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THE New Jersey State Board of Health has undertaken a work which we hope it will carry out thoroughly. Within ten years the coast of that State, once a desolate line of sand hills, has been taken up for summer hotels and cottages, and thousands of new houses have been built on or near the beach from Sandy Hook to Cape May. As usual in such places little care has been taken of sanitary matters, and the dry, sandy soil, which in its natural state would be nearly perfect as the substratum for dwellings, has become saturated with filth in many places. The inevitable consequences have now begun to appear, and typhoid fever and malaria have this year invaded places supposed to be exempt from them. As, according to the New York *Tribune*, "the crop of summer boarders is regarded in New Jersey as more profitable even than that of sweet potatoes," the Board of Health, like wise guardians of the interests of their fellow-citizens, have now instituted an inquiry into the causes of the ailments which afflict their visitors, and propose to examine all the resorts along the coast. We trust that they will not content themselves with investigation alone, but will enforce with decision the measures which they may judge necessary for remedying the evils complained of.

THE people of Newark and Jersey City must have a certain curiosity to know what will be the next foreign ingredient mixed with their drinking water. It is but a few months since some one called attention to the fact that not only was the whole of the sewage of Paterson and several other towns carried down by the river to supply Jersey City and Newark, but that a considerable portion of the sewage of Newark itself was carried back at each flood-tide to the "intake" of the water-works. An investigation was then instituted, which resulted in finding a beneficent paper-manufacturer somewhere up the stream, who said that he discharged so much carbolic acid from the waste of his mill into the river that it neutralized the sewage from the cities above, and made the water "more healthful and pleasant than it would otherwise be." Not long afterward this wholesome compound of sewage neutralized with carbolic acid received an additional flavor by the breakage of a coal-oil pipe-line, which covered the river with oil to a considerable depth; and very recently, just after the late heavy rains had filled the channel to overflowing, a fresh discovery was made, that a ton of arsenic had been washed away by the flood in a suburb of Newark, and had been carried into a tributary of the Passaic. As a ton of arsenic, according to the usual estimate, would furnish a fatal dose for six millions of people, it is not surprising that the drinkers of Passaic water were alarmed, and their fears were not quieted until it was ascertained that the Second River, into which the poison escaped, joined the Passaic a little below the Newark Water-Works, and the current of the Passaic was so strong, owing to the flood, that there was little danger of its being reversed by the tide.

THE venerable Ashbel Welch, President of the American Society of Civil Engineers, died at Lambertville, N. J., last week. Born in 1812, Mr. Welch had in seventy years of an active and industrious life done much for the advancement of the profession of engineering, as well as for his own reputation. At eighteen years of age he was engaged as assistant on the Lehigh Canal, with several others who have since, like himself, risen to eminence. His skill and judgment brought him constant employment, and for many years he was closely identified with the great railroad works in and about the State of New Jersey. For fifteen years he was President of the United New Jersey Railroad and Canal Company, and was active in promoting the consolidation of the companies which now compose the system. His enterprising turn of mind led him, while still a young man, to join with Captain Stockton in the experiments which led to the construction of the Princeton, the first screw steamer ever built; and many improvements in the casting of heavy ordnance were made under his direction. Last January he was chosen President of the Society of Civil Engineers, and continued the practice of his profession until the last, being at the time of his death consulting engineer of the New York, West Shore and Buffalo Railroad.

THE enormous building of the State, War and Navy Departments, at the foot of Pennsylvania Avenue, in Washington, does not seem to have been constructed with the solidity befitting its importance. Some changes were recently made there, by which a number of clerks were assigned places in rooms formerly occupied for storage of papers, and on removing the papers to make room for desks it was found that the copper roof of the building had leaked badly, and that, perhaps on that account, the plastering had broken away, and had either fallen, or was so insecurely held to the laths that it was dangerous to occupy the room. The plaster is said to have been so thin that the laths were almost visible through it, and extensive repairs are now in progress to make the place fit for use. We should not ourselves be sorry to see an examination of the whole building made, say by some army engineer. Our own impression is that certain other details of the workmanship of this costly structure besides the plastering would bear criticism.

A FEW weeks ago a certain Mr. Hendricks, who resided on Wallace Street in Philadelphia, sent word to his landlord that there was a crack in the rear wall of his house, extending from the basement nearly to the eaves, and that unless it were repaired at once he should move away at the end of the month. Other serious cracks, which appeared before, had been remedied by the simple process of filling them with mortar, but this one seemed to increase in size every day. The peril did not, however, seem to be immediate, and Mr. Hendricks left the city on business. While he was gone there was no one to watch for the signs of approaching danger, and one morning about five o'clock the house suddenly collapsed, all the walls falling outward, and letting the floor, with the furniture and nine persons, most of whom were quietly asleep, drop to the basement. Fortunately, with the exception of trifling bruises from falling plaster and timbers, no one suffered any injury, so that the landlord will escape pursuit for manslaughter, but it is not unpleasant to reflect that his house is probably a total loss to him, since there is no insurance against such accidents.

CAPTAIN E. M. SHAW, the distinguished Chief of the London Fire Brigade, made recently a short visit to this country, and on the eve of his departure for home confided to a newspaper reporter his impressions of the efficiency of the American methods for extinguishing fires, which were by no means favorable. His first criticism, that the interference of the firemen with politics, or of politics with the firemen, or both, is injurious to the service, is certainly fully justified; but some expressions in regard to the ignorance of their business displayed by American firemen, as well as in relation to the superiority of the English men and engines, may be taken with considerable allowance. It is doubtless true, as Captain Shaw asserts, that the London Fire Brigade protects a much larger area than New York, at less cost and with less loss; but the difference must lie partly, if not mainly, in the inferior methods of building pursued among us. The interminable furrings, which in this country hold a shell of lath and plaster within the walls and roof of so-called substantial buildings, are in Europe little known, and the rapid spread of a conflagration, concealed and out of reach in the wood-lined cavities of floors and walls, must be a phenomenon much less common in London than in the

cities of the United States. Moreover, our universal hot-air furnaces do much to kindle the fires which the practice of furring renders uncontrollable, and the prodigal use of combustible material gives peculiar fury to the flames. Captain Shaw says that "American firemen have no idea of the work to be done at a fire, or the way to do it," and although we know the incorrectness of this assertion it is not difficult to imagine that the impossibility in our buildings of determining the vulnerable point of a fire, which if kindled in the basement is most likely to break out in the roof, may give an air of random effort to the work of our men in the eyes of one accustomed to deal with solid walls and exposed construction.

The *Fireman's Journal* publishes a letter from a correspondent in Tokio, Japan, who tells some surprising stories about fires in that city. Soon after his arrival in Japan he witnessed a terrible conflagration, which swept street after street, until it was stopped by the impassable barrier of a canal. The next day, after relating his experience to a native acquaintance, he was astonished to hear the latter reply that it was "not much of a fire,—not more than a thousand houses burned." Further experience showed him that his friend was right, and it was not long before another occurred which consumed fifteen thousand houses, followed by a third, which destroyed seven thousand more. The greatest conflagration in the history of Tokio, about a hundred years ago, burned everything in its way for nine miles across the city. Although the roofs of the houses are usually tiled, the rest of the construction is very light, and there is no protective service worthy of the name; but merchants who have valuable stocks of goods contrive to secure them from danger by storing them in buildings constructed of bamboo lattice-work, thickly plastered with mud dug from the canals. The windows are small, and are furnished with shutters of a similar frame-work, also plastered with mud. Tubs of fresh mud stand always in readiness, and on the approach of a conflagration the proprietor plasters up the crevices which the sun soon causes in the original coating. This done he and his wares are safe, and the fire beats on the building in vain. The number of these "kuras" has much increased lately, and in some places they line whole streets, which effectually resist the spread of fires in their neighborhood.

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To this statement of the case *La Semaine* makes reply that in general an architect is at fault if he omits to supervise the works under his charge with due care; if he allows the building to be erected on a bad or yielding soil; if he permits the use of improper materials; if his plans indicate weak or vicious construction; and if he neglects to require the observance of the public laws and regulations, as well as of any conditions or restrictions concerning which his employer has given him notice. Whether the fact that the cost of the construction exceeded the estimate should be regarded as a fault on the part of the architect depends, says *La Semaine*, upon circumstances. If the architect, unknown to the proprietor and without his authority, should bring him into expense, the latter would naturally refuse to pay the cost of the extra work, and the question of responsibility should then be decided; but as the architect has unquestioned authority to order the execution of extra works asked for by the proprietor or arranged with his consent, the fact of its having been paid for without remonstrance was evidence that the additional work in the present instance was carried out by the architect with at least the assent of his client, and in this case he was entitled to commission on the whole cost. For vicious construction, required by the drawings or permitted by the architect, he was certainly responsible, and both he and the contractor were jointly liable for damage caused by building in the beam under the fireplace; but in regard to the sashes and shutters there might be a question as to their superfluous character, and the twenty-three inch corridors, although unusual, could hardly be classed as constituting a vicious construction, particularly as the proprietor did not notice the inconvenience of them until he had lived in the house for two years.

A plan which has proved successful on a small scale in former years is to be carried out extensively this season in the Paris theatres, where paintings and sculptures are to be exhibited and sold in the anterooms and *foyers*, not only during the hours of the performance, but through a portion of the day. According to the *Architect*, this mode of displaying their works is favored by artists, who thus save a part of the exorbitant commissions charged by the picture-dealers, and the public will certainly welcome such an addition to the pleasures of the theatre. Some well-known painters have already begun to exhibit in this way, and it seems likely that they will find the enterprise a profitable one.

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The municipal authorities of the city of Edinburgh, through the influence of the Public Health Committee, have established a regulation which should prove very useful. Under it any citizen who suspects that the plumbing or drainage of his house are not what they should be, has only to notify the city engineer, who will send a competent inspector to examine the whole system of sanitation of the house. This inspector carries his notes to the engineer, who then prepares a report, stating the character of the defects, if any exist, and, what is still better, explaining the proper manner of remedying them. If we are not mistaken, a similar provision is to be found in the health regulations of some towns in this country, but for some reason little advantage seems to be taken of it.

BUILDING SUPERINTENDENCE.—XXIII.

GAS-FITTING.

[*The gas-fitting is often included in the plumber's contract.*]

Piping. PIPE the house for gas in the best manner in accordance with the regulations of the Gas Company, with outlets as marked on plans, [*seventy-two*] outlets in all. All pipe to be best wrought-iron, and all fittings under 2-inch to be of malleable iron. All to be put together with red lead, capped, tested and proved perfectly tight before any plastering is done, and the caps left on. All pipes are to be laid with a fall towards the meter, which is to be placed [*in furnace-cellar near west window*] and all are to be well secured with hooks and bands.

The gas-fitter is to call upon the carpenter to do such cutting of timbers as he needs, but no beams are to be cut, notched or bored at a greater distance than 2 feet from the bearing; drop-lights where requisite to be supplied by special branches. All nipples to be of the exact length for putting on fixtures without alteration, and all to be exactly perpendicular to the wall or ceiling from which they project. Bracket outlets in all Halls and passages, Parlor, Dining-room, Kitchen, Bath-room, Furnace-cellar and Basement Water-closet, to be exactly 5′ 6″ above finished floor; elsewhere to be exactly 4′ 9″ above finished floor. Mirror light outlets to be 8′ above finished floor.

Connecting Meter. Apply and pay all necessary charges for service-pipe from street main to inside of cellar-wall, and connect the service-pipe and house-pipes with the meter in the best manner, with stop-cock on the street side of the meter, and leave all perfect.

HEATING.

Furnish and set where shown or directed in Basement one best quality [*No. 24 Peerless*] brick furnace, including galvanized-iron inverted cone top and covering bars, 8-inch galvanized-iron smoke-pipe, tin hot-air pipes, register-boxes, registers, soapstone borders, plastering rings, wire nettings and dampers complete, and including also all cartage, transportation and labor of every kind except only mason and carpenter work.

Size of Pipes and Registers.

In First Story: The Front Hall is to have 12-inch pipe and 12″ x 15″ register.
The Back Hall is to have 12-inch pipe and 12″ x 15″ register.
The Parlor is to have 12-inch pipe and 12″ x 15″ register.
The Dining-room is to have 12-inch pipe and 12″ x 15″ register.

In Second Story: The Chamber over Dining-room is to have 10-inch pipe and 10″ x 14″ register.
The Chamber over Parlor is to have 10-inch pipe and 10″ x 14″ register.
The Chamber over Kitchen is to have 9-inch pipe and 9″ x 12″ register.
The Chamber over Hall is to have 9-inch pipe and 9″ x 12″ register.
The Dressing-room is to have 8-inch pipe and 8″ x 10″ register.
The Bath-room is to have 8-inch pipe and 8″ x 10″ register.

Each room is to have an independent hot-air pipe and all hot-air pipes to be double where they pass through floors or partitions, or behind furrings. The pipes are to be carefully arranged so that all may draw equally, with easy turns at every change of direction. All register-boxes are to be double; all tin-work to be of XX bright tin, and all wood-work within 1″ of any hot-air pipe, or within 16″ of the smoke-pipe, to be protected with pieces of bright tin, securely nailed on. All registers are to be of [*Creamer's*] make, all placed where shown on plans or as directed; the one in Parlor to be nickel-plated; all the others to be black japanned.

Cold-Air Box. Make and put up a cold-air box of galvanized-iron as shown by blue lines on plan, to be 22″ x 31″ in section, all riveted together in the best manner, and strongly secured to cellar ceiling. The mouth at each end to be flanged out to protect the joint with the frame, and to have strong galvanized-wire netting, ¼″ mesh, over the opening. Put a sliding damper of galvanized-iron in each end, and make door 24″ x 30″ for cleaning out, with button fastening.

Regulator. Furnish and put on in the best manner [*White's*] automatic regulator, to act both upon the check-draught and the damper in the smoke-pipe, and leave all in perfect working order.

Clean up the iron-work and leave it neat at the completion of the building, and furnish a shaking handle, poker and iron shovel.

Range. Furnish and fit up where shown in Kitchen one No. 5 [*Carpenter's*] Range with water-back and couplings, and plate-warmer, all to be set complete, including all transportation and labor except mason-work. Clean up the range and leave it neat at the completion of the building, and furnish at the same time the usual list of tin and iron ware.

Laundry Stove. Furnish and set up where directed in Laundry a [*Walker's*] No. 1 stationary laundry-stove, with galvanized-iron smoke-pipe and zinc-covered stove-board complete: all to be left neat and perfect.

CONTRACTS.

Not the least important of the young architect's duties is that of guarding the interests of his employer by means of a clear and explicit contract with each of the mechanics employed on his building. In general the architect himself will have to draw up these instruments, the ordinary printed forms being quite inadequate for the purpose, and he will find the task not always an easy one. While it is incumbent on him to secure the best and safest terms for his employer that the contractors will agree to, he has no right to use unfair means to induce them to sign their names to stipulations of which they do not fully understand the meaning; and if he wishes to be able to enforce the contract in case of need he cannot be too careful to express in the plainest language every point upon which it may subsequently be necessary to insist.

In order to provide for all possible contingencies it is necessary to define the rights and duties of the parties under a great variety of circumstances, and a good contract will for this reason be somewhat long; but this is better than a condensation which leaves loopholes for evasion or dispute.

It must not be forgotten that contracts are often entered into unthinkingly, which may prove very disadvantageous for one of the parties, and the architect must be careful to protect his principal from such mishaps. Thus the making of a bid for work by a mechanic, and its unconditional acceptance by the owner, or the architect for him, constitute a valid agreement, by which the mechanic is bound to do the work, and the owner to pay for it, perhaps without any stipulations as to the time of completion, the terms of payment, or other very important matters, which may have to be decided afterwards by costly litigation. For this reason many architects accept a tender only upon the condition that a satisfactory contract shall be signed by the party offering it; but such a conditional acceptance does not bind the latter, who is then at liberty to withdraw his bid, if he chooses, at any time before the final agreement is signed. If, therefore, any tender should be particularly advantageous, it may be desirable to prevent its withdrawal by a prompt and definite acceptance, and in order that this may carry with it by implication the consent of the parties to at least the more important clauses of an ordinary contract, it is usual to employ the device of General Conditions, which are prefixed to every specification and constitute a part of it: and since the tender is always for doing work or furnishing material according to the specification, the general conditions will be included in the terms to which the bidder offers to conform, and will be binding upon him if his bid is accepted. As the general conditions relate to the duties of the mechanic, not to those of the owner, the former will usually be very willing to exchange the one-sided agreement constituted by them, under which for instance, the owner would not be required to make any payments before the completion of the work, for a new one, defining the rights of both parties; and the new contract may, and should, comprise the substance of the general conditions of the specifications, expressed in nearly the same words.

A building contract is usually divided into two portions, the first of which is the simple agreement of one party to do a certain work for the other within a certain time, in consideration of a certain payment, which the latter promises to make; while the second comprises the conditions which explain, or modify the principal agreement. The first portion, comprising the essence of the contract, should be drawn up with special care, and although expressed in the briefest possible terms, it should be made to include the points regarded as most important. In English contracts the principal agreement is generally written without any punctuation except periods at the ends of the sentences, the object of this being as much to enforce clearness of expression as to prevent the possibility of fraudulent or careless change in the sense by the alteration of points, and the practice seems to be a useful one. The conditions which follow may have ordinary punctuation or not, but it is not easy to make them intelligible without it.

Seals. Whether contracts should be sealed by the signers or not is perhaps doubtful. A simple agreement, in which a consideration is expressed for each promise, would not require seals, but among the many and various stipulations of a building contract some might possibly be regarded as promises to which the consideration did not apply, and a seal would be required

cities of the United States. Moreover, our universal hot-air furnaces do much to kindle the fires which the practice of furring renders uncontrollable, and the prodigal use of combustible material gives peculiar fury to the flames. Captain Shaw says that "American firemen have no idea of the work to be done at a fire, or the way to do it," and although we know the incorrectness of this assertion it is not difficult to imagine that the impossibility in our buildings of determining the vulnerable point of a fire, which if kindled in the basement is most likely to break out in the roof, may give an air of random effort to the work of our men in the eyes of one accustomed to deal with solid walls and exposed construction.

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GAS-FITTING.

[*The gas-fitting is often included in the plumber's contract.*]

Piping. PIPE the house for gas in the best manner in accordance with the regulations of the Gas Company, with outlets as marked on plans, [*seventy-two*] outlets in all. All pipe to be best wrought-iron, and all fittings under 2-inch to be of malleable iron. All to be put together with red lead, capped, tested and proved perfectly tight before any plastering is done, and the caps left on. All pipes are to be laid with a fall towards the meter, which is to be placed [*in furnace-cellar near west window*] and all are to be well secured with hooks and bands.

The gas-fitter is to call upon the carpenter to do such cutting of timbers as he needs, but no beams are to be cut, notched or bored at a greater distance than 2 feet from the bearing; drop-lights where requisite to be supplied by special branches. All nipples to be of the exact length for putting on fixtures without alteration, and all to be exactly perpendicular to the wall or ceiling from which they project. Bracket outlets in all Halls and passages, Parlor, Dining-room, Kitchen, Bath-room, Furnace-cellar and Basement Water-closet, to be exactly 5′ 6″ above finished floor; elsewhere to be exactly 4′ 9″ above finished floor. Mirror light outlets to be 8′ above finished floor.

Connecting Meter. Apply and pay all necessary charges for service-pipe from street main to inside of cellar-wall, and connect the service-pipe and house-pipes with the meter in the best manner, with stop-cock on the street side of the meter, and leave all perfect.

HEATING.

Furnish and set where shown or directed in Basement one best quality [*No. 24 Peerless*] brick furnace, including galvanized-iron inverted cone top and covering bars, 8-inch galvanized-iron smoke-pipe, tin hot-air pipes, register-boxes, registers, soapstone borders, plastering rings, wire nettings and dampers complete, and including also all cartage, transportation and labor of every kind except only mason and carpenter work.

Size of Pipes and Registers.

In First Story: The Front Hall is to have 12-inch pipe and 12″ x 15″ register.
The Back Hall is to have 12-inch pipe and 12″ x 15″ register.
The Parlor is to have 12-inch pipe and 12″ x 15″ register.
The Dining-room is to have 12-inch pipe and 12″ x 15″ register.

In Second Story: The Chamber over Dining-room is to have 10-inch pipe and 10″ x 14″ register.
The Chamber over Parlor is to have 10-inch pipe and 10″ x 14″ register.
The Chamber over Kitchen is to have 9-inch pipe and 9″ x 12″ register.
The Chamber over Hall is to have 9-inch pipe and 9″ x 12″ register.
The Dressing-room is to have 8-inch pipe and 8″ x 10″ register.
The Bath-room is to have 8-inch pipe and 8″ x 10″ register.

Each room is to have an independent hot-air pipe and all hot-air pipes to be double where they pass through floors or partitions, or behind furrings. The pipes are to be carefully arranged so that all may draw equally, with easy turns at every change of direction. All register-boxes are to be double; all tin-work to be of XX bright tin, and all wood-work within 1″ of any hot-air pipe, or within 16″ of the smoke-pipe, to be protected with pieces of bright tin, securely nailed on. All registers are to be of [*Creamer's*] make, all placed where shown on plans or as directed; the one in Parlor to be nickel-plated; all the others to be black japanned.

Cold-Air Box. Make and put up a cold-air box of galvanized-iron as shown by blue lines on plan, to be 22″ x 31″ in section, all riveted together in the best manner, and strongly secured to cellar ceiling. The mouth at each end to be flanged out to protect the joint with the frame, and to have strong galvanized-wire netting, ¼″ mesh, over the opening. Put a sliding damper of galvanized-iron in each end, and make door 24″ x 30″ for cleaning out, with button fastening.

Regulator. Furnish and put on in the best manner [*White's*] automatic regulator, to act both upon the check-draught and the damper in the smoke-pipe, and leave all in perfect working order.

Clean up the iron-work and leave it neat at the completion of the building, and furnish a shaking handle, poker and iron shovel.

Range. Furnish and fit up where shown in Kitchen one No. 5 [*Carpenter's*] Range with water-back and couplings, and plate-warmer, all to be set complete, including all transportation and labor except mason-work. Clean up the range and leave it neat at the completion of the building, and furnish at the same time the usual list of tin and iron ware.

Laundry Stove. Furnish and set up where directed in Laundry a [*Walker's*] No. 1 stationary laundry-stove, with galvanized-iron smoke-pipe and zinc-covered stove-board complete: all to be left neat and perfect.

CONTRACTS.

Not the least important of the young architect's duties is that of guarding the interests of his employer by means of a clear and explicit contract with each of the mechanics employed on his building. In general the architect himself will have to draw up these instruments, the ordinary printed forms being quite inadequate for the purpose, and he will find the task not always an easy one. While it is incumbent on him to secure the best and safest terms for his employer that the contractors will agree to, he has no right to use unfair means to induce them to sign their names to stipulations of which they do not fully understand the meaning; and if he wishes to be able to enforce the contract in case of need he cannot be too careful to express in the plainest language every point upon which it may subsequently be necessary to insist.

In order to provide for all possible contingencies it is necessary to define the rights and duties of the parties under a great variety of circumstances, and a good contract will for this reason be somewhat long; but this is better than a condensation which leaves loopholes for evasion or dispute.

It must not be forgotten that contracts are often entered into unthinkingly, which may prove very disadvantageous for one of the parties, and the architect must be careful to protect his principal from such mishaps. Thus the making of a bid for work by a mechanic, and its unconditional acceptance by the owner, or the architect for him, constitute a valid agreement, by which the mechanic is bound to do the work, and the owner to pay for it, perhaps without any stipulations as to the time of completion, the terms of payment, or other very important matters, which may have to be decided afterwards by costly litigation. For this reason many architects accept a tender only upon the condition that a satisfactory contract shall be signed by the party offering it; but such a conditional acceptance does not bind the latter, who is then at liberty to withdraw his bid, if he chooses, at any time before the final agreement is signed. If, therefore, any tender should be particularly advantageous, it may be desirable to prevent its withdrawal by a prompt and definite acceptance, and in order that this may carry with it by implication the consent of the parties to at least the more important clauses of an ordinary contract, it is usual to employ the device of General Conditions, which are prefixed to every specification and constitute a part of it: and since the tender is always for doing work or furnishing material according to the specification, the general conditions will be included in the terms to which the bidder offers to conform, and will be binding upon him if his bid is accepted. As the general conditions relate to the duties of the mechanic, not to those of the owner, the former will usually be very willing to exchange the one-sided agreement constituted by them, under which for instance, the owner would not be required to make any payments before the completion of the work, for a new one, defining the rights of both parties; and the new contract may, and should, comprise the substance of the general conditions of the specifications, expressed in nearly the same words.

A building contract is usually divided into two portions, the first of which is the simple agreement of one party to do a certain work for the other within a certain time, in consideration of a certain payment, which the latter promises to make; while the second comprises the conditions which explain, or modify the principal agreement. The first portion, comprising the essence of the contract, should be drawn up with special care, and although expressed in the briefest possible terms, it should be made to include the points regarded as most important. In English contracts the principal agreement is generally written without any punctuation except periods at the ends of the sentences, the object of this being as much to enforce clearness of expression as to prevent the possibility of fraudulent or careless change in the sense by the alteration of points, and the practice seems to be a useful one. The conditions which follow may have ordinary punctuation or not, but it is not easy to make them intelligible without it.

Seals. Whether contracts should be sealed by the signers or not is perhaps doubtful. A simple agreement, in which a consideration is expressed for each promise, would not require seals, but among the many and various stipulations of a building contract some might possibly be regarded as promises to which the consideration did not apply, and a seal would be required

to make these valid: so that it seems to be a reasonable precaution to affix them.

In some states building contracts must be recorded by the proper public officer, and the law in this respect should be ascertained by architects practising beyond the boundaries of their own state. The statutes in regard to the liens of mechanics and material-men also vary in different states, and are frequently changed, so that some care is necessary to secure owners absolutely against loss by the dishonesty or bankruptcy of the builder. In most states the right of mechanics to file liens against a building or estate to recover the amount of their wages for work upon it is barred at the expiration of thirty days from the time that they cease their labor, so that if the record after this time shows no lien to have been filed, the contractor may be paid the balance due him in full, without fear that the workmen can demand an additional sum. Where sixty days or more are allowed by law for filing liens, the last payment to the contractor must be deferred until after the lapse of this term, allowing a few days more to give opportunity for examining the record. Liens for materials furnished to a contractor can in most states only be claimed by giving notice to the owner of the building in which they are used, before they are delivered, that he will be held responsible for the price of them, and he can then retain the amount out of the payments to the contractor, or he can notify the dealer that he will not receive them, and the latter can then only look to the builder for his pay.

With these explanations, the clauses in the following form of contract will be sufficiently clear. The insurance clause may need modification according to circumstances, but the important points are to make sure that the builder's interest will be covered, so that in case of loss he may not be thrown into bankruptcy, to the injury of the owner; and to define clearly the mode in which the policy shall be taken out and paid for, so that the building may not be left unprotected through any misunderstanding between the owner and contractor as to each other's duty.

CONTRACT FOR BUILDING

Made this *fifteenth* day of *September* in the year 1883 by and between *James Johnson* of *Albany* in the County of *Albany* and State of *New York* party of the first part and *Thomas Smith Richard Smith* and *Henry Smith* of *Melrose* in the County of *Rensselaer* and State aforesaid *copartners doing business under the firm name and style of Smith Brothers* builders party of the second part.

The said *Smith Brothers* party of the second part for themselves and each of them and each of their heirs executors administrators and assigns hereby covenant and agree to and with the said party of the first part his heirs and legal representatives in consideration that the party of the first part agrees to perform the consideration hereinafter mentioned to make erect build and finish for the said party of the first part his heirs and assigns a dwelling-house on land of said party of the first part on *Fairfield Street* in said *Melose* including all the *excavation and grading mason-work plastering carpenter-work roofing painting and glazing but exclusive of plumbing gas fitting and heating* and to furnish all the materials of every kind labor scaffolding and cartage for the full completion of the said *excavation and grading mason-work plastering carpenter-work roofing painting and glazing* and they agree to supply said work and materials in strict accordance with the drawings and specifications made by *Edward Tyro* of said *Albany* architect which said drawings and specifications are and are to be taken and deemed to be a part of this contract by both the parties thereto and all things which in the opinion of the said architect may fairly be inferred from such drawings and specifications to be intended without being specially stipulated are to be taken as expressly specified and all the materials are to be supplied in sufficient quantity and where the quality is not otherwise described in the specifications the best quality and workmanship is specifically implied throughout and the said *Smith Brothers* party of the second part covenant to perform the whole of their agreement in the best most substantial and most workmanlike manner subject to the directions from time to time and to the satisfaction of the said architect or his successor appointed by the party of the first part and to deliver their work completely finished on or before the *fifteenth* day of *April* next.

And the said party of the first part hereby promises and agrees in consideration of the promise of the party of the second part to perform the foregoing covenants to pay to the said party of the second part the sum of *six thousand four hundred and ninety-seven dollars* ($6,497) in four several payments as follows: —

The first payment to be *Fifteen Hundred* Dollars ($1,500) when the roof is on and boarded.

The second payment to be *Fifteen Hundred* Dollars ($1,500) when all the outside work including piazza and porch is done and painted one coat and the mason-work and plastering finished and the sashes in.

The third payment to be *Fifteen Hundred* Dollars ($1,500) when the standing finish is done and the upper floors and stairs completed and the second coat of paint on the outside.

And the balance *thirty-three* days after the said work shall have been completely finished and delivered and accepted by the said party of the first part unless some defect shall meanwhile have been discovered in the said work.

Provided however that no payment shall be made except upon the certificate of the said architect or his successor that the work for which said payment is to be made is properly done and that the payment is due such certificate however not exempting the party of the second part from liability to make good any work so certified if it be afterwards discovered to have been improperly done or not in accordance with the plans or specifications and provided further that prior to each payment by the party of the first part a satisfactory certificate shall have been obtained to the effect that the estate or building upon or for which the work is done is at the time when the payment is made free from all mechanic's liens and other claims chargeable upon said building or estate and incurred by said party of the second part.

And it is hereby further agreed by and between the said parties hereto that the drawings and specifications are intended to coöperate so that any works shown on the drawings and not mentioned in the specifications or *vice versa* are to be executed by the party of the second part without extra charge the same as if they were both mentioned in the specifications and shown on the drawings. The said party of the first part or the said architect with the consent of the party of the first part shall be at liberty to order any variations from the drawings or specifications either in adding thereto or diminishing therefrom or otherwise however and such variations shall not vitiate this contract but the difference in cost shall be added to or deducted from the consideration of this contract as the case may be by a fair and reasonable valuation and the architect shall have power to extend the time of completion on account of alterations or additions so ordered such extension to be certified by him to the party of the first part at the time when such order for alterations or additions is given. Orders for changes which do not affect the cost of the work may be given by word of mouth but no order for any change which increases or diminishes the cost of the work or affects the time of completion shall be valid unless given in writing.

Neither the whole nor any portion of this contract shall be assigned or sub-let by the party of the second part without the written consent of the party of the first part.

If the said party of the second part shall fail to complete the said works including all variations should such be made at or before the time agreed upon with such extension if any in the case of extra work as may have been made and certified by the architect then and in that case the said party of the second part shall forfeit and pay to the said party of the first part the sum of *Ten* dollars ($10) for each and every day that the said works shall remain unfinished after the time agreed upon for their completion unless in the opinion of the architect such delay could not with reasonable diligence and prudence have been avoided or foreseen by the said party of the second part the sums so forfeited to be retained as liquidated and ascertained damages out of any money that may then be due or owing or may thereafter become due or owing to the said party of the second part on account of *their* work and materials under this contract.

If the said party of the second part shall become bankrupt or insolvent or assign *their* property for the benefit of creditors or become otherwise unable *themselves* to carry on the work or shall neglect or refuse to do so at any time for six days in the manner required by the architect or shall refuse to follow his direction as to the mode of doing the work or shall neglect or refuse to comply with any of the articles of this agreement then the said party of the first part or his agent shall have the right and is hereby empowered to enter upon and take possession of the premises with the materials and apparatus thereon after giving two days' notice in writing and thereupon all claim of the said party of the second part *their* executors administrators and assigns shall cease and the said party of the first part or his agent may after using such of the materials already on the ground as shall be suitable provide other materials and workmen sufficient to finish the said works and the cost of labor and materials so provided shall be deducted from the amount to be paid under this contract.

All materials shall be the property of the party of the first part as soon as they are delivered on the ground subject only to the right of the party of the second part to remove surplus materials at the completion of the building but no materials are to be paid for before they are set in place in the work.

The said party of the first part shall keep the said building at all times fully insured against loss by fire for the benefit of whom it may concern and in case of loss the indemnity shall be divided between the parties hereto according to their respective interests in

the property destroyed. The said party of the second part shall be solely responsible for all loss failure or damage from whatever cause to the said works loss by fire alone excepted until the whole is delivered and accepted by the party of the first part and shall give all necessary assistance to the other mechanics employed in the building and shall be solely responsible for any delay to their operations or damage to their work or materials or to neighboring property or to the persons or property of the public by the workmen or through the operations of the said party of the second part.

And for the faithful performance of each and every the articles and agreements hereinbefore contained the said parties hereto do hereby bind themselves their heirs executors administrators and assigns each to the other in the penal sum of *Three Thousand* Dollars ($3,000) firmly by these presents.

In Witness whereof the said parties hereto have hereunto set their hands and seals the day and year first above written.

In presence of

Edward Tyro to both.	James Johnson,	[Seal.]
	Smith Brothers.	[Seal.]

BUILDERS' SCAFFOLDING.—V.

IN the four previous papers which appeared in the March, April, May, and August monthly numbers of the *American Architect*, we have mainly attempted to consider the description of the scaffolding which is usually employed in the United States in the ordinary classes of buildings, and which may for the sake of convenient distinction be called the *scantling* or American type, of which that particular variety which is usually built for bricklaying purposes, Figures 8 and 9, are illustrations. It has been fully described in the first part of the April paper of this series. Figure 9 is a geometrical section of Figure 8. It may be observed with regard to the cross-bracing shown in Figure 9, that unless the upper as well as the lower corresponding braces are both made fast to the opposite ends of the same putlog, the bracing will not be effective unless indeed the putlogs be secured each to a standard which ordinarily is scarcely practicable, and I have seldom observed it to have been attempted in the United States, though in England the putlogs are frequently lashed to the ledgers, which, however, being poles are stiffer laterally than the plank or board ledgers mostly used in America. Other distribution of braces are common, as by fastening a piece of board, fencing, cull, etc., to the window frames and to the standards; but it often happens that the window frames do not come squarely opposite to the standards, which would render this bracing less effective. This method of bracing can only be done below the working stage of the scaffold, which for the time being is in use. Another method is sometimes used though often, it would appear, accidentally in ignorance of its possessing this property to any extent, viz.: by slanting the putlogs obliquely to the face of the wall, or askew, as shown by Figure 10, in which the arrow in the enlarged portion of the figure indicates the normal tendency or direction in which any distorting force would usually be free to act, the longitudinal bracing preventing any lateral movement or motion in any other direction, *i. e.*, an oblique movement outwards from the wall, which would coincide with the axial direction of the putlog when it would be easily withdrawn. When putlogs are thus laid obliquely for the purpose of serving as cross braces, the obliquity of each half of their number should be in opposite directions, so that any tendency to an oblique movement, facilitating the withdrawing of the one-half of the putlogs would be counteracted by the opposing tendencies of those slanted in the opposite direction. Putlogs when thus laid obliquely for the purpose of acting as cross braces, should be wedged around by the brick and mortar so as to prevent their slewing back out of their original position. This sort of bracing can only be to any extent effective when several feet of wall is built above the putlogs, so as to superimpose sufficient weight on them.

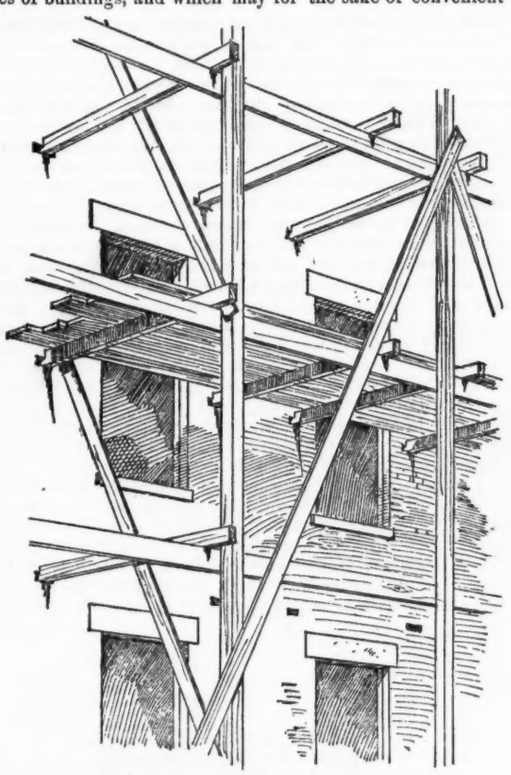


Fig. 8.

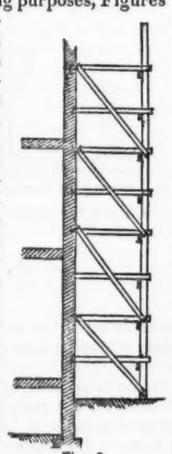


Fig. 9.

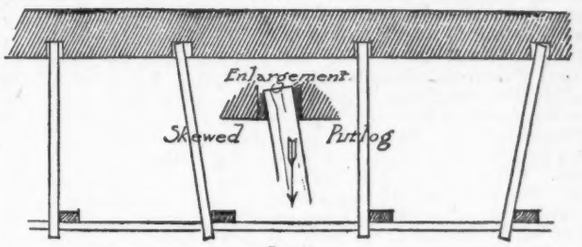


Fig. 10.

In New York, and probably to a less extent in other eastern cities, the *pole*, or English type as we may call it, because of its prevalence in England, is now being pretty generally employed. The essential difference between the *scantling* and the *pole* varieties of scaffolds is simply that which is implied in their distinguishing names and the different methods of fastening which is respectively adopted for each. In the *pole* scaffolds straight fir or larch spars or poles varying in length from 20 to 35 feet, and in thickness at butt from 5 to 8 inches, and at top from 2 to 4 inches are used. These poles are employed respectively for standards, ledgers, and lateral braces, the putlogs being usually of square oak scantling, the cross braces are usually waste boards, culls, etc. There are the single and double-faced varieties of the pole scaffolds similar in principle and purpose to that described for the scantling type in the April paper. The methods of fastening the standards to ledgers and braces are necessarily different in each of the above, as well as in the frame or whole timber scaffolding, which, in the first paper (March number) in the enumeration of the different varieties of builders' scaffolds, we designated as the No. 2 variety, the usual methods of fastening together the different parts or members of the various scaffolds are thus accomplished in the Frame No. 2 type, the fastening is effected by means of iron dogs, bolts, spikes, and solid brackets, etc., whilst in the *scantling* variety of the *ledger* form of scaffold the fastening is mainly effected by means of large nails and spikes; but for pole scaffolds these methods could not be adapted, and therefore lashings of rope, half-inch to three-quarter inch diameter, are employed. When high pole scaffolds are to be built the standards are each formed of double poles lashed together, breaking joints, each higher pole butting down on top of the next lower one, such joints always occurring alternately at the middle of the adjacent pole, the double poles are lashed together at all such butting joints as well as at intermediate points, the lashings being tightened around the poles with wooden wedges. Doubling the poles for standards is most noticeable in London for the ordinary class of three, four, or five story buildings. For higher and more important buildings, as for wholesale purposes, etc., the *frame* scaffold is brought into use. Double-pole standards do not appear to be much resorted to in Paris, where the buildings, generally speaking, being more substantial, larger and longer spars, 10 to 14 inches in diameter at the butt, are more generally used, in which case bolt fastenings are used, the pieces being slightly gained into each other where they cross one another. The methods of lashing the rope differs in Paris from the English, mainly in the lashing of ledgers to standards. In the English lashing a couple of turns of the rope is taken round the standard on the level of the underside of the ledger, then the two parts of the rope are twisted together and brought up around the ledger so as to embrace it, and afterwards around the standard above the level of the ledger and up again around the standard, the last two operations being repeated several times according to the security required of the lashing; the end is finally secured by one or two hitches, then a wedge of wood is driven between the upper turns of the lashing and the standard to tighten it up as may be required. The scaffold builder in making a lashing brings the coils of rope to fit closely around the poles by hammering with a hatchet as it is bent around the poles. The French method is essentially as follows: the rope has a spliced eye at one end, by means of which one turn or loop around the standard is taken several

inches (say 6 to 10 inches) above top side of ledger, it is then passed down in front of, and under the ledger and then around the standard, then up again around ledger, and then passed around the standard, this being repeated a number of times around the standard, both above and below the ledger, and also around the ledger as often as may be necessary to security; the end is finally fastened by hitches, etc., a wooden wedge is driven between pole and rope to tighten up as described in the English method. In Europe, in addition to the ledgers and braces being lashed to standards, the putlogs or many of them are usually lashed to the ledgers. A screw and chain adjustable arrangement of fastening is also used in Paris, though the writer, during a brief visit observed it in use in the scaffolding of buttone building. In Edinburgh, he observed a similar chain lashing tightened by a screw, used for securing lumber loaded on wagons. When standard poles are set on flag pavement they are usually prevented from slipping, etc., by means of a bottomless barrel which is placed around the lower end of the standard, resting flat on end on the pavement; the barrel is then filled with gravel, sand, earth, cinders, etc., and packed down, which causes an adhesion to pavement, and as the standard is confined by being thus imbedded in the gravel, etc., its liability to slip is thus prevented. Another method is to lay a plank or timber sleeper upon the flagging or pavement, and foot the standards on it, securing them to it with dog-irons or spikes, or by means of cleats nailed to the sleepers around the foot of the standard. In Paris the same is accomplished occasionally by means of brickbats or stone spawls laid in mortar or plaster-of-Paris around foot of standard in a semi-globular shape of about 2 feet diameter.

Where there are projecting pavilions with deep re-entering angles to the façade the continuous line of the scaffold of a façade is awkwardly broken, thereby adding to the complicity and extent of the scaffolding required, and to the labor and expenses of building it; but it provides a better opportunity for transverse bracing. In the scaffolding of buildings on streets where there is much passing, there is usually scant opportunity for cross-bracing, especially in the narrow streets and thoroughfares of the old cities of Europe. The outside tier of standards in such cases is set on the curb. The gutter should of course be always kept free of obstructions, and a temporary footpath, with outside guard-rail is constructed on the inside of such tier, or if all of the sidewalk or pavement is required to be occupied in connection with the building operations the temporary footpath is placed on the outside of the standards, which are made the line of the hoarding: in some cities the hoarding and temporary footpath are extended out to occupy one-third or one-half of the street. Scaffolding in streets includes, expressed or implied, proper provision for protecting passers-by from falling brick, stone, débris, dust, etc., arising from the building operations. In the large cities of America, this protection should be more insisted on than it is. In England and France it is strictly imperative. Most American cities permit builders to occupy with their building materials, mortar-beds, etc., one-third to one-half of the street during building operations. Such liberal licenses are frequently abused by careless or troublesome builders to the great and often needless inconvenience of the public, and while it may be considered desirable in American cities to encourage building improvements, or to avoid what might be deemed restrictive obstacles to the convenient prosecution of building operations, and citizens will usually bear with commendable good temper, very considerable inconvenience for the sake of having the improvements in their midst; yet city authorities should not only have, but impartially enforce the due observance of such equitable regulations as shall curtail as much as possible the necessary inconvenience which is permitted. In London and perhaps still more generally so in Paris, canvas or baize screens are used towards streets on which the façades require carving, sculpture, moulding, etc., to be executed on the building, which both serve to protect passengers from dust, etc., and at the same time to shield workmen from inclement weather. Sometimes the entire building is enclosed and temporarily roofed by boarding with glazed sashes properly distributed to admit light inside, canvas, tarpaulins, etc., the scaffolding being utilized as a frame-work to secure the covering to, so that building operations may be carried on in all weather, and if need be, at night as well as by day, by the aid of the electric light or the oxy-hydrogen lime-light. In London and some of the provincial cities of England tarpaulins are frequently secured to the tops of the scaffold standards and stretched over the top of the entire building as a temporary roof, to exclude rain and snow.

A combination of the *single ledger* scaffolding with *trestles* is sometimes convenient for outside scaffolds, as it minimizes the number of putlog holes in front walls, as well as simplifies the building of the scaffold; it being easier to place a tier of trestles upon plank sleepers laid on putlogs already in place than to put up the additional ledger and putlogs. Sometimes two and even three successive tiers of trestles are thus superimposed between contiguous tiers of ledgers for successive working platforms. It is necessary in such cases that the upper tiers of trestles should be well braced in towards the wall, and that care be taken that the plank sleepers are not liable to spring between bearings, to avoid which the trestles should rest the one directly upon the other. English and French *double ledger* scaffolding is usually erected in the first instance, before the building is begun, to its proposed height and duly braced, and only the putlogs and planking or boarding of successive platforms are afterwards laid in place as required by the progressive rising of the walls of the building. Planks two to three inches thick are generally used in Europe for masonry scaffolds for the working platform, whether for brickwork or stone-work.

In Scotland the "Gabbert" scaffolding and the *Trestle* scaffold are usually employed in combination: the former is generally confined to large buildings for the purpose of raising the materials by means of steam or hand-power cranes set upon the top of the scaffold platform so as to command an extensive range of the walls of the building within the varying radius of the jib. The cranes are set within or without the walls, distributed in such positions, number and sizes as may be deemed most convenient. The scaffold proper is simply a series of strong trestles, of which Figure 11 may be taken as an illustration, standing breast-high and 5 feet or 6 feet long, and for ordinary house-building are made in sets of 3 feet, 5 feet

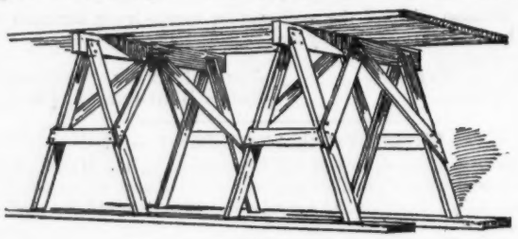


Fig. 11.

and 6 feet high, in order that by combinations they will suit for ordinary heights of stories. The feet of the trestles are set on plank sleepers which are laid upon the floor-joists. When the direction of the sleepers is parallel with the joists, short scantlings are laid across the joists at convenient intervals and the sleepers are laid upon these. The platform or stage on which the workmen and masons stand consists of plank laid close together resting upon the top of the trestles. For the next higher stage the trestles, resting upon plank sleepers laid on the lower tier of trestles, are repeated successively, the one upon top of the other, tier after tier as often as may be required to enable the masons to reach breast-high the height of the story or wall. When trestle scaffolding is adopted for high walls between floor and ceiling there must be sufficient cross-bracing as well as wind-bracing to insure stability against the disturbance of oscillation caused by the movement of heavy weights and tending to overturn or derange the structure. It is seldom advisable, having regard to the heavy loading and the extraordinary strains to which scaffolds are occasionally liable, as when large "baskets" of rubble-stones are dumped upon the scaffold for backing up front walls or for building back or side walls, etc., as is a usual practice in Scotland, to superimpose successive tiers of trestles resting the one upon the other, having sleeper-planks between the tiers higher than five or six trestles, because of the great want of integrity of such a structural combination, without resorting to a system of interties and braces which would probably make it more costly and less satisfactory than the ordinary ledger scaffolding of proper construction, with a suitable distribution of the several parts adapted to resist the strains axially. In some parts of Scotland both inside and outside trestle scaffolds are used for the ground or first story in solid stone walling: masons then work together on

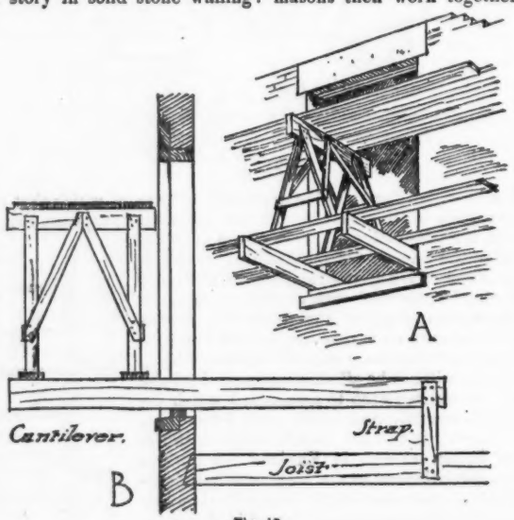
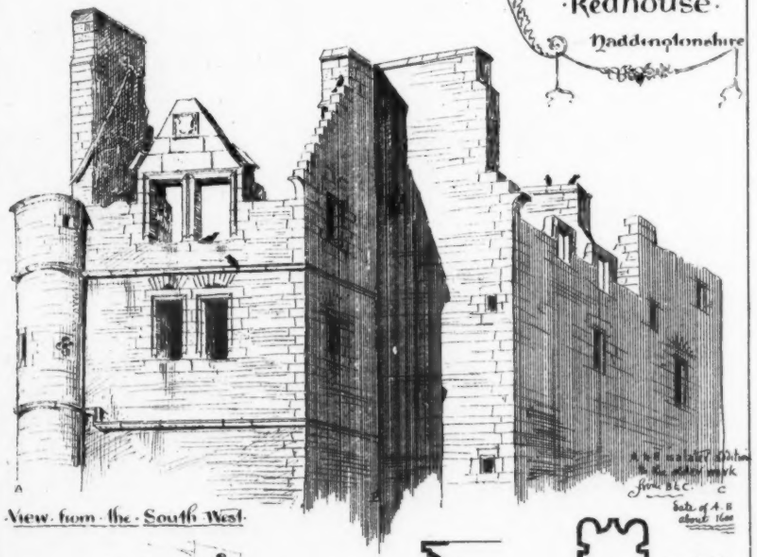


Fig. 12.

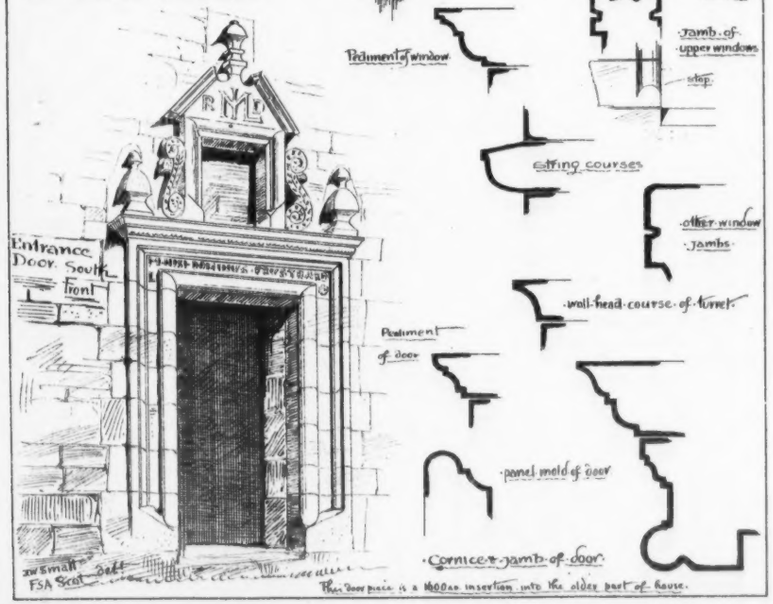
both faces of the wall at the same time. Outside scaffolding is seldom otherwise used, except for remodelling or partially rebuilding façades or other outside walls of a building, when it is often of the double-faced *pole* or *scantling* description. When, however, it is required for the purpose of carving, dressing, or cutting mouldings, it is then usually of the cantilever variety, of which Figure 12 is an example, *B* showing it geometrically and *A* in perspective elevation. It consists, as is shown, of two or more beams of timber resting on a

No. 354 AMERICAN ARCHITECT AND BUILDING NEWS. OCT. 7, 1882.

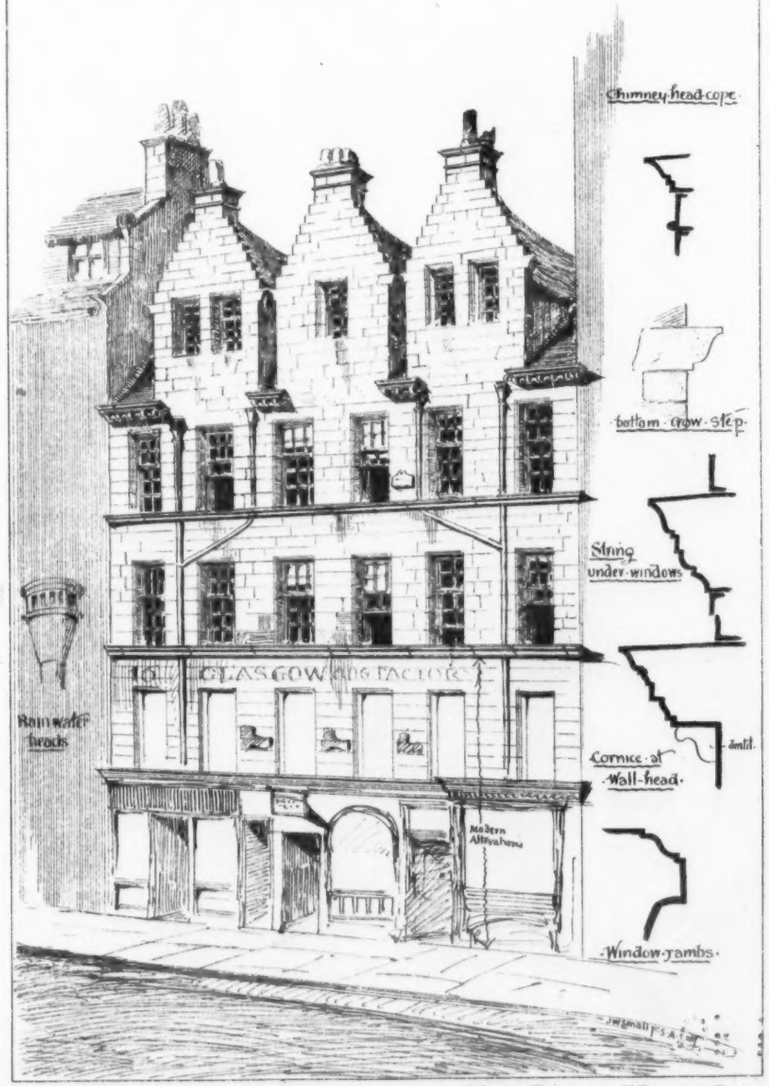
The Manor-house of Redhouse Haddingtonshire



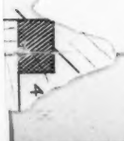
View from the South West

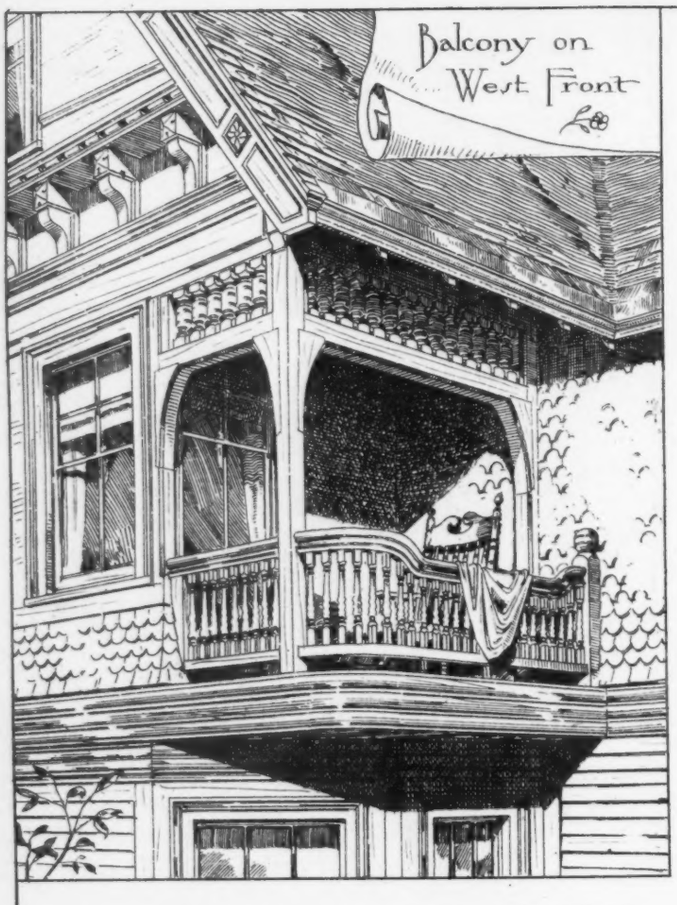


Old front from the Saltmarket Glasgow date about 1700



Heliotype Printing Co. 211 Tremont St. Boston.





Balcony on West Front

West Gable.

Exterior Details of House at Arlington, Mass.

For Geo. D. Moore Esq.

Messrs. Rand & Taylor, Architects, Boston.

South Front

East Front.

Balcony Front.

First Floor Plan

Section

Chimney.

East Gable

Detail of Frame

2"x7" Rafter

4"6" plate

2"x9" Joist.

ledger

Sheathing

Furring

2"x4"

South Gable

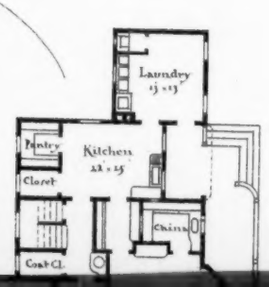
2"x9" Joist

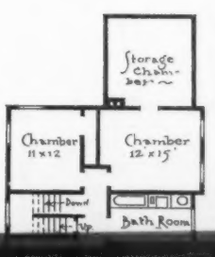
4"x8" Girt

Sheathing

Balcony on West Front. Detail

First Floor Plan





able.

Section

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Detail of Frame

2"x7" Rafter

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ledger

Sheathing

South Gable

Furri

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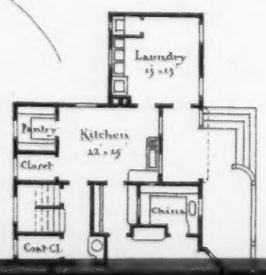
2"x9

Sheathing

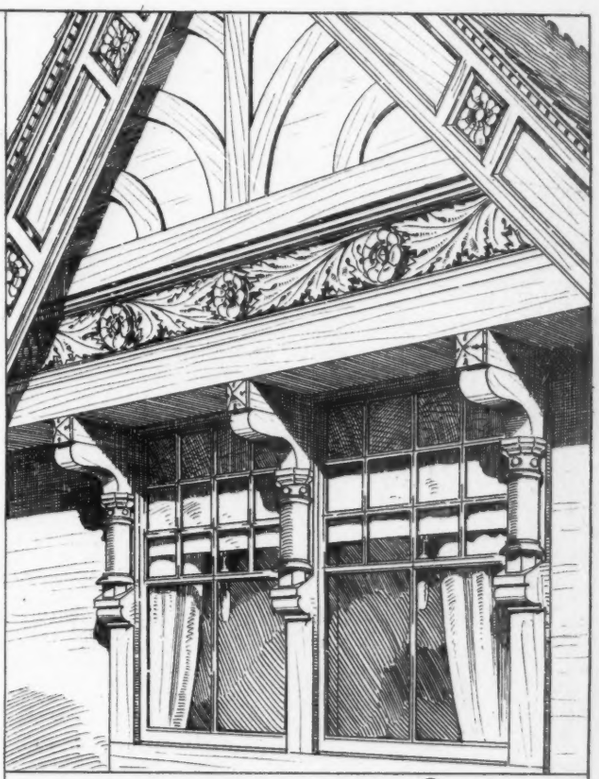
Balcony on West Front. Detail

First Floor Plan



East Gable

Section thro' 3d Story Window, East Gable.



Third Story Window ~ East Gable

Scale for all details.

INCHES. 12 1 2 3 FEET.

For Plans and Elevation.

10 20 30 40 50 60 70 FEET.

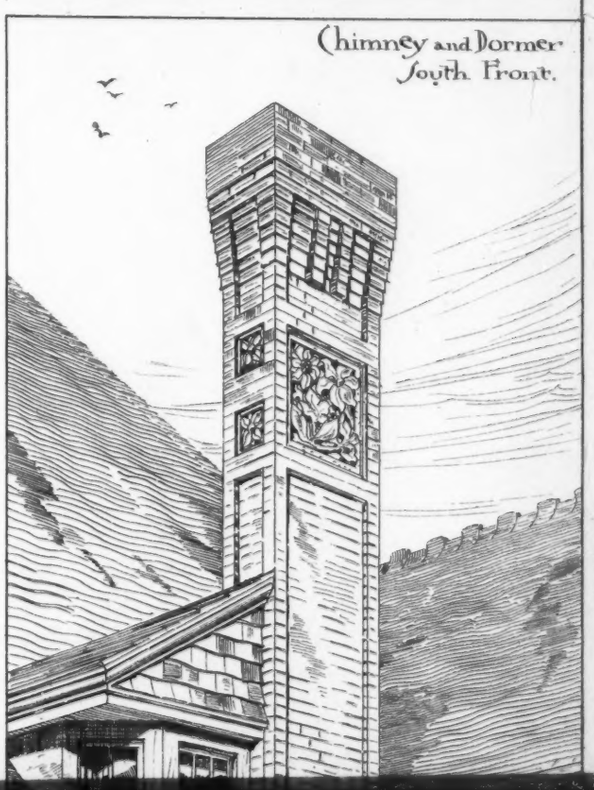
Furring

2×4

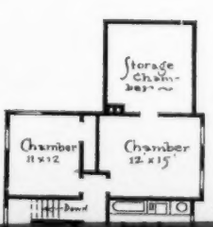
2×9 Joist

4×8 Girt

In Carriage Porch



Chimney and Dormer South Front.



Exterior Details of House at Arlington, Mass.

For Geo. D. Moore Esq.

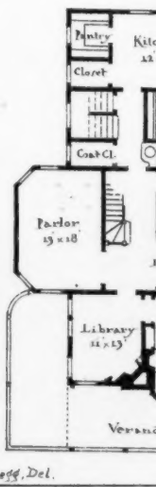
Messrs. Rand & Taylor, Architects, Boston.

South Front

East Front.

Balcony on Front.

First Floor Plan



D.A. Gregg, Del.

Chimney.

Detail of Frame

2"x7" Rafter

4" 6" plate

2"x9" Joist.

ledger.

Sheathing

South Gable

Furring

2"x4"

2"x9 Joist

4"x8" Girt

Sheathing

cony on West

nt. Detail

Laundry 13 x 13'

Pantry

Kitchen 23 x 15

Closet

China

Coat Cl.

Dining Room 13 x 14'

Parlor 13 x 18

Hall.

Carriage porch

Library 11 x 13'

Sitting Room 14 x 17

Veranda

West Elevation.

Storage Chamber

Chamber 11 x 12

Chamber 12 x 15'

Bath Room

Seat

Chamber 13 x 13 x 6

Chamber 13 x 15

Balcony

Cl.

Dressing

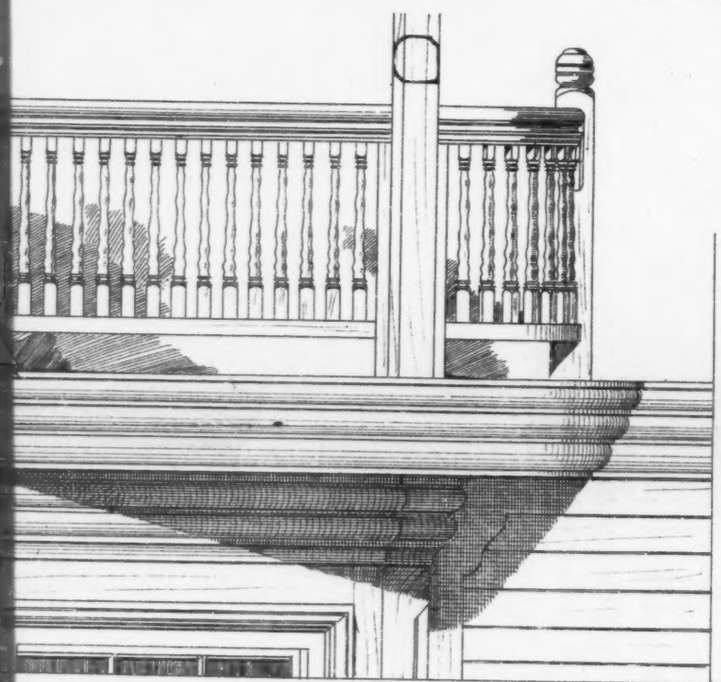
Balcony

Chamber 11 x 14

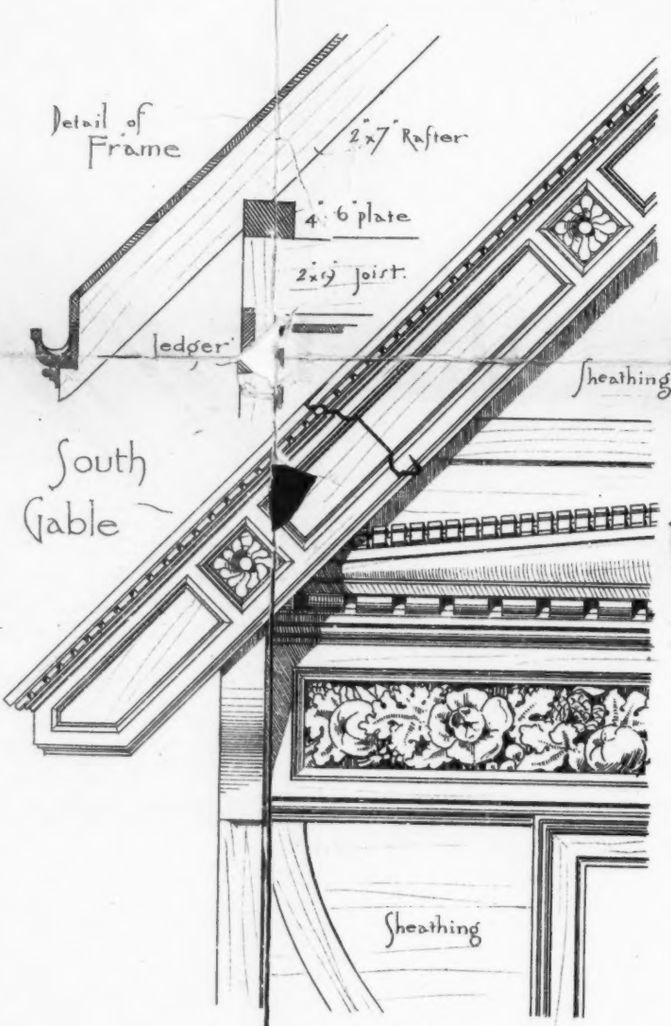
Chamber 14 x 17

Second Floor.

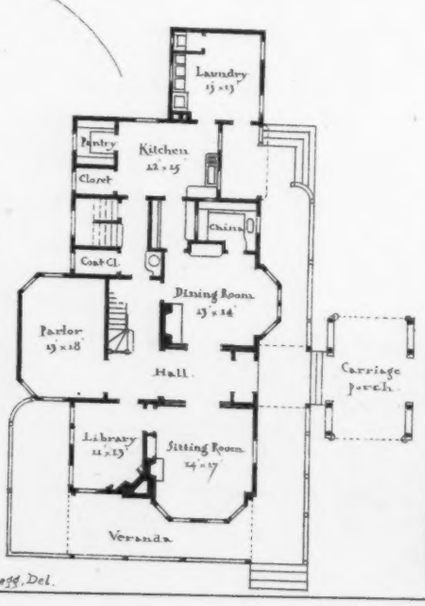
Chimney.



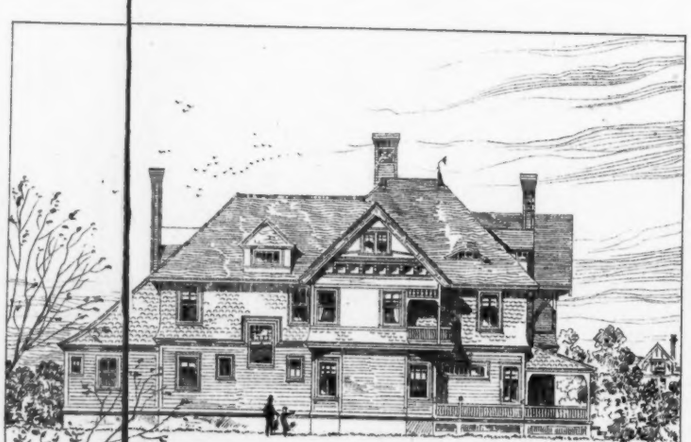
Balcony on West Front. Detail



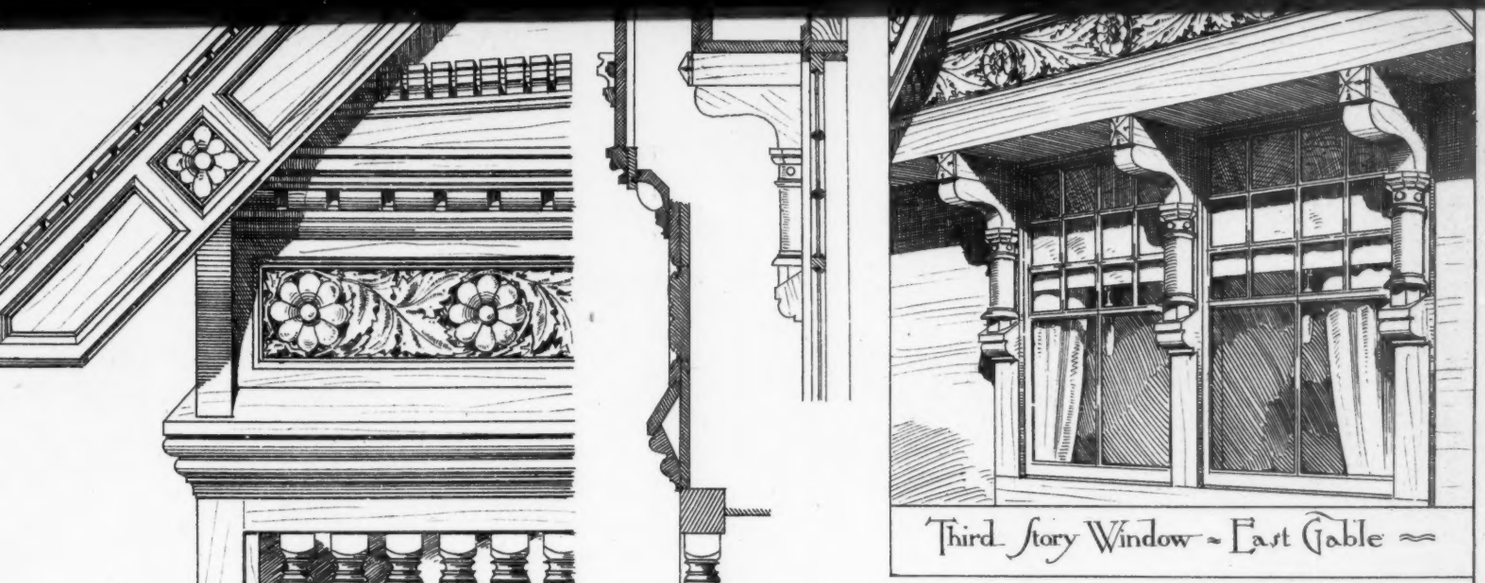
First Floor Plan



D.A. Gregg, Del.



West Elevation.



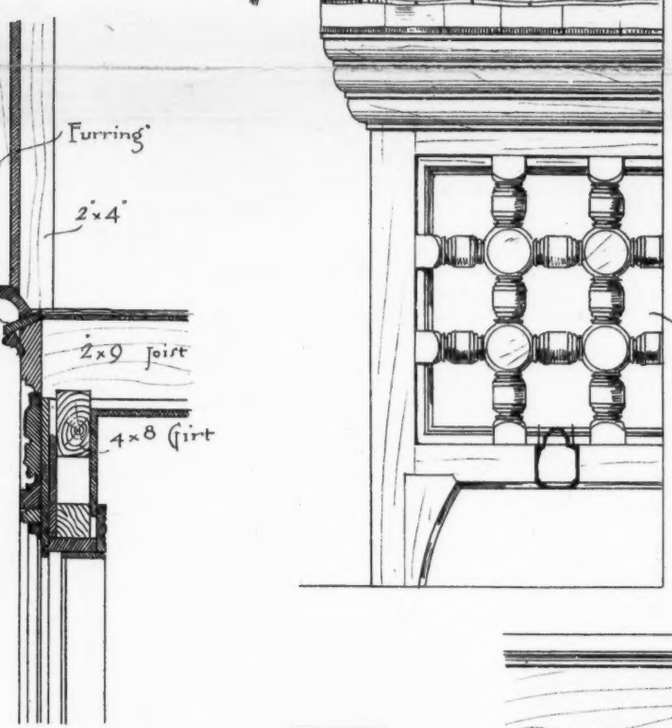
Third Story Window - East Gable

Scale for all details.

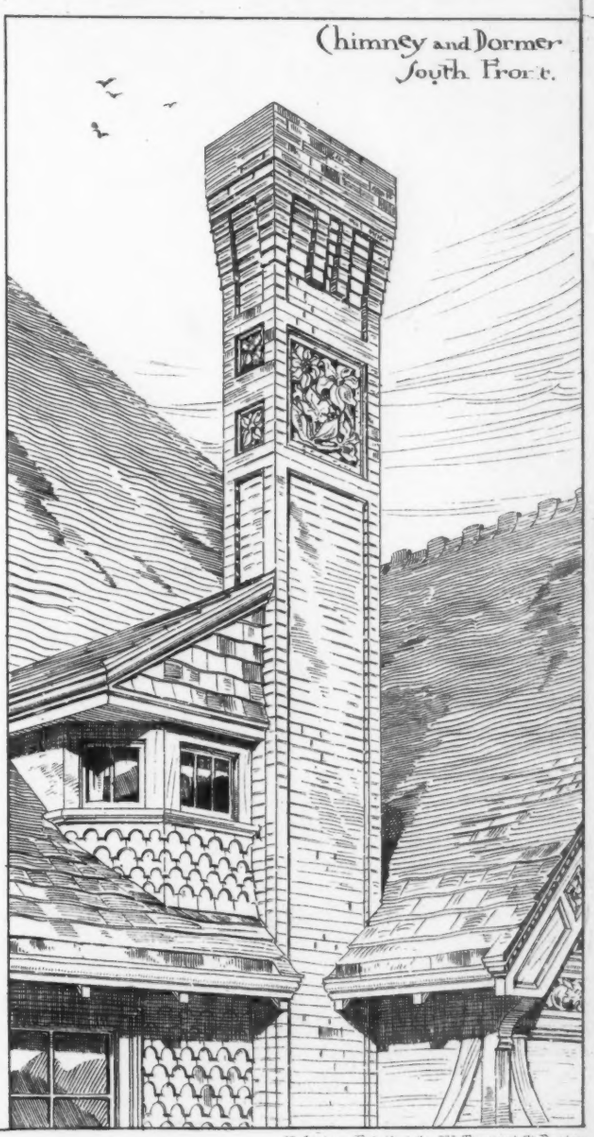
INCHES. 12 1 2 3 FEET.

For Plans and Elevation.

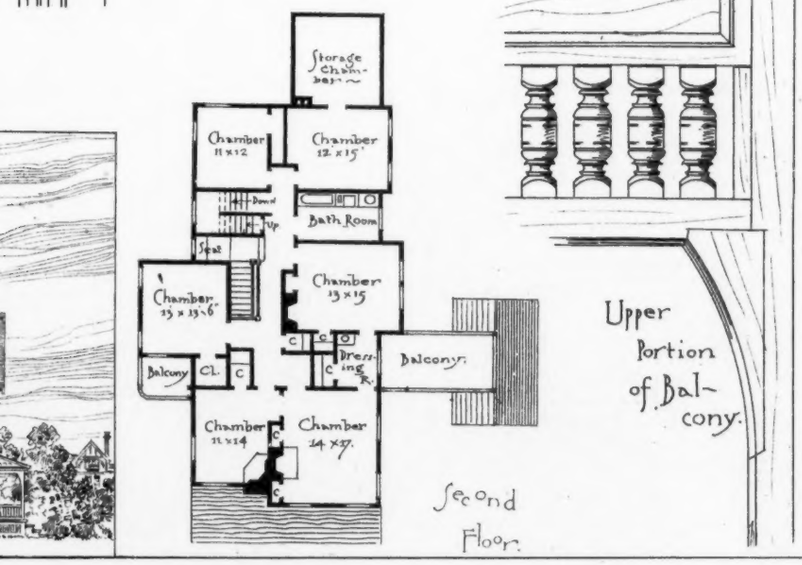
10 20 30 40 50 60 70 FEET.



In Carriage Porch



Chimney and Dormer South Front.



Second Floor

Upper Portion of Balcony.

Heliotype Printing Co. 211 Tremont St. Boston.

Mr. J. R. McGinley's
Residence,
Shady Side, Pittsburgh, Pa.

Jas. T. Steen, Architect, Pittsburgh.

Heliotype Printing Co. 211 Tremont St. Boston.

window-sill, on which is first laid a piece of plank or board sufficient to distribute the weight and avoid injury to the sill. The inside ends of the beams are strapped down with a piece of board, etc., sufficiently nailed to a joist which is properly secured against lifting by the ends entering the walls.[1]

Across the cantilevers planks are laid to form a platform, if at a convenient height to work from; if the height be not suitable, trestles are set upon planks, and the working platform is then laid upon the trestles. Other tiers of trestles may here be superimposed one above the other as before described, so as to reach breast-high to the next story tier of windows or to the top of the wall, in which case precautionary bracing is necessary as already stated. Whenever trestles are used care should be taken that all four legs should rest firmly on the planks, preferably without requiring to be wedged up, but if trestles become distorted by usage so that wedging is needed they should be nailed in place to avoid getting loose, or being carelessly removed. In ordinary dwellings, shops, or other smaller description of buildings, one or more hand-power cranes are set in convenient positions, usually inside the building, but frequently outside also in front as well as rear, and at a height sufficient to command collectively all the masonry walls so as to hoist the materials up to the wall or upon the trestle scaffold. The "Gabbert" scaffold consists of four upright posts braced together in stages, forming a square or rectangle on plan, and of sufficient extent apart, usually not less than 8 or 10 feet, but more according to the breadth of base required by the height of the structure to insure its stability. Such structures being frequently required to run up 80 or 100 feet high above the basement or cellar floor. The four posts are usually constructed each of (say) three thicknesses of 2″ x 6″ or 2½″ x 7½″ stuff, breaking joint alternately; the transverse pieces on two opposite sides cutting through the intermediate thickness of 2″ x 6″, the cross bracing butting against the inside and outside thicknesses of the posts and spiked thereto on the alternate opposite sides, the transom is spiked or bolted on the inside or outside of the corresponding posts, the cross or panel bracing being inserted between the posts similarly to that above described. Three such structures are disposed at the angles of a right-angled triangular arrangement on plan, and say 20 or 30 feet or longer distance apart, according to size or power of the crane. A frame-work is then laid across the tops of the three structures and fastened firmly together by dog-irons to form a secure combination. On the frame-work are laid three platforms 4 to 6 feet wide, with guard rails to form a connected passage from the one structure to the other, all around the top. When the distance between the three structures renders the connecting frame-work liable to sag it is propped up from the ground by posts or spars set upright in the middle of the span. Diagonal cross bracing is passed between the structures alternately to their tops and bottoms on the three sides of the triangle so as to re-inforce their combined stability. The structure which occupies the right angle of the triangular combination carries a steam crane which is supported directly by an upright log reaching from the ground and running up in the centre of the structure and steadied by raking ground-braces shoring it upon the four sides. A 10 or 12 foot square platform is extended from top triangular platform around foot of crane for the convenience of working it. The raking leg-braces of the crane are passed to the remaining two structures of the combination and secured thereto, and are anchored down by chains passing over the foot of the leg-braces and down vertically to a strong timber frame in the bottom of the two structures on which large piles of stones are loaded. With such an arrangement, and a steam-crane with jib 70 or 80 feet long, with double slewing gear, an extensive range of walls is readily commanded. Such cranes are also multiplied and conveniently disposed over the area of the building according to its requirements.

In the smaller class of houses the cranes, steam or hand power, are supported and guyed at suitable heights by single posts or logs disposed at each of the angle points of a triangle, and all braced together by a system of raking-braces. In most of such cases the connecting platform or staging covers all of the intervening triangular space as well as an extended platform made around the foot of the crane for the purpose of working it. The main platform is supported at intermediate points of the spans between the posts, as well as in the geometrical centre of the included triangle, by auxiliary posts which are braced to the main posts. The extended platform is supported by raking-braces from the supporting post. When logs of sufficient dimensions and stiffness are not conveniently attainable, two logs together braced a foot or two apart support the crane; they are steadied by independent raking ground-braces. This latter staging is not used for heights exceeding 35 or 40 feet from the ground up to the platform. The architect usually makes the employment of the "Gabbert" scaffold imperative in his specifications in such cases as he deems its use necessary to the effective or convenient performance of the building contract.

THE ILLUSTRATIONS.

HOUSE FOR J. R. McGINLEY, PITTSBURGH, PA. MR. JAMES T. STEEN, ARCHITECT, PITTSBURGH, PA.

A peculiarity of this house is that the roof is covered with glass tiles.

[1] The joists in the position shown in *B* would not be a correct representation for either a front or rear wall, as they are usually laid longitudinally of the building, although in Scotland the joists are ordinarily laid across the building from front to rear.

HOUSE FOR GEORGE D. MOORE, ESQ., ARLINGTON, MASS. MESSRS. RAND & TAYLOR, ARCHITECTS, BOSTON, MASS.

SCOTTISH SKETCHES BY MR. J. W. SMALL, F. S. A. SCOT. — OLD FRONT FROM THE SALT MARKET, GLASGOW; MANOR-HOUSE OF REDHOUSE, HADDINTONSHIRE.

ON THE PROTECTION OF BUILDINGS FROM LIGHTNING. — II.[1]

There is much difference of opinion as to whether iron or copper is the better material for lightning-conductors. The French use iron almost exclusively, and Sir W. Thompson prefers it to copper.

For the same money the same conductivity can be purchased in either metal (iron being one-sixth of the price and one-sixth of the conductivity of copper), and iron has the following advantages: —

(*a*) The mass of an iron conductor being greater than that of a copper conductor of equal conductivity, it is heated less by a given current of electricity.

(*b*) The fusing point of iron (2,786° F.) is much higher than that of copper (1,994° F.).

(*c*) Iron is more constant in its conductory power than copper of different samples.

(*d*) A conductor made of iron is not so liable to be stolen as copper, and being so much the stronger is therefore less liable to be broken, accidentally or otherwise.

(*e*) A copper conductor if connected to a cast-iron water-supply pipe (to form an "earth") produces galvanic action, to the damage of the pipe.

On the other hand, a copper conductor lasts longer in smoky towns or near the seashore, where the air rusts iron quickly, and being of much smaller size it does not interfere so much with architectural effects. But Sir W. Thompson has suggested that iron conductors should be treated boldly by architects, and brought into prominence purposely and artistically, and the late Professor Clerk Maxwell recommended that in the case of new buildings the conductors should be built into the walls. They would then not only be hidden but protected from the weather, from the British workman carrying out repairs, and from the thief.

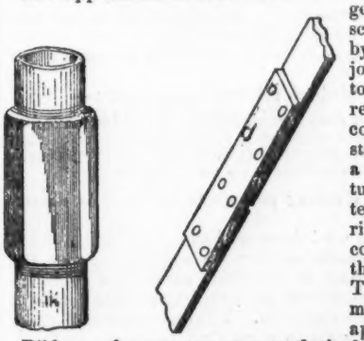
As regards the liability of iron to rust, galvanizing is in most situations a sufficient protection, and in smoky towns an iron conductor should be painted periodically.

On the whole, therefore, the advantages of iron outweigh those of copper so considerably that the employment of copper in lightning-conductors should be the exception instead of the rule. Those who make, supply, and apply lightning-conductors in this country, nevertheless, invariably recommend copper, and it is quite difficult to convince them to the contrary.

Another point I notice is that large conductors are always recommended for lofty buildings, and smaller conductors for smaller buildings, and the same for masts of ships. This is unscientific and wrong. The stroke of lightning falling on a short conductor is no less powerful than the stroke that falls on a lofty conductor; indeed the chances are in favor of the shortest conductors receiving the heaviest strokes, if they are struck at all. On costly and important buildings the proper course to pursue is to increase the number of conductors and of the earth connections, the limit of electrical resistance between any possible striking point and earth being kept below what is fixed upon as the point of safety, viz.: 0.3 ohm per 1,000 yards.

We will now examine the question as to the best *form* of conductor. Mr. Preece has investigated this subject, and by permission of Dr. Warren de la Rue carried out in that gentleman's splendid laboratory a series of experiments on the best sectional form for lightning-conductors. The results were communicated to the British Association at Swansea last year. He found that ribbons, rods and tubes, of the same weight per foot, were equally efficient.

The application of rods and tubes necessitate frequent joints, generally made by means of screw collars. I have found by electrical tests that these joints after long exposure to weather offer very high resistances, especially so in copper conductors. For instance, at Tipner magazine a screwed joint in a large tubular copper conductor tested 10,000 ohms, and a riveted joint in a ribbon conductor on a battery in the Isle of Wight 700 ohms. These joints could not be moved by hand, and were apparently quite tight.



Ribbons of *copper* are now made in long continuous pieces (as much as 70′ or 80′ in one length), and can be applied to irregular architectural outlines, but the joints, although less frequent than with rods and tubes, are open to the same objections. The copper ribbon, however, possesses one decided advantage, viz.: that by the introduction of suitable bends the expansion and contraction from

[1] By Capt. J. T. Bucknill, R. E., from the *Journal of the Royal United Service Institution*." See September Number.

heat and cold can be allowed for. Iron conductors, when in the form of tubes, rods or ribbons, are difficult to apply, and must possess a number of joints. Moreover, in long conductors, compensators to allow for expansion and contractions by heat and cold have to be introduced. In order, therefore, to obtain with iron the necessary continuity and pliability, it is best to resort to the wire rope, which form is already very generally employed for copper conductors. Pliability can be obtained in several ways: —

1. By using small wires.
2. By making the rope *flat*.
3. By using a hemp core with the round rope.

It is not advisable to make the iron wire ropes with very small wires, because oxidation destroys such a rope rapidly if through carelessness the conductor be left unpainted. A fair amount of pliability can be obtained with a round iron rope 6 lbs. per yard if the wires are about No. 11 B. W. gauge, and arranged in six strands of seven wires each round a hemp core, thus producing a rope about $3\frac{3}{4}''$ in circumference.

But there are few situations in which two ropes of half the size could not be more readily applied, and I think the double rope, if taken up on one side of a tower and down on the other, in one continuous length, has many advantages.

When a single conductor is desired, the best for general purposes is probably a flat iron wire rope about $\frac{1}{2}'' \times 2\frac{1}{4}''$ (11 lbs. per fathom), or $\frac{1}{2}'' \times 2\frac{1}{2}''$ (13 lbs. per fathom.) The round ropes cost from 21*s* to 24*s* a cwt., or about 2*s* 6*d* per fathom for a 12-pound rope, and the flat ropes 33 per cent more, or add one-third.

The next question that presents itself is concerning the terminal point, and a good deal of nonsense has been written about it. Points made of silver or of copper, points covered with platinum or with gold, points of so many millimetres in height and diameter, and possessing certain exact forms, have been proposed, and rejected or adopted as the case may be.

The height of the points above the surrounding roof or tower to be protected has also been much debated with very little profit, for to this day many of the rods erected on the Continent are made much longer than is necessary.

It is a good plan to carry conductors on lofty rods high above powder-mills, flour-mills, and petroleum-oil wells, but these are exceptional cases, the air close to the buildings being frequently charged so as to be dangerously explosive.

The English practice of using a short rod in most situations is a reasonable plan, the rod being placed on the highest part of the building. The rod should be made of the same metal as the conductor, and the connection formed with bolts and afterwards run in with molten zinc or solder. The weight of the rod per foot should be the same as the conductor. The top of each rod should be provided with several points: (*a*) because the gathering power is increased thereby, and the chance of lightning striking other things in the immediate vicinity of the conductor is proportionately diminished; (*b*) because the top of the rod is less likely to be fused when struck, the stroke being divided between the various points; and finally (*c*) because the brush discharge is facilitated.[1]

Another plan is to carry the wire rope up the side of the rod, which in this case might have one point, the wires being opened out to form a brush-like arrangement just under the point. The wire rope and the rod should be bound together with wire and connected with molten zinc.

We must now pass to the foot of the conductor, and here we enter upon the most difficult part of our subject. The earth connections of a lightning-conductor constitute the most important portion of the whole arrangement. If the electrical resistance of the earth connections be high a conductor perfect in all other respects may fail, some alternative and perhaps dangerous route being taken by the lightning discharge. It is difficult to fix the limit of maximum resistance of the earth-connections.

The Académie des Sciences recommends an iron earth-plate, consisting of four arms on a central bar, or five arms in all, each 2′ long and of square section 0.8 inch side, thus presenting a combined surface of 2.6 square feet, to be immersed in water in a well that never dries.

Again Mr. Anderson, in his book referred to says that: —

"When a conductor is taken deep enough into the ground to reach permanent moisture the single rope touching it will be quite sufficient; but when the permanency of the moisture is doubtful it will certainly be advisable to spread out the rope like the fibres in the root of a tree."

Here a few square inches touching permanent moisture is considered sufficient.

Again, Professor Melseus used three earths for the Hôtel de Ville at Brussels: one the gas-main, another the water-main, and the third a cast-iron pipe, nearly 2′ diameter, sunk in a well and giving 100 square feet of surface to the water, which was rendered alkaline with lime to prevent oxidation. The total surface of these three earth-connections amounts to more than two and a half millions of square feet!

As opinions differ so greatly concerning the surface required for the earth-connections it will be necessary before laying down any rule to give some of the reasons upon which it is based.

[1] Sir William Thomson's opinion: "A fork or brush of three or four points at the top of a lightning-rod is probably in general preferable to a single point; but of what practical value this preference may be I cannot tell for certain, although I think it may be considerable."

I must ask you to examine Table (C) of Resistances, which has been compiled from various authorities, and which deals with such enormous differences that it can only be regarded as approximately accurate.

Table C. — *Of Resistances.*

Substance.	Comparative Resistances in Ohms.		Effective Section.
	Copper unity.	Iron unity	
			Sq. in.
Pure copper	1.0	..	..
Commercial Copper	1.17	0.2	0.2
Iron wire	7.0	1.0	1
			Sq. ft.
Carbon	2,500	360	2½
Coke, variable with the sample, about	3,000	400	3
	4,000	600	4
Sat. sol. sulph. zinc	6,000,000	..	..
Salt (sea) water	10,000,000	..	10,000
Approximately, only	15,000,000	..	15,000
Water (spring)	2,800,000,000	..	2,800,000
Water (distilled)	6,754,000,000	..	..
Dry earth (practically)	Infinity.	..	..

We might state the figures against water in this table thus: —

The electrical resistance offered by a cylinder of spring water one yard long is as great as the resistance offered by a cylinder of copper of equal diameter, but seven times longer than the distance of the moon.

The study of this table involves some rather curious considerations. Let us call one square inch of iron its efficient section[2] or conductive capability for carrying off a stroke of lightning. Then the efficient sections of carbon, of water, etc., are as shown in column 4 of table.

Now the practice in the War Department has always been to give joints in conductors a surface of about six times the sectional area of the conductor. This is a very good rule, and is borne out by the French practice, where even with soldered joints 6 square inches of surface is laid down as necessary at each joint in an iron conductor. An obvious corrollary to this rule is that when a conductor is made of two metals (end to end) the joint must have a surface equal to six times the efficient section of that conductor of the two joined which possesses the lowest conductivity. The efficient section of the better conductor ought not in any way to govern the amount of surface of the joint. Thus copper to iron requires a joint of six square inches, the same as would be required by iron to iron. In short the joints should be made of such a size as to prevent the conductors of lower conductivity being damaged by the lightning.

A copper to copper joint only requires one square inch of surface, but it is generally convenient to give more.

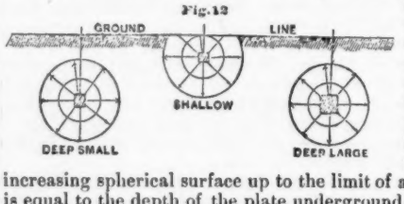
Now, the earth-connection is really a joint — a very difficult joint to make well, and one that should follow the rules of other joints, *unless we can show good reason to the contrary.*

It is found that increasing the size of an earth-plate does not proportionately decrease the electrical resistance. A limit of size is soon arrived at, beyond which it is useless to go. "In the sea this limit is quickly reached." — (Culley.)

Culley states that if a plate containing one square foot of surface gives a resistance of 174 ohms, a plate of 4 square feet will give 140 ohms, and so on, a reduction of only 20 per cent in resistance being obtained by quadrupling the earth-plate surface.

The explanation that suggests itself as probable is that the electric current is distributed through the humid ground by an ever-increasing sectional area (often by a hemispherical surface), thus arriving at the efficient section for a water-conductor of two millions of square feet (*see* Table C), at the small distance of 200 yards or thereabouts,[3] from the earth-plate, and this is borne out by the fact, noted by Culley, that the resistance depends to a certain extent upon the depth at which the plate is buried. Thus, a deep plate would disperse its charge in all directions by an ever-increasing spherical surface up to the limit of a sphere whose radius is equal to the depth of the plate underground, and afterwards by a segment of an ever-increasing sphere, which segment would always in this case be larger than, but would gradually approximate, the atmosphere. These actions are roughly shown on Figure 12.

Fig. 12



Culley states that the resistance alters with the depth at which the earth-plate is buried as follows: —

4	inches	100	ohms.
10	"	90	"
40	"	80	"
80	"	77	"

It would appear, therefore, that little is to be gained by increasing the surface of junction between the earth-plate and the earth: (1) beyond the amount required to insure that the resistance to

[2] This has already been shown to be rather less than a square inch of solid iron.

[3] In an arid plain with a dry subsoil, the surface of which was wet by rain only to the depth of one inch, the efficient section of water-conductor would not be reached at a less distance than fifty miles.

earth at foot of conductor is less than the resistance to earth through possible alternative routes in the vicinity of the conductor, and (2) beyond the amount required to prevent damage to the conductor by the flash of lightning when it leaves for earth. It is evidently impracticable to give a surface of some millions of square feet to the earth-connections, and if it were practicable the foregoing considerations prove, I think, that it is not necessary to do so.

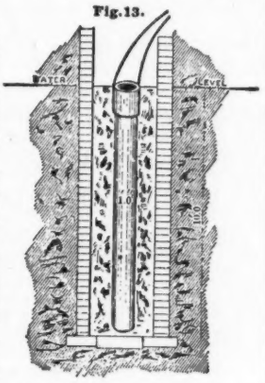
The difference in the conductivity of iron and water is so enormous that an intermediary appears to be very desirable. Carbon is eminently suited to act in this manner, especially if used in the cheap form of coke and ashes. The minimum effective section for coke is about 4 square feet; the iron which is surrounded by coke should therefore have a surface of 24 square feet. Moreover, inasmuch as the contact between an iron plate, of whatever form, and coke loosely surrounding it must frequently be discontinuous, and as the conductivity of coke in a mass composed of loose particles must be very much lower than that of a solid piece, the above surface should in practice be a minimum. The total surface may, however, be divided if a number of earths be used.

The outer surface which should be given to the coke must depend very much upon the nature of the ground; when the conductor is led into soil which cannot be regarded as permanently damp the surface of the carbon "earths" must be increased.

As the surface of the earth-connections should vary directly as the resistance per unit of area, an intermediary of coke becomes unnecessary where a conductor is led into salt water: but the conductor should still present a total surface to earth of from 20 to 30 square feet, the amount being divided between the "earths" if several conductors be connected.

Professor Pouillet's committee, which reported upon the application of conductors to the Louvre in 1854–55 (the said report being adopted by the *Académie des Sciences*), recommended that when permanent water is not found near the surface two descriptions of "earth" are necessary; first, the deep earth-connections to permanent water, and secondly, the shallow earth-connection to the surface-water. This for the following reasons: after a long drought the "terminating plane of action" (to use Sir William Snow Harris's term) is situated on the upper surface of the deep water-bearing strata, the induced charge being consequently collected there. After a heavy rain, however, which thoroughly impregnates the upper strata with water, the "terminating plane of action" is raised to the surface of the ground and the induced charge is accordingly collected there. It is evident, therefore, that a perfect arrangement should in many situations provide both for *surface earths* and for *deep earths*. In some situations, however, such as the top of a chalk hill, deep earths would be of little value; whereas in other situations surface earths would be inefficient — in a well-paved town, for instance, where the surface-water is at once carried off by gutters and drains.

Fig. 13.



A deep earth-connection can be effected in the manner shown in Figure 13, the well being carried down 10′ below water-level in the driest seasons. The diameter of the well may be fixed at 3′. It should be rendered alkaline with lime, so as to protect the iron from rust.

The bottom 10′ should have no mortar or cement in the walls, and should be filled in with blocks of coke. The iron conductors should terminate in cast-iron pipes, offering together 24 square feet of outside surface. The pipes should be galvanized to preserve it from oxidation. The dimensions of the pipe may be, length 10′, diameter, 1′. The pipe may rest on the bottom of the well in a vertical position. The best way to connect the pipe with the conductor is to have a flange at the top (all ordinary gas or water pipes have such flanges), and to rivet a small cylinder to the inside of the pipe at the upper end, thus forming a ring or annulus into which the end of the conductor can be introduced and the space filled in with molten zinc, the surfaces of the conductor and of the pipe having first been cleaned and painted with hydrochloric acid.

In situations where iron water-supply pipes are at hand they can be employed in place of the deep earth-connections already described, but great care must be devoted to the connections. The conductor must be laid along the iron pipe for a distance of 4′ (if an iron wire rope it should be unlaid for this distance); it must then be bound to the pipe with wire and a metallic connection formed by means of lead, zinc or solder. The connection should then be tarred and covered with tarred tape to prevent galvanic action.

Surface "earths" should consist of a trench filled with coke and ashes, and carried away from the walls. Clay and other soils which keep the rain-water near to the surface require shallow trenches about 1′ deep; whereas gravel, sand, or shingle, through which the water penetrates easily, require deeper trenches, say 2′ deep. In each case, however, the top surface should be kept on the ground-level.

The end of the metal conductor should be carried along the bottom and through the whole length of each trench. This length may in ordinary soils be fixed at 25′, and in very porous soils at 50′.

The water-pipes from the roof of the magazine or building may with advantage be caused to deliver into gutters which lead to the surface "earth" trenches.

The shallow trenches 1′ deep, recommended for stiff soils, may conveniently be split into a V-shape on plan (the conductor being split also), so that the total side of surface may be equal to that given by the same length of deeper trench used with porous soils.

Important buildings and magazines provided with several conductors may have a few deep "earths" and several shallow "earths," an "earth" of one or the other description being provided at the foot of each vertical conductor, and in order to connect the whole it is advisable to employ a horizontal conductor near the foot of the wall, but above ground, in order that it may be open to inspection, such conductor being carefully connected to all the vertical conductors, and to all the metal water-pipes. By this means not only is the cage principle advocated by the late Professor Clerk Maxwell and other physicists embodied, but the earth-connections are connected in an efficient and reliable manner.

Sir W. Thompson considers that conductors on magazines should be spaced at intervals of about 50′, by which plan no portion of the building would be more than 25′ from a conductor. This rule has been adopted by the War Department for all large magazines, and a conductor of power equal to an iron rod weighing 8 lbs. per yard has been adopted for single conductors, and of half that weight for all others. A wire rope of 4 lbs. per yard applied *as shown in diagram*, is now considered the best arrangement.

It will be seen that where er the lightning falls a conductivity equal to, or more than, that of a single large conductor, will carry the stroke off to earth.

Small magazines can be protected by one rope led to a deep "earth" at one end and to a shallow "earth" on the other as shown on diagram.

Powder-mills must be provided with lofty conductors to guard as much as possible against powder-dust in the air being ignited by the stroke.

As regards the inspection of lightning-conductors opinions vary greatly, and it was mainly in order to obtain a report on this matter that I was ordered last summer to inspect a number of conductors on magazines in the Portsmouth district.

Before concluding this paper I may observe that the principal object has been to prove the following points: —

1. That iron is the best metal to use in conductors.
2. That wire ropes are more easily applied than rods, ribbons, tubes, etc.
3. That conductors should be continuous, and that all unavoidable joints should be soldered.
4. That conductors should be specified in terms of electrical units.
5. That lofty conductors require no additional conductivity per unit of length.
6. That high lightning-rods are only required in exceptional situations.
7. That several points are preferable to a single point.
8. That greater surface than is usual with present practice should be given to earth-connections.
9. That both deep and shallow earths are required.
10. That periodical inspection is most important.
11. That the history of conductors and of former tests should be carefully recorded.
12. That electrical tests may then be of value.

CEMENT, "VULCAN," AND ASPHALT FLOORS.

A RECENT issue of the *Baugewerkszeitung* contains a communication by Herr Walter Lange on some results obtained by him in the use of cement, a material called "Vulcan," and asphalt for floors in wet and highly-heated rooms. In the extensive rebuilding of the starch manufactory of Herr E. Hoffmann at Salzuflen (near Minden), burnt down some time ago, about 30,000 square yards of flooring had to be laid down. The various uses to which these floors would be put necessitated the employment of various materials. If to this fact it be added that a portion of the floors had to be taken into use as soon as ever practicable, it may

well be believed that it was not a very easy matter to make a selection at once as to the proper material to be employed. Experiments had on former occasions been made with different materials, all of which had been unsuccessful. It was especially found that the wear and tear of the floors in the starch factory was very great, owing to the employment of three-wheeled trollies (on the average loaded with 20 cwt. to 30 cwt.), the rapid deterioration of the floors being further accelerated by the fact that they are generally in a very wet or highly heated state.

It was at first intended to use a layer of cement on a concrete bottom for all the rooms (stone slabs could not be employed for the greater part of the rooms on account of the joints), and this was partly laid down when it was found that it would not answer. As above stated, sufficient time had not been allowed for hardening, and then the floors were used at once to such an extent that the cement was broken up in an incredibly short time by the three-wheeled trollies. The front wheel in turning leans over on one side and cuts the upper skin of the cement, and if this were once effected there was no chance of saving the rest, for the lower layer had not yet attained that hardness which would resist pressure. Water on the cut and bruised surface completed the destruction, for, being forced onto the floors at high pressure, even pebbles in the floor were washed out.

Two methods were employed at Salzuflen for laying down cement floors: Upon a fresh bed of concrete a layer consisting of cement and sand in equal parts, and from 2 to 3 centimetres thick, was put, well rammed down, levelled, and then smoothed with a hand iron. This proceeding, compared with the other, has several disadvantages. The second method consists of mixing a concrete of one part of cement, two parts of sand, and four parts of gravel, laying it down, and ramming it until a layer from 1 to 2 centimetres thick appears on the surface without any gravel. This layer is then levelled and smoothed down. Floors prepared by the latter method are much more durable and resist pressure much better than those laid down by the former. The thickness of the concrete floors depends very much upon the extent to which they will be used and the resistance of the soil to be covered. If sufficient time is left for the cement floor to harden — and the longer it is left the better — it will resist for a very long time any ordinary pressure.

In the drying-rooms of the above starch manufactory, cement floors were also laid down; but they proved efficient only after having been put down in first-rate style, and left to bind and harden for a sufficient length of time (from four to six weeks). But should they be intended to be used before that time, and subjected early to a high temperature (about 40° C.), it is highly advisable to desist from using cement. In the latter case, a kind of floor is to be recommended which is at present very little known, and is described by the inventor, Herr Oelzner, Ingenieur, of Hagen, Westphalia, as "Vulcan" floor. The mass is poured upon prepared beds to a thickness of four centimetres to six centimetres, and costs from three marks to three-and-a-half marks per square metre (about eight cents a square foot). The "Vulcan" floors are prepared in the following manner: The surface is covered with stone chips, ashes, etc., the height of this bed depending upon their later use. The mass, the composition of which is Herr Oelzner's secret, is made liquid, and poured upon the bed. The liquid mass penetrates the cracks and pores of the rubble, and forms, after solidifying, a hard slab. After having somewhat settled, the mass is beaten with a wooden pestle, and smoothed. This operation is repeated as long as the floor sweats after each beating. The floor is smoothed down after each beating. Amongst the advantages claimed for the "Vulcan" floor is its great solidity, which it assumes, however, only after some time. But the hardening of the floor takes place even at a great heat (in the drying-rooms at Salzuflen, hardening is effected at a continuous temperature of 50° C.). Finally, it must be noted that the floor is proof even against strong acids. Experiments have been made by Herr Lange in which the mass in a powdered state was submitted to the action of concentrated sulphuric acid, the only effect of which treatment was that the mass dissolved and then hardened. Herr Lange likewise observed that old pieces of this floor, after having been immersed for some time in concentrated soda lye, remained perfectly intact. The only drawback is that hardening takes place so very slowly. On the other hand the mass becomes so hard as even to blunt steel chisels very rapidly. Herr Oelzner's "Vulcan" floors have been very successful elsewhere, even in establishments where very heavy iron castings or forgings are moved over them. Herr Lange says respecting the composition of Oelzner's "Vulcan" mass it appears to him that it contains a large proportion of blast-furnace slag, and that residuums of sulphuric acid manufacture and the so-called *caput mortuum* (colcothar) are also used in it.

For such rooms as were already in use it was found necessary to resort to asphalt. The asphalt, from the Limmer pits, was the so-called "casting asphalt" (*asphalte coulé*). It was melted in the usual way, mixed with gravel, laid on, and smoothed down with wooden spaddles. Concrete of cement, sand, and gravel served as a bed. In some rooms cement and asphalt layers were used together, asphalt being put down in the passages, concrete in the less used parts; a very sharp edge being indispensable for the joints. Of course, asphalt was used in rooms with wet floors; but it is not suitable in rooms where acids are used, because asphalt peels off in course of time under the influence of acids.

It may be finally added that in Hoffmann's starch manufactory several tanks had to be constructed for the reception of acids, the selection of the inner coating causing some difficulties. Cement, if exposed to the direct action of acids, is at once destroyed; asphalt shares the same fate, although not quite so rapidly. It was, therefore, proposed to employ a plaster of cement with a coating of zeïdeïolithe, a material consisting of nearly equal parts of sulphur and powdered glass and a trifling addition of graphite. This composition is absolutely acid-proof, but inflammable. Its preparation, moreover, and the laying on, caused so many difficulties that the use of zeïdeïolithe was given up at the last hour. It was determined to employ stone slabs, filling up the joints with sulphur, a treatment or procedure which has been found efficient in sulphuric acid manufactories. Of course, it is understood that the stone slabs used must be acid-proof, and have been tested in that direction.

THE TENTH CINCINNATI INDUSTRIAL EXHIBITION.

The Tenth Cincinnati Industrial Exposition which is now about the middle of its prosperous existence, has much in it to interest and instruct the architect and builder.

This is the first time in the history of Cincinnati that any attempt whatever has been made towards an architectural exhibition, and the display is not without interest, and argues well for what can be done in the future by a little more push and concerted action on the part of managers and exhibitors. All the architects of the city, with three exceptions, have three or more drawings on exhibition, the most important ones being a pen-and-ink perspective sketch by Mr. J. W. McLaughlin, of the new Art Museum building, as it will be in some future generation finished in all its parts, and if it is so completed according to the plans, it will probably be the first case of the kind on record.

The other drawing we refer to is a fine perspective of the "Ortiz," the largest French-flat hotel in the city, made as much Queen Anne as moulded and pressed bricks, and stone, and gables, and tower, and things can make it. This building is now receiving the finishing touches (it is nearly two years since it was started), and was designed by Mr. Hannaford, and is a very creditable building. The plans have never been published in any way. We hope to see both of these perspectives, together with their plans, published in the *American Architect* soon.

There is as much else in the Exhibition of interest, but there is not space to mention all, and it would be unjust to discriminate; suffice it to say that the E. Dalbro Company have a magnificent display of hard-wood, there being over fifty different varieties coming from all parts of the world.

POWDER-POST.

Washington, D. C., September 27, 1882.

To the Editors of the American Architect: —

Dear Sirs, — The timber of the worm-eaten church at Andover, Mass., page 142, *American Architect*, is suffering from a disease well known to the manufacturers of shovels and pick-axes, and called by them "Powder Post."

A worm eats the ashen handles, which show minute holes, and when jarred by striking a hard substance gives out a shower of fine powder, "Powder Post." It is so common that they do not attempt to keep long any stock of handled spades, shovels or picks, and I was advised by the late Mr. Oakes Ames, at the close of the war, to sell off at auction the large stock of such stores left in the army depots, as it would be impossible to save the handles from destruction.

Saturation with petroleum was tried, and I think gave protection and prevented progress of the disease.

Dog-wood in the turners' shops is peculiarly subject to being eaten and converted into powder, though I think that the worm-holes in dog-wood are larger than in ash suffering from "Powder Post."

Perhaps petroleum applied in abundance by a sponge or brush might arrest the destruction threatened to the Andover Church.

Very respectfully, your obedient servant,

M. C. Meigs, Bvt.-Maj.-Gen., U. S. A., Ret'd.

BOOKS.

Detroit, September 25, 1882.

To the Editors of the American Architect: —

Sirs, — Please state the best work on Strains in Structures, Heating and Ventilation, also the best work on Graphic Statics.

Yours, etc., Student.

[Rankine's *Applied Mechanics*. Moseley's *Mechanics of Engineering and Architecture*, or Peclet, *Traité de la Chaleur*, Box on *Heat*, Baldwin's *Practical Treatise on Steam Heating*, and the articles in Buck's *Cyclopædia of Hygiene*. Greene's *Graphical Analysis*, Parts I, II and III. — Eds. American Architect.]

OUR BUILDING REPORTS.

Trenton, N. J., September, 25, 1882.

To the Editors of the American Architect: —

Gentlemen, — Will you kindly permit us to find a little fault with your "summary for the week" department. If your correspondents would give the post-office address of the owners and architects, as is partially done in your New York reports it would add greatly to the value of your more than excellent journal to us, and we presume to many other subscribers. Your friends,

Dibble Manufacturing Co.

[WE hope that our correspondents and reporters will give due heed to this suggestion, but we cannot hope that much greater exactness in the matter of our reports can be effected. We habitually publish the fullest information we can obtain, and the fact that we use the lists ourselves for distributing specimen copies of our journal gives us the opportunity of gauging the exactness of the information we publish: not more than one per cent of the copies we send out being returned by the postal authorities as "undeliverable" through deficiency of address. A large part of the trouble of which our correspondents complain arises from the fact that the different building bureaus throughout the country keep their records in very dissimilar and imperfect ways. Many officials record only the owner, others the builder and owner, some few the architects, and some only the building and its location. These last are useless to ourselves and our subscribers, and consequently we do not report those cities. Very few record with the very desirable fulness of the New York Building Bureau. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

A BIG tree recently felled in California showed 4,860 annual rings of growth.

THE CASTLE OF HEIDELBERG. — The Union of German Architects and Engineers has issued an appeal to the German people to aid in a partial restoration of the Schloss of Heidelberg.

FOSSIL CORAL AS A BUILDING STONE. — From Sydney is reported the discovery of a new building material at Suva, on one of the Fiji Islands. It is known as fossil coral, and when cut from a mass is soft, but on exposure to the air it looks and is very much like brick. During the short time it has been known it has satisfactorily stood the tests that have been applied to it. Orders have already been received for quantities of it to be used in building.

WELLS IN THE SAHARA. — A large number of wells have been sunk along the northern border of the Desert of Sahara,—more than one hundred and fifty in the province of Constantine alone, and the work is advancing into the interior. One of the curious phenomena which the digging of these wells has brought to notice is the existence of fish and crabs at great depths. The engineer, M. Jus, who for twenty years has directed the work, avers that he once boiled and ate a crab which had been drawn up from a depth of 250′, and that, moreover, it was of an excellent flavor.

THE STINGING TREE. — The "stinging tree" of Queensland is a luxurious shrub, pleasing to the eye but dangerous to the touch. It grows from two or three inches to ten or fifteen feet in height, and emits a disagreeable odor. Says a traveller: "Sometimes while shooting turkeys in the scrub, I have entirely forgotten the stinging tree till I was warned of its close proximity by its smell, and have often found myself in a little forest of them. I was only once stung, and that very lightly. Its effects are curious; it leaves no mark, but the pain is maddening, and for months afterward the part when touched is tender in rainy weather or when it gets wet in washing, etc. I have seen a man who treats ordinary pain lightly roll on the ground in agony after being stung, and I have known a horse so completely mad after getting into a grove of the trees that he rushed open-mouthed at every one who approached him, and had to be shot. Dogs, when stung, will rush about whining piteously, biting pieces from the affected part." — *Youth's Companion.*

PAINTING ON SILK. — Some years ago an artist of Florence employed a method of painting on silk and other fine fabrics, in such a way that the surfaces of the colors were not damaged when folded or rubbed. His paintings, even when subjected to tests far more severe than such crumpling as ordinary wear would produce, are said to retain their appearance unchanged, the colors remaining as bright and the surface as smooth as when first laid on by the brush. The method is now no longer the complete secret it was, as the medium is at present manufactured for amateurs, though protected by patent. An example, consisting of groups of flowers, painted on blue satin, by this Adolfi process, shown by Mr. Emil Dünki, has been subjected to hard rubbing, without there being any appearance of injury to the painting. Some Italian artists have tried the medium for oil-painting on canvas. — *Journal of the Society of Arts.*

THE ST. CLOUD CRYSTAL PALACE. — A committee of the French Chamber of Deputies has recently reported favorably on the construction of a Crystal Palace in the park of St. Cloud, a project which was approved in principle in 1881 by M. Sadi Carnot, Minister of Public Works. The building is proposed to occupy the highest part of that portion of the park conceded for the purpose, and its principal entrance would be opposite the avenue descending to the château. It is intended that the buildings should occupy 17½ acres. The palace is to be rectangular in plan, with five naves and a façade facing towards Paris. The dimensions would be — 1,640′ long, 459′ wide, and 164′ high. In the centre would be a dome 328′ high. The other buildings in the space reserved would be as follows: 1. The Palace of the Republic, reserved to the President of the Republic, to ministers, members of the two Chambers, etc. 2. A press building for French and foreign journalists. 3. Panoramas constructed and arranged on a new system. 4. A cosmopolitan theatre, for scenic exhibition of classic and modern drama. 5. A large amphitheatre, for children, gymnastics, etc. 6. A buffet restaurant. 7. A model farm, with land for experimental purposes. 8. Greenhouses, rustic buildings, kiosks, etc., erected either by the Administration of the undertaking, or by exhibitors. It is proposed to utilize the façade of the Belgian Section, which was so striking a feature in the Paris Exhibition of 1878, as well as portions of the Palace of the Tuileries and other monuments in the new scheme. It is intended to connect with this undertaking a project of popular instruction, scientific, artistic, and industrial, and the building would, of course, lend itself admirably to any special exhibition held from time to time. — *Engineering.*

THE CIRCULATION OF UNDERGROUND WATERS. — In the Geological Section of the British Association meeting at Southampton, Mr. C. E. De Rance read the report of a committee appointed for the purpose of investigating the circulation of the underground waters in the permeable formations of England, and the quality and quantity of the water supplied to various towns and districts from those formations, to which was added an appendix, written by Mr. Edward Wethered, on the density and porosity of rocks in relation to the water-supply, in which the author set out by averring that a knowledge of the porosity of rocks was important as regarded the water-supply, the suitability of stone for building purposes, and in accounting for some of the lithological changes often observed in the earth's strata. Though the matter had not escaped investigation, the vast volume of water stored in the rocks had not been fully realized. The density of the old red sandstone was 2.61, the volume of water absorbed by a cubic foot being over 0.707 gallon, and by a square mile, three feet thick, 59,000,000 gallons. The conglomerate beds of the same formation were still more absorbent, being capable of taking in 0.805 per cubic foot, or 67,000,000 gallons to a square mile, three feet thick. The mill-stone grit which lay at the base of the coal measures varied much in different localities, that found in the Forest of Dean being the most porous, absorbing 66,000,000 gallons to the square mile, three feet thick. Some of the coal-measure grits also stored large volumes of water. The Pennant rock, about nine hundred feet thick, in the Bristol coal-field, and extensively developed in Somersetshire, as also around Swansea, was capable of absorbing 12,000,000 gallons in a square mile, three feet thick; and specimens of magnesian limestone, taken from the neighborhood of Bristol, showed a porosity of 86,000,000 gallons; but the carboniferous limestone was quite the reverse, and only absorbed 3,500,000 gallons. Oolites held vast stores of water, and the rock was much used for building. Mr. Wethered then referred to the relation of specific gravity to porosity, and proceeded to say that shallow well-water had been classed by the Rivers Pollution Commissioners as dangerous, and the deep as wholesome, and there must, therefore, be a purifying process going on during the percolation into the earth. From an analysis of rocks, it was clear that nothing in the chemical composition of the rock could purify the water, and in order to get rid of organic contamination there must be oxidation, and they must, therefore, look to another source for the oxidizing agent, which, he thought, existed in the air absorbed by the water, and in the air contained in the interstices of the rock.

POMPEII'S NEW PAINTING. — An important painting has been found at Pompeii and was yesterday placed in the Naples Museum among the Pompeiian frescos. It represents the judgment of Solomon and is the first picture on a sacred subject, the first fragment either of Judaism or Christianity that has been discovered in the buried cities. I have therefore studied it carefully this morning, and forward you a description of it, as I think the discovery of such a painting is a matter of public interest. The picture is 15′ 6″ long and 19″ in height, and is surrounded by a black line about an inch in width. The scene is laid upon a terrace in front of a house adorned with creeping plants and shaded with a white awning. On a dais (represented as being about 4′ high) sits the king, holding a sceptre and robed in white. On each side of him sits a councillor, and behind them six soldiers under arms. The king is represented as leaning over the front of the dais toward a woman in a green robe who kneels before him with disheveled hair and outstretched hands. In the centre of the court is a three-legged table, like a butcher's block, upon which lies an infant, who is held in a recumbent position, in spite of his struggles, by a woman wearing a turban. A soldier in armor, and wearing a helmet with a long red plume, holds the legs of the infant and is about to cleave it in two with his falchion. A group of spectators completes the picture, which contains in all nineteen figures. The drawing is poor, but the colors are particularly bright and the preservation is excellent. As a work of art it is below the average Pompeiian standard, but it is full of spirit and drawn with great freedom. The bodies of the figures are dwarfed and their heads (out of all proportion) large, which gives color to the assertion that it was intended for a caricature directed against the Jews and their religion. This may be so, but my own impression is that the artist was anxious to develop the facial expression, and to do this exaggerated the heads. There is nothing of the caricature about it in other respects: the agony of the kneeling mother, the attention of the listening king, and the triumph of the second woman, who gloats over the division of the child, are all manifest, and to my mind there is no attempt intentionally to burlesque the incident, but this is a matter of opinion. — *Correspondence of the London Times.*

THE DIVERSIONS OF LEONARDO DA VINCI. — Stories like that of the automaton lion, which walked forward to the French King and opened its breast, discovered to be full of lilies, are no more than the feats daily performed by Messrs. Maskelyne & Cook. Again, when Leonardo da Vinci constructed certain figures of animals for Leo X, which flew through the air, he was merely catering for the amusement of a learned trifler, whose "philosophical inquiry," as Vasari calls it, did not rise above a weak dabbling in alchemy. True, some of these experiments have a half-humorous, half-subtle meaning, affording a pleasant glimpse of one aspect of Leonardo's character, — as, for instance, when he once caused the intestines of a sheep to be cleansed and scraped until they were brought into such a state of tenuity that they could be held within the hollow of the hand; then placing in an adjoining chamber a pair of blacksmith's bellows, made fast to one end of the intestines, he would blow into them until he caused them to fill the whole room, which was a very large one, insomuch that whoever might be therein was compelled to take refuge in a corner. He thus showed them transparent and full of wind, remarking that, whereas they had previously been contained within a small compass, they were now filling all space, and this, he would say, was a fit emblem of talent or genius. Vasari goes on to state, "he made numbers of these follies in various kinds, occupied himself much with mirrors and optical instruments, and made the most singular experiments in seeking oils for painting, and varnishes to preserve the work when executed." — *London Times.*

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.]

264,852. Hinge for Awning-Blinds. — F. Barton Brown, Boston, Mass.

264,853. Shutter-Fastener. — F. Barton Brown, Boston, Mass.

264,859. Atmospheric Hammer.—John C. Butterfield, Chicago, Ill.

264,861. Machine for Mixing Mortar or Concrete.—Henry W. Caldwell, Chicago, Ill.

264,863. Blower for Fire-Places.—Benjamin G. Covington, Fort Mill, S. C.

264,868. Carpenter's Vise.—Amos Fales, Denver, Col.

264,873. Shutter-Bower. — Stiles Frost, Boston, Mass.

264,875. Pug-Mill. —Alfred Hall, Perth Amboy, N. J.

264,884. Door-Bell.—James J. Johnston, Columbiana, O.

264,918. Self-Luminous Paint.—William H. Balmain, Eversley, Ventnor, County of Hants, Isle of Wight, Eng.

264,934. Scaffold-Support. — Richard Deeves, New York, N. Y.

264,945. Sash-Fastener. — Samuel R. Hawley, Odin, Ill.

264,977. Speaking-Tube Annunciator. — Joseph Walter, New York, N. Y.

264,990. Fire-Place Attachment. — James P. Winter, Greenup, Ky.

265,012. Brick-Elevator.—John C. Bobzien, Chicago, Ill.

265,090. Illuminating-Grating.—Jacob Jacobs, New York, N. Y.

265,112. Water-Closet Valve. — Henry S. Lord and Cornelius Birkery, Hartford, Conn.

265,141. Pile. — Joseph W. Putnam, New Orleans, La.

265,163. Fire-Place. — James G. Smith, Cleveland, O.

265,174. Grate-Fender. — Stephen S. Stedman and William T. Barker, Jordan's Store, Ga.

265,217. Window-Ventilator.—Edward G. Caldwell, Newton Centre, Mass.

265,220. Automatic Gate for Elevators.—Geo. V. Delue, Boston, Mass.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits.—Since our last report, (12) permits have been granted, of which the following are the more important:—

Saml. T. Williams, three-st'y brick building, w s Caroline St., bet. Baltimore and Hampstead Sts.

H. G. Willis, three-st'y brick building square, s s Pierce St., bet. Pine and Pearl Sts.

John Mehring, two-st'y brick stable, rear w s Fulton Ave., n of Laurale St.

Boston.

House. — Mr. W. H. Coffin is building a house, No. 202 Commonwealth Ave., 23′ x 60′, four-st'y, brick, with stone and terra-cotta trimmings; Mr. I. C. Hooper, mason; Mr. O. F. Smith, of Boston, architect.

Building Permits. — *Brick.* — *Mercantile St.*, cor. Clinton St., Ward 6, Estate of J. and E. Quincy, two-st'y mercantile and mechanical, 20′ x 80′; Wm. Carpenter, builder.

N St., near East Fourth St., Ward 14, for H. B. Stratton, 2 three-st'y dwells., 21′ x 50′; H. B. Stratton, builder.

Wood. — *Tremont St.*, cor. Whitney Pl., Ward 22, for John J. Kennedy, three-st'y dwell., 23′ x 39′; McDonald & Tobin, builders.

Harlow St., near Howard Ave., Ward 20, for Abram Ripley, two-st'y dwell., 18′ 6″ x 35′; ell, 17′ x 21′ 6″; Abram Ripley, builder.

Maple St., near Wayne St., Ward 21, for Wm. D. Forbes, two-st'y dwell., 56′ x 60′; ell, 30′ x 40′; McNeil Bros., builders.

Highland Ave., near Cambridge St., Ward 25, for Jas. W. and John P. Loudon, 2 two-st'y hip dwells., 21′ x 39′; Samuel Davenport, builder.

East Third St., near N St., Ward 14, for C. C. Walworth, two-st'y dwell., 21′ x 31′.

Brook Ave., cor. North Ave., Ward 20, for Carl L. Diltmer, two-st'y dwell., 20′ x 32′; P. Hanlon, builder.

Holmes Pl., near Mill St., Ward 24, for Daniel L. Farnum, dwell., 20′ x 28′; John A. Tucker, builder.

Dudley Ave., near Washington St., Ward 23, for John Anderer, two-st'y dwell., 20′ x 28′; John String, builder.

Gerard St., near George St., Ward 20, for Thomas F. Scanlon, lumber storehouse, 32′ x 50′; Andrew Anderson, builder.

Beaumont St., near Carruth St., Ward 24, for Smith W. Nichols, three-st'y dwell., 30′ x 44′ 6″; Wm. J. Jobling.

Washington St., rear, near Green St., Ward 23, for Daniel Carroll, two-st'y dwell., 23′ x 30′; Wm. R. Hudson, builder.

Columbia St., rear of, near Quincy St., Ward 24, for A. W. Spencer, green-house, 30′ x 82′; E. B. Noyes, builder.

Central Ave., cor. Bellevue Ave., Ward 23, for Thomas Van Dyl, dwell., 18′ x 26′; G. W. Bemmink, builder.

Elm St., near Breed St., "Orient Heights," for M. F. Dearcy, three-st'y mansard dwell., 22′ x 28′; S. H. Griffin, builder.

Unnamed St., cor. Webster Ave., Ward 25, for John W. Hollis, 6 two-st'y dwells., 14′ and 20′ x 50′; Jacob W. Berry, builder.

Harlow St., rear, near Howard St., Ward 20, for Abram Ripley, storage, 20′ x 24′; Abram Ripley, builder.

Greenville St., near Winthrop St., Ward 20, for J. E. Came, two-st'y dwell., 19′ and 37′ x 26′ and 37′; H. C. Allen, builder.

Foster St., near Mt. Vernon St., Ward 23, for Horace W. Baxter, two-st'y dwell., 22′ x 35′.

Central Ave., near Berry St., Ward 23, for Geo. Thompson, dwell., 20′ x 26′; John A. Crosby, builder.

Green St., near Union Ave., Ward 23, for Mrs. R. A. Atwood, two-st'y store, 21′ x 30′; J. S. Atwood, builder.

Brooklyn.

Building Permits.—*Lafayette Ave.*, n s, 75′ w Sumner Ave., 5 two-st'y frame dwells.; total cost, $13,600; owners, Chas. and J. C. Debevoise, 104 Debevoise St.; architects and carpenters, Marinus & Gill; mason, S. J. Burrows.

Nostrand Ave., n e cor. Hancock St., 2 three-st'y brownstone dwells.; cost, each, $4,500; owner, F. M. Kinney, 418 Third St.; architect, J. G. Prague.

Hancock St., n s, 500′ e Bedford Ave., 3 three-st'y brownstone dwells.; owner, architect, and builder, S. E. C. Russell, 58 Hancock St.

Monroe St., s s, 275′ e Nostrand Ave., 4 two-and-one-half-st'y brownstone dwells.; cost, each, about $5,000; owner and architect, F. C. Vrooman, 444 Gates Ave.

Wyckoff St., n s, 120′ w Smith St., three-st'y brick stable and lofts; cost, $5,000; owner, P. Belford, 27 Wyckoff St.; architect, Chas. Werner; builders, J. J. Bentzen and H. J. Smith.

Suydam St., No. 9, n s, 140′ e Broadway, two-st'y frame dwell.; cost, $3,000; owner, Lena Fisher, 16 Myrtle St.; architect and builder, P. Johnson.

Adams St., e s, 25′ n Plymouth St., four-st'y brick store and office-building; cost, $13,000; owner, E.W. Bliss, Pearl, cor. Plymouth St.; builders, M. Reed and E. Snedeker.

Harmon St., n s, 208′ e Evergreen Ave., 25 two-st'y frame dwells.; cost, each, $2,500; owner and builder, J. Hopkins, Jr., 109 Grove St.; architect, E. R. Charatier.

St. Marks Ave., s w cor, Nostrand Ave, on rear, one-st'y stable; cost, $3,000; owner, D. R. Van Nostrand, on premises; architect and carpenter, W. C. Booth; mason, C. A. Barton.

Flatbush Ave., s s, cor. Dean St., four-st'y brick and stone stores and flats; cost, $9,000; owner, F. Darrigrand, 452 Dean St.; architect, F. E. Lockwood.

Jefferson St., n s, 250′ e Marcy Ave., 3 three-st'y brick dwells.; cost, each, $7,000; owner and builder, George H. Stone, 356 Stuyvesant Ave.; architect, G. A. Shellenger.

Gwinnett St., No. 164, s s, 175′ w Throop Ave., three-st'y frame tenement; cost, $4,500; owner, John Schlinger, 160 Gwinnett St.; architect, Th. Engelhardt; builders, Henry Grasman and D. Kreuder.

Moore St., Nos. 171, 173, 175 *and* 177, s s, 125′ e Bushwick Ave., 4 two-st'y frame tenements; cost, each, $8,500; owner, Maggie Julius, on premises; architect, Th. Engelhardt; builders, G. Herrlein and J. G. Hoepfer.

Nostrand Ave., s e cor. Monroe St., 6 four-st'y brownstone tenements; cost, each, $4,500; owner, architect and builder, G. W. Brown, 728 Fulton St.

Manhattan Ave., w s, 120′ n Norman Ave., three-st'y brick store and dwell.; cost, $5,500; owner, Adrian Meserole, 590 Lorimer St.; architect, Fred. Weber; builders, G. J. Roberts and S. M. Randall.

Third St., w s, abt. 50′ n South First St., three-st'y brick dwell.; cost, $5,000; owner, Daniel Driver; architect, E. F. Gaylor; builders, J. Rodwell and R. B. Ferguson.

Floyd St., s s, 350′ e Marcy Ave., 3 three-st'y frame tenements; cost, $3,000; owner, John Bernauer, Stockton St.; builders, G. Straub and J. Rueger.

Bridge St., n e cor. Plymouth St., four-st'y brick paint factory; cost, $16,000; owner, P. Cassidy, 1119 Madison Ave., New York; architect, M. J. Morrill; mason, George Phillips.

Chicago.

Houses. — J. V. Farwell is about to build a mansion on Pearson St., near Lake Michigan. The front will be marble from north shore of Lake Michigan. The dimensions are 65′ x 70′.

S. A. Kent is building a new house, of Philadelphia pressed brick, 60′ x 100′, on Michigan Ave., near Twenty-ninth St. The plans for both these residences were prepared by Burnham & Root.

Building Permits. — C. Dannehl, three-st'y and basement brick store and dwell., 24′ x 75′, 571 Ogden Ave.; cost, $6,000.

Mary Mott, two-st'y brick dwell., 22′ x 40′, 358 South Clinton St.; cost, $2,500.

John J. Karsters, two-st'y and basement brick store and dwell., 25′ x 62′, 177 West Harrison St.; cost, $3,500.

Paul Pundt, two-st'y and basement brick dwell., 21′ x 46′, 826 West Twelfth St.; cost, $3,000.

J. W. Jackson, Jr., two-st'y and basement brick dwell., 22′ x 50′, 273 Hubbard St.; cost, $3,000.

A. Moeller, three-st'y and basement brick store and dwell., 35′ x 72′, 685 West Chicago Ave.; cost, $5,000.

Edward Hudson, 9 three-st'y and basement brick stores and dwells., 56′ x 181′, 3108 Wabash Ave., and 293 to 309 Thirty-first St.; cost, $45,000.

Abe Klee, two-st'y and basement brick dwell., 22′ x 50′, 38 Cornell St.; cost, $4,500.

F. A. Kruse, three-s 'y and basement brick dwell., 26′ x 50′, 255 North Ave.; cost, $6,000.

Fred B. Clarke, two-st'y and basement brick store and dwell., 21′ x 60′, 628 Twelfth St.; cost, $3,200.

J. A. Whidden, two-st'y and basement brick dwell., 22′ x 60′, Twenty-second St., cor. Jones Pl.; cost, $6,000.

J. A. Homan, two-st'y and attic brick dwell., 22′ x 50′, 1122 Fulton St.; cost, $4,000.

Fortune Bros. Brewing Co., four-st'y and basement brick ice-house, 60′ x 93′; Pearce St., near Desplaines St.; cost, $20,000,

J. H. Brooks, 2 three-st'y and basement brick dwells., 23′ x 52′ each, 612 and 614 Division St.; cost, $18,000.

Samuel Burkhardt, 2 three-st'y and basement brick stores and dwells., 48′ x 66′, 3817 and 3819 Halsted St.; cost, $10,000.

Nathan Davis, three-st'y brick dwell., 20′ x 25′, 1609 Wabash Ave.; cost, $3,000.

J. L. Stewart, two-st'y and basement brick dwell., 28′ x 47′, 540 and 542 West Van Buren St.; cost, $7,000.

J. H. Thompson, 2 three-st'y brick dwells., 44′ x 56′; Nos. 15 and 17 Seymour St; cost, $8,000.

M. J. Andryzayk, two-st'y brick store and dwell.; No. 673 Ashland Ave.; cost, $5,000.

H. V. Bemis, two-st'y and basement brick addition, 16′ x 50′; No. 2322 Indiana Ave.; cost, $5,000.

James Lyons, 2 one-st'y cottages, 22′ x 40′ each; Thirty-third and Jones Sts.; cost, $2,500.

A. W. Harlow, two-st'y and cellar brick dwell., 25′ x 86′; No. 475 Congress St.; cost, $6,000.

Peter Schoenhover, brick elevator, 72′ x 100′; Crawford Ave., near Canal St.; cost, $50,000.

Clark, Raffen & Co., four-st'y and basement brick machine shop, 50′ x 72′; Ohio St. near Kingsbury St.; cost, $12,000.

J. W. Rich, three-st'y and basement brick dwell., 22′ x 62′; No. 265 La Salle Ave.; cost, $8,500.

A. Seeberger, 3 one-st'y brick cottages, 20′ x 30′, each; Thirty-seventh Court, near Butler St.; $3,000.

E. L. Smith, three-st'y brick basement, store and dwell., 24′ x 70′; No. 260 Division St.; cost, $5,600.

A. Elmars, three-st'y brick store and flats, 25′ x 50′; No. 3159 State St.; cost, $5,000.

J. A. Green, two-st'y and basement brick dwell., 21′ x 45′; No. 329 Idaho St.; cost, $2,500.

John Palvey, two-st'y and basement brick dwell., 20′ x 42′; No. 72 Millard Ave.; cost, $3,000.

M. Milligan, three-st'y and basement brick dwell., 27′ x 40′; No. 323 Franklin St.; cost, $5,000.

Sutter Bros., 3 three-st'y brick dwells., 50′ x 72′; Nos. 3551 to 3553 Lake Ave.; cost, $15,000.

J. W. Wilson, brick basement, 22′ x 54′; No. 3032 Wentworth Ave.; cost, $2,800.

James Todd, two-st'y brick addition, 30′ x 65′; No. 331 to 333 Wabash Ave.; cost, $3,000.

A. C. Norris; two-st'y and cellar brick dwell., 25′ x 62′; No. 468 Congress St.; cost, $7,000.

Louise Fowler, three-st'y brick dwell., 20′ x 64′; No. 15 Willard Place; cost, $8,000.

Frances Rew, three-st'y and basement brick dwell., 24′ x 60′; No. 562 N. Wells St.; cost; $7,500.

Bartholomee & Leicht, three-st'y and attic brick dwell., 50′ x 75′; Sedgwick St., near Centre St.; cost, $16,000.

E. Uehlein, two-st'y and basement dwell., 24′ x 50′, No. 58 Granger St.; cost, $7,000.

Wm. Gilman, three-st'y and basement brick factory, 41′ x 60′; Nos. 132 and 134 Lake St.; cost, $4,000.

D. P. Peck, three-st'y brick dwell., 25′ x 60′; No. 59 Bryant Ave.; $5,000.

Honora Graham, three-st'y basement, store and dwell., 23′ x 60′; No. 78 Douglas Ave.; cost, $3,000.

Geo. Lauterbach, two-st'y and attic brick dwell., 24′ x 30′; No. 51 Thirteenth St.; $2,500.

Frank Fiava, two-st'y and basement brick dwell., 21′ x 50′; No. 442 Nineteenth St.; cost, $3,000.

Cincinnati.

Annual Report.—We learn from the advance sheets of the forthcoming annual report of the Builders' Exchange that during the year last past a total of 34,000 cubic yards of sand was used in connection with building of this city at a total cost of over $120,000; and that the amount of lime used was 600,000 bushels.

Art Museum.—Ground was broken last week for the new Art Museum building in Eden Park. The contracts for building the cellar have been awarded, and it is expected to push this part of the work as fast as the weather will permit. Mr. McLaughlin the architect is at work on the rest of the plans.

Building Permits.—John Werner, two-st'y brick dwell., 1620 Eastern Ave.; cost, $4,000.

Aug. Enneking, two-st'y brick dwell., Woodburn Ave., near Lincoln Ave.; cost, $3,500.

John Koeler, two-st'y brick dwell., Wheeler St., near Calhoun St.; cost, $2,100.

Four permits for repairs; cost, $2,000.

Cleveland.

Building Permits.—*Sibley St.*, 6 stone dwells.; cost, $24,000; owner, I. Reynolds; architect, J. W. Blackburn.

Sibley St., frame dwell.; cost, $5,000; owner, Frank Hart, architects, Coburn & Barnum; builders, Cass & Co.

Cedar Ave., double frame dwell.; cost, $7,000; owner, Wm. Goodwin; architects, Coburn & Barnum; builder, Mr. Young.

Franklin St., church; cost, $30,000; owner, First Congregational Church; architects, Coburn & Barnum; builders, Co-Operative Building Co.

Marquett St., brick wire mill; cost, $27,000; owners, Otis & Co.; architect, F. O. Bate; builder, Jno. T. Watterson.

Kennard St., frame dwell; cost, $3,000; owner, Chas. S. Paddock; architect, F. C. Bate, builder, Jno. Foote.

Broadway, frame store and dwell.; cost, $3,500; owner, Jno. Sheehan; architect, F. C. Bate.

Scott St., frame dwell.; cost, $2,000; owner, G. C. Barnes; architect, F. C. Bate.

Frankfort St., brick building; cost, $5,000; owner, Jno. A. Vincent; architect, Walter Blythe.

Seneca St., brick building; cost, $60,000, owner, Jos. Perkins; architect, J. H. Edleman; F. H. Norton, Supt.

Prospect St., frame residence; cost, $20,000; owner, J. H. Ely; architect, Wm. Dunn; builder; Mr. Cass.

Wire St., acid works; cost, $12,000; owners, Hayes & Co.; architect, F. C. Bate; builder, Jno. T. Watterson.

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 7. SATURDAY, OCTOBER 7, 1882. VOLUME XII. No. 354.

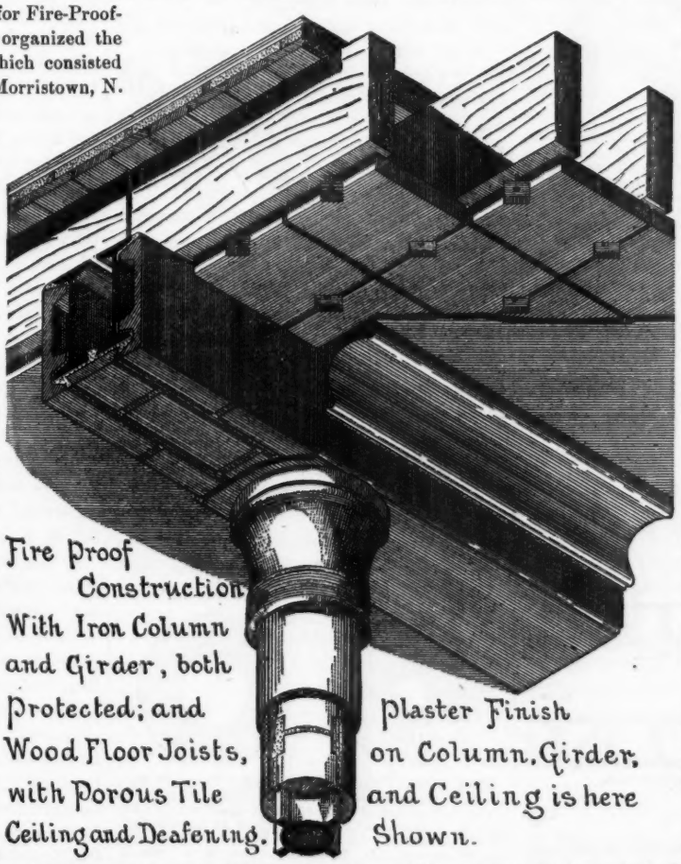
WORK OF THE WIGHT FIRE-PROOFING COMPANY.

IT is now nearly a year since the organization of this company, to which the business and patents of P. B. Wight & Co. were transferred. Four years ago, after the sale of Mr. Drake's interest in the Patents for Fire-Proofing iron columns, Mr. Wight organized the firm of B. P. Wight & Co., which consisted of himself, H. B. Merrell, of Morristown, N. J., and Thomas Ferguson of Detroit, Mich., and decided to try the experiment of contracting for the fire-proofing of iron columns only. Two patents were taken out for three additional methods; so they were soon prepared to do everything required in that line, and to cover columns of every shape and make, whether in new buildings or old ones.

The experiment was more successful than anticipated. Architects ordered iron columns adapted to the process of fire-proofing, in their general contracts for iron-work; adopting such forms from the illustrated circulars as were best adapted to the purpose. The difficulty of finding men sufficiently skilled to properly finish the columns in plaster induced the firm to train a body of workmen in the finishing and ornamentation of columns. They were thus enabled to give artistic form and perfect finish to the fire-proof work.

Very soon the fire-proofing of girders was included in the work to be undertaken, and as Mr. Wight had meanwhile perfected and patented a method of constructing ceilings of porous terra-cotta, that could be used both under iron and wooden floor joists, the fire-proofing of ceilings was added to the business of the firm: so that under a steady demand for thorough fire-proofing with porous terra-cotta, — the only material that has ever withstood all the tests that can be applied to it,— there was gradually developed a complete system of fire-proofing for all purposes.

The organization of the Wight Fire-proofing Company became a necessity in order to meet the demand for work, which was constantly increasing; and with its organization it was decided to include, along with the special processes of its own, all the systems of fire-proofing in general use, and to do plastering in connection with fire-proofing. The Company now not only does its own plastering where its fire-proof work is used, but makes a specialty of all kinds of expert plastering in Portland and Keene's cement. The latter material, having the appearance of plaster, has also the hardness of marble. Two grades of this cement are used. The coarser kind has all the requisites for hardness, and it can be troweled to as smooth a surface as ordinary plaster. It is not perfectly white, and uniformity in color is not always obtained; but it can be tinted with earth colors so as to make substantial wainscotings that will not require painting. The finest grade is a pure white. It may be colored uniformly to any tint, and will take a polish equal to marble. The prevailing method of finishing columns is to work a moulded base and dado with Keene's cement, and above the dado to finish in plaster, with any desired amount of elaboration. The plain shafts may be of superfine Keene's cement, colored and polished. This company is now finishing the entire under side, together with the strings and well-hole aprons of the grand stairway of the store erected by Martin Ryerson, Esq., at the corner of Wabash Avenue and Adams Street, Chicago. This is all done in Keene s cement. It is elaborately moulded. The platforms are carried on iron columns, fire-proofed with porous terra-cotta and similarly finished. The stairway is first fire-proofed with porous terra-cotta tiles secured with screws and plates to the wooden carriages, and provision is made for expansion or contraction of the wood-work so as to provide against the possibility of the work cracking. The cement finish is applied to the tiles.



Fire Proof Construction With Iron Column and Girder, both Protected; and Wood Floor Joists, with Porous Tile Ceiling and Deafening.

Plaster Finish on Column, Girder, and Ceiling is here Shown.

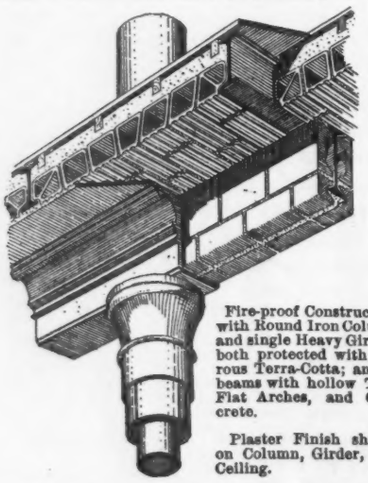
This entire building, which is 150′ x 160′ on the ground and six stories high, is fire-proofed throughout with porous terra-cotta. The interior construction is with iron columns and iron girders, all of which are covered and plastered. The floors are of wooden

joists. The ceilings are of porous terra-cotta tiles screwed to the joists and plastered. The floors are double and fire-proofed between the two courses of floor-plank with 1¼″ of plaster. Our illustration on the first page shows the system of construction and fire-proofing.

It may be of interest to state that this building has cost only 18 per cent more than if it had been built in the usual non-fire-proof way. It is built to withstand any fire that may take place in its contents.

The Montauk Block in Chicago, a nine-story office-building owned by P. C. Brooks, Esq., of Boston, has been fire-proofed throughout by the Wight Company. It differs from the Ryerson Building from the fact that the floor-joists are of iron I-beams and the spaces between are bridged with hollow fire-clay flat tile arches.

The following illustration will show the system of construction and fire-proofing.

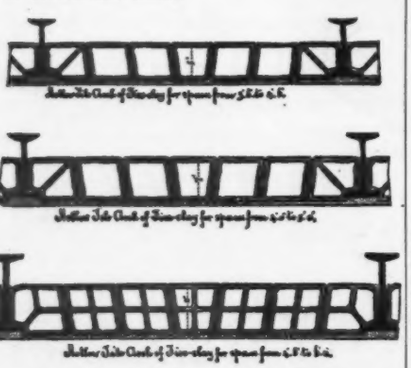


Fire-proof Construction with Round Iron Column and single Heavy Girder, both protected with Porous Terra-Cotta; and I-beams with hollow Tile, Flat Arches, and Concrete.

Plaster Finish shown on Column, Girder, and Ceiling.

This company manufactures and puts in hollow tile arches of fine quality and extraordinary strength, all made of the best Ohio River fire-clay. The material is such as to admit of the construction of lighter floor arches than have ever been made before. Their 6″ arches weigh 18 lbs. per foot; 7″, 24 lbs., and 8″, 30 lbs.

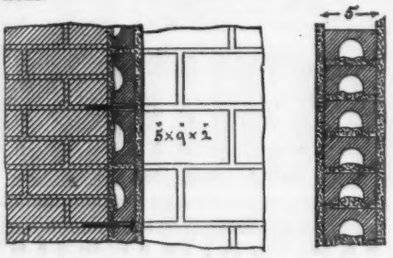
The following illustration shows the sizes of arches now made.



Work is contracted for in all parts of the United States.

Partitions are built either of hollow fire-clay tiles similar to floor arches, or of Porous Fire-Brick. 4″ partitions weigh 15 lbs. per superficial foot if of hollow tiles and 20 lbs. if of porous fire-brick.

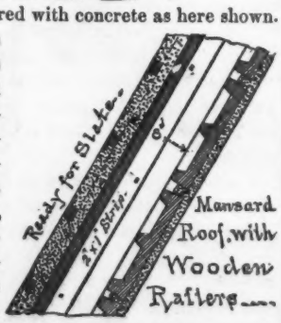
Walls are furred with hollow porous fire-brick. The following illustration shows sections of porous fire-brick furrings and partitions.



Porous Furring Bricks. Partition

Mansard roofs if built with iron rafters are filled in between the rafters with porous fire-bricks as here shown. If the mansard has wooden rafters they should be set twelve inches from centres, and covered on the inside with porous terra-cotta ceiling-tiles and a coat of plaster. The outside of such roofs may be covered with concrete as here shown.

When iron floor-beams are used and the appearance of arches in the ceiling is not objectionable, the best system of fire-proofing is to enclose the lower half of the beam with porous terra-cotta skew-backs, and to spring segmental arches of porous fire-brick between them, as shown on the following illustration.



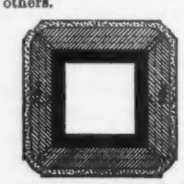
Skew Backs for Iron Beams.

We give here sectional drawings of iron columns fire-proofed according to the Wight system.

The Standard Fire-Proof Column as used in Milwaukee Chamber of Commerce, Ryerson stores, Montauk Block, American Express stable, New York, Smith Building, New York, and many others.

Round column as used by the Supervising Architect of the Treasury Department at Austin, Texas, Little Rock, Arkansas, and Utica, N. Y., also in Milwaukee Exposition Building, and many others.

Six Flange column as used in the First National Bank, Chicago, and Mitchell Building, Milwaukee.



Square column as used in Perkins' Building, Cleveland, and Grannis Block, Chicago.

Phœnix Wrought-Iron column as used in the Chamber of Commerce, Milwaukee.

Cruciform column suitable for church work. Many are used in upper stories for light loads.

In the American Express Company's Offices, Chicago, all the columns in the first story were fire-proofed two years ago. The new ones then introduced are of the same section as the first illustration. The old square iron columns were finished as round ones, and the old round ones were covered as they stood, thus making all the columns of uniform shape and finish.

Buildings completely fire-proofed by this company comprise the Art Department of the Milwaukee Exposition; the Montauk Block, and Ryerson's Block in Chicago; the Perkins Building at Cleveland, O., and the new Hammond Library, at Chicago, now in progress.

Fire-proofed columns are used in the Detroit Savings Bank, and store of Newcomb, Endicott & Co., Detroit; the Grannis Building, the American Express Building, the First National Bank, the Chicago Club-House, and numerous store buildings in Chicago; the United States Court-House and Post-Office, at Austin, Texas, Little Rock, Arkansas, and Utica, N. Y.; the Mitchell Building and Chamber of Commerce, Milwaukee.

Hollow-tile flat arches are also used in the Nixon Building, Chicago, the Watkins Institute, Nashville, and the Hammond Library, Chicago.

In most of the above buildings the iron girders are also fire-proofed with porous terra-cotta.

Architects in New York may examine the system of porous terra-cotta skew-backs with brick arches in combination with iron beams, also the covering of heavy girders and columns with porous terra-cotta and cement, in the new stable of the American Express Co., corner of Lexington Avenue and Forty-eighth Street, New York.

In all these buildings it is a recognized principle that *no building can be fire-proof unless all constructive iron-work is protected.* With these words as a motto the Wight Company has inaugurated a new era in the art of fire-proofing; having perfected systems for protecting the treacherous, though necessary, iron-work, wherever used for construction, and in such a manner as not to make it cumbersome and ugly. It has saved this useful material from the condemnation of those who have often decried its use because of its unreliability under great heat, without being able to suggest a practicable remedy. And in so doing it has perfected methods for artistically and substantially ornamenting interiors in a manner becoming such buildings.

The officers are H. B. Merrell, President; P. B. Wight, General Manager; Thomas Ferguson, Treasurer; F. R. Pettibone, Secretary. A. W. Hammett is Superintendent at Chicago, having immediate charge of the outside work, plastering and cementing.

The company has a branch office at 60 Williams St., New York, while the main office is at 73 Dearborn Street, Chicago, Ill.

BUILDING MANILLA.

This Water-proof Manilla for covering outside and lining inside of buildings is one of the most important inventions in the paper line. It was patented by C. J. Fay, and is now owned by his successor, W. H. Fay.

Though properly termed paper, the manilla from which it is made is a product of the Philippine Islands, carefully selected and manipulated by a chemical process, which, while it is in nowise detrimental to health in its use for buildings, renders it obnoxious to insects and vermin, as well as makes it a water-proof material. This takes the place of more expensive materials for roofing; for outside walls of buildings; for walls and ceilings inside, in place of plaster; for lining under clapboards or weather-boarding, shingles, slates, etc.; for insulating buildings; for lining ice-houses and refrigerators, for covering trunks, counters, desks, etc. It is also made into carpets and rugs to take the place of oil-cloth.

Since the business was established sixteen years ago the material has been tested upon roofs, outside walls and inside walls and ceilings in place of plaster, and the result shows that there has never been introduced a material that takes its place for economy and comfort. For roofing or covering outside walls, this is without doubt the cheapest material in the market. Old shingle roofs may be covered with the roofing if the shingles are sound enough to hold the nails, and any ordinary workman can apply it after reading the printed instructions furnished. For the outside walls of buildings it is equally desirable as the cheapest lumber may be used. This material is used under weather-boards, shingles, slate, etc., for the purpose of excluding air and dampness. The use of the lining under weather-boarding, and the use on the wall and ceiling for inside in place of plaster, forms an air-tight space, — which Mr. J. Wilkinson, a practical architect of Brooklyn, N. Y., considers very indispensable in the construction of buildings. This invention is put to another use in the manufacture of manilla carpeting, and its manifold advantages are as follows: First, is its durability, a desideratum of every one who is aware of the yearly expenditure of carpets alone; and although the manilla carpeting has the same appearance (except a finer finish) as oil-cloth it is safe in making the assertion, that it will wear twice the time of any oil-cloth of the same price found in market. And the reason is that for oil-cloths a burlap (a kind of sleazy bagging) is first filled with a paint made of earth and fish oil, which forms the base for printing the colors upon; the oil never allows the filling to dry, hence the surface paint or colors are kept soft, and when in use easily peels off; while the surface paint on the manilla drys hard, the same as paint upon wood. Again, this carpeting does not expand to form wrinkles and wear off like oil-cloth, but lays down smooth to the floor, and having no paint on the back does not stick to the floor; it does not fray out at the edges, is easily kept clean, and, as it is secured to the floor with small tinned tacks, the carpet is easily removed. This carpet runs 36, 54, 72, and 90 inches in width, and the price for any of these widths is 40 cents per square yard. The factory is located at the corner of Front and Elm Streets, Camden, N. J., and the office and warehouse on Vine Street, below Second.

W. H. FAY, Camden, N. J.

SPURR'S PAPERED VENEERS.

The use of a veneer of thin wood of value glued to the surface of wood of lesser worth for the purpose of imparting a handsome finish to the work has long been known. Such veneer was, and indeed still is, cut about a thirtieth or a fortieth of an inch in thickness, but is never cut any thinner. Somewhere about the year 1868 it was discovered that it was possible to obtain a surface of wood so extremely thin that in some cases it would take 175 of the sheets piled upon each other to make an inch. This was thought to be an economical improvement at any rate, and the attempt was made to introduce these extremely thin sheets of veneer into general use. The attempt failed. The surface obtained was, indeed, marked and figured with all the beauties of the wood; it could be applied successfully to a surface, but it soon cracked and curled. Mr. Charles W. Spurr, however, found, upon experiment, that when this thin wood was expanded to its natural capacity and in that condition applied to a piece of paper, it ever afterwards remained in that condition, neither shrinking nor expanding after it had been applied as a veneer. This was the first idea, the details and the full development of which it has taken years to effect.

The logs, which embrace all the many kinds of rare and handsome woods, are halved or quartered and placed in a large tank, where they are steamed. This is for the purpose of expanding the water already contained in the sacs of the wood. The log is taken out in this moist condition and bolted upon a revolving section of a ponderous machine, which weighs over thirty tons, and which at every revolution throws off a thin board twelve feet long and from one-ninetieth to one hundred seventy-fifth of an inch in thickness. This machine is the only one of its kind in the world. The long knife which is used has to be the sharpest and truest possible. Any vibration would be fatal to the work. These delicate sheets of wood preserve the fibrous markings and tints. Different woods are cut of different thicknesses. The thinner the wood the smoother it is. Maple is cut 175 thicknesses to the inch; mahogany 125 thicknesses to the inch; birch 150 thicknesses to the inch; walnut and oak about 90. After cutting the wood is taken still wet, and applied to a sheet of paper. The paper is also wet at the time. After this papered veneer is dried it is a perfect compound and cannot be separated. Not only are logs used from which to cut these thin sheets of wood, but the unwieldy and shapeless burls, the warts as it were of the tree, are subjected to the same treatment. The peculiar marking and figures of wood cut from these burls make it particularly desirable for panelling, etc. After the wood is backed with the paper it is hung up and dried and is then ready for use. Such are the main features of the manufacture of the raw material. It now remains to speak of some of the uses to which it is put.

There are many uses to which the papered veneer can be put; but the most prominent of them all and that which may be expected to increase most in popular favor is the appliance of the veneer to the walls of rooms. It can be attached to the plastered wall, and after it has received the finish it can be washed whenever necessary. The beauty of the wood improves with age; it even strengthens the walls, while steam or furnace heat, dampness or frost have no effect upon it. There is no part of the room that is so much neglected, and which repays for furnishing more than the ceilings. Foreign artists understand this, and rich ceilings are generally found even when the walls are perfectly plain.

Obviously an invention which secures such advantages over the old veneer as this is peculiarly adapted to the manufacture of furniture. The New England Organ Company has used the veneer for seven years. It is used in various ways, and has entirely superseded the old veneers throughout the large establishment. The head of the firm is loud in its praise. He finds a saving of 30 per cent in the material for applying the papered over the old veneer, and a similar gain in labor. The veneer can be applied to any and all surfaces, to a square corner as well as anything else, and he has yet to find an instance where the work had failed to stand the test of wear. This can not be said of the old veneers formerly used, which cracked and peeled off after a time. The advantages which the veneers have been found to possess for this kind of work may be briefly summed up as follows: No waste or injury in storage or carless handling; many sheets can be cut at once, without ruining brittle wood; 100 pounds of glue will lay as much surface as 250 with ordinary veneers, twenty minutes under pressure, instead of twelve hours, keeping the press going all day; no delay for glue to set, but being immediately sand-papered, instead of planing, scraping, and sand-papering; less than one-half the amount of filling and finish, with marked clearness of color and brilliancy, and durability under circumstances fatal to the ordinary veneers and finish, from the absence of glue in the veneer or finish.

And, of course, what applies to the manufacture of organs applies equally to all kinds of furniture.

One of the most elegant uses to which papered veneer is put is the binding of expensive books, such as albums. Some of the sample books, bound in ash, French walnut and maple, highly polished, with or without steel engravings upon their surface are very taking. The report of the proceedings at the Garfield memorial services in Boston, were bound in this manner and sent to Mrs. Garfield and others. The same idea was embodied in the heliotype of the old elm on the Common and an autograph letter signed by Mayor Cobb. Mr. Spurr was made the custodian of the tree. A portion of the trunk was treated by his process, and, after subjecting it to the heliotype process, was framed. All the beauties of the wood were thus preserved, and will long remain a memento of the ancient tree, older than the city in which it grew.

Another use to which the veneers are put is in the production of marquetries. The ordinary definition of this term means artificial and natural colors marked, sawed or cut in, the aid of hot sand and iron to shade, and dyes to produce the desired effect being resorted to. In Mr. Spurr's method the sawing or marking in of pieces is done away with, as these pieces are continually working up and off, a similar effect being accomplished by marking in different transparent colors on one whole piece of wood, dyeing the different parts, the whole making a flexible and durable veneer, which can be mailed or shipped. French-polished or varnished they withstand all our climatic changes. It is claimed by all who have used these marquetries and veneers that many days' time are saved by the use of these goods; time saved in laying in press, no time afterward needed for setting and hardening of glue before smoothing, and one-half the number of coats of shellac or varnish, means one-half the time saved.

Experiments are constantly being made to see what can be done with the veneer. It has lately been found that the wood can be stamped and handsomely embossed, and this discovery will lead to important results.

The business has grown up gradually and quietly, paying its way as it went, improvement after improvement being added to increase the perfection of the manufacture, till now not only the United States is supplied, but exports are made to all parts of the civilized world by

CHARLES W. SPURR,
35 Bedford St., Boston, Mass.

THE COMBINATION HOT-WATER AND HOT-AIR HEATING APPARATUS.

Now that indirect hot-water heating is generally admitted to be the most healthy and safe system for heating dwelling-houses, any improvement in that system will no doubt be appreciated by those acquainted with the subject of artificial heating. The objects of the combination are to economize in the use of fuel, and produce a pure, warm air uninjured by being overheated, and with the least expense. The cut below represents a hot-water boiler set inside of a thin wrought-iron hot-air radiator with a galvanized-iron casing outside of all. The front of the casings is cut away to show the boiler *A*, which is an upright tubular boiler in the form of a plain cylinder. *B* is a wrought-iron hot-air radiator riveted and calked air-tight with smoke-pipe *G* and *F* riveted to it and extending outside of the air space. *C* is a thin galvanized-iron casing outside of all.

The fire passes up through the tubes and returns down between the outside of boiler and wrought-iron hot-air radiator as shown by arrow points, and passes out through the smoke-pipe *F* to the chimney. *G* is a direct draught to be used when starting the fire.

The cold air is admitted at the bottom of the furnace, and passes up around the hot-air radiator absorbing the heat from the fire inside of the radiator *B*, thereby saving the heat which goes out and is wasted in the ordinary hot-water boiler.

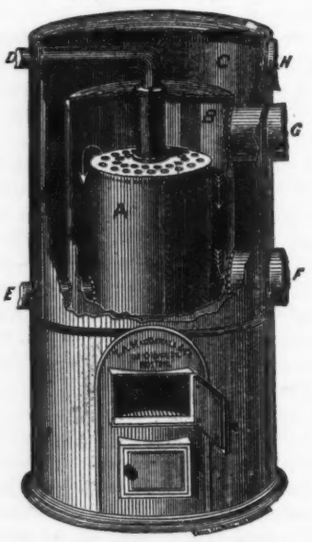
The warm air is conveyed from the hot-air chamber over the radiator *B* in tin tubes to the halls and rooms to be heated.

The hot-water circulates through the pipe *D* to the stacks of indirect radiators which may be placed anywhere in the basement convenient for heating the rooms above. After the water cools, it becomes heavier and gravitates to the lowest point which is the bottom of the boiler. This causes the circulation, *E* being the main return pipe.

The wrought-iron radiator *B* is made air-tight, where the pipes *D* and *E* pass through it by being placed between flanges in said pipes with asbestos packing on each side and bolted through all.

It will be seen that the object of economy in fuel is accomplished by absorbing nearly all the products of combustion, allowing as little heat to pass into the chimney as will serve to cause a draught. The fire-box is also constructed for thorough combustion, hot air being admitted over the fire. The tubes being smooth and upright will not clog up with soot and ashes, likewise the wrought-iron radiator, which is not the case with cast-iron surfaces. As to cheapness of construction: The boiler being in the form of a plain cylin-

(Patent applied for.)



der, is the cheapest as well as the strongest possible form in which a boiler can be made. The sheets come from the rolling mill the proper size for both the boiler and wrought-iron radiator, the riveting and calking being so simple is inexpensively done, and every square inch of both is exposed to the fire.

It will also be seen that as the boiler sets immediately over the fire, the water absorbs the intense heat, while it is only the milder gases which come in contact with the hot-air radiator *B*, and the air which is heated by it is not injured as it is in the ordinary hot-air furnaces, where the whole fire comes in contact with the radiator.

It must be remembered that the object of placing the wrought-iron radiator over the boiler is to absorb the heat from the fire which passes off and is wasted in other hot-water and steam boilers, for after the fire becomes reduced to a temperature equal to the steam or hot water inside the boiler it ceases to give off its heat, but by causing it to come in contact with a thin and sensitive radiator, surrounded with cold air, just before it passes to the chimney, this waste is saved in a very simple and practical manner, and the warm air produced by it is of a good quality.

We set these so that by drawing the water out of the radiators to a certain point in the boiler they can be used for low-pressure steam heating in extreme cold weather, the fire-box being large; the draught-door may be opened and a stronger fire used, which of course will be necessary when used for steam heating. A valve is put on each stack of radiators to check or shut off the circulation. Parties having their houses heated by wrought-iron furnaces have requested us to put a small boiler inside of them and a few hot-water radiators in rooms which they could not heat with hot air. This can be done at very little expense. The apparatus can be seen at

T. A. MacDONALD & CO.'S,
110 Oliver Street, Boston.

NOTES.

The bronze statue of "Endymion" lately erected at Greenmount Cemetery, Baltimore, over the grave of its sculptor, W. H. Rinehard, was cast at Philadelphia, by Messrs. Bureau Bros. & Heaton.

An architect who has probably profited by the advertisements of amateur photographic outfits in our columns, has discovered a new use for the pocket camera. Instead of sending us his original drawings that we might determine whether we wished to publish them in the *American Architect*, he has sent us photographic prints, and so has saved himself their possible loss and the cost of unnecessary expressage in case we should find they were not "suited to our needs."

The "Old Cape Cod Glass Works," of Sandwich, have been bought by Charles W. Spurr, of Boston. They have been idle since 1869, and will now be fitted up for making paper veneers.

Architects and builders will be interested in knowing that if they desire to use Peerless bricks in their buildings they must deal direct with the company itself, at 208 South Seventh Street, Philadelphia, as the company has no authorized agents in any part of the country.

The Fairhaven marble and marbleized slate company of Fairhaven, an old concern, have begun a suit against the Fairhaven slate company, a new corporation, claiming that the name of the latter company is calculated to deceive, and asking for an injunction for bidding its use.

The American Architect and Building News.

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The "Advertisers' Trade Supplement" is maintained in the interest of advertisers in the *American Architect and Building News.*

WARMING BY STEAM.

Of the means given us to supply artificial warmth to dwellings and all other buildings, none present so many points of excellence as that of steam.

The properly erected steam-heating apparatus of the present day has no superior in point of purity of temperature, economy in fuel used, simplicity in attendance, cleanliness in operation, and the ease with which a greater degree of heat can be equally maintained. Although the first cost of such an apparatus is greater than with other methods, and more so in proportion for a small than for a large building, yet a steam apparatus will pay for itself in time, certainly, in the increased comfort and health of the occupants of edifices so warmed.

Heating by steam is the same to-day as at its inception, thirty years since. In point of practical working, experience has taught better mechanical skill, and science has added improvements which render its control easier and adapt it more fully to the wants of consumers.

The great point of difficulty in erection of all steam-heating apparatus lies in the arrangement of returns or the placing of proper and ample means to remove the condensed water. Unfortunately the greater number of works in this line have been put up by unskilled workmen, the advance in the business having been so rapid as to preclude the proper education of many who have adopted the profession.

Particularly is unskilful work prolific of noise, and an abominable thing it is. Many times when retiring, and again at midnight, have most of us been annoyed by what can well be likened to a park of artillery let off at one's ear.

This more than anything else has served to bring steam-heating into disrepute, and caused many parties building to rely on older methods.

The best efforts of conscientious contractors have been directed of late to remove these obnoxious features, and to insure perfect circulation throughout all portions of any apparatus without appreciable pressure, and wholly free from noise.

Owners and constructors of buildings can not pay too much attention to the hygienic perfection of their edifices, and the best means of warming and ventilating should be adopted only after careful study and examination. Contractors only of known ability and experience should be employed; and again as to materials: if for use as low pressure, that they may be good and lasting, and if for high pressure that they be strong and carefully put together.

To any requiring work in this line we offer our services. Having an experience of twenty-five years, a large manufactory where almost everything required in steam engineering is manufactured under careful supervision and tested to a pressure of eighty pounds steam per square inch, and having a large force of skilled mechanics and engineers satisfaction is at once insured and fully guaranteed. As witness our work in New York at the New York Stock Exchange, Drexel, Morgan & Co., Mutual Life Insurance Co., and Herald Buildings, New Cathedral, and many other public and private constructions in all parts of the country.

Correspondence solicited by

GILLIS & GEOGHEGAN,
Heating and Ventilating Engineers,
116 and 118 Wooster St., New York.

ENCAUSTIC TILES.

The presentation of the case of the Indianapolis Encaustic Tile Works before the members of the United States Tariff commission lately is a matter of more than local interest, for the reason that the special line of industry which this company has introduced to the United States is one that the people may well regard with more than usual consideration. Indianapolis is the only city on this side of the Atlantic which manufactures encaustic tiles in patterns, styles and quality that rival, and frequently excel, the famous Minton tiles of England, rendering importation of the foreign production no longer necessary. For this reason the members of the Commission were ready to give marked attention to the facts and arguments presented to them, and, after inspecting choice specimens of the artistic production of the tile works, they were probably convinced that the industry was one of sufficient national importance and promise to deserve whatever aid in its development might be possible through the aid of protective tariff duties.

The company was represented by Hon. Addison C. Harris, who addressed the Commission in explanation of the history of the manufacture of encaustic tiles in England and the United States. The Minton works in England had, he said, been in operation since 1840, and the production of encaustic tiles, by a similar process, was commenced in this country, at Indianapolis, in 1877. Up to that time, all the tiles used in this country had necessarily been imported, and their price which had, of course, been controlled entirely by the foreign manufacturers, was so high that they could not be obtained for the general use which was desirable. As an illustration of the great expense at which the imported tiles were procured before the Indianapolis Encaustic Tile Company commenced operations, he stated that the tile flooring of the Indianapolis post-office, laid about eight years ago, cost the Government $1.25 per foot, while a similar and better tile could now be supplied from the works of this city at forty cents per foot. In view of the fact that the use of tiles in public and private buildings deserved encouragement, both upon artistic and practical grounds it was, therefore, evidently a public advantage to have the home manufacture encouraged and developed. This he said could only be done by a continuance of the present tariff duties, for, although the Indianapolis company was gradually establishing itself, and would in a few years be second in capacity to no other encaustic-tile factory in the world, it would be unable to successfully compete with the wealthy and old-established foreign producers, who, if the tariff duties were not maintained, could easily, with the difference in the cost of labor, undersell to such an extent as to ruin the American industry, and make their profits subsequently by the high rates that could be charged when competition was at an end.

Mr. Harris, at the conclusion of his address, introduced to the Commission Mr. Robert Minton Taylor, superintendent of manufacture of the Encaustic Tile Company, and a nephew of the celebrated Herbert Minton, who was the originator of the manufacture of encaustic tiles in England. Mr. Taylor, who has been engaged in tile manufacture since 1859, described somewhat in detail the efforts of his uncle, in association with the well-known English architect, Welby Pugin, for the restoration of the lost art of reproducing fac-similes of the rare mediæval designs upon the tiles found in the old churches and cathedrals of Europe. He also gave some details of the modern methods and processes entering into the manufacture of these tiles, and said that the location of the encaustic-tile factory at Indianapolis had been largely on account of the fact that the clays of Indiana, easily accessible from this point, were superior to any that could be found elsewhere—better in reality than those which had been used in similar manufactures in England. For this reason some of the work produced here had been better than the English tiles. Their production in this country was, however, attended by much greater expense. Three-fourths of the work is done by hand, and much of it by skilled labor. He believed the wages here were from 50 to 75 per cent more than for the same class of labor in England. Besides this, the cost of clay was greater. It would, therefore, he said, be impossible to compete with the foreign producers if the tariff duties were removed, and he asked that the present duties—20 per cent ad valorem on the common tiles, and 35 per cent on the better class of goods—be retained.

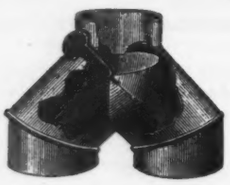
Mr. W. W. Lyon, secretary of the Tile Works Company, was also presented as a witness, and said that the present rate of duty was satisfactory, although if there was to be any change it should be in the nature of an increase, as the development of the home industry would not only lead to the employment of a large number of persons, many of them women, but would also keep down the price of encaustic tiles more effectually than could be done by allowing the foreign producers to monopolize the markets of the world, as they did before the Indianapolis company was started. Mr. Lyon replied to a number of questions put by members of the Commission, and showed that although the manufacture of encaustic tiles was only commenced here about five years ago, the American product was being used extensively for flooring and panelling in Government offices, banks, and public and private buildings of all descriptions throughout the country, their beauty and utility being everywhere acknowledged. Orders may be addressed to

THE UNITED STATES ENCAUSTIC TILE CO.
Indianapolis, Ind.

A RAIN-WATER CUT-OFF.

In these days of sanitary investigation the first thought of every householder is, Is my water-supply all right? and if he acts upon his thought he too often finds that it is all wrong, especially if he lives in the country and depends on a well. Evidently to dig another well is but a doubtful cure of the

existing evil, and he naturally considers the matter of collecting and storing the rain-water falling upon his own roof. If he has had any experience with cisterns he knows they are troublesome things, either too large or too small, sometimes tight, oftener leaky; demanding regular and periodic cleansing, but rarely getting it, and therefore being a standing threat against the health of the household, and a constant cause of expense because of the necessity of renewing the filter-wall which has become inoperative by being clogged with the impurities washed down from the roof. But in spite of all these ob-



jections rain-water if properly collected affords the safest, most refreshing and satisfactory water-supply, and it is a very simple matter to collect it properly. In the first place the gutters should be kept clean of all decaying vegetable matter by frequent cleaning, and the opening from the gutters into the conductors should be protected by raised galvanized-wire cages, and next, some means should be provided by which the first rain which falls on a roof — it may be after weeks of dry and dusty weather which has covered the slates or shingles with every conceivable kind of mineral and vegetable dust — is made to discharge elsewhere than into the cistern. This can be effectually accomplished by fixing at a convenient point in each down-spout connected with the cistern a Howell Patent Cut-off, of which the construction and manner of working is clearly shown in the annexed cut. The damper should always be turned so that the rain-water may run to waste, and it should only be turned so as to discharge into the cistern if the shower is a heavy one, and then only after the rain has fallen heavily for some five or ten minutes and it is certain that the impurities have been thoroughly washed from the roof. If after this has happened the dampers are reversed the householder may rest assured that he is collecting the purest and safest water for family use.

These cut-offs are made by

HOWELL & CLENDENNING,
638 Madison Street, Covington, Ky.

PROPOSALS.

(*Continued from page x.*)

HARDWARE AND GLASS.
[At New York, N. Y.]

Office of Supervising Architect,
Treasury Department,
Washington, D. C., September 30, 1882.

Sealed proposals will be received at this office **until 12 M., on the 18th day of October, 1882,** for furnishing and delivering at the Treasury Building, Washington, D. C., all the hardware required for the Barge Office at New York, N. Y., in accordance with specification and schedule. Also, for furnishing and delivering (at the Barge Office at New York, N. Y.) all the plate double thick sheet and cathedral glass required for that building, in accordance with specification, schedule and diagrams. Copies of the specifications, schedules, and diagrams, and any additional information, may be had on application at this office or the office of the Superintendent.

JAMES G. HILL,
345 Supervising Architect.

PROPOSALS.

STEAM-ENGINE. [At Albany, N. Y.]
Office of the Superintendent,
Albany, N. Y., September 14, 1882.

Sealed proposals will be received at this office (where proposal blanks can be procured) **until 12 o'clock, noon, Friday, October 13, 1882,** for furnishing and putting up a steam-engine for use in this building. It must be equal in durability, economy and all other respects to the Buckeye engine. Bidders will give their prices for both a 300 and a 500 horse-power engine. The bids must be accompanied with full detailed specifications of the engines which are proposed to be furnished, and of what they will be guaranteed to accomplish. The engine must be furnished and put up where directed by the Superintendent on or before December 15th, 1882.

Each bid must be enclosed in an envelope addressed to the undersigned, indorsed "Proposal for Engine," and must be accompanied by bonds of two sureties, residents of the State of New York, each to the amount of $5,000. Said sureties are to guarantee that the bidders will execute a contract, if it is awarded to them, and will perform the same faithfully. The right is reserved for the Superintendent, with the concurrence of the New Capitol Commission, to reject any or all bids, and after a contract is entered into, to declare said contract forfeited whenever, in their judgment, it is not being performed for the interest of the State.

JAMES W. EATON,
354 Superintendent of New Capitol.

PROPOSALS.

LOW-PRESSURE STEAM-HEATING APPARATUS. [At Philadelphia, Pa.]
Office of the Supervising Architect,
U. S. Treasury Department,
Washington, D. C., September 28th, 1882.

Sealed proposals will be received at this office **until 12 M., on the 18th day of October, 1882,** for the Low-Pressure Steam-Heating and Ventilating Apparatus, Tanks, etc., for the Court-House and Post-Office Building at Philadelphia, Pa., in accordance with the Drawings, Specification and Schedule.

Copies of Specification and Schedule may be obtained from, and drawings may be seen at this office, or the office of the Superintendent.

353 JAS. G. HILL, Supervising Architect.

PROPOSALS.

INSANE ASYLUM.
[At Traverse City, Mich.]

Sealed proposals, in duplicate, will be received at Traverse City, Michigan, by the Board of Commissioners, **until 10 A. M., of Wednesday, October 25th, 1882,** at which place and time the proposals will be opened for the general construction of the Northern Asylum for the Insane, located at Traverse City, Michigan, in accordance with plans and specifications prepared by Gordon W. Lloyd, and adopted by the Board.

The plans and specifications can be examined at the office of the Board, in Traverse City, Michigan, on and after September 6th, 1882.

For further information address

355 C. M. WELLS, Superintendent.
By direction of the Board of Commissioners.

IRON RAILING AND FLOOR LIGHTS.
[At Philadelphia, Pa.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., September 22, 1882.

Sealed proposals will be received at this office **until 12 M., on the 12th day of October, 1882,** for furnishing and fixing in place the Iron Railing for Approaches and the floor lights for first-story floor of the Post-Office and Court-House at Philadelphia, Pa., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

JAS. G. HILL,
354 Supervising Architect.

YELLOW-PINE LUMBER, ETC.
[Near Lewes, Del.]

U. S. ENGINEER OFFICE, 1125 Girard Street,
PHILADELPHIA, PA., September 12, 1882.

Sealed proposals, in triplicate, will be received at this office **until 12 M., of Thursday, October 12, 1882,** and opened immediately thereafter, for

Furnishing 91,380 feet B. M. of first-class Southern yellow-pine lumber, and appurtenances for a first-class railroad track, 2,810 feet long, including two switches, the material to be delivered at the U. S. Pier Delaware Breakwater Harbor.

The pier is to be of stone, with either crib or pile foundation, as may be most advantageous.

For forms of proposals and all information apply at this office.

G. WEITZEL,
354 Lt.-Col. of Engineers, U. S. A.

PROPOSALS.

BRIDGE.
[At Covington, Ky.]
August 15, 1882.

The City of Covington, Ky., through its Board of Bridge Commissioners, solicits proposals for building a bridge across the Ohio River at Covington, under the provisions of an act of the General Assembly of Kentucky, approved 1st March, 1873, which will be received **until 12 o'clock, noon, the 15th of October next.**

Apply to J. D. Hearne, President of the Board of Commissioners, at Third National Bank, Cincinnati, for particulars.

J. D. HEARNE,
J. O'HARA,
Committee.
354 W. H. MACKOY, W. W. CLEARY, Attorneys.

LUMBER, ETC.
[At Philadelphia, Pa.]

PHILADELPHIA, PA., September 27, 1882.

Sealed proposals, in triplicate, will be received at this office **until 12 M., of Wednesday, October 25, 1882,** and opened immediately thereafter, for material to be used in the construction of the Delaware Breakwater Harbor, as follows:

123,278 feet B. M. yellow pine or white oak; 19,162 pounds wrought-iron bolts, nuts and washers; 4,300 pounds spikes and nails; 40 tons railroad iron, 30 pounds per yard; 1,200 oak railroad ties; 264 spruce or pine piles, creosoted; 15,000 cubic yards brush; 16,225 tons granite.

Bids received for any or all classes of material.

For forms, specifications, etc., apply at this office.

G. WEITZEL,
356 Lt.-Col. of Eng'rs, U. S. A.

JOINERS WORK AND WOOD FLOORING.
[At Philadelphia, Pa.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D.C., September 26th, 1882.

Sealed proposals will be received at this office **until 12 M., on the 13th day of October, 1882,** for furnishing and fixing in place complete all the Joiners Work and Wood Flooring required for the Court-House and Post-Office Building at Philadelphia, Pa., in accordance with the drawings, specification and schedule, copies of which and any additional information may be had on application at this office, or the office of the Superintendent.

JAS. G. HILL,
354 Supervising Architect.

PROPOSALS.

BRICKS.
[At Cincinnati, O.]

The Cincinnati Gas-Light and Coke Company will receive tenders **up to noon Saturday, October 14, 1882,** for five million bricks, to be delivered at "East End Garden," situated between Eastern Avenue and Ohio River, and Main and Spencer Streets, First Ward, Cincinnati.

One million to be delivered between January 1 and March 1, 1883.

Two million to be delivered between March 1 and May 1, 1883.

Two Million to be delivered between May 1 and July 1, 1883.

Each bid to be accompanied by specimens of the bricks to be furnished, which specimens are to be made the standard to which deliveries must conform, in accordance with the provisions of the specifications on file at Gas office, corner Fourth and Plum Streets.

A good and sufficient bond in the sum of $10,000 will be required, conditioned upon the faithful performance of the contracts.

Bids will be received for the whole lot, and also for separate deliveries.

The Company reserves the right to reject any and all bids. 354

STEEL WIRE.
[At Boston, Mass.]

NAVY PAY OFFICE, 45 MILK ST.,
BOSTON, September 29, 1882.

Proposals, sealed and indorsed "Proposals for Steel Wire," will be received at this office **until October 11, 1882, at 12 o'clock, M.,** to be opened immediately thereafter in presence of bidders, for furnishing and delivering at the navy-yard, Boston, 13,500 pounds No. 8 galvanized steel wire, diameter .175, breaking strain each wire 3,800 pounds, to stand the usual tests at the United States ropewalk of wire for like purpose; to be in one continuous length of not less than 30 pounds; to be delivered at the Boston Navy Yard within thirty days; the price bid to include delivery. Two satisfactory sureties must accompany the bid, guaranteeing a faithful execution of the offer, if accepted. The right is reserved to reject any and all bids not considered advantageous to the Government. Blank forms for proposals will be furnished by this office.

354 G. E. THORNTON, Pay Director, U. S. N.