect over one-thirtieth of an inch for every foot of span, under the load which they have been calculated to support.

Tie-rods. — Tie-rods from $\frac{5}{8}$ to $1\frac{3}{8}$ inches diameter are ordinarily employed to take the thrust of the brick arches, and to add to the security of the floor. These may be spaced from eight to ten times the depth of the beams apart, and the holes for them should always be punched at the centre of the depth of the beam. The formula for the diameter of the-tie rod for any floor is:[1] —

$$D = \sqrt{\frac{s\,W}{62{,}832\,r}},$$

where s = span of arches in feet, W = weight of floor and superimposed load resting on the arch, half way between the tie-rods on each side, and r = rise of arch in *feet*.

Example: What should be the diameter of the tie-rod to take the thrust of the arches in the above example under fire-proof floors, the rods to be spaced 7 feet apart?

Ans. — In this case $s = 4$ feet nearly; $W = 320 \times 4 \times 7 = 8960$,

$$\text{and } r = \tfrac{1}{8} \text{ of } s = \tfrac{1}{2} \text{ foot. Then } D^2 = \frac{4 \times 8{,}960}{62{,}832 \times \frac{1}{2}} = 1.14,$$

or $D = 1$ inch nearly.

Of course, where arches abut against each side of a beam, there is no need of a rod to take the thrust of the arches, but it is always safer to use them, as the outside bay of the floor might be pushed off sideways, if the whole were tied through, and also if one of the arches should fall or break through, the rods would keep the other arches in place.

TABLE III. — SHOWING THE DEPTH AND WEIGHT OF FLAT ARCHES OF TEIL HOLLOW BLOCKS; OF HOLLOW FIRE-CLAY BRICKS; AND OF HOLLOW TERRA-COTTA TILE.

FLAT ARCHES OF TEIL HOLLOW BLOCKS.

Spans between Iron Beams.	Depth of Arch.	Weight per square foot.
Up to 2 ft. 0 in.	4 inches.	16 lbs.
" " 2 " 9 "	5 "	20 "
" " 3 " 0 "	6 "	22 "
" " 4 " 9 "	7 "	24 "
" " 5 " 0 "	8 "	26 "
" " 5 " 6 "	9 "	29 "
" " 6 " 3 "	10 "	35 "
" " 7 " 0 "	11 "	39 "
" " 8 " 0 "	12 "	43 "
" " 10 " 0 "	15 "	52 "

Flat Arches of Hollow Fire-Clay Bricks.

Spans between Iron Beams.	Depth of Arch.	Weight per sq. ft.
Up to 3 ft. 0 in....	4 inches.	20 lbs.
" " 5 " 0 "	6 "	30 "
" " 6 " 0 "	7 "	38 "
" " 7 " 0 "	8 "	45 "

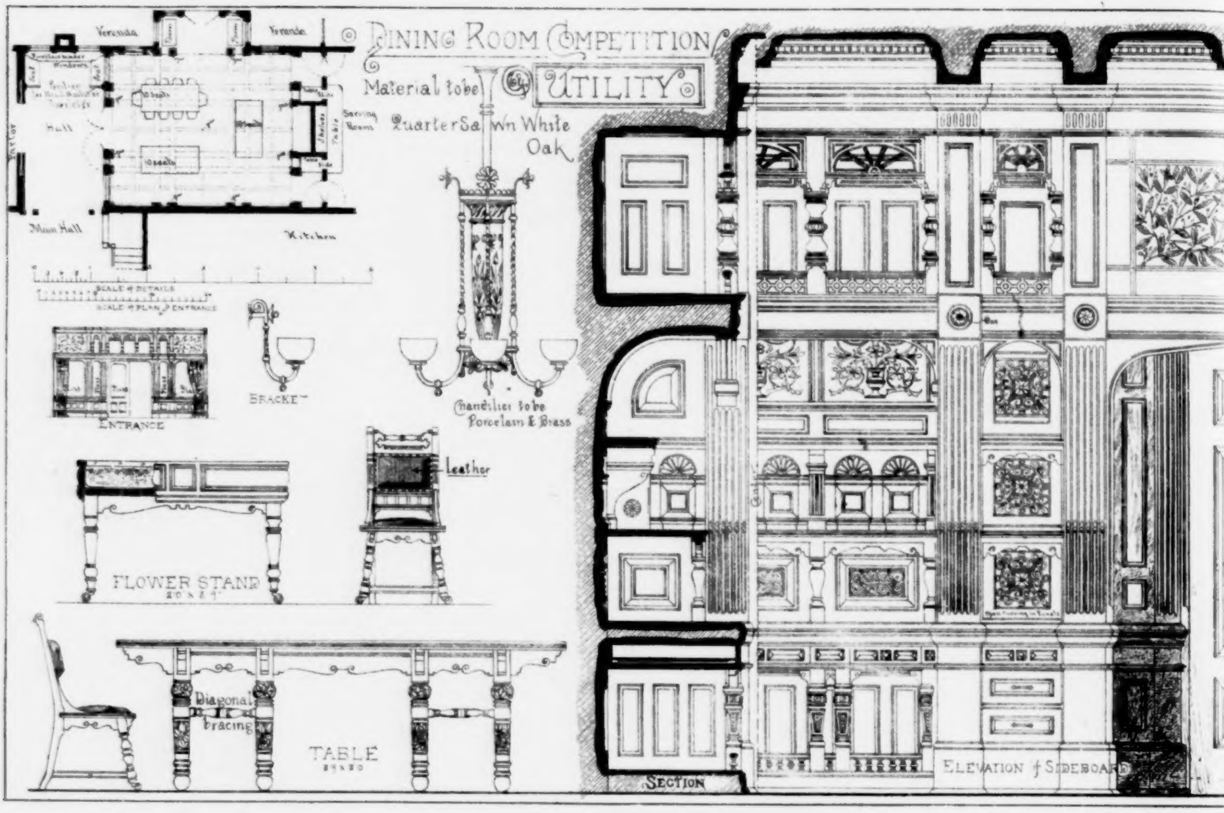
Flat Arches of Hollow Terra-Cotta Tile.

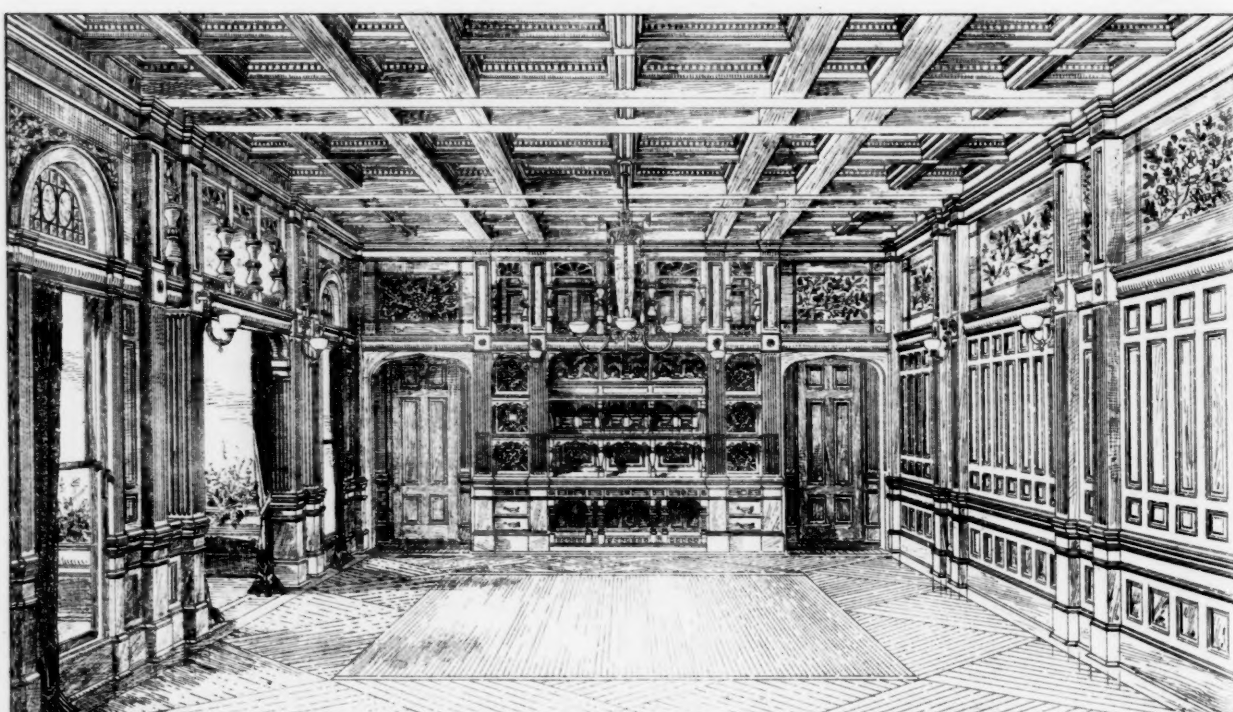
Spans between Iron Beams.	Depth of Arch.	Weight per sq. ft.
Up to 4 ft. 0 in....	6 inches.	30 lbs.
" " 5 " 0 "	8 "	38 "
" " 6 " 0 "	12½ "	45 "
" " 8 " 0 "	15 "	—

This table is compiled from data furnished by the Fire-Proof Building Co., of New York; and Messrs. Johnson & Co., of Chicago.

Table III gives the weight per foot and depth of arch, for floors constructed of hollow Teil fire-proof blocks, and of hollow fire-clay brick, manufactured by the Fire-Proof Building Company, of New York; and also of the flat arches of hollow terra-cotta tile, manufactured by Messrs. Johnson & Co., of Chicago. Either of these materials make a very strong floor, and as they give a flat surface, both above and below, they are often preferred to brick arches. As

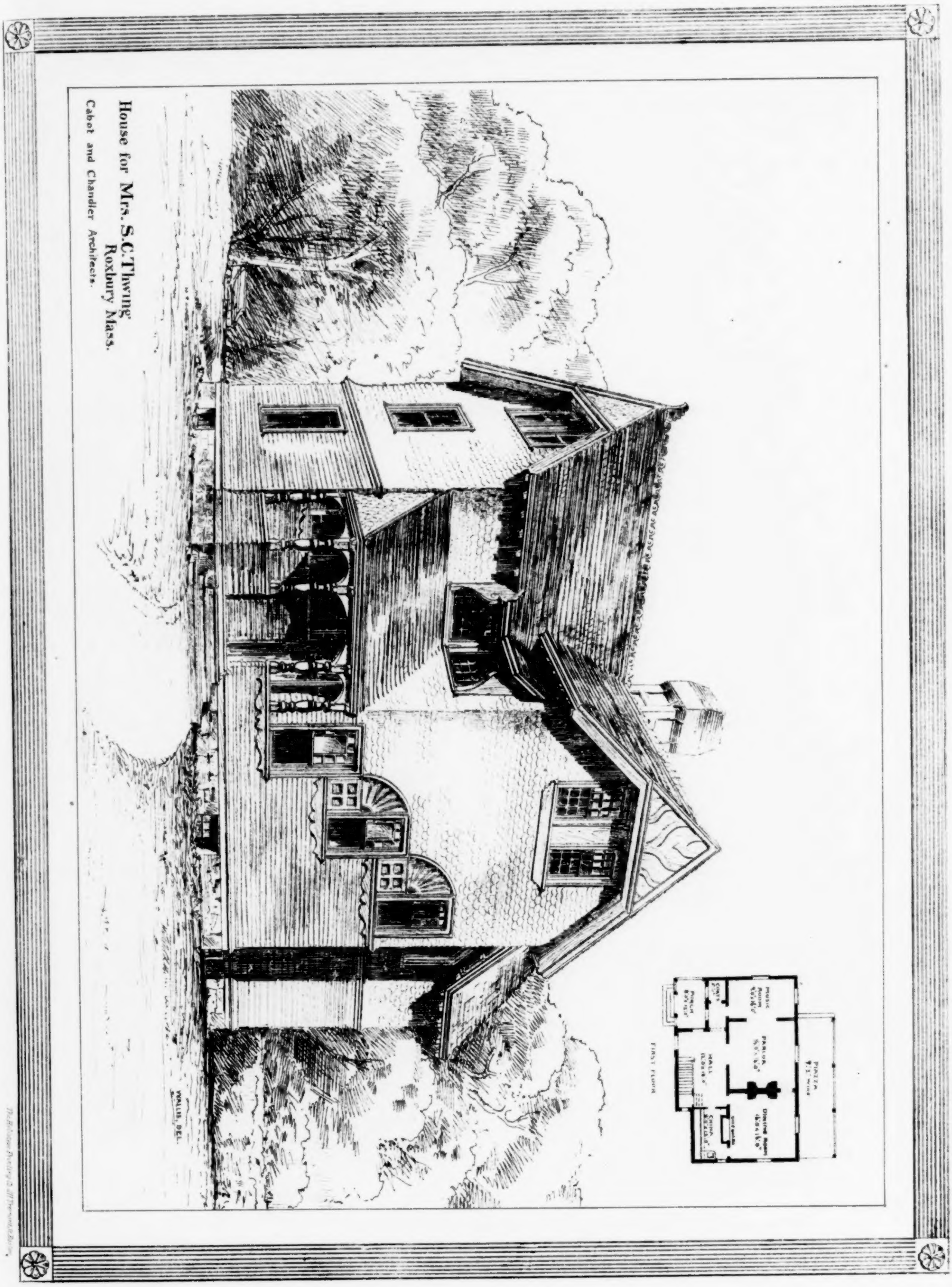
[1] *Transverse Strains*, Art. 507.





Dining Room Competition. Utility

The Heliotype Printing Co. 211 Tremont St. Boston.



House for Mrs. S. C. Thwing
Roxbury Mass.
Cabot and Chandler Architects.

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are filmed clockwise beginning in th
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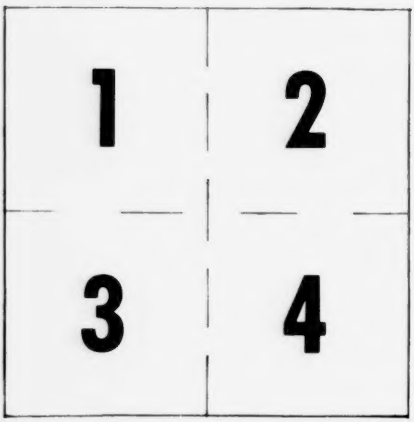
diagrams illustrate the method.



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frames as required. The following

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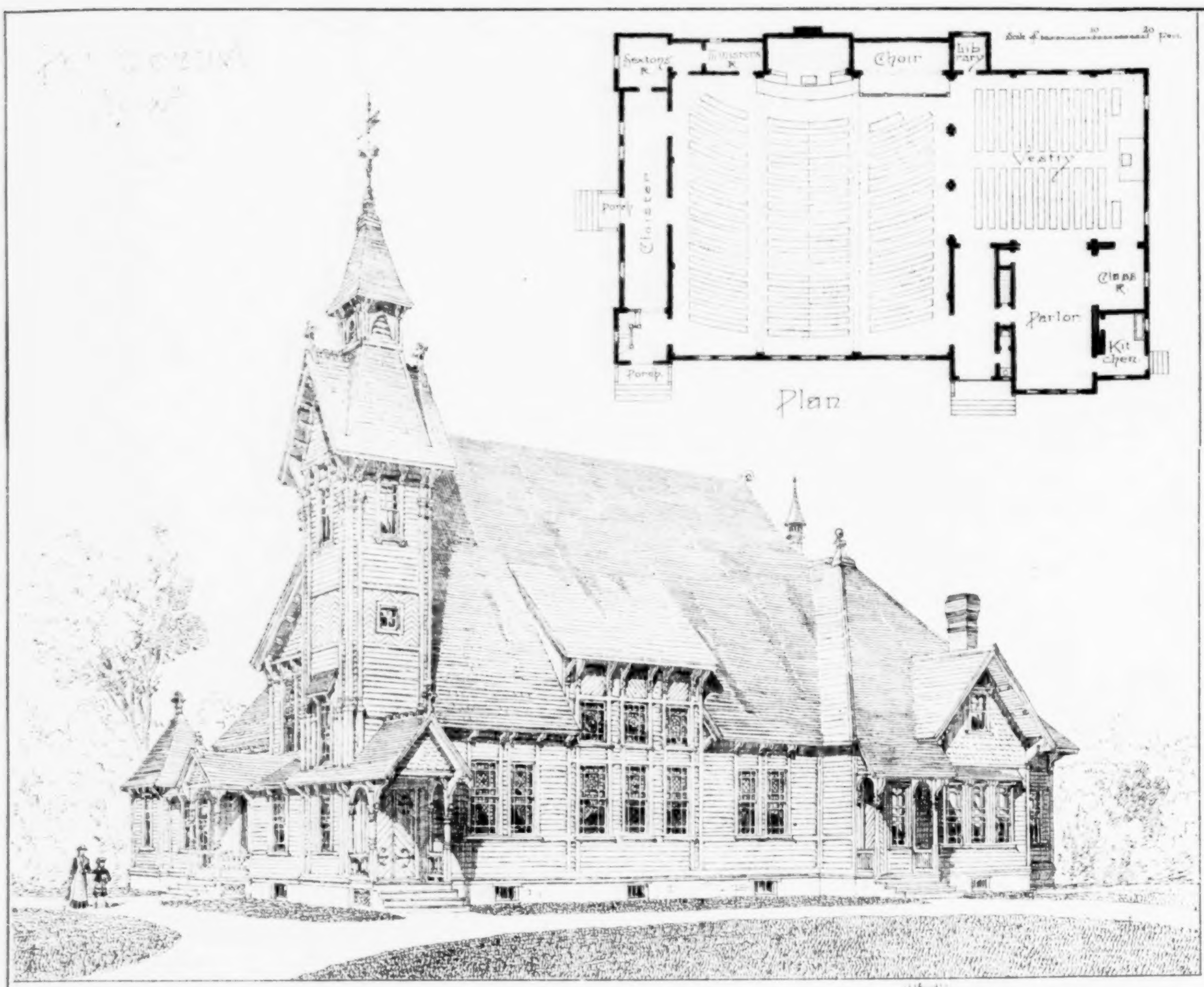
7	8	9



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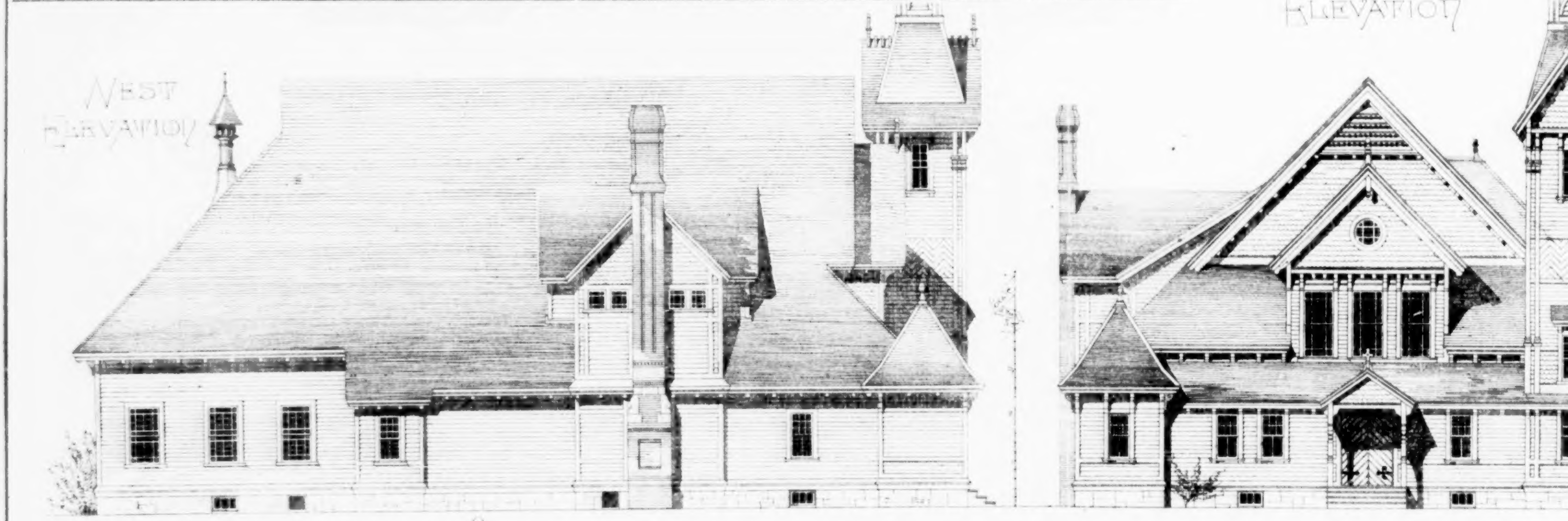
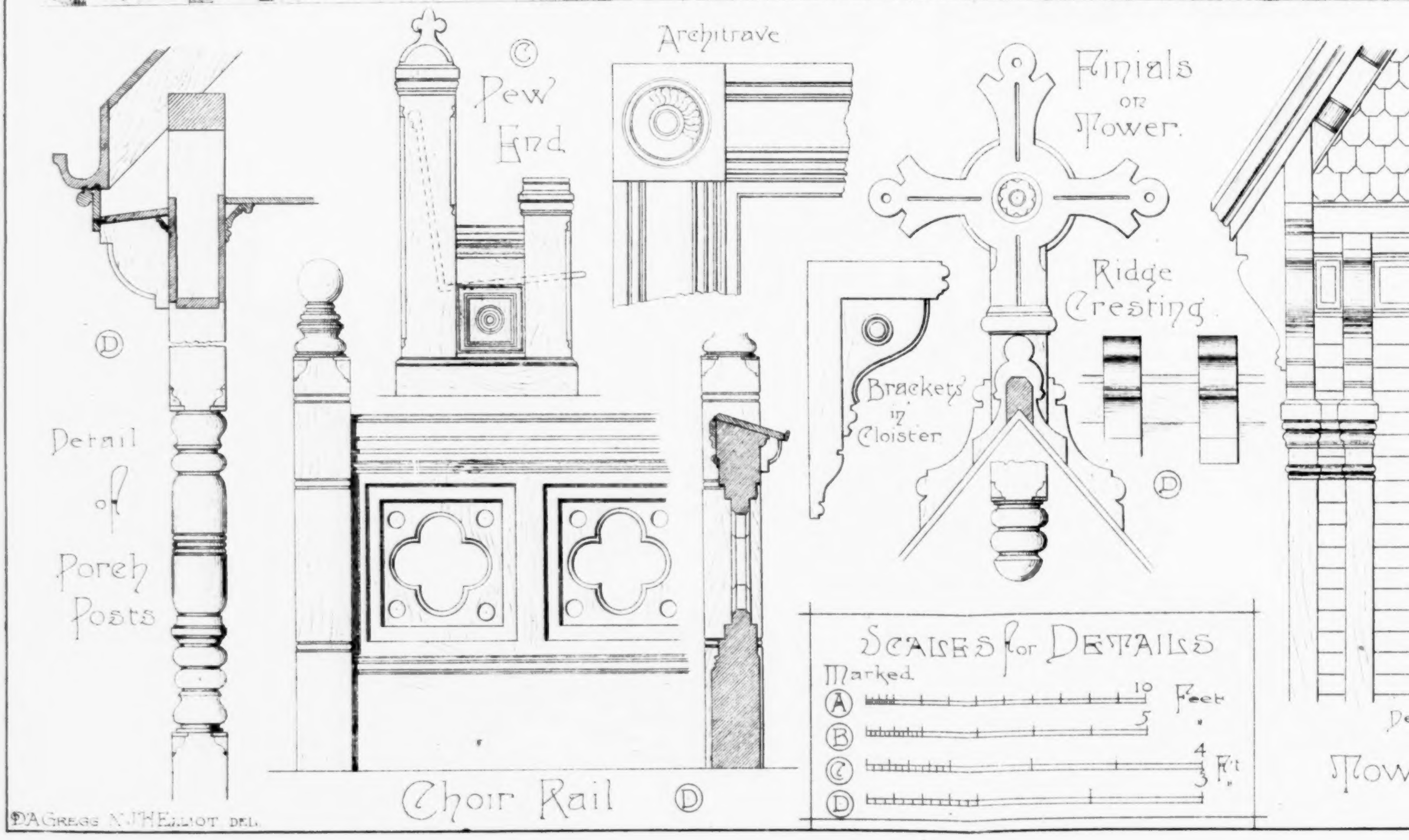
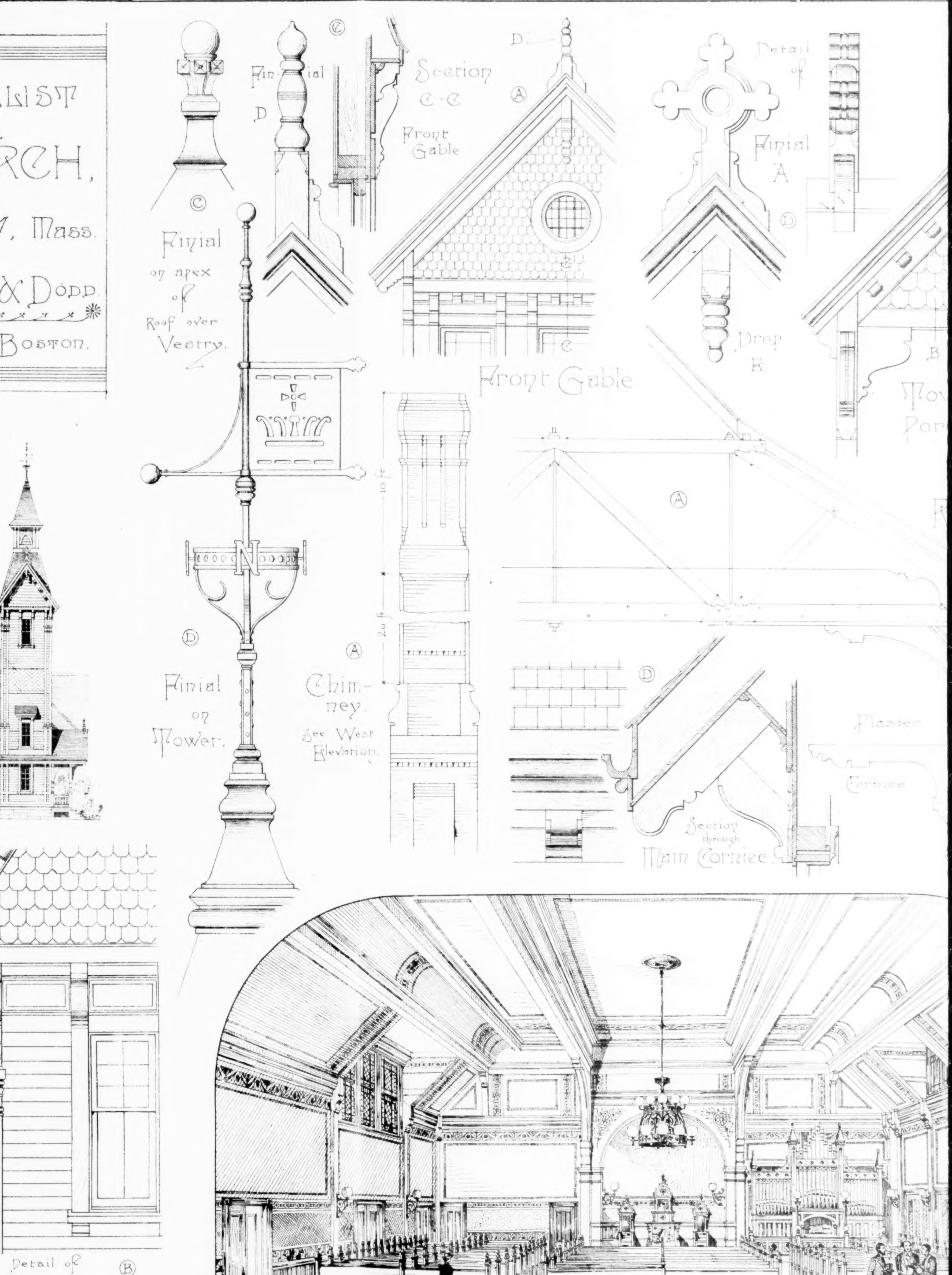
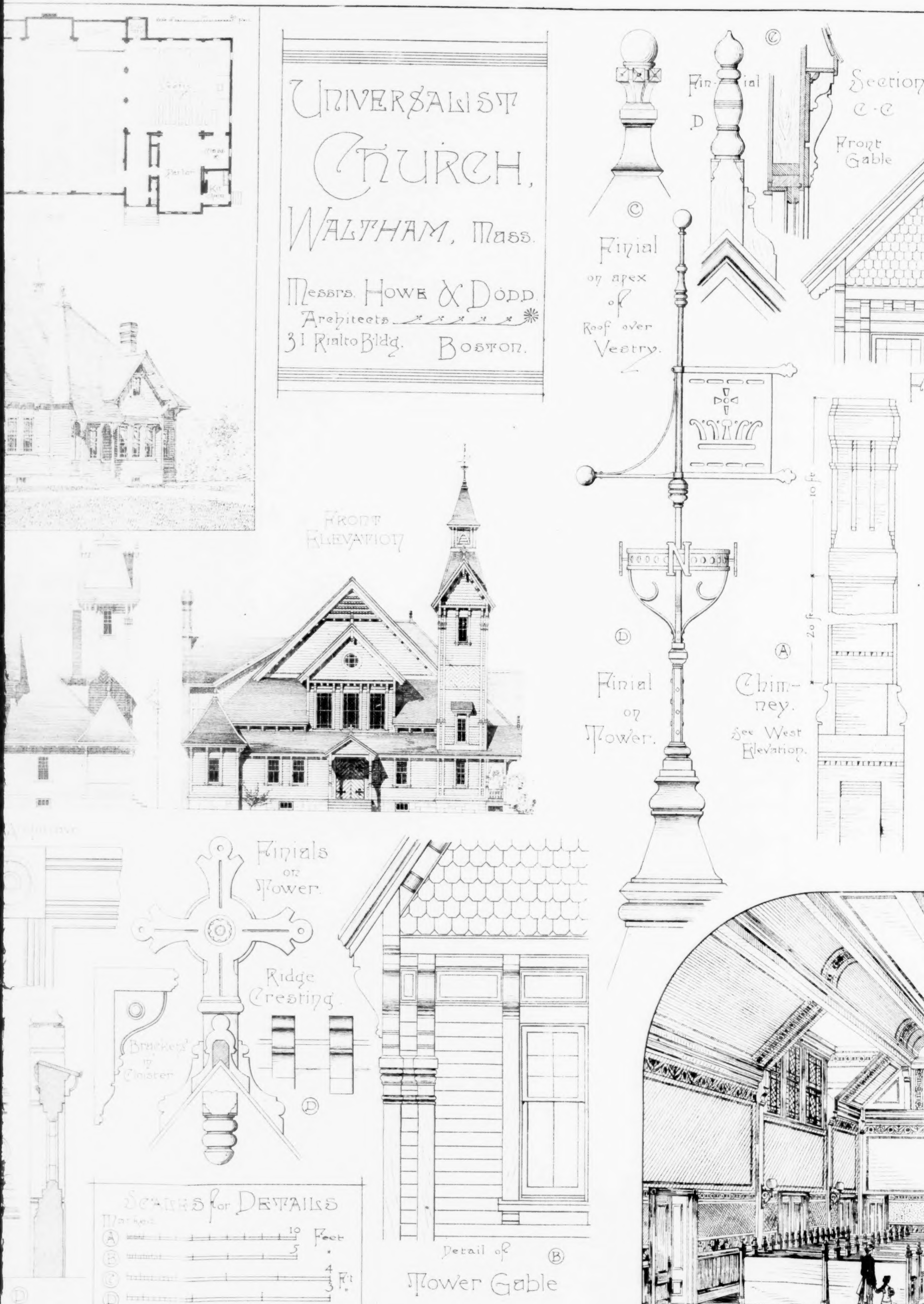
Architects
31 Rialto Bldg. Bo



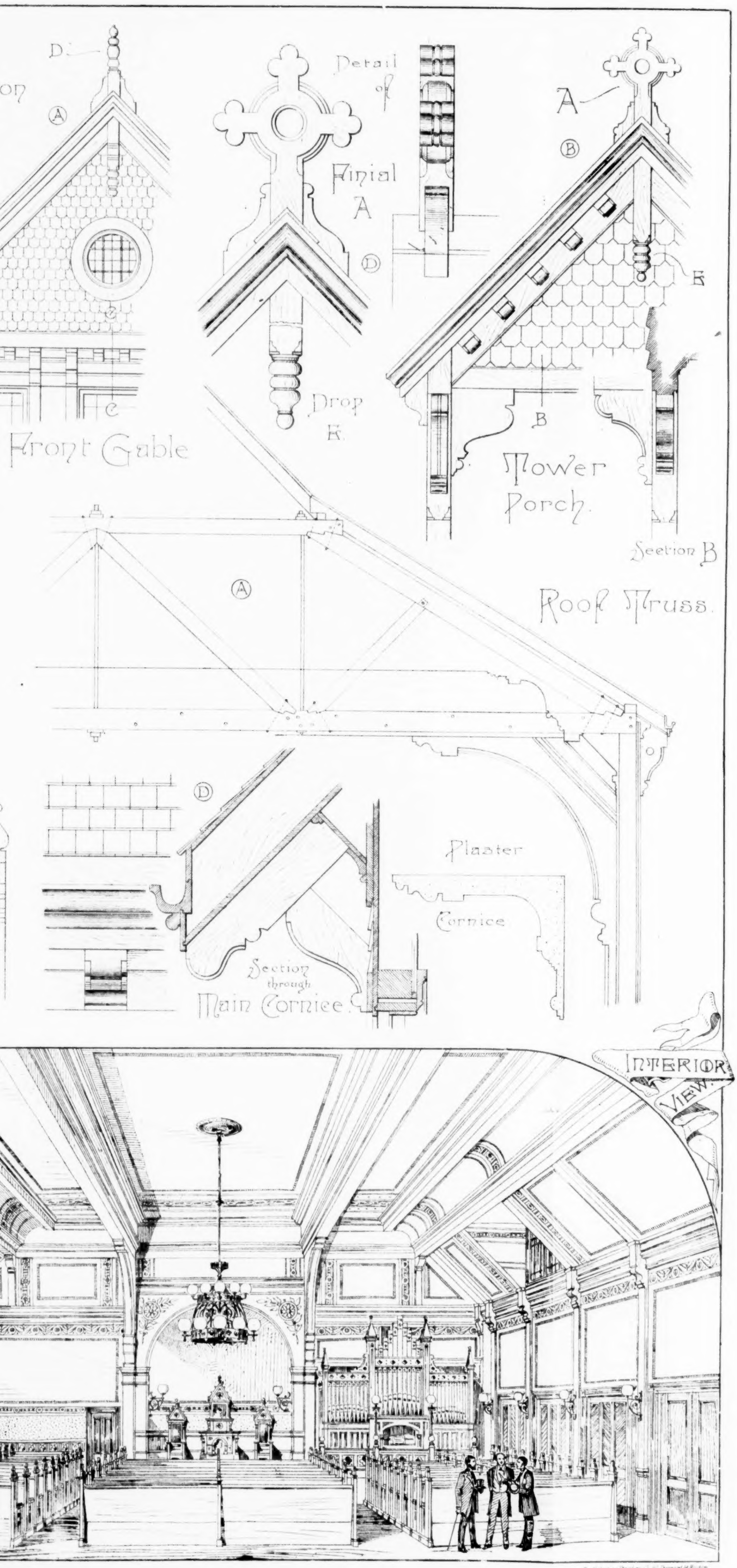




Boston.
Finial on apex of Roof over Vestry.
Fin-ial D
Section C-C Front Gable
Front Gable
Detail of
Finial A
Drop E
Finial on Tower.
Chim-ney. See West Elevation.
10 ft
20 ft
Section through Main Cornice.
Plaster
Cornice
Detail of Tower Gable



Universalist Church, Waltham, Mass.
Messrs. Howe & Dodd Architects
31 Rialto Bldg. Boston.
Front Elevation
Finial on apex of Roof over Vestry.
Fin-ial D
Section C-C Front Gable
Finial on Tower.
Chim-ney. See West Elevation.
10 ft
20 ft
Finials on Tower.
Ridge Cresting.
Brackets in Cloister
Scales for Details
Marks
10 Feet
5
4
3 Ft
Detail of Tower Gable


D.
on
A
Detail
of
Finial
A
D
Drop
E.
A
B
E
B
Tower
Porch
Front Gable
Section B
A
Roof Truss.
D
Plaster
Cornice
Section
through
Main Cornice
INTERIOR
VIEW.

they are also much lighter than brick arches, they do not require as heavy beams to support them. "The flat arches, both of hollow brick and of hollow Teil blocks, from 2 feet span to 4 feet span, have been tested with 1,300 lbs. per square foot, and from 4 to 6 feet span, with 2,000 lbs. per square foot, without deflection or cracks." A six-inch flat arch of hollow terra-cotta tile, having a span of 3 feet 8 inches, was loaded with 3,356 lbs. on one square foot in the centre, without the arch showing any evidence of weakening under the severe strain.

The flat terra-cotta arches represented in the last part of Table III are all guaranteed by the makers to sustain without deflection 2,000 lbs. per superficial foot of floor.

Either of the forms of floor mentioned is sufficiently strong to support any steady weight that is liable to come upon it, but for concentrated live loads, and particularly for floors where heavy boxes are to be moved, the brick arch appears to be the best.

The following experiments, conducted by Mr. F. C. Merry, architect, at the time of the erection of the Western Union Telegraph building, in New York City, show very conclusively the comparative strength of the different floors we have mentioned to resist suddenly-applied loads. Experimental floors were constructed of brick arches, flat arches of hollow terra-cotta tile, and flat arches of the Teil hollow blocks, supported by iron beams placed about 5 feet apart. These arches were tested by allowing a piece of granite, 15 inches square and 4 feet long, with the edges rounded, to fall from different heights so as to strike the floor squarely on one of its faces. The arches were covered with a thin layer of concrete, but without any boards or other material.

The effect of the falling weight on the floor constructed of flat arches of Teil hollow blocks was to punch a hole through the floor, almost exactly the size of the stone, the rest of the floor remaining intact. The effect on the hollow terra-cotta arch was to break down the upper part of the hollow blocks, though it took "a tremendous amount of pounding to break it down." It should be remembered, however, in connection with the terra-cotta arch, that the experimental floor was very carefully constructed, under the personal supervision of Mr. Merry, so that the joints were very close; while in ordinary construction the mechanics are not always careful to put the pieces in their proper places, and thus do not secure close joints.

The brick arches stood the tests the best of all. The weight was allowed to fall through a height of 3 feet, on to the floor, without fracturing it in the least. At last, after severe pounding *on the same place*, one brick at a time was knocked out of place, showing that the only way in which the brick arches can be broken is by breaking the individual bricks into fragments.[1] F. E. Kidder, B. C. E.

THE ILLUSTRATIONS.

UNIVERSALIST CHURCH, WALTHAM, MASS. MESSRS. HOWE & DODD, ARCHITECTS, BOSTON, MASS.

HOUSE FOR MRS. S. C. THWING, ROXBURY, MASS. MESSRS. CABOT & CHANDLER, ARCHITECTS, BOSTON, MASS.

COMPETITIVE DESIGN FOR A HOTEL DINING-HALL, BY MR. M. ROCHE, CHICAGO, ILL.

VAULTS.[2]—IX.

5. Septpartite. Figure 84 shows the common form. It is used over rectangular compartments, in towers and transepts chiefly, which have walls on three sides and an arch on the other. Limburg Cathedral.

6. Octopartite. *a*. For covering a rectangular space with walls on all sides, as in towers. (Fig. 85.) There are eight oblique cells. Examples are numerous, as at St. Ived, Braisne; Gelnhausen; Notre Dame de Dijon, etc. Fig. 86 is another, and apparently a unique, form from the central tower of Lincoln Cathedral. The surfaces of the square part in the middle are supported by the groin and transverse ribs of four three-quarters of quadrilateral vaults, which occupy the corners, carried on above the level ridges to the centre. It is an ingenious device for covering a square space with four vaults without a central shaft.

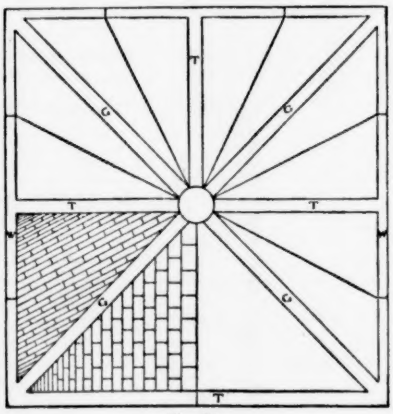


Fig. 84.

[1] The information concerning these experiments was kindly furnished the writer by Mr. Merry.

[2] These papers, by Prof. Charles Babcock of Cornell University, will be printed in monthly parts.

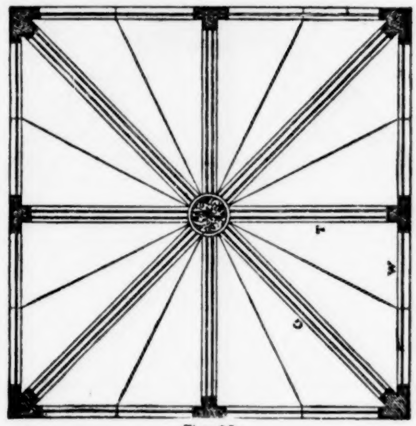


Fig. 85.

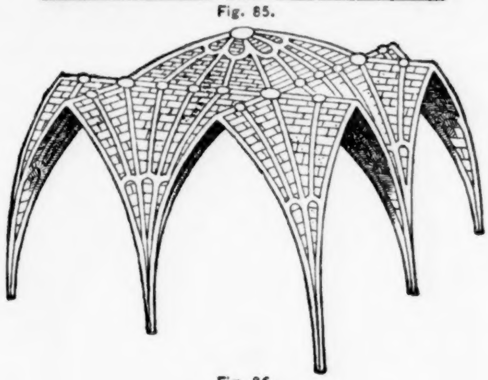


Fig. 86.

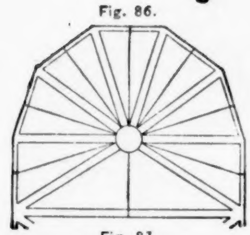


Fig. 87.

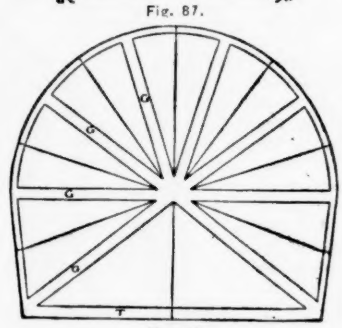


Fig. 88.

b. Fig. 87 is from Notre Dame de Dijon.
Fig. 88 is from Rheims, Laon, and Soissons.

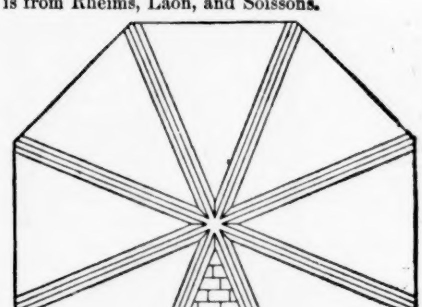


Fig. 89.

c. For covering an octagonal space, as in chapter-houses, kitchens, etc.

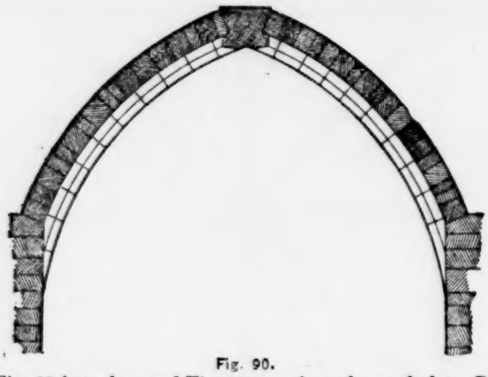


Fig. 90.

I. Fig. 89 is a plan, and Fig. 90 a section, of a vault from Dirleton Castle, Scotland, without cells. It is like the form given in Fig. 33, with ribs in the inner angles, and closed at the top. We suppose it to be really solid vaulting, and the ribs to be only ornamental, though they are heavy enough to be useful, and do away with the necessity of careful mitring of the surfaces in the angles.

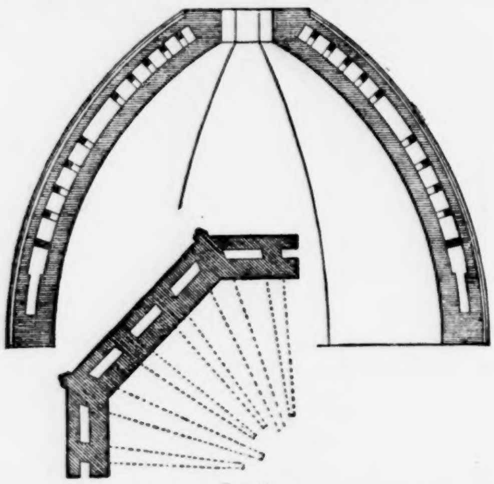


Fig. 91.

Fig. 91 gives a section and a quarter plan of the so-called dome of the Duomo at Florence, which is really a rib-vault, double shelled. The inner shell is not supported by the ribs. The great angle-ribs show on the outside. Segmental arches are thrown from rib to rib.

II. Groin and wall ribs only, making eight cells. Fig. 92, from Inchcolm Abbey.

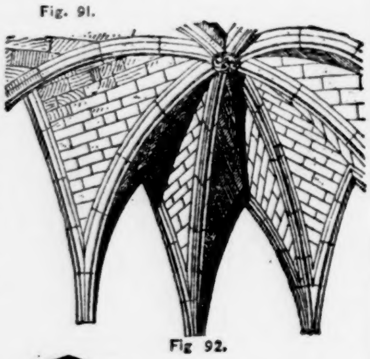


Fig 92.

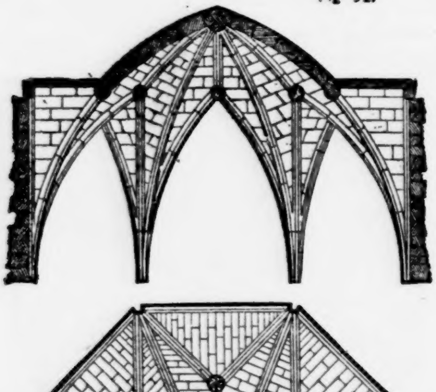


Fig. 93.

III. Welsh vaulting, eight cells. (Fig. 93.)

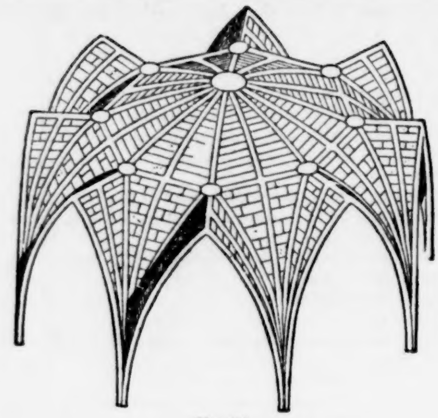


Fig. 94.

IV. Groin-ribs not meeting at the centre, but terminating at the angles of a central octagon. Fig. 94, from the chapter-house of York Cathedral.

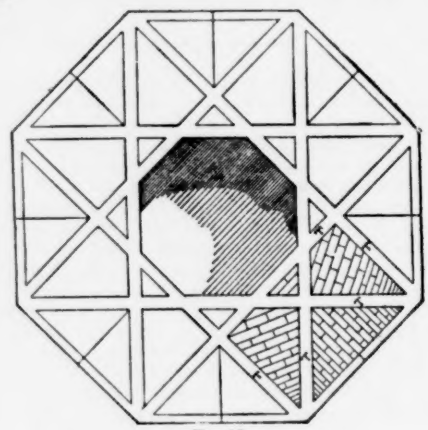


Fig. 95.

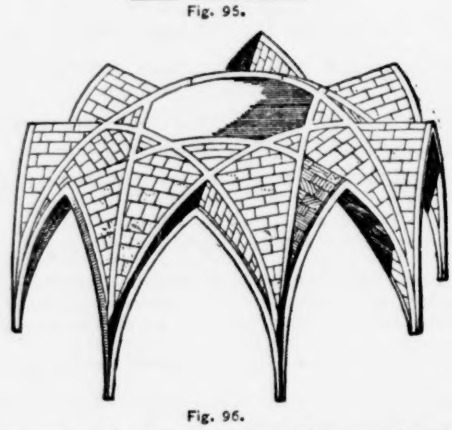


Fig. 96.

V. Eight semicircular transverse-ribs. Figs. 95 and 96, from the Abbot's kitchen, at Durham. The central space is left open.

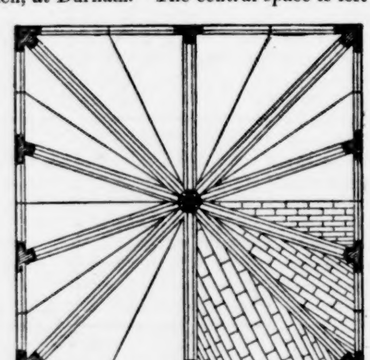


Fig. 97.

7. Decapartite. Fig. 97 is an example, from the chapel at the east end of the choir of the Cathedral of Auxerre. The central ring here shown is a not uncommon feature in other varieties, especially quadripartite.

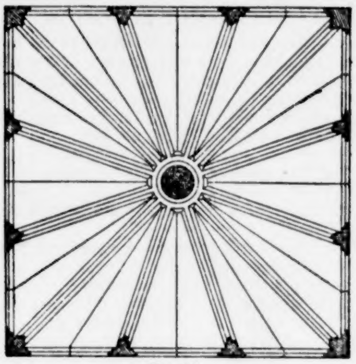


Fig. 93.

8. DODECAPARTITE.

SMOKE PREVENTION. — II.

IT is not proposed here to discuss the questions connected with the causes, or possible prevention under certain circumstances, of the occurrence of fogs. They are among the great and ordinary meteorological phenomena which go to make the planet, upon whose surface we live, what it is. They can only be controlled very partially and in extremely limited localities, and are no more under human direction than are the seasons and the general weather. In extensive geographical regions fogs are perpetual; they flank certain sea-coasts like an impenetrable wall. In general, however, this appearance is fortunately rare, and their continuance in a particular spot depends either on the absence of wind to disperse them, or on the existence of vast atmospheric circular currents, cyclones and anticyclones, which keep the fog floating about in the same place, like chips in the eddies of a stream of water. Mention, however, should be made of the ingenious theory of Mr. John Aitken, communicated to the Royal Society of Edinburgh in December last. He concludes that there would be no visible vapor of water in the world unless there were present in the air particles of minute dust to assist and promote its formation. Laboratory experiments, on a small scale, seem to afford some support to this hypothesis, which Mr. Aitken pushes to the extent of asserting that if there were no dust in the atmosphere there would be no fogs, no clouds, no mists, no visible steam, and probably no rain. This, of course, means that wherever these constant phenomena occur, even in the highest regions of the atmosphere, there must be dust suspended in the air; a conclusion so vast and novel, and importing so many fresh points to be considered in the constitution of the world in which our lot is cast, that one may be excused for not hastily adopting it, and for waiting at least for further artificial experiments upon a much larger scale; and it is to be hoped that Mr. Aitken will continue his most interesting and useful line of research.

A very able contribution to the subject of London fog was made by Dr. Alfred Carpenter to the Society of Arts in December last, and he points out that the prevailing smoke nuisance in London and other large towns, such as Brighton, is not really due to fog, but simply to the presence of unconsumed particles of carbon in the air, arising not from factories, but from the chimneys of dwelling-houses. At Brighton there are no factories, but a large collection of well-to-do families, who would have well-replenished fires in all their rooms, and especially in the kitchen towards the usual hour of dinner in the late afternoon, when the smoke of Brighton is at its worst. In London, where the Sunday dinners of the great mass of the inhabitants take place about the middle of the day, and are more important meals than on other days, it is at or before noon that most smoke may be expected on a Sunday.

Dr. Alfred Carpenter relies much upon the substitution of gas for coal in the domestic fireplace, and contends that it might be supplied for this purpose at a price which would make its use economical. His own experience is in favor of gas stoves, so arranged that at first sight they cannot be distinguished from an ordinary coal fire; and he says that if he had gas in all his rooms he could do with one servant less in his household. He adds that gas fires can be fitted to existing grates, and points out their enormous advantages in a sick-room, to give a constant temperature by day and night, and by which the noise of poking the fire and putting on coals is entirely avoided. Dr. Carpenter's proposal of an impost upon badly constructed fireplaces in private houses is, for the present at least, inadmissible. Hearth-money was always a hateful tax, and would not now be tolerated even in the interests of health and economy. Other matters of scientific value are discussed by him, but these references are intended to deal solely with the more practical parts of a most useful paper.

Mr. Rollo Russell, in his recently published pamphlet on London fogs, truly shows that artificial London smoke, without any natural fog to combine with, is alone sufficient to occasion great darkness in London, and, of course, it is alone sufficient to produce all the dirt of which we have to complain. A stratum of smoke may form in the upper region of the atmosphere, and then act as a thick pall to intercept the rays of the sun, which may at the time be shining quite brightly in the open country, beyond the reach of metropolitan smoke. This phenomenon of smoke without fog may be sometimes seen at Brighton, when the wind blows from the shore and the smoke of the town is carried out to the sea, over which it is flung for miles like a black and dismal banner, blotting the bright sky of that naturally sunny place. So, as Mr. Russell remarks, may the long line of smoke from its funnels be seen lingering in the track of a steamer long after it has passed, and in the country the smoke from a cottage chimney, on a still day, will form a flat cloud in its neighborhood. Mr. Russell also shows that the climate of the country regions surrounding London is now injuriously affected by London smoke. Richmond is not now what it used to be, but is invaded by smoke, and once, after two days of north-east wind, he counted one hundred and six particles of soot on a square inch of snow in Richmond Park. Mr. Russell's personal observations of London fogs are very interesting and valuable, and he dwells with much force and sympathy upon the deleterious influence of London smoke upon the poorer classes, who have not even the resource of occasional escape from it into the purer air of the country.

The lecture delivered at the Society of Arts in January last, by Mr. W. D. Scott Montcrieff, was too remarkable not to be here mentioned. It contained the outline of a vast and ingenious scheme by which all the coal to be consumed in London should be rendered smokeless. By the aid of the gas companies, it is proposed that smokeless coke shall become the universal fuel of the future; but that the coal from which the coke results shall not be so far deprived of its inflammable gas as to render the coke also incapable of burning with a flame. Mr. Scott Moncrieff estimates that four millions of tons of coal are annually consumed in the house fireplaces of London, together with two millions of coals which are reduced to coke in the process of extracting gas from them by the gas companies; and these four millions of tons of coal would form a square rectangular solid mass with a base of about two hundred yards, and a height of the cross on St. Paul's Cathedral. He proposes that all this coal should be used for making gas, and should therefore pass through the retorts and gasometers of the companies, and this, it is affirmed, would double the illuminating power of the gas supplied, and also double the commercial value to the companies of the residual product, besides saving the value to the public of the present yearly loss of fuel which escapes unconsumed from the fireplaces of London in the shape of smoke, which he calculates at over two million pounds sterling.

This is indeed a gigantic proposal, but even if the gas companies were tempted to undertake its reduction to practice, the questions would have to be asked, whether the space at their disposal would admit of such an extension of their operations, and suffice for placing additional apparatus for the manufacture of gas, or still more for the storage of the whole coal supplies of London, and of the resulting coke, the enormous quantities of which have been just now indicated; and whether such a monopoly and such an interference with existing interests are likely to be allowed. The simple practical remark may also be made, that the result of a hot fire without smoke, but with flame, may be at present easily obtained by a judicious mixture of bituminous coal and of the ordinary coke as now sold by the gas companies.

The object now in view is to try to explain what are the practical bearings of the great smoke question, and especially to point out that the great source of the existing evil is the domestic fireplace, to which it will be difficult, if not impossible, to apply any legislative coercion or control. The gain would be great if we could only get rid of a quarter of the present amount of smoke. Twenty-five per cent would be a diminution well worth struggling for; fifty per cent would be a vast improvement indeed, and there need be no despair of this much at least being achieved. We are engaged in a war with the powers of darkness, and it is a contest for life, health, and happiness, for the vigorous prosecution of which it is worth while to take a good deal of pains, to incur some trouble, and to go to some expense — and it need not be a great expense — in modifying old grates.

It is indeed, in Roman phrase, a fight "*pro aris et focis*," but one in which, unfortunately, the domestic hearth is often found ranged as an enemy, and in rebellion against the interests of the household gods. There is, however, happily no fixed reason why London should be the murky place it so often is. At early morning, before the fires are lighted, the atmosphere is as clear as that of Paris. Legislators returning home from a long sitting of their house, and all who are either out late or up early, may still look upon a London as fair as that which Wordsworth gazed on from Westminster Bridge, when he "saw it all bright and glittering in the smokeless air."

To restore the air of London to its natural purity, to diminish the present amount of preventible disease and death, to bring back the roses to the cheeks of the London children, and to the London parks and gardens, and to prevent our buildings, our pictures and other works of art, our libraries, and all our belongings, from destruction and filthy defilement by the soot-demon, is an object surely worth as much energy and perseverance as we are capable of devoting to it. All must devoutly wish that the public efforts now being made towards the accomplishment of such objects may be crowned with early success. But it is on individual exertion that the triumph of the general and combined effort must ultimately depend.—*Sir W. F. Pollock in the Nineteenth Century.*

THE ALBANY CITY-HALL COMPETITION.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Sirs, — A very singular, certainly a very unfair proceeding, disposed of the new City-Hall competition at Albany, N. Y.

The commission to select a design was composed of gentlemen above reproach, but of no knowledge whatever of building or mechanics. Their printed instructions to the architects selected for the competition (there being four from Albany, one from New York, and one from Boston) were absolute and explicit, and to this effect: —

That the cost of the complete building, not including any furniture, should not exceed $195,000; that the building *must be thoroughly fire-proof;* "and that the commissioners agree to decline to consider any design accompanied by an estimate in excess of the cost fixed by the commission."

The Albany architects produced designs, accordingly, within the figure named, expecting fairness. The Boston architect submitted one seemingly regardless of the direction as to cost. When the bids were received by the commission, the Boston one figured up to some $244,000 for a fire-proof building as ordered. The commission intentionally, or through lack of judgment or knowledge, accepted the Boston one, and immediately applied to the Legislature for the balance to complete the amount.

The Albany architects naturally feel injured in the matter, and wonder why — if the architect competed to build his $244,000 design for $195,000 — he was not allowed to?

This is another lesson to localities in the appointment of commissions to decide on matters with which they are totally ignorant. We had forgot to say that each but the successful architect in the competition received $250 for his trouble; but this had nothing to do with the conditions as to the cost.

The award thus unfairly made has caused some wonderment in the ancient capital. The architects were at first requested to give bonds that would hold them to their estimate; but this was quashed, unfortunately, too early to have effect in this decision. X.

[We have submitted our correspondent's letter to the successful competitor, who requests us to correct certain errors of statement as follows: —

1. The contractor's estimate submitted with the competitive drawings was $184,000, so that no objection could be urged against it on the score of its overrunning the limit of cost.

2. The floors and roof were specified to be built of wooden beams filled in with fire-proof blocks, while the partitions and walls were of brick or similar concrete blocks; so that it may reasonably be claimed that the condition of fire-proof quality was fulfilled.

3. The contract as finally concluded was for $204,000 (not $244,000), the difference between this and the original estimate being due to the substitution, by order of the commissioners, of red granite and a particular kind of freestone for those mentioned in the lower estimate.—Eds. American Architect.]

THE PROTECTIONS AFFORDED TO OPERATIVES IN TEXTILE FACTORIES.

Boston, March 26, 1881.

To the Editors of the American Architect: —

Dear Sirs, — In your last number reference is made to the safety of operatives in respect to fires in factories, and you ask the question: "Why the operatives of the Lowell and Lawrence factories should not enjoy the same safeguards in the matter of stairways and fire-escapes that are made compulsory in Boston?"

I beg to say that when the manufacturing departments of Boston buildings are as adequately supplied with stairways and fire-escapes as the factories of Lowell, Lawrence, and most other places now are, nothing but an intense panic on the part of the operatives will expose them to any danger from fire.

In fact the textile factories have for a long time been set up as the mark for every kind of legislation; some of it very suitable and more of it mere meddlesome interference; while the condition of the more numerous class of operatives in other kinds of work, crowded into ill-ventilated, narrow, and exceedingly dangerous premises, has been overlooked, or in many cases entirely neglected.

The "trial by newspaper," applied a few weeks since by the Boston *Herald* has, in some cases, at least, proved much more effective than the official inspection, or perhaps it would be more correct to say the want of official inspection.

I observe in the same number a reference to the statement made by Mr. Spofford as to the effect of heat on books. May not the destructive effect on bindings be attributed to the desiccation of steam-heated air under ordinary conditions or methods of heating by steam? Judging by analogy the injury may be more from extreme dryness than from heat.

If so, the remedy is very easily applied wherever a small power is available to operate an air-pump, by the use of the air-moistener invented by J. G. Garland, Biddeford, Maine. The apparatus consists of a suitable number of atomizers served from a common reservoir.

I have had one for a short time in my large office, and the comfort during some of the dry, cold days of the winter was very great.

The main purpose of the invention was to regulate the humidity of the air in textile factories, to which purpose it has been applied with great success. E. A.

Responsibility of the Bulgarian Architect. — It is said that if any life is lost by the failure of a building the architect who built it is imprisoned until it can be proved that the accident was not due to any fault of his.

A Fire-Proof Hotel. — It is said that the proprietors of the new Southern Hotel, which replaces the one burned so disastrously in St. Louis two or three years ago, evince their belief in the really fire-proof character of their building by carrying an insurance only on its plate-glass.

NOTES AND CLIPPINGS.

Competition. — We desire to call attention to the notice of a competition for the title-heading for a new newspaper for children which appears in our advertising columns. The quotation which Mr. Lawrence has chosen as the key-note of the composition which he wishes to secure is very appropriate to its purpose, and so suggestive that it cannot fail to offer an attractive theme to the artist.

Correction. — The name of M. Lefuel was incorrectly given in the resolution adopted by the American Institute of Architects and printed in our last issue. M. Lefuel's first name was Hector, not Henri as printed.

Cheap Engineers. — An engineer was running a large Corliss engine in a woollen mill, and drawing $1.87 per day for his services. The manager of the concern took an economical turn by discharging this engineer, and hiring an "apology" at $1.50 per day. The new man came on duty, and neglecting to put any oil in the cylinder, one of the composition valve-stems stuck fast; and the new man, not knowing what was the matter, did not stop the engine until it was compelled to stop by the breaking of the wrist plate pins, and a general distortion of the valve gearing. During the excitement attending this occurrence no water was put into the boilers, and by the merest chance the low water was discovered by an outsider, just in time to avoid an explosion. The engine was 250 horse-power, having a condenser attached, and the new man, when questioned, confessed that he knew nothing of the condenser or the nature and uses of a vacuum. The cost of repairs rendered necessary to the engine was about $2,000. — *American Machinist.*

Catalpa Wood. — It is believed that the railroad-tie of the future will be cut from the catalpa tree. The Fort Scott, Texas and Gulf Railroad has planted three hundred acres of young trees, and the Iron Mountain Railroad one hundred acres, near Charleston, Mo. On the track-bed of the latter company ties of this wood have lain in the muddy silt of the Mississippi for twelve years, and are still in a good state of preservation. They have outlasted two sets of white-oak ties, and bid fair to survive the third. Fence-posts in Indiana and Illinois are now sound after having been in service for forty, fifty, and even seventy-five years. In the muddy regions about Cairo, where it is grown extensively, it is used as "corner-stones" for the most substantial buildings. It is of an elastic nature, but not so soft and light as cotton-wood. Dr. John A. Warder, president of the American Forestry Association, claims for the catalpa a durability and power of resistance to the influences of the elements possessed by no other wood. It is found in the Mississippi Valley and on the shores of the tributaries of the great river. It bears a large white, highly perfumed flower, and grows quite rapidly. — *Boston Herald.*

David Cox's Signboard at Bettws-y-Coed. — The case *ex parte* Baroness D'Eresby *re* Thomas was before the Court of Appeal last week. It was the appeal of the Baroness Willoughby D'Eresby from the order of Sir James Bacon, Chief Judge of the Court of Bankruptcy, who had reversed the decision of the judge of the Bangor County Court, and had decided against the claim of the baroness to the signboard of the "Royal Oak," at Bettws-y-Coed, painted by David Cox. Mr. Romer stated that the signboard in question had been used as the signboard of the inn in question as far back as 1841. It was hung up outside for some years, and was afterwards framed and glazed and hung up in the hall of the inn, where it had remained up to the date of the failure. The evidence went to show that the signboard was always handed over to the next tenant, and was, in fact, treated all through as a landlord's fixture. He submitted that the Chief Judge, in treating the picture as he had done, as being a chattel in the possession of the tenant, and as such passed to the trustees, was not justified by the evidence. He contended that this was a fixture within the meaning of the Act, and as such passed with the freehold to the landlord. After further arguments their lordships allowed the appeal, with costs, Lord Justice James observing that in no conceivable view of the case was this a chattel in the hands of the trustee by right of any ownership on the part of Miss Thomas. She never had a right to claim the picture as against Lady D'Eresby, and the trustee could only claim it as being in the order and disposition of the bankrupt at the time of the bankruptcy, with the consent of the true owner; but it never belonged to Miss Thomas, but belonged to Lady Willoughby D'Eresby in her own right as a thing affixed to the freehold.—*Builder.*

Thomas Carlyle's Opinion of Public Statues. — In one of his "Latter-day Pamphlets" Mr. Carlyle expressed himself strongly on the subject of statues. After observing that the first question to be decided by "a company of persons who have decided to set up a brazen image" was whether the hero's memory is worthy a statue, Mr. Carlyle said the next question to be decided was whether the statue would be worthy the hero — "Is it so excellent in point of art as to be a respectable approach to the Ideal? Or alas, is it not such an amorphous brazen sooterkin, bred of prurient heat and darkness, as falls, if well seen into, far below the Real? Can you, my misguided friends, think it humane to set up in its present uncomfortable form this blotch of mismolten copper and zinc, out of which good warming-pans might be made? Cannot the Woods and Forests, in the name of sense and common decency, interfere at least thus far? Namely, to admonish the misguided citizens, subscribers to the next Brazen Monster of sad sculptural solecism, and exhort them three successive times to make warming-pans of it and repent; or failing that, finding them obstinate, to say with authority, 'Well, then, persist. Set up your Brazen Calf, ye misguided citizens, and worship it, you, since you will and can. But observe, let it be done in secret, not in public; we say in secret at your peril! Observe therefore. Build a high enough brick case, or joss-house for your Brazen Calf, with undiaphanous walls and lighted by sky-windows only; put your Monster into that and keep him there. Thither go at your pleasure and worship your bellyful; ruin your own souls only, and leave the poor population alone; the poor speechless unconscious population whom we are bound to protect, and will!'" And now some people in Chelsea are proposing to erect a statue of Carlyle himself on the Chelsea Embankment!

BUILDING INTELLIGENCE.

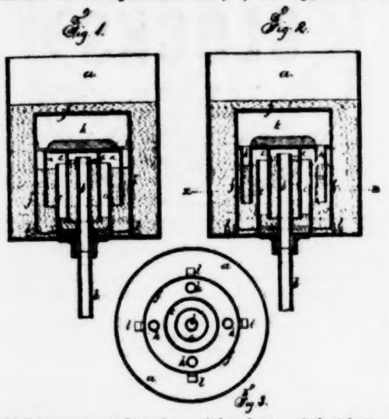
[Reported for The American Architect and Building News].

[*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.*]

237,187. AUTOMATIC FLUSHING-CISTERN FOR WATER-CLOSETS. — James P. Hyde, New York, N. Y. This invention relates to a compound siphon in which there is a column of water confined between the parts of the siphon and air intervenes between such column and the column of water that is allowed to accumulate gradually within the cistern. The special feature of the improvement consists in the combination, with the compound siphon, of an air-chamber within the cap of the siphon, and tubes from the same into the water-space between the cap and the first cylinder of the siphon. By this device the air will be compressed within the chamber of the cap as the column of water in the cistern increases, and when the siphon commences to draw the water off the air will expand and force down the water into the siphon and increase the volume thereof to insure the rapid filling of the entire siphon with water. Fig. 1 is a vertical section of the cistern and siphon. Fig. 2 is a similar view in a slightly modified form, and Fig. 3 is a section at the line, *x x*, of Fig. 2. The cistern, *a*, is circular. The pipe, *b*, leads to the closet or urinal, and there is around it a stationary tube, *c*, the space between *b* and *c* being sufficient to allow for the introduction of the pendent tube, *e*, the upper end of



which is connected to the weighted cap, *f*, that is supported on legs, *l*, or otherwise within the cistern. It is preferable to have this cap removable, but sufficiently weighted not to be moved by the action of the water. A suitable water-supply is provided and the water is allowed to run freely into the cistern to fill the parts and cause the siphon to operate. Then the cock closes and only a small stream passes in, which is regulated according to the frequency of the flushing operation. Water will remain between the tubes, *b* and *c*, as in a sewer-trap, and the cap, *f*, will have air in the upper part, the same having been drawn in below its lower edge when the water was siphoned out of the cistern. Hence as the water accumulates in the cistern it rises and compresses the air in the cap, *f*, and the water rises between *b* and *e* in proportion to the pressure, and the air may bubble through the auxiliary column of water between *b* and *e*, and the difference of level of the auxiliary column (between *b* and *e* and *c* and *e*) will be the same as the difference of level inside and outside the cap, *f*. In Figs. 1 and 2 the siphons are shown as nearly ready to fill and flow. As soon as the pressure of the water in the cistern is sufficient to break away the auxiliary column of water and allow the air that is confined in the siphon-trap to escape down the tube, *b*, the external water of the cistern rushes in and fills the siphon, so as to cause it to continue to run until the atmosphere is drawn in below the lower edge of the cap, *f*. The air that is confined in the cap, *f*, performs an important duty in starting the siphon, because as soon as the auxiliary column of water gives way and the pressure on the confined air is relieved, such air expands and gives a momentum to the water as it passes into the space between *c* and *b*.

239,014. FIRE-ALARM AND GAS LIGHTING APPARATUS. — George D. Bancroft, Boston, Mass.

239,033. PRESERVING WOOD. — Brandt V. B. Dixon and J. P. Card, St. Louis, Mo.

239,037. WATER-CLOSET. — Abraham Edwards, Philadelphia, Pa.

239,045. ELECTRIC ANNUNCIATOR. — Charles Heisler, St. Louis, Mo.

239,047. CHURCH. — Albee F. Hyde, Boston, Mass.

239,049. WEATHER-STRIPS. — William B. Jones, Newton, Ill.

239,050. SASH-WEIGHT. William C. Joslin, Putnam, Conn.

230,053. BRICK-KILN. — Henry McCue, Kansas City, Mo.

239,056. REAMER. — David K. Overhiser, Williamsport, Pa.

239,072. SPRING CALLIPER. — Frederick J. Thomas, Athol, Mass.

239,076. WATCHMAN'S ELECTRIC REGISTER. — William A. Wilson, Needham, Mass.

239,085. SPRING-CATCH. William M. Chance, Decatur, Ill.

239,104. ROOFING TILE. — L. Dane and L. D. Woodworth, Youngstown, O.

239,129. CRANE. — David H. Williams, Homestead, Pa.

239,156. CROSSCUT-SAW. — James E. Emerson, Beaver Falls, Pa.

239,157. HOIST. — John Fensom, Toronto, Can.

239,160. WATER-BACK. — A. and J. W. Geddes, Baltimore, Md.

239,177. HEATING-APPARATUS. — William R. McDonald, Allegheny City, Pa.

239,198. SAW SWAGE. — George F. Simonds, Fitchburg, Mass.

239,217. AUTOMATIC FIRE-EXTINGUISHER. — John W. Bishop, New Haven, Conn.

239,230. HOLLOW BRICK AND TILE MACHINE. — Wear L. Drake, Chicago, Ill.

239,248. HOT-AIR REGISTER. — William Highton, Malden, Mass.

239,284. CASING FOR WATER-PIPES. — Wilhelm Weisbrath, Offenbach-on-the-Main, Germany.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — The following building permits of importance have been issued since the last report: —

Hannis Distilling Company, one-st'y brick building, cor. Ostend and Russell Sts., 75' x 100'.

Joshua Register & Son, four-st'y warehouse, iron front, s e cor. Holliday and Saratoga Sts.

Joshua Register & Son, three-st'y brick building in rear of 49-51 and 53 Holliday St.

St. Michael R. C. Church, three-st'y brick building in rear of n w cor. Lombard and Chapel Sts.

Philip H. Sonneborn, three-st'y brick building, s e cor. Light and York Sts.

Mary and Catherine Lehey, three-st'y brick building on Canton Ave., between Register St. and Broadway.

Allen Martin, three-st'y brick building, on Park St., near Tyson, 17' x 62'.

Alex. Wilen, 8 three-st'y brick buildings, n e cor. Carrollton Ave. and Saratoga St., and 6 three-st'y brick buildings on Saratoga St., near Carlton.

Jas. S. Hockadel, 2 three-st'y brick buildings, n w cor. Eden and McEldery Sts.

American Fire Insurance Company, four-st'y stone and brick building, No. 6 South St.

Henry Mylander, 5 three-st'y brick buildings, commencing n w cor. Franklin and Schroeder Sts.

27 permits were issued during the week, in addition to the above-named.

WAREHOUSES. — Mr. Frank E. Davis, architect, has prepared drawings for 2 large warehouses, to be built on South Howard St., near Lombard. One is for Mrs. Weisenfeld, and the other for the Stearns Estate. The former will not be put under contract, but done under the supervision of Mr. C. D. Hook. The latter will be put under contract, and the work commenced on both warehouses immediately. Each building will be 23' x 105', five stories high, of brick, with stone, terra-cotta, and moulded brick finish.

Mr. Chas. L. Carson, architect, is preparing drawings for 2 new warehouses, to be built on South Howard St., near Lombard, for Messrs. Alex. Rieman & Son, each to be 25' x 80', four stories high, of brick, with finish of stone, terra-cotta and moulded brick. The work will not be put under contract, but done under the supervision of Mr. Wm. Furgerson.

FACTORY. — Mr. Carson is also preparing drawings for a chemical factory for Mr. Thompson, to be located on Leadenhall St., near Winder, 38' x 88', three stories high, of brick.

Boston.

STORAGE WAREHOUSE. — A building for the storage of furniture, statuary, pictures, carriages, and household goods generally, is to be built by a corporation organized under the General Court, officered as follows: President, N. J. Bradlee; Directors, Thomas J. Whidden, Charles U. Cotting, James Longley, Charles G. Wood, Wm. Minot, Jr., Samuel Wells; Treasurer, Otis Norcross, Jr.; Clerk, Stephen H. Williams. The capital is $200,000. The projectors have not yet made a selection of a site.

BUILDING PERMITS. — *Brick.* — *Huntington Ave.*, cor. West Newton St., for Mass. Charitable Mechanic Association, an exhibition building, 317' x 577', three stories; Wm. M. Rummery & Augustus Lothrop, contractors.

Marlboro St., near Exeter St., for Edmund Dwight, dwell., 32' x 70', three stories mansard; Jas. Smith, builder.

Rutherford Ave., near Lincoln St., for T. B. Morrill, stable, 40' x 60', three stories.

Commonwealth Ave., *No.* 175, for Charles Merriam, dwell., 29' x 78', three stories, mansard.

North St., *Nos.* 82-86, Estate of C. M. Hurd, storage of iron, 39' x 78', two stories; Ripley & Stearns, builders.

Everett St., *No.* 115, for Linus M. Child, tenement-house and stores, 24' x 57', three stories; Manuel Silva, builder.

Rear of No. 115 *Everett St.*, for Linus M. Child, tenement-house, 24' x 43', three stories; Manuel Silva, builder.

Wood. — *Chelsea St.*, near Eagle St., for T. Brigham Bishop, 15' x 25'; Wm. F. Wood, builder.

Linwood St., near Highlands St., for Hiram Whittington, dwell., 29' x 56', three stories; Gooch & Pray, builders.

Winchester St., near Rutherford Ave., for Reed Bros. & Sawin, stable, 32' x 62', with wing 59' x 85', two stories; A. B. Perham, builder.

Union St., *Nos.* 16 *and* 18, for Samuel W. Barrett 2 dwells., 24' x 29', three stories, ell 12' x 16'; Edwin W. Archer, builder.

Dickens St., near Adams St., for John Colton, 2 dwells., 20' x 32', two stories, ell 13' 6" x 12'; Jerh. Colter, builder.

Brooklyn.

BUILDING PERMITS. — *Herkimer St.*, s s, 250' e Nostrand Ave., 3 three-st'y brownstone dwells., 20' x 43'; cost, each $6,000; owner and builder, Andrew Miller, 1257 Pacific St.; architect, A. Hill.

Boerum St., w s, 125' e Bushwick Ave., three-st'y frame tenement, 25' x 52'; cost, $4,000; owner, Henry Koster, 183 Boerum St.; architect, J. Platte; builders, B. Rauth & Bro. and F. J. Berlenbeck.

St. Mark's Ave., s e cor. Troy Ave., three-st'y frame store and dwell., 25' x 45'; cost, $3,500; owner, Mathew Donahun, on premises; architect, P. Graham.

President St., n s, about 175' w Hicks St.; three-st'y brick flat, 20' x 50'; cost, $6,000; owner, E. L. Donnelon, President St., near Hicks; architect, R. Dixon; builder, P. J. Carlin.

Franklin Ave. No. 94, being 75' s w Park Ave. and No. 100 Franklin Ave., being 147' s w Park Ave., 2 three-st'y frame tenements, 28' x 50'; cost, each $5,000; J. G. Glover, 245 Franklin Ave.

Spencer Pl., westerly cor. Hancock St., three-st'y brownstone dwell., 20' x 45'; cost, $8,000; owner and builder, Benj. Linikin.

Spencer Pl., w s, 77' s Hancock St., 2 three-st'y brownstone dwells., 16' 8" x 45'; cost, each $5,500; owner and builder, Benj. Linikin, 216 Greene Ave.

Spencer Pl., w s, 20' s Hancock St., 3 three-st'y brownstone dwells, 19' x 45'; cost, each $6,500; owner and builder, Benjamin Linikin, 216 Greene Ave.

Ainslie St., n s, bet Ninth and Tenth Sts., four-st'y brick factory, 100' x 50'; cost, about $12,000; owner, Harvey W. Pease; builder, J. T. Miller.

Floyd St., n s, 175' e Yates Ave., 2 three-st'y frame tenements, 25' x 50'; cost, $4,000 each; owner, John Kramer, Yates Ave. and Floyd St.; builder, John Rueger.

Tenth St., s s, *and Eleventh St.*, n s, 250' e Fifth Ave., 4 two-st'y brick dwells., 20' x 40'; cost, each $3,500; owner and mason, W. Corrigan, 646 Sixth Ave.; carpenter, Thos. Corrigan.

Park and Clinton Aves., three-st'y brick factory, 100' x 50'; cost, $22,000; owner, C. S. Higgins; builder, J. Hearns.

Willoughby Ave., n s, 100' e Lewis Ave., 12 two-st'y brownstone dwells., 16' 8" x 45'; cost, each $6,000; owner and builder, O. Nichols, 619 Warren St.

Middagh St., n s, 100' e Columbia St., 2 four-st'y brownstone flats, 26' 6' x 66'; cost, each $10,000; owner, Jas. Lane; architect, J. Mumford; builder, J. H. O'Rourke.

Bushwick Ave., w s, 150' to 175' from s s Cooper Ave., 2 two-and-one-half-st'y frame dwells., 20' x 40'; cost, each $3,500; owners, Myers & Von Prief, 405 Evergreen Ave.; architect, T. J. Beir.

Louisville, Ky.

BUILDING PERMITS. — Of the building permits issued since last report, the following are those of $2,000 and over:—

A. G. and S. Van Fonda, store; cost, $9,000; D. Murphy, architect.

Hemming, Speed & Judge, hotel and store; cost, $5,000; H. P. McDonald & Bro., architects.

Mary West, dwell.; cost, $2,000.

E. D. Standiford, store and dwell.; cost, $5,000.

Louisville Building Company, 2 brick dwells.; cost, $9,000.

New York.

BUILDING PERMITS. — *Twenty-First St.*, *No.* 511, w, three-st'y brick shop, 28' and 23' x 69' 6"; cost, $3000; owner, C. J. McGourkey, trustee, Metropolitan Bank; builder, D. H. King, Jr.

One Hundred and Twentieth St., n s, 275' w First Ave., 3 three-st'y brownstone dwells., 16' 8" x 45'; cost, each, $6,000; owner, E. H. Miller, 6 Gansevoort St.; architects, D. & J. Jardine.

Rose St., *Nos.* 45, 47, 49 *and* 51, nine-st'y brick printing-house, 92', 53', and 56' x 86' and 104' 6"; cost, $300,000; owner, George Munro, 25 Vandewater St.; architect, J. Corrigan; builders, R. L. Darragh, and J. B. & J. M. Cornell Iron Works.

Wall St., n e cor. Front St., brick office-building, 56' 9" and 45' x 54'; cost, $35,000; owner, R. N. Rogers, 6 West Twenty-Second St.; architects, D. & J. Jardine.

Madison Ave., n e cor Sixty-Seventh St., 5 four-st'y Connecticut brownstone dwells., 18' 20' and 22' x 58'; cost, each $18,000; owner, D. Hennessy, 129 East Fifty-fifth St.; architects, Thom & Wilson.

Sixty-Seventh St., n s, 84' e Madison Ave., 2 four-st'y Connecticut brownstone dwells., 20' and 21' x 58'; cost, each $22,000; owner and architects, same as last.

Washington St., s e cor Jay St., four-st'y brick store, 25' x 80'; cost, $25,000; owner, W. H. Duckworth, 325 Washington St.; architects, Thom & Wilson.

Third Ave., *No.* 779, five-st'y brick store, 25' x 85'; owner, Geo. A. Haggerty, 803 Third Ave.; architects, Thom & Wilson.

West One Hundred and Twenty-Sixth St., *Nos.* 316, 318, *and* 320, 3 three-st'y Connecticut brownstone dwells., 15' 6" x 50'; cost, each, $9,000; owner, Edward Cunningham, 314 West One Hundred and Twenty-Sixth St.; architects, Thom & Wilson.

One Hundred and Forty-Third St., n s, 150' e Willis Ave., 5 two-st'y brick dwells., 15' x 42'; cost, $3,000; owner, Chas. Van Riper; architect, H. S. Baker.

Seventeenth St., s s, 95' w Broadway, six-st'y brick flat, 41' x 31' 6"; cost, $20,000; owner, Edward C. Cozzens, Croton Falls, N. Y.; architect, Jas. Stroud; builder, N. L. Weeks.

Seventeenth St., s s, 136' w Broadway, six-st'y brick flat, 25' x 78'; cost, $40,000; owner, E. C. Cozzens, Croton Falls, N. Y.; architect, Jas. Stroud; builder, N. L. Weeks.

West Thirty-Eighth St., *No.* 134, one-st'y brick store and dwell., 25' x 50'; cost, $4,000; owner, Jacob Kirchoff, Jr., 1391 Broadway; architect, J. G. Michel.

Fifth St., n e cor Lewis St., four-st'y brick factory, 32' and 47' x 128'; cost, $21,000; owner, Wm. H. Webb, 504 Fifth Ave.; architect, R. Shapter.

One Hundred and Thirtieth St., n s, 75' w Seventh Ave., 3 three-st'y brownstone dwells., 16' 8" x 50'; cost, $10,000; owner and builder, S. J. Wright; architect, J. H. Valentine.

One Hundred and Thirty-First St., s s, 75' w Seventh Ave., 3 three-st'y brownstone dwells., 16' 8' x

(*Continued on next page.*)

Publishers' Department.

The American Architect and Building News.

PUBLISHED EVERY SATURDAY BY
JAMES R. OSGOOD & COMPANY
211 Tremont St., Boston, Mass.
NEW YORK OFFICE, 21 ASTOR PLACE.
An Illustrated Journal of Constructive and Decorative Art, devoted to the Interests of Architects, Builders, Decorators, etc.
15 cents per copy; $7.50 per year; $6.00 in advance; 12 Monthly Numbers, with Detail Sheet, $1.75.
☞ Payments should be made *directly* to the publishers, either by draft or post-office order.
JAMES R. OSGOOD & CO., *Publishers*,
211 TREMONT ST., BOSTON, MASS.

BUILDING INTELLIGENCE.

50′; cost, each $10,000; owner and builder, S. J. Wright; architect, J. H. Valentine.

Fifth Ave., No. 697, four-st'y Connecticut brownstone dwell., 25′ x 60′; cost, $60,000; owner, George S. Osgood, 19 East Twenty-First St.; architects, Thom & Wilson.

One Hundred and Twenty-Third St., n s, 80′ w First Ave., four-st'y brick apartment-house, 20′ x 59′; cost, $15,000; owner and builder, I. E. Wright, 417 East One Hundred and Sixteenth St.; architects, Thom & Wilson.

Eighty-Fifth St., s s, 100′ w First Ave., four-st'y brownstone tenement, 25′ x 68′; cost, $14,000; owner, Q. W. Hawkes, 419 East Eighty-Fifth St.; architect, J. C. Burne; builder, J. E. Frame.

Eighty-Fifth St., n s, 225′ w First Ave., 5 four-st'y brownstone apartment-houses, 25′ x 68′; cost, each $14,000; owner, etc., same as last.

Eighty-Sixth St., s s, 245′ w First Ave., 2 four-st'y brownstone tenements, 30′ x 68′; cost, each $18,000; owner, etc., same as last.

Eighty-Sixth St., n s, 225′ and 285′ w First Ave., 2 four-st'y brownstone apartment-houses, 20′ x 64′; cost, each $15,000; owner, etc., same as last.

Sixty-Eighth St., s s, 175′ e Fifth Ave., four-st'y brownstone dwell., 25′ x 89′; cost. $30,000; owner, A. Mowbray; architects, Lamb & Wheeler.

Sixty-First St., s s, 250′ w Ninth Ave., 2 four-st'y brownstone tenements, 30′ x 86′; cost, each $15,000; owner, John Moloy, 213 East Forty-Ninth St.; architect, A. B. Ogden.

Third Ave., Nos. 1516, 1518 *and* 1520, 2 five-st'y brownstone tenements, 16′ 6″ and 20′ and 34′ 7″; rear, x 60′; cost, $10,000 and $15,000; owner, Wm. B. Welsh, East Orange, N. J.; architect, Jas. E. Ware.

West Forty-Sixth St., No. 541, two-st'y brick store and dwell., 25′ x 46′; cost, $4,800; owner, Conrad Engleken, 620 West Forty-Eighth St.; architect, J. S. Foster; builders, Peter Tostevin's Sons and Guy Culgin.

One Hundred and Twenty-Ninth St., s e cor. old Broadway, two-st'y brick institution (Furniss Memorial), 41′ x 75′; cost, $30,000; owner, Sheltering Arms Institute; architect, R. S. Townsend.

West Fifty-Sixth St., No. 143, two-st'y brick stable, 25′ x 90′; cost, $13,000; owner, W. J. Hutchison; builders, A. A. Andrews & Son.

Seventy-Ninth St., n s, 75′ e Second Ave., 2 four-st'y brownstone tenements, 27′ 6″ x 62′; cost, each $14,500; owner, Jacob Marchke, 3 Suffolk St.; architect, Fr. S. Barus; builder, Jos. Schnalzer.

First Ave., n w cor. Sixty-Ninth St., 4 four-st'y brownstone stores and dwells., 21′ and 27′ x 63′ and 73′; cost, each $13,000; owner, John Seltzam, 234 East Fifty-Fifth St.; architect, Fr. S. Barus.

Third Ave., n w cor. Seventieth St.; 3 four-st'y brownstone flats, 20′ and 20′ 5″ and 35′ x 67′ and 62′ and 70′; cost, each $12,000 and $16,000; owner, Ehler Oeterholt, Seventieth St., n s, near Third Ave.; architect, F. S. Barus.

Eldridge St., No. 38, five-st'y brick tenement, 25′ x 40′; cost, $15,500; owner, A. Weber, 34 Forsyth St.; architect, Wm. José; builder, J. Fish.

Elm St., Nos. 7 *and* 9, two-st'y brick show-rooms, 88′ x 100′; cost, $4,000; owner, A. T. Stewart Estate; builder, Peter Doyle.

One Hundred and Eighteenth St., n s, 395′ 9″ e Ave. A, 3 four-st'y brick tenements, 20′ 5″ x 52″; cost, each $8,000; owners, A. Murch and A. Loehr, 7 Grove Hill Place; architect, J. Kastner.

Thirty-Fourth St., n s, 150 w Seventh Ave., five-st'y brownstone flat, 25′ x 85′; cost, $20,000; owner, Cath. Fettretch, 233 West Thirty-Ninth St.; architect, D. MacRae; builder, Jno. Fettretch.

Fifty-Seventh St., s s, 600′ w Fifth Ave., 4 brownstone dwells., 23′ 25′ and 27′ x 61; cost, $39,000, $45,000, and $53,000; owner, John C. Donnelly, 60 East Eighty-First St.; architect, J. E. Ware; builders, J. C. Donnelly & Son.

East Eightieth St., Nos. 229 *and* 231, 2 four-st'y brownstone dwells., 25′ 2″ x 70′; cost, each $11,000; owner, Mrs. M. Braender, Ave. B, between Eighty-Fourth and Eighty-Fifth Sts.; architect, W. Graul; builder, P. Braender.

Seventy-Second St., s s, 200′ e Madison Ave., 5 four-st'y brownstone dwells., 16′, 20′ and 22′ x 74′; cost, each $18,000, $23,000 and $25,000; owner, architect and builder, Robert B. Lynd, 41 East Forty-Eighth St.

Eighty-Second St., No. 339, three-st'y brownstone tenement, 21′ x 50′; cost, $10,000; owner. Jas. Peters, 438 East Eighty-First St.; architect, J. Brandt.

East Sixteenth St., No. 425, five-st'y brick tenement, 25′ x 57′; cost, $9,000; owner, —— Goodby, 221 Ave. A; architect, Wm. José; builder, J. Schmitt.

Water St., No. 277, five-st'y brick warehouse, 24′ 7″ and 23′ 6″ x 57′; cost, $9,500; owner, Jas. D. Amery, 340 East Twenty-Eighth St.; architect, J. C. Lyons; builders, Giblin & Lyons.

Spring St., No. 47, cor. Mulberry St., five-st'y brick store and tenement, 21′ and 11′ 8″ x 66′ 4″ and 68′ 6″; cost, $15,000; owner. James Cunningham, 233 Mulberry St.; architect, J. Boekell.

Eighty-Fifth St., s s, 275′ e Second Ave., 3 four-st'y Connecticut brownstone apartment-houses, 25′ x 65′; cost, each $12,000; owner, A. H. Jonas, 206 Broadway; architect, Chas. Baxter.

Eighty-Fifth St., n s, 175′ e Second Ave., 2 four-st'y Connecticut brownstone apartment-houses, 25′ x 65′; cost, each $12,000; owner and architect, same as last.

One Hundred and Fifteenth St., s s, 170′ w Third Ave., 3 four-st'y Connecticut brownstone apartment-houses, 30′ x 65′; cost, each $16,000; owner, B. Donovan, Sixty-Fifth St., near Second Ave.; architect, C. Baxter.

Bethune St., Nos. 8 *and* 10, five-st'y brick tenement, 40′ x 60′; cost, $16,000; owner, F. A. Miller, 132 Broadway; architect, W. S. West; builder, H. Hoover.

ALTERATIONS. — *West Forty-Ninth St., No.* 8, two-st'y brick extension; cost, $5,500; owner, J. C. Kalbfleisch, on premises; architects, Wm. Field & Son.

Centre St., Nos. 211, 213 *and* 215, five-st'y brick extension, 25′ x 20′; cost, $6,000; owner, S. V. R. Cruger, Fulton St., cor. Broadway; builder, R. Deeves.

Broadway, No. 30, one-st'y brick extension; cost, $4,600; owners, Estate S. L. Mitchell, on premises; architect, J. W. Ritch; builder, E. Smith.

Fulton St., No. 144, rolled iron beams, etc.; cost, $5,500; owner, G. H. Witthaus, 202 Broadway; D. H. King, Jr.

Fourth Ave., No. 2352, change roof; cost, $9,000; owner, H. A. Beyer, on premises; architect, J. H. Valentine.

Front St., No. 128, raised one-half-st'y, interior alterations; cost, $3,500; owner, Samuel S. Beard, 180 Duane St.; builder, A. Crouter.

Broadway, Nos. 1180 *to* 1186, divided into rooms; cost, $5,000; owners, L. & G. S. Leland, 1186 Broadway; architect, Jno. Sexton.

Third Ave., Nos. 1510, 1512, *and* 1514, four-st'y brick extension; cost, $10,000; owner, Wm. B. Welsh, East Orange, N. J.; architect, J. E. Ware; builders, J. P. Niblo and O. T. Mackey.

West Fifty-First St. No. 143, raised one-st'y, also four-st'y brick extension; cost, $4,000; owner, A. A. Shea, 143 West Fifty-First St.; architect, F. S. Barus.

Second Ave., No. 304, four-st'y brick extension, 10′ 9″ x 16′, alteration for apartment-house; cost, $7,000; owner, J. A. Kellner, 306 Second Ave.; architect, J. Kastner.

East Seventeenth St., No. 313, alteration to apartment-house; cost, $5,000; owner, Louis Ott, 307 Sixth St.; architect, J. Kastner.

West Twenty-First St., No. 143, 3 eight-st'y brick extensions; cost, $3,000; owner, Louis F. Gorger, on premises; builders, Baker & Spahnan, and Lee & Nolan.

Mr. Jas. Stroud is the architect for the alteration of the residence No. 10 East Eighteenth St. into a store, at a cost of about $3,000.

WAREHOUSE. — Mr. G. W. da Cunha is the architect of a nine-st'y brick warehouse, on Broadway, Franklin, and Varick Sts., for F. H. Leggett & Co.; cost, $200,000.

HOTEL. — Messrs. D. & J. Jardine have prepared plans for a high-class hotel, to be built for Mr. Geo. Kemp, on the corner of Forty-Ninth St. and Fifth Ave. The building has a frontage on the Avenue of 33′, and on Forty-Ninth St., 200′ in the rear, there will be a 100′ front. It is to be built of brick and stone, will be nine stories high, and will probably cost $500,000.

STORES. — Nos. 176 and 178 Worth St. will be covered by stores, 50′ x 90′, of brick and stone, to cost about $60,000; builder, T. Cunningham.

FACTORY. — Mr. Ed. Bussell will build a brick factory, 100′ x 100′; cost, $70,000.

APARTMENT-HOUSES. — The Hubert Club Association, No. 7, will have erected on Madison Ave., corner of Twenty-Fifth St., an eight-st'y fire-proof apartment-house, 75′ x 90′, of brick and stone.

No. 2 Club will build, on Fifty-Ninth St., between Seventh Ave. and Broadway, an apartment-house of same size; and Club No. 4, on Fifty-Ninth St., between Sixth and Seventh Ave., will erect a similar building.

Philadelphia.

BUILDING PERMITS. — *Hamilton St., Nos.* 1927, 1929 *and* 1930, 3 three-st'y dwells., 17′ x 60′; Jas. Beatty & Son, contractors.

Cor. Levering and Fleming Sts., 3 two-st'y dwells., 14′ x 30′; G. H. Whitworth, owner.

Delaware Ave. and Beach St., e s Front St., between Willow and New Market Sts., 3 one-st'y sheds, 88′ x 120′; Philadelphia & Reading R. R. Co., owners.

Market St., No. 920, four-st'y store, 18′ x 62′; R. J. Whitesides & Sons, contractors.

Mill St., e Main St., two-st'y office, 28′ x 30′; Trott & Fisher, contractors.

Pepper St., s e Tulip St., 4 two-st'y dwells., and stable, 18′ x 37′; Thos. L. Kelly.

Phillip St., n Columbia Ave., five-st'y factory, 40′ x 43′; Jas. McCartney, contractor.

(*Continued on next page.*)