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THE movement in favor of the substitution of an improved building law for that now in force in New York progresses under the most favorable auspices. The committee which has in charge the draught of the proposed statute combines to a remarkable degree the best representation of all the professions concerned with such a law, containing, as it does, three insurance men well-known for their knowledge of building matters, several architects of great experience and reputation, various prominent builders in wood, masonry and iron, and, in particular, the present Inspector of Buildings, to whom the proposed law owes much of its merit. Of the text of the bill, as now adopted by the committee, we can say nothing, but it is to be presented to the State Legislature this week, and will soon be public property.

WE are sorry to learn that the case of the Philadelphia architect, who was invited to compete for a certain building, and sent in designs, which were locked up in a safe and not looked at, has been decided by the Supreme Court of Pennsylvania adversely to the claim of the architect, who demanded compensation for the trouble and expense which he had been at in preparing plans on the understanding that they would be fairly considered. Without attempting to call in question the technical propriety of the decision, we are sure that the members of the profession which spends its time and money on competitive plans, and knows how much they cost, will be unanimous in regarding it, so far as can be judged from the accounts we have of it, as being obviously unfair and oppressive to the plaintiff. That it should have been given at all seems to us only a consequence of the general idea among men of business, that a person who does work on speculation must set very little value on his efforts, and may be regarded as having practically no rights which need inconvenience those upon whom he thrusts his services. This impression, whose effect in diminishing the income of the younger members of the profession, in particular, is only too well-known to practitioners, will never be removed, nor will architects take their place in public opinion as men who work honestly for a fair and certain remuneration, until the present method of conducting competitions is made impossible. We must be understood as being by no means of the opinion of those who think that all artistic competition should be abolished; on the contrary, we believe that such contests, if so conducted as to secure enlightened judgment and adequate compensation in money and reputation for those who take part in them, form one of the best means of encouraging and developing artistic talent; but such competitions have nothing, except the name, in common with the schemes by which in this country ingenious greed seeks to gain advantage over the ignorant and foolish.

THE Temple competition for historical painting, which has recently excited so much discussion among artists in Philadelphia, is to end in a law-suit, which will determine some points of great importance to artists and architects, as well as to those who promote competitions. Our readers will remember that the Temple prize was established for the encouragement of

the highest class of artistic work, and that a premium of three thousand dollars was offered to the author of the picture placed first in the award, with medals of various values for those next in merit. Owing perhaps, partly, to the well-grounded distrust and contempt for American competitions which most respectable artists feel, but still more to the fact that the conditions of the Temple prize, in a characteristically thrifty spirit, required that the successful picture should become the property of the Pennsylvania Academy of Fine Art, so that the utmost gain of the most talented competitor would simply be a forced sale of his picture at a low price, few persons entered the competition, and only four pictures were admitted, in regard to which the committee of award, which contained, we believe, no professional artist, decided that no one was worthy of the first prize, and awarded only the third prize, a silver medal. The winner of this ridiculous recompense for victory in a struggle involving months of hard work laid claim to the reward promised to the author of the best picture presented, namely, the three thousand dollars, and the artists of the city, in an enthusiastic meeting, condemned the withholding of the first prize as a violation of the agreement made between the authors of the invitation to compete and those who accepted it. These representations had apparently no effect, and Mr. Trego, the so-called "successful" competitor, now proposes to enforce his demand at law.

WE need hardly say what we think about the matter, and will only call attention to the fact that some of the best and most influential newspapers in the country agree heartily with the artists in their opinion that not only was the substitution of the third prize for the first an indefensible violation of the terms of the competition, but that the essence of such contests, if they are to serve for the encouragement of art, is that the reward proposed shall be allotted without reserve to the best work offered, whatever may be its intrinsic merit. Unless this is the condition of a competition, it is useless to invite respectable artists to enter it, and still more useless to expect that anything except cheap trickery will be promoted by it. To quote the words of an excellent editorial in the New York *Evening Post*, "the committee" (in the Temple competition) "was appointed to choose the best, not to decide if the best showed three thousand dollars' worth of merit," or, in other words, "they had a comparative, not an absolute choice to make." This sentence expresses the whole matter in a few words, and all our readers will, we are sure, join with the editor of the *Evening Post* in the sentiment of his closing remarks, in which he says that "Mr. Trego has our hearty good wishes for the legal establishment of his claim to the prize for which he honestly contested, and which he appears to have honestly won, whatever may be the special merit of his picture."

A SINGULAR accident occurred in New York a few days ago, from the carelessness of workmen, who were engaged in fixing a fire-escape on a school-building on East Broadway. The school-building proper is a four-story structure, in the rear of which is a one-story extension, in which is held a kindergarten class for little children. This room is lighted from the ceiling by a large skylight over the portion nearest the rear wall of the main building, to which the fire-escape was secured. The wall was coped with stone in the usual manner, but the wall immediately under it seems to have been in bad condition, and the movement of the workmen over and about it loosened both the coping and the wall, so that a considerable mass fell suddenly over, first reaching the fire-escape which it tore away, and then precipitating itself through the skylight into the kindergarten class-room beneath. Fortunately, none of the children were immediately under the skylight, but several of them with one of their teachers, were nearly buried in rubbish, and severely cut or bruised, while the others were terribly frightened. The class-rooms in the main building were occupied, and the crash nearly caused a panic there; but the teachers, whose conduct seems to have been admirable, succeeded in restraining their pupils, and no more injury was done.

THE *Fireman's Journal* discusses with its usual sense the problem of diminishing fire losses in this country, and reaches the same conclusion which we have so often expressed, that the most effective remedy for the present

deplorable state of affairs lies in the hands of the underwriters. It is too much to expect that property owners will take much trouble, still less pay out much money, to adopt precautions against fire which save them nothing in the cost of insurance; and while underwriters neglect to ascertain the real value of the common safeguards, and to support their judgment by variations in premium rates, they must be prepared to find the proprietors and tenants of buildings at least as indifferent as themselves to improvements. It would be premature to suggest that insurance companies should take upon themselves the duty of inspecting buildings in process of construction, and of extinguishing all fires, but the fact remains that, as the *Fireman's Journal* says, a majority of the fires which occur could have been prevented by the exercise of proper precaution and ordinary intelligence; and the underwriters have certainly a greater interest than any one else in preventing them. Supposing that only half the fire losses of the last year could have been saved by thorough examination of valuable buildings, this half would amount to fifty million dollars, which is certainly enough to pay for a good deal of "ordinary intelligence," and to leave a handsome profit over. If to the "ordinary intelligence" could be added some substantial inducements to the owners of new buildings to construct them in the ways well-known to be, as compared with the old system, almost absolutely secure, a still greater saving might be made, which, it must be remembered, would operate indefinitely for the good of the companies, without further trouble.

AN interesting discovery has been made by Mr. James Stevenson of the United States Geological Survey in Arizona, where explorations have been carried on for some time. It will be remembered that some extensive villages of caves and houses built in the sides of cliffs, were found in the same district a year or two ago, and more recent investigations have shown the existence of several others, differing in certain ways from those first observed. The most curious of the newly discovered towns formed a group of pits, about sixty-five in number, sunk in the volcanic foot-hills of the San Juan mountains. Each dwelling consisted of a central cavity, oval in shape, and about twenty feet in its shortest diameter, with arched roof, and surrounded by three or four smaller apartments, communicating with the central hall by passages, but entirely isolated from the adjoining habitations. Access to each of these groups of rooms was obtained through a square shaft, which had holes cut in its walls to serve as steps, and a groove in one side, which answered for a chimney-flue. The shaft entered at one side of the main hall, and the upper end was surrounded by a fence of loose stones, to guard against the entrance of unwelcome guests. About fifteen miles from this singular town was found another, consisting of a large number of huts, built of stone in a sort of horizontal crevice in the perpendicular wall of a deep cañon. The houses stood in a single row, with the back against the rocky wall, the fronts and sides only being constructed of large stones laid in clay. A narrow path extended along the front of the houses, and the deserted groups formed almost a continuous line of houses for about five miles along the side of the cañon. Many simple utensils of wood and stone were found in the huts, but no inscriptions or other indications of high civilization.

ANOTHER of the interesting letters in *Le Génie Civil* respecting the Panama Canal puts us in possession of some information as to the Pacific terminus of the line. The city of Panama, as every one knows, is the seat of the general administration of the operations on the Canal; and the Company bought some years ago the Grand Hotel there, the largest and finest hotel on the Pacific coast, south of California, paying for it about two hundred thousand dollars, as an office-building for its own use. The hotel was ingeniously remodelled by the Company's architects, who placed the rooms required for the accommodation of the Canal business in the second and third stories, converting the ground floor, which originally contained the dining-room, bar and kitchens of the hotel, into a set of reception and reading rooms for the attachés of the company. The business of the administration was more easily provided for than the still more urgent necessity which devolved upon the Company of furnishing care and shelter to those of its employes who might be attacked by disease; and one of the first undertakings of the officers in charge was the selection of

a site, and the construction of hospital buildings. The place chosen was that called Huerta de Galla, and is situated on the slope of the mountain range under which Panama lies, at a distance of half a mile from the sea, and nearly two hundred feet above it. The arrangement of the hospital group, so far as we can judge from the small block-plan, is excellent. The chapel occupies a central position, and is situated upon a little plateau, which furnishes room also for the operating-house, the pharmacy and a general kitchen. Just below this plateau are three groups of hospital buildings, each consisting of two pavilions with an administration-room between. Each pavilion contains twenty-four beds, and the three buildings of each group are isolated from each other as well as from all neighboring buildings. At the easterly corner of the grounds, nearest the city, is the entrance and the general administration group, and not far off, but on lower ground, the baths, laundry, and disinfecting rooms. At the extreme west, high up on the mountain side, is an isolated group of buildings for contagious diseases, with its own kitchen, pharmacy, nurses' house and mortuary. Half-way between these buildings and the chapel is another small group, devoted to the treatment of foreigners who may come under the care of the Company.

NOTWITHSTANDING the anxiety shown by the Company to provide adequately for the infirmities of its dependants, the ravages of disease among its workmen have been by no means so serious as some accounts have represented. Although most of them have been foreigners, unaccustomed to the climate, and exposed, by the character of their work, to risks which even the natives would avoid, the number of deaths among the laborers on the canal has for some time averaged only about one a day; and as eleven thousand men are employed, the annual mortality would thus amount to a little more than thirty to the thousand, which, although a high rate, is not worse than that of some towns not exposed to tropical heat and miasma. The effect of the climate, although rarely fatal, is, however, felt in the general prevalence of mild forms of malarial affection, intermittent fevers keeping the strength of the working parties always somewhat below the European standard, while the lassitude induced by the heat prevents the energetic effort possible in cooler regions. The climate is not in itself extremely warm, the temperature at Panama rarely rising above ninety-five degrees Fahrenheit, but it seldom falls, even at night, below seventy degrees, and its continued effect operates to produce a depression which exposes the system to easy attack from infection. The best remedy for this depression is found to be there, as elsewhere, the avoidance of fatigue, either physical or mental, gentle exercise and nourishing food, with congenial, but not exhausting occupation, and an avoidance of all stimulating tonics, which predispose the system to the worst forms of malarial disease.

WHE stockholders of the Keely Motor Company seem to need occasional encouragement to keep up their spirits, and with them, we suppose, the flow of contributions necessary to the progress of the operations from which so much is expected. The last of the cheerful announcements which appear from time to time informs the stockholders, through the medium of the president of the company, that "the first of the coming month will find all thoroughly completed, and there will be nothing left but setting up the transitive process, when all labors will terminate, preparative to operating and showing up the specific qualities of the perfect vibratory engine." Just how much time will be necessary for "setting up the transitive process" seems to be doubtful; the great inventor himself puts it at "a few days, and perhaps a few weeks," but it is satisfactory to think that there is even a remote possibility that anything relating to the matter is likely to be "shown up" within a few weeks. Notwithstanding the uncertainty as to when the "line of graduation" will be completed, the stockholders are requested to take measures at once to hire a hall having "accommodation for at least three hundred guests," in order that "the final issue" which is supposed to be "nigh at hand," may be shown "to proper advantage." There ought to be no great difficulty in securing a hall of this modest size at less than "a few weeks'" notice, but if the stockholders should go to the expense of engaging one beforehand, they will at least be the more disposed to see that they get something to exhibit in it.

ANCIENT LEAD-WORK.

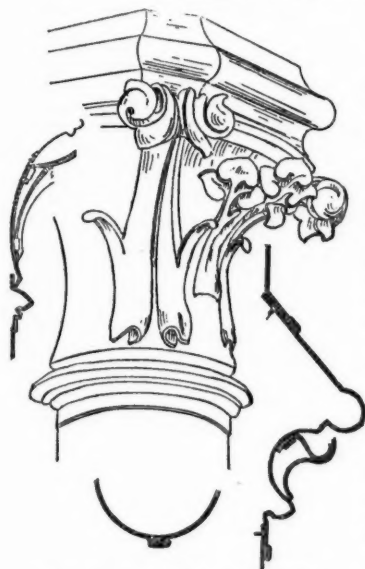


Fig. 1. — Lead Capital of the Middle Ages.

tin and lead from Britain. The Romans, who always took advantage of the natural as well as the artistic resources of the conquered countries, mined lead in France, Spain and Britain. Mines in the former countries were deep, and lead was procured with difficulty, while in Britain it was abundant and near the surface. A number of Roman mining tools and lead pigs were found in Yorkshire, England, in the year 1791, each weighing one hundred and fifty pounds, and having the name of the reigning emperor, Domitian, inscribed upon it. Lead pigs weighing eighty-four and one hundred and twenty-six pounds, with Hadrian's name upon them, were discovered during the latter part of the seventeenth century. A pig was supposed to make a horse-load, varying in weight according to the mountainousness of the country.¹

The elder Pliny, in his elaborate work on Natural History,² which treats of Nature in its widest and broadest sense, gives an extended list of the Greek and Roman authors who mention the use of lead. Pliny divides the subject under the heads of black-lead (*plumbum nigrum*) and white-lead (*plumbum album* or *candidum*), and states that both kinds were in common use among the Romans. Their black-lead was without doubt the same as the lead used at the present day. Although their white-lead is supposed by some authors to have been tin, the weight of opinion seems to be that it was intended for lead with more or less silver combined with it. In order to comprehend this, we must recollect that a large or the larger part of lead ore contains silver. It cannot be considered singular, then, that the ancients used lead of this kind in sufficient quantities to justify Pliny in giving it a division to itself.

People in ancient times paid little attention to silver, as they were accustomed to separate the metals only when there was enough silver to defray expenses. By the imperfect process of smelting, this would not be the case even when a hundred pounds of ore contained one pound of silver. Such ores were used as lead. "Hence," Beckman³ says, "has arisen the common opinion that lead and also copper with which some ancient roofs were covered had in course of time become argentiferous." The ancients obtained large amounts of lead from silver ores; according to Strabo, this was particularly the case in ores taken from Spanish mines.

Although plumbing originally signified the art of working in or with lead, lead has been and is now put to many uses that, according to the present meaning of the word, no one would understand as belonging to the art of plumbing at the present day.

The fishermen of Egypt sunk their nets with lead. A part of an Egyptian net, with a sinker attached, is preserved in the British Museum, according to Ewbank. Lead tablets are mentioned by Job. Statuettes were cast in lead by the Egyptians, Greeks and Romans, although Count Caylus says such statues were rare. Fosbroke mentions one of Mamurcius at Rome.⁴ The use of lead in the form of pipes, as conduits for water, as well as the fixation of iron by molten lead is mentioned by Vitruvius.⁵ Lead coins in large numbers were found in Herculaneum, and lead was used for seals by Edward the Fourth.

The Romans and Saxons used leaden coffins. Treadway Nath, in a paper read before the Society of Antiquaries in England, 1787, describes a curious leaden coffin in which Catherine Parr, the sixth and last wife of Henry VIII, was buried. He says: "The body, I believe, is perfect, as it has never been opened. We thought it

LEAD, being exceedingly plastic, its ores frequently found on or near the surface of the ground, and fusing at a low temperature, was among the first metals worked, and it has been useful to mankind from the earliest times. Lead is frequently mentioned by ancient writers. In the Book of Numbers, Moses names it among other metals as being in use at that date.

Ezekiel, in a graphic account, mentions lead as one of the articles taken from the Midianites by the Israelites, when all articles made from this metal were ordered to be melted up. The prophet, in the same account, while describing the commerce of Tyre, states that the Phenicians exported

indelicate and indecent to uncover it, but observing the left hand to lie at a small distance, we took off the cere-cloth, and found the hands and nails perfect but of a brownish color. The cere-cloth consisted of many folds of coarse linen dipped in wax, tar, and perhaps some gums; over this was wrapped a sheet of lead fitted



Fig. 2. — Lead Coffin of Catherine Parr.

exactly to the body."⁶ Catherine Parr died in 1548, and the coffin described was opened two hundred and thirty-eight years afterward, in 1786. The state in which the corpse was found shows the preservative effect of lead as a final winding-sheet, although the state of preservation in which the body was found may be partially due to cere-cloth. Leaden coffins of the last century differed from the ones used during the Middle Ages, in having their top and bottom in separate pieces and soldered to the sides. The name-plate was held in place on top of the coffin by solder-tacks.

Lead was sometimes used during the Middle Ages for the purpose of making baptismal fonts. According to papers read before the Society of Antiquaries, such fonts were still in existence about a hundred years ago, at Brookland in Kent, Dorchester in Oxfordshire, and at Walsford in Northamptonshire.⁷ To prevent the porous stone absorbing the water, lead was frequently used to line stone fonts before the Reformation. There was an ordinance in force at this time against the use of tin.

Lead, on account of its low melting point (612° Fahrenheit) and ductility or malleability, is one of the easiest of metals either to cast or hammer into any desired shape. The advantages mentioned seem to have been utilized, in making ornaments for various purposes,

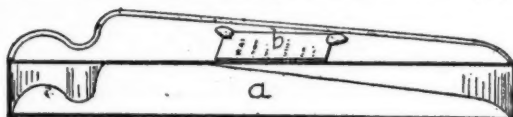


Fig. 3. — French Lead Coffin of the last century.

a, Section of Coffin.

b, Name-plate.

such as the foliage and scroll-work for capitals, finials, crestings, and the ornamental mouldings which were common during the Middle Ages. It seems to have been used very much in the same way that galvanized or zinc-coated iron is used at the present day, although lead is susceptible of much the most artistic treatment of the two.

The plumber of the Middle Ages had as a part of his duty to do *repoussé* lead-work. Lead being easily beaten into or over a mould, it sometimes formed the principal features of the building on which it was used. Viollet-le-Duc writes that it was easy to see by the ornaments themselves that in some cases they were beaten out without moulds or models. To make this work the sheets were thick enough to allow them to be beaten into the desired form of crocket, leaf or flower, by small and differently shaped hammers. These ornaments were usually simple, but they often show the knowledge and taste of an artist in their form and combination. The ornaments were first cut from the sheet in the form of the object to be beaten out. They were soldered or hooked to the bell of the capital, mould or crest for which they were intended, by means of small hooks and staples fixed in the lead for that purpose. The highly ornamental capital shown in the initial cut is taken from Viollet-le-Duc, and was made of lead, from the moulded abacus to the delicate scrolls and leaves on the capital proper. The section of an ornamented moulding on the same cut shows how the joints were lapped,

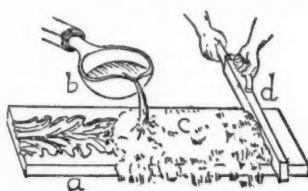


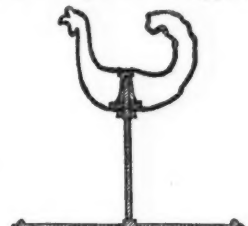
Fig. 4. — Lead Casting.

a, Mould.

b, Ladle.

c, Molten lead.

d, Scraper.

Fig. 5. — Old French Weather-cock.
Hollow lead casting.

and the manner of fastening the sheet-lead to the wood-work and around columns.

Toward the latter part of the fifteenth century, *repoussé* ornaments were replaced by ornaments cast in moulds of stone or plaster. Some of the moulds that were used for making roof-crests still exist. Cast ornaments were on a small scale and far less decorative than the *repoussé* work. Viollet-le-Duc tells us that cast-lead ornaments are still to be seen on the roofs of the cathedrals of Amiens and Rouen, both of which were commenced in the sixteenth century.

¹ Phil. Trans., abridg. ix, 420.² Natural History. Pliny. Eng. Trans. by J. Bostock. Page 215.³ History of Inventions. John Beckman. Johnson's English Trans., 1846.⁴ Encyclopedia of Antiquities. London, 1825: Rev. Dudley Fosbroke.⁵ Vitruvius. Gwilt's Trans. London, 1847.⁶ Archaeologia.⁷ Archaeologia, Vol. x.

The method of casting lead ornaments is clearly shown in the illustration (Fig. 4) taken from an old French work on plumbing, published more than one hundred years ago!¹

The mould was shallow: the molten lead was poured from a ladle into the mould, and the excess was scraped off by a scraper before the lead became hard. In some instances the mould had a core and the object cast was hollow. Figure 5 is a section of a weather-cock made in this manner. That which gives the lead-work of the Middle Ages such a charm is that the means which they employ and the forms which they adopt are in every way appropriate to the material used.

The most important branch of plumbing in ancient times was the laying and jointing lead roofs, with their valleys, hips, gutters, overflow-pipes or spouts, and their down-spouts. Roofing still continues a branch of the trade, second in importance only to the inside plumbing work.

The use of lead for roofing purposes extends back certainly to the time of the Roman Empire. Count Caylus² says that a piece of sheet-lead was found and taken from the inner dome of the Pantheon, half a line (one twenty-fourth of an inch) thick, and five by six inches large. Gregory of Tours (540 A. D.) in describing an old temple of the Gauls, extant during the reign of the Emperor Valerian, mentions the fact of its having a leaden roof.

It is an ancient tradition that no one could excavate in Gallo-Roman ruins without discovering some traces of lead, sometimes on the top of the rubbish. Under the Merovingian kings all church buildings and palaces were covered with lead. The church edifice of Saint Paul des Champs is reported to have been covered with lead by the direction of St. Eloi, the lead-work being artistically done. Aginhard in one of his letters calls himself busy, being engaged in having the roof of the basilica to the martyrs Marcellin and Pierre covered with lead. Frodoard, in his history of the church at Rheims, represented that the Archbishop Heucomar had the Church of Notre Dame covered with lead. Paulinus built a church at Catarack, England, of wood and covered it with a leaden roof. There is no doubt but that all cathedrals, palaces, castles, and other buildings of magnitude were covered with lead during the Middle Ages.

In the reign of Edward the First (1276), a commission was appointed to "examine castles and also other buildings compassed about with ditches, to determine what the walls, building-timbers, stone, lead and other manner of covering were worth."³

The plumbing trade dated from the first centuries of the Christian Era, and continued through the Middle Ages, and the epoch of the Renaissance to the present day. The main effort of the plumber has been to so joint his roofs that they should be water-tight. The lead used in the Middle Ages contained traces of arsenic and silver, probably for the same reason that Roman lead contained silver, because of the imperfect methods of separating the ores. These ingredients may have aided the lead in resisting oxidation or decay. Before the ruins of the cathedral of Chartres were destroyed by fire in 1835, so Viollet-le-Duc⁴ informs us, the lead-work was in a perfect state of preservation. It was cast in sheets about three thirty-seconds of an inch (0.004 m. environ) thick, and covered by the hand of time with a hard, greenish-brown coat, lying slightly wrinkled and brilliant in the sun. The sheets were laid on oak sheathing-strips, and were not more than two feet wide (0.60 m.) by about eight feet long (2.50 m.). The illustration (Fig. 6) graphically explains the method employed in putting on a roof during the Middle Ages.

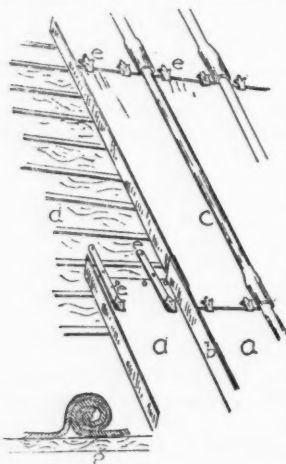


Fig. 6.—Roof of the Cathedral of Chartres.
a, Sheets of lead.
b, Edges turned up before rolling.
c, Joint rolled together. d, Sheathing.
e, Iron hooks. g, Section of joint c.

The lead sheets were first nailed at the top to the oak sheathing-strips. The nails, which were wrought-iron, had large pewter heads. The long edges of sheets were joined together by first turning them up at right angles and rolling the edges over together; in this way small ridges about an inch and a half in diameter (0.04 m.) and less than two feet apart, were formed, running from the ridge of the roof towards the eaves. These ridges or rolls helped to make the lead-work stiff, and also allowed sufficient play for the small amount of expansion and contraction that would take place in lead sheets of this size. The bottom edge of each sheet, where it lapped over the top of the sheet next below it, was held in position by iron hooks. The Church of Notre Dame de Chalons-sur-Marne also has a roof covered in the manner just

described, which is ascribed by ancient writers to the thirteenth century. This church had its leaden roof decorated with black figures, of which there are still some traces. Gilding was used between the lines to heighten the effect. Leaden roofs during the Middle Ages were often covered with paint to heighten their decorative appearance.

Gutters made from lead during this period were good in construction and artistic in design. They were put up without solder, to

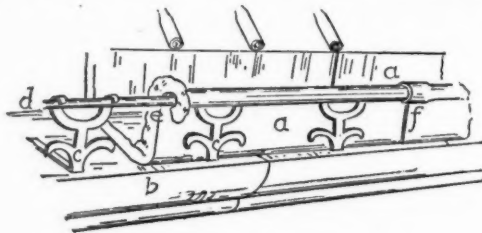


Fig. 7.
a, Gutter. c, Forged angle-irons. b, Cornice. e, Sheet turned up to make joint. f, Finished joint.

allow freedom for expansion and contraction. The gutter was supported on the outside by an iron bar, around which the sheet-lead was rolled. The bar was held in place by forged angle-irons that were let into the stone beneath the gutter. Near the head of the angle-irons were forged branches. The sheet-lead of the gutter being turned up at right angles to the cornice, was wrapped or rolled around the bar in such a manner as to form a background for the ornamental iron forgings. The sheets of lead for gutters were made very thick and about four feet (1.30 m.) long, one sheet lapped over the other so the water would run over the joint, as is shown in the perspective sketch, or the water was carried off through small spouts introduced for the purpose. There are gutters of this kind, so Viollet-le-Duc informs us, still extant in the houses of Rouen, Orleans, and Bourges. When gutters were formed of wood and lined with lead, the wooden fascia was left exposed to view, being often carved and painted.

During the Middle Ages a roof was sometimes covered with small sheets of lead. Instead of running across the roof at right angles, they were placed diagonally, so one set of sheets would be at right angles to or abut against the other. The joints were rolled together in the same manner as the joints described, and the plates were held in position by iron hooks. This arrangement (see Fig. 9), with its rolls, hooks and diagonal sheets, would give the roof a pleasing appearance. Sheet-lead was used as a roofing material at an early date in Eastern countries. Sir Henry Blount, who travelled in Egypt and Turkey in 1634, found the roofs of temples and seraglios covered with this metal. Tavernier, in writing of the mosques in Aleppo, says their domes were covered with lead and so was the roof of the Divan at Constantinople.

What gave a great stimulus to the use of sheet-lead was the invention of a rolling-mill for pressing or rolling the lead out into sheets. This machine was invented by Theo. Hale, an Englishman, in the year 1670,⁵ and about this time the first mill was erected at Deptford. The inventor met with violent opposition from shipwrights and plumbers. The first were opposed to it because of its being used to cover ships' bottoms instead of the old method of leather and wood. Archimedes is said to have covered ships with lead in his time (287 B. C.). The plumbers objected, because, on account of its smoothness, uniform thickness, and low price, it rapidly took the place of sheet-lead made by the plumbers themselves.

The following illustrations I take from the "Art du Plombier," as they explain clearly the methods employed about a hundred years ago, when lead was used as a roofing material. Lead was used in sheets having a lapped or rolled joint, or in the form of tiles. When put on in the latter way they were nailed to sheathing-strips at the top, and so arranged as to cover

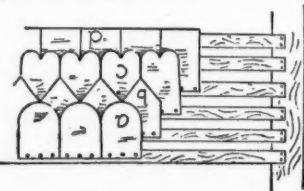


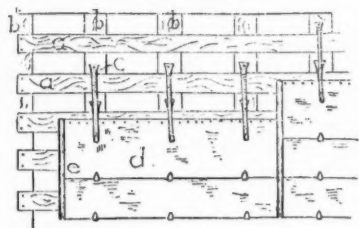
Fig. 10.—Lead Tile.
a, Semicircular ends. b, Diamond-shaped ends. c, Heart-shaped. d, Square.

¹ Art du Plombier: Arts et Metiers. Paris, 1761-1779.
² Recueil des Antiquités Egyptiennes, Etrusques, Grecques, Romaines et Gauloises. Paris, 1782.
³ English Statutes at Large.
⁴ Dictionnaire Raisonné d'Architecture, xii to xiv siècle. Viollet-le-Duc.

⁵ Collins's Dictionary of Art.

the joint between the two beneath it. For the sake of ornament, the lead tiles had their lower end so cut as to leave exposed either square, semicircular, diamond, or heart-shaped ends.

Fig. 11.—Lead roof of a hundred years ago. a, Sheathing. b, Rafter. c, Iron hooks. d, Lead sheets. e, Joints.



The manner of laying lead roofs in sheets was very much like the methods employed during the Middle Ages,

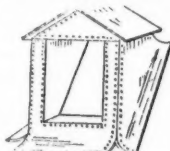


Fig. 12.—Old Lead Dormer.

the principal difference consisted in the length of the sheet being placed at right-angles to the pitch of the roof, instead of running parallel to it. Laid in this

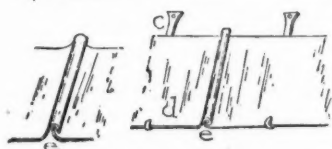


Fig. 13.—Detail of Joint.

manner the roof would not be as stiff, because the raised joints would be placed much further apart. The hooks on which the lower edge of the sheet rested were nailed to the rafters, three to each sheet. The standing groove is formed by simply turning up the edge of one sheet and lapping the other edge over it.

The sides, face and roofs of dormer-windows, turrets, and steeples were covered with sheets of lead nailed directly to the wood-work, the heads of the nails being probably covered by solder. The joints, crests and finials were covered with ornamental lead-work. Gutters as well as roofs, during this period, show a decided deterioration

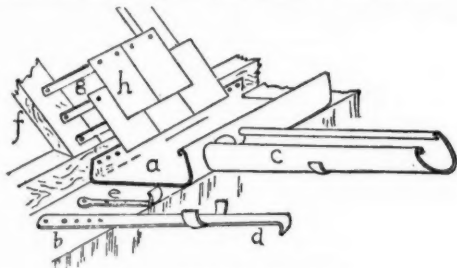


Fig. 14.—Old French gutter of lead.

a, Lead gutter. b, Cornice. c, Spout or shoot. d, Support for spout. e, Angle-iron for gutter. f, Rafter. g, Sheathing.

both in constructive ability and in the artistic capacity of the designer. Instead of the continuous iron rod, with ornamental wrought-iron supports to which the gutter was attached in the Middle

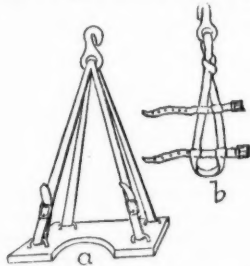


Fig. 15.—Swinging or Hanging Seat. a, Seat. b, Stirrup.

le Ages, at this period the gutter was simply laid on the top of the cornice or wall, and being turned up with the edges rolled over so as to make it stiff, was held in position by short angle-irons bolted or screwed to the stone-work. The back edge of the gutter was carried up against and nailed to the edge of the wall-plate.

Spouts, that would be called gargoyles when ornamented, were placed at right-angles to the gutter and run out far enough to throw the water well away from the building. These spouts or shoots were supported on long iron arms which were attached to and projected from the wall, and so branched as to support and hold the spout in position. Down-spouts and hips for steep roofs were put up by the aid of a swinging seat, on which the

Fig. 16.—Manner of putting up outside lead-work in France a hundred years ago. a, Slop-hopper. c, Knot-roped rope. e, Swinging seat.

workman sat with his feet securely strapped in stirrups. The seat

was swung by leather straps that were connected with a large hook, and was intended to be hooked to a knotted rope at any desired point. The rope was attached by a large hook to a window-sill, or over a ridge. In the illustration (Fig. 16) are shown workmen putting up a down-spout, on which is placed at each story, near the windows, a slop-hopper—a convenient, if not a healthy method of disposing of the waste matter from the house.

Although lead is in every way, except possibly on account of its low fusing point, suitable for a roofing material, there has been to the best of my knowledge very little used in this country. In England, the roof, gutters, valleys, flashing, ridges and all work connected fall into the hands of the plumbers and form what is called the outside work. This branch of the trade equals, if it does not exceed in monetary importance, the inside plumbing work. On account of its durability and easy manipulation it might be advantageous in some cases to use lead as a covering for roofs in this country. The principal objection, and an objection that would be insuperable where the building was in proximity to others, or in any case where there was a probability of its being subjected to fire, is the fact that it melts at a low temperature. It melts so easily that a fire near a roof, either in the building itself or in an adjoining building, would treat the firemen to a shower of molten lead, and leave the wood-work exposed. A lead roof might be dangerous when intended to act as a collector for cisterns which were to contain potable water. Although there is little if any danger in using water from lead pipes, Prof. Wm. Ripley Nichols has shown that lead roofs should never be used as collectors for potable water.

EGYPTIAN ARCHÆOLOGICAL FRAUDS.



THE most extraordinary archæological frauds—always excepting the work of Shapira—which have been perpetrated within very recent years are credited to poor Egyptians or Arabs, without education or art-knowledge. In lieu of these gifts some of the fellahin and Bedouins appear to possess an imitative capacity and patience out-rivaling even the wonderful ability of the Chinese. Some of their devices to make money have but very recently been discovered; and American travellers in Egypt would do well to beware of purchasing antiquities or "finds" of any kind without first seeking counsel of some trustworthy expert, such as the Director of the Museum at Cairo, or one of his assistants.

M. Ludovic Lepic, a painter of no little reputation, has just published a work upon Egyptian travel, in which some of these counterfeit arts are exposed. The book is enriched with excellent engravings, and is all the more valuable because its author is not only a painter, but likewise an Egyptologist of learning. Despite his scientific knowledge, however, he is obliged to confess that he had on more than one occasion been duped by the vendors of antiquities. These men usually sell their wares to American and English voyagers, and haunt all the beaten lines of travel pursued by European pleasure-seekers. So profitable has the business become that in the neighborhood of the Pyramids of Gizeh, of Memphis, of Thebes, and other points along the Nile, whole villages live solely upon the products of the manufacture of counterfeit idols, figurines, jewelry, etc. The imitation of such antiques has actually been brought to a degree of perfection which the most expert craftsmen of London or Paris could not reach.

For some years the Arabs and others have been prohibited by the Government from making further researches for curiosities, whether in the mortuary pits, catacombs, pyramid-chambers, rock-tombs, or elsewhere. No doubt this command has not been strictly obeyed in all instances; but it has been sufficiently well enforced to teach the natives it was cheaper and safer to make imitations of antiquities than to dig for them or dive after them into the bowels of the hypogea. Nevertheless one is naturally led to inquire how the imitators obtain the models for their work. All the secrets of their industry are far from being known; but one discovery made by M. Lepic is well worthy of note.

A certain archæologist living at Siout happened to become very well acquainted with a fellah who had made his dwelling-place in one of those singular Egyptian tombs hollowed out in the side of the mountain. This fellah could work the hardest stone into almost any form with consummate ability, and frequently brought specimens of his handiwork to the archæologist. One day, when the latter was on the point of leaving for Europe, the stone-cutter came to him and asked him to bring back with him a copy of the famous Egyptological work containing engravings of all the cartouches of all the Pharaohs. "Why, the book costs more than a hundred francs," said the European; "you won't be able to pay for it."

"Yes, here's the money in advance," said the stone-cutter—giving it to him. When the archæologist returned from France he gave the man his book. Some months afterward the fellah offered him a scarabæus of hard stone, on which was graven the cartouche of an almost unknown Pharaoh. The article possessed an enormous face-value, and the savant did not hesitate to offer its possessor any price

he desired. "I made it myself," said the native, smiling. "Impossible," cried the other, "where could you get the model for that cartouche?" "In that book you bought me," replied the stone-cutter.

Such proved to be the case; for the fellah presented his friend with several other specimens *made to order*. Meanwhile, however, one of the most learned archaeologists of the day had bought a similar specimen for more than its weight in gold; and was preparing to forward it to the Berlin Museum, when, almost by accident, the gentleman discovered that somebody else had bought a scarabæus precisely like his own. Now, each royal mummy was buried with a different scarabæus on its breast, and only one scarabæus — so that two original stone-beetles, bearing the same cartouche, could not exist. Thus the mystification was discovered; but even then it required an Egyptologist to discover it. — *New Orleans Times-Democrat*.

THE ILLUSTRATIONS.

MANHATTAN STORAGE AND WAREHOUSE BUILDING, NEW YORK, N. Y. MR. JAMES E. WARE, ARCHITECT, NEW YORK, N. Y.

THE whole structure is in fact ten separate buildings, having no communication with each other, in general storage lofts. These lofts are separated from each other by solid brickwork, from 28 inches to 20 inches in thickness, and communicate only with a central court, in which are located all the working apparatus that would in any way tend to cause or extend a fire, such as the elevators, stairs, boiler-flues, and fresh-air duct, steam-pipes, plumbing and gas pipes, electric wires, etc. The elevator engines, fan and engine, electric engine and dynamos are all located in a sub-cellar in this central court, and the boilers are placed in vaults on Lexington Avenue, on line of same court. The electric current for lighting is shut off automatically from each loft when the loft doors are closed, or can be shut off in the court when required. Each loft has one window opening on the street, and one door on the court, thus securing ventilation, and at the same time preventing the supply of such a quantity of air as would be required to sustain an extending fire. Thus the evils of a fire from within or without are reduced to a minimum, consistent with sanitary arrangements. The average size of lofts is 24 feet wide by 83 feet long. The court is 30 feet wide by 125 feet long. 15-inch rolled-iron beams, weighing 150 pounds per yard, have been used, set less than 5 feet from centres. The floor construction is Portland cement and concrete arches, springing from porous terracotta skew-backs, formed so as to entirely envelope the exposed under sides of beams with 2½ inches of material; thus thoroughly protecting the beams from fire. All the floor beams throughout the entire storage space, and in the court, have their bearings on the heavy division walls only. No cast-iron or other columns are used to support the above-mentioned beams. As each loft is bounded by solid masonry, composing the four walls, ceiling and floor (the floor being of same material as arch), it follows that each loft is therefore absolutely fire-proof, and therefore, as constructed, impregnable against fire either from without or within. Heavy double shutters of iron are provided for all outside windows; each outside pair of shutters is provided with a hinged cover and hand-hole, to permit of opening shutters from the outside, according to the letter of the law. In addition to the usual fire-extinguishers, two large iron tanks are provided on line of roof, each holding at least 5,000 gallons, one at each end of the central court, supplied with water by means of a powerful fire-pump, and each floor (in court) is provided with two coils of fire pipe of regulation size, and all arranged to be connected with Fire Department apparatus, if necessary. The roof is constructed of same material as floors, with a layer of Trinidad asphalt, properly embedded beneath cement flooring of roof. Each loft throughout is constructed with slightly inclined floor, so that in case of fire the water would run into the court, which is in turn pitched to six different points, thus conveying water to drains, and preventing unnecessary damage by water. With the exception of administration room furniture, no combustible materials are used in the construction. Wherever the lofts are divided off into small compartments, only brick is used, and the doors are of wrought-iron. To sum up, it has been the design of this building to consider it as a whole—that is, one fire-proof building; then this fire-proof building is subdivided into ten separate and distinct buildings, with no communication with each other in storage lofts, but only from the common court. Each of said buildings is subdivided into eight fire-proof lofts, and each loft subdivided into fire-proof rooms of various sizes, constructed of brick and iron. Thus the risks are each so thoroughly separated from each other by the complex divisions and subdivisions, that each risk is practically individualized throughout. There are no gas-pipes under floors, or steam-pipes in the lofts to add to the risks, therefore only spontaneous combustion in each compartment is to be feared. The exterior is composed of selected Haverstraw hard brick in cement mortar with Philadelphia pressed-brick for arches, bonded joints, moulded courses, cornices, etc. The roofs of the towers and of the central court are covered with heavy terra-cotta semicircular tile all bedded in cement. Loaded vans are drawn on the elevators, each safely sustaining 12,000 lbs., and can be raised to any floor. The purpose of the Company is to store household goods, valuables, carriages, wines, merchandise, etc., of every description. A safe-deposit vault for valuable papers, etc., is also provided.

"SUNSET HALL," HOUSE OF S. P. HINKLEY, LAWRENCE, L. I. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK.

THIS house is just completed, finished in pine throughout. The hall finish is treated with a peacock-blue tint, by means of stain, and finished with a dead gloss. The dining-room is wainscoted eight feet high and painted in Brandon red. A feature of the house are the fireplaces, which are of the old-fashioned build, six feet six inches opening; and throughout the house are low and wide window-seats, with antique arms. The house is heated by steam throughout.

HOUSE FOR GEORGE RETTIG, ESQ., FERTU, IND. MR. EDWIN ANDERSON, ARCHITECT, CINCINNATI, O.

CONCRETE IN FOUNDATIONS.



CONCRETE in foundations is one of those essential items connected with the erection of new buildings that deserves far more general attention than as a rule is accorded it. There have been, and are still, many contributory causes to account for this. To the architect it is oftentimes an uncertain factor in his calculations, for the nature of the component parts of concrete has to be governed in a great measure by the materials most readily procurable within easy distance of the works, and unless the locality is well-known to him this is a matter not at all times easily ascertained. This difficulty, however, obviously does not apply to the metropolis and neighborhoods in proximity to the Thames, for which the unlimited

Thames ballast forms the staple supply; or even to other large towns where there is some recognized source for obtaining clean gravel, quarry chippings, broken stones, slag from iron ore, or similar substances.

The contractor, from his point of view, looks upon concrete in foundations as an obstacle absorbing so much valuable time, which might be more profitably employed in the laying of bricks and the "tumbling in" of carcass timbers. For the clerk of works concrete certainly possesses but few attractive features. The constituents being specified, with their relative proportions, and an intimation that they are to be well mixed and thrown into the trenches from a height of not less than, say, 6 feet, the *modus operandi* affords him but little diversity of occupation; it needs no working-drawings or checking of dimensions, nor does it visibly grow into size or substantiality; it creates no opportunity for artistic treatment or constructive efforts; it leaves no visible evidence of careful forethought or unremitting care, and the clerk of works therefore mentally agrees with the architect, and for once tacitly is of the same opinion as the contractor, that it is a subject for which the usual half-dozen lines in the specification are as much as it deserves, and one and all pronounce it an unmitigated nuisance, to be got rid of as quickly as possible, and in point of fact practically and mentally buried and forgotten, only perhaps to be remembered in after years when sundry cracks and settlements disfigure the building, and somebody suggests that "perhaps the concrete was no account." But within the last few years "concrete in foundations" has certainly received more attention, and although the old free-and-easy formula of "six parts of good clean gravel, and one part of fresh burnt Dorking or Mertsam lime," still holds good in many specifications, it is partially recognized that the back that bears the burden should have its constitution inquired into more fully than has hitherto been the custom, and that the piling and planking always thought necessary when the foundations were at all of a suspicious character, might, in the majority of instances, be dispensed with in favor of concrete. The causes that have led to this result are not difficult to discover. When concrete was used for one purpose only, viz., foundations, no practical means existed for testing whether the materials selected fulfilled the desired object; the concrete was made, the trenches filled in, and the walls commenced thereon, with, in most cases, as little delay as possible, so that three sides of the foundations were encased by the natural ground, and the fourth covered by the footings of the walls, practically hiding all defects and preventing any after inspection as to the quality of the concrete. But concrete having become of late years a material extensively employed in engineering works, such as sea-walls, dock-walls, and harbor works, and also in ordinary buildings for wall construction, has enabled very practical trials and careful observations to be made as to the respective qualities of the various materials employed in its composition, and of different modes of treatment in its adaptation. In dealing with concrete in foundations I do not propose to enter into any disquisition upon the nature of the ground upon which buildings have to be erected, but upon the concrete itself, which has to take the place of the excavated material from trenches, and to carry the superstructure.

The old system of piling and planking was costly, and not always satisfactory, and there are very few instances now — except, of course in swampy ground or on shifting sands — where concrete cannot be more economically and safely employed.

As every one engaged in building knows, the object of concrete is to obtain an artificial foundation with a material that shall bear a large superincumbent weight, which shall be homogeneous in its

character, so that no one part shall be able to sink or move away from the bulk, and of which the constituents to effect this object shall be uniform in character, possessing great cohesive properties, and resistance to crushing force, whilst also unaffected by aqueous surroundings. Unfortunately it is too often considered that the natural soil will keep the foundations in place laterally, and that it is a waste of time and materials to spend much of either on work out of sight. But in point of fact the foundations of any building ought to be of that nature that it would be practicable to remove the whole of the ground on each side to within a few inches of the bottom, without any fear of the concrete bulging, yet how many architects or clerks of works could safely say they would be willing to do this with the buildings they have superintended?

The materials, or the bulk of them, employed in making concrete have, for want of a better term, come to be recognized as the "aggregate," and the cementing medium, for like reasons, the "matrix."

For the aggregate, where a choice exists, it should be a material free from anything of a clayey or dirty nature, and the finer or sandy portions of which are composed of the same materials as the bulk, and it is for this reason that hand-broken materials are unsuitable when compared with those broken by a machine-crusher similar to Blake's. Another reason why machine-crushed materials are superior to hand-broken is, that all sizes are thus obtained, ranging from irregular cubes of three inches square to coarse sand or grit; and this is of great importance, because it enables the interstices between the larger portions to be filled up by those next in size, and these latter interstices in turn by smaller still, till we get to the sandy grains, which unite with the matrix, and make a strong liquid mortar, grouting the whole together, and forming a solid "pudding stone" unobtainable by any other system of manufacture. Now concrete made with an aggregate almost uniform in size must have its interstices filled up only with the mortar grout formed by the matrix and the sandy grains, and therefore creating an irregular texture in the concrete itself, or as is most likely the case, the interstices are too large to be filled up in this way, and the aggregate is simply held together at its prominent angles, and is thus weak and unreliable, admitting water like a sieve, having but a limited power of cohesion, and if broken presenting a honeycombed appearance. It is attempted at times to avoid this condition of things by adding an excess of sand, the result being that the adhesive properties of the matrix are lessened in the same way that weak mortar would be produced.

In some articles that have been written on concrete, we are told that the proper quantity of sand may be found by simply filling a water-tight measure with aggregate, then adding as much water as the measure will contain without running over, and that the amount of water by measure needed for this object will be exactly the correct amount of sand required for as much of the aggregate as the measure contains.

Nothing could be more unsatisfactory in practice than this, especially if it happens that the aggregate is large and uniform in size, similar, for instance, to hand-broken road stone.

With Thames ballast and most other river gravels, and sea-beach, we usually find the distribution of sizes most essential for a good aggregate, but as a rule, too much sand is employed; only enough should be left in the ballast as would ensure making a good mortar with the lime employed as a matrix. Those proportions of the aggregate which are below a certain size—in point of fact, sand—combine with the lime to form the cementing medium which binds together the larger portions of the aggregate. This is a point which should not be lost sight of in concrete-making where lime is the matrix, viz., that without sand it will not make a mortar which will possess strong adhesive properties, and on the other hand, when the aggregate contains more than a fixed proportion of sandy particles its strength is impoverished. This fixed proportion should be about twice the amount of lime intended to be used.

River and sea-beach gravels have two disadvantages, in being generally of a pebbly shape, with their angles worn away by attrition, and also in being non-absorbent.

No better materials for aggregates exist than hard brick-bats and the strongest of natural stones, broken by a Blake's stone-crusher. Scarcely, if any, inferior is slag from iron ore. Those materials which, if of a hard nature, possess the strongest power of adhesion to mortar or cement, make the best aggregates, and Pasley classes this power in the following order, commencing with the strongest: First, bricks; second, Kentish rag-stone; third, Bath stone; fourth, Cornish granite; fifth, Portland stone; sixth, Yorkshire stone; seventh, Craig Leith stone. Reid also found that ten per cent greater force was required to separate cemented granite blocks than Portland stone blocks, and the same difference existed between Staffordshire bricks and ordinary gray stocks, the former being the strongest. These experiments go to prove that the most absorbent materials do not always possess the greatest powers of adhesion, and that granite and rag-stone chippings, when obtainable, are pre-eminently fitted for aggregates.

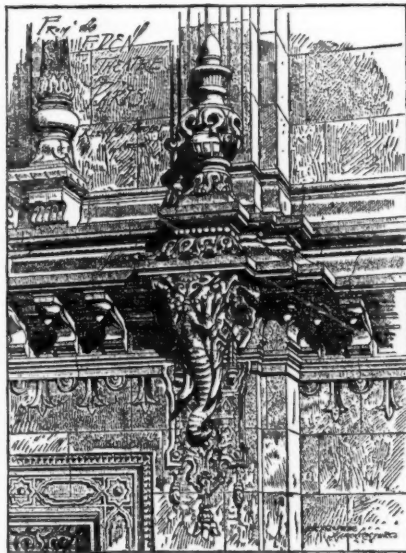
This knowledge has been taken advantage of in the manufacture of concrete street pavings, for which purpose both these aggregates are extensively used.

Coming to the cementing medium, the "matrix" or "matrice," we find that practically there are only two now in use, "lime" and "Portland cement." Roman cement enjoyed some popularity in its day as a matrix for concrete, in common with its other uses as a

mortar for building purposes, and a stucco for the external plastering of walls, but the introduction of "Portland" has driven "Roman" cement out of the market, and it seems probable that the latter will eventually become a curiosity.

The quick-setting properties of Roman cement must have been a great drawback to its use in concrete foundations, although of great service where running water was prevalent, and in tidal work.—*T. P. in the Building World.*

AYUTHIA, SIAM'S ANCIENT CAPITAL.



It is about 130 p. m. when two gray, crumbling pagodas, so buried in creepers and wild grass that only the highest points are visible, warn us that we are nearing what was once the capital of Siam. But we look in vain amid the dark woods and shaggy thickets around us for any definite outline of the great city "whose walls were leagues in circumference," and strong enough to defy for nearly two years all the armies of Burmah. The "golden-footed King" was not one to do his

work by halves. Reversing the vaunt of Attila that "grass never grew again where his foot had trod," Meng-Luang might boast that beneath his footsteps grass sprang up over the ruins of mighty cities. Dimly and doubtfully, amid the gloomy shadows of the forest, we descry broken pillars, and roofs, and crumbling walls, and shapeless masses of brickwork almost hidden by coiling creepers, fattened into rank and foul luxuriance by the spongy rottenness below. Far in the depths of the jungle the Siamese peasant of our time, struggling homeward at nightfall through matted thickets and spiky thorns, sees a mighty face looking down upon him in the ghostly twilight through a mask of clustering leaves, and recognizes the giant image of Buddha, which was lifted to its place in the heart of the capital five centuries ago, amid the rejoicings of 100,000 men. But these are the ghosts of things that were.

"Gaunt ruin and destruction now around their towers have clung, And in their costly palaces the serpent rears her young."

But although the sceptre has passed away from Ayuthia forever, the carcass of the dead lion still shelters a pretty large swarm of working bees. All along either side of the great river stand thicker and thicker, as we advance, native huts planted so closely together, and crowded with so many inmates as amply to bear out the estimate which credits the modern town of Ayuthia with a population of 40,000 or 50,000 souls. Most of the huts are petty shops of the same kind as in Bangkok, the wares being piled up in the veranda, and the room behind serving as a sleeping apartment for the entire family. Built either of bamboo and matting or of rough-hewn planks, they have a tumble-down, shipwrecked look which harmonizes only too well with the gloomy associations of the spot, though seemingly a matter of perfect indifference to the inhabitants themselves. These are principally Chinamen, "John" being quite as prominent a figure in the cities of Siam as he is in Penang, Singapore, Batavia, and every other place where "little piecee dollar can do."

About midway through this amphibious town the river forks suddenly, and striking into the left-hand channel we steam up to the house of the Siamese Governor, a big white building with a broad wooden veranda, not unlike a second-class hotel. Here we halt, and send one of our boatmen up to the local great man with the letter given us by the Prince at Bang-Pa-In. The effect of our arrival strongly reminds me of the description given by one of my Brazilian negroes of his first day in an English country town: "Queer people, Senhor, very queer. Man look, woman look, little child look, very dog look, see black man." The sight of a royal barge, with the White Elephant at her stern, and two white-faced *farangs* (foreigners) inside of her, suffices to bring out every Siamese in the neighborhood. Scarcely has our boat been made fast to the mooring post of the plank jetty when her whole starboard side, from stem to stern, is lined with a double row of brown faces and keen black eyes, staring with all their might at us both, but more especially at the *farang* woman, as they politely term Mrs. Ker.

But just as we are "astonishing the natives" to the full, the gazing crowd is suddenly parted by a dignified Siamese gentleman

in a white coat and crimson shirt, who steps into our bows and squats there, with his bare brown feet tucked neatly under him. This worthy proves to be the Governor's deputy, sent to show us all the sights. He at once takes command of the crew, and under his guidance they run us back to the fork of the river, strike into the other channel, and halt just in front of a huge, crumbling, antique-looking temple, half hidden by spreading banyans, broad-leaved teaks, feathery bamboo clumps, and the pointed leaves of the pepal or Poh tree, revered by the Brahmans as sacred to their gods, and by the Buddhists as the tree under which their great teacher is said to have attained heavenly wisdom after his midnight victory over Marah, the King of Evil.

The open door is sentinelled by two of those misshapen stone monsters, with staring eyes and gaping jaws so common in Eastern Asia, at sight of which a pious old mediaeval missionary expressed the sly hope that "these idolaters kept all their devils outside the church." Through the twilight of the interior a pale golden gleam grows little by little into the semblance of a mighty face, vast, solemn and passionless as that of the Egyptian sphinx. It is a colossal image of Buddha, beside which the gilded effigies of his two chief disciples, twenty feet in height, are dwarfed into absolute nothingness; but these lesser figures seem gigantic in their turn, as we glance around the temple, which is literally crowded with gilt "Buddhas" of every size, and in every attitude, while the very walls themselves are honey-combed with small niches, each occupied by a tiny image no larger than a pocket-knife. Having finished our inspection of this religious toy-shop—which is, after all, not so utterly unlike certain Christian churches which I have seen—we return to the great entrance just in time to see one of our boatmen eagerly swallowing a large draught of very dirty "consecrated water," undoubtedly qualified to send to heaven any man who should take much of it.

A little to one side of the large temple stands a smaller one, into which our guide marches unceremoniously, and, seizing upon a Chinese teapot and two little handleless cups of porcelain, treats us to a light refreshment of lukewarm tea. A shrivelled old Chinese priest, who tumbles out of a kind of curtained "berth" in the wall at our approach, watches the proceedings with a lurking grin, which is intensified when I begin to play with the two kittens that are basking in the afternoon sunshine close to the shrine itself, as composedly as the man who excused himself for remaining unmoved by a touching sermon on the ground that he "didn't belong to that parish." Our next halt is at the old palace of Ayuthia, standing a little back from the river in the midst of a vast open space, over which the small, brown, half-clad townsfolk are swarming like ants. At the first glance the long line of buildings, and the vast white boundary wall encircling them have a very imposing appearance, but the charm vanishes the moment we enter. Weeds are starting through the cracks in the court-yard pavement, and creeping over the steps of the stone pulpit in the corner. The dark, dusty voiceless rooms seem the very embodiment of desolation. The great throne-room itself is only made tenfold more dreary by the ill-judged attempts to smarten it up for one of the King's periodical visits. Two colored prints from the *Illustrated London News* of 1863 deepen the gloom of the mildewed cobwebbed walls upon which they hang. The throne and the pear-shaped white canopy above it look unreal and ghostly amid the sombre shadows that brood over the farther end of the great chamber. Stopped clocks, rolled-up carpets, and mouldy cabinets enhance the universal dreariness, and the whole place looks so weird and forsaken that one would hardly be surprised to behold the blood-marks of Hood's "Haunted House" suddenly appear upon the dust-begrimed floor, or the goblin figure of Dickens's "Miss Havisham" come rustling in her faded bridal finery through the gloomy doorway.

A few miles farther up the stream, amid the wide green meadow lands, between which the rushing river pours itself through a maze of wooded islets, we come to the famous "elephant trap," an enormous stockade of upright logs as thick as the trunk of an ordinary tree, with a single opening, through which the wild elephants are driven. In the centre stands the hut occupied by the watchers, strongly built, and raised many feet above the ground, while at the back, surrounded by a massive wall, are the stables in which such of the captives as may be thought worth keeping are secured; but our examination of this corral of giants is necessarily a very hasty one, for a large part of the surrounding country is already laid under water by the vanguard of the autumn floods, and the towers of two or three distant temples stand up over the drowned land like the spires of some antique town in Holland. We are already preparing to depart, when up comes a boat freighted with eggs and monster prawns as a present to us from the Governor of Ayuthia. These dainties we hand over to our crew, who dispose of them as only Siamese boatmen can. And then our bow is turned southward at last, and we bid adieu to the great city which represented for more than four hundred years the national life of Siam.

The foundation of Ayuthia is, indeed, the first great historical fact which stands out clearly from the twilight of fable that encompasses the early history of Siam in common with that of every other Eastern kingdom. About the middle of the fourteenth century a certain king of Cambodia, Phya Udong by name, found himself, in the eighth year of his reign, in "considerable of a fix." A terrific pestilence was ravaging his dominions, trade of every kind was at a standstill, and things in general were looking (to borrow an Irish phrase) "as bad as they could, and worse too." Just at that auspicious moment there came news of a party of explorers, who, "in journeying toward

the setting sun, had discovered a fruitful country," and more attractive still to such confirmed ichthyophagists as the Cambodians, "a great river abounding in fish." King Phya Udong was a practical man, and although born five centuries before Horace Greeley, he anticipated that eminent politician's advice to "go West." West he went, accordingly, with all his people, till he struck the bank of the Me-Nam, which proved fully equal to the explorer's glowing reports of it. Here, in the spring of 1350—while Edward III and his English were hewing their way into the heart of France, and the "Black Death" was avenging France upon England by a havoc unparalleled in modern times—these wholesale emigrants founded their new capital, to which they gave the modest title of "The great city, impregnable even to angels" (Krung Theph Maha Nakhon Siayuthia, afterward contracted into Ayuthia). But if impregnable to angels, the new town was not so to the warriors of the neighboring realm of Burmah, who, after a hard and doubtful struggle, prolonged with but slight intermission through two centuries, reduced Siam to subjection in 1556, took Ayuthia after a three months' siege, and carried off the king and his family as prisoners.

Under the captive monarch's gallant son, Prince Naret, Siam regained her independence a few years later, but only to be involved in fresh wars with Burmah and even with Cambodia, the ancient home of Ayuthia's "Pilgrim Fathers." As a sample of the humane fashion in which these conflicts were waged, it may suffice to mention that a certain Siamese king, having defeated and captured his royal brother of Cambodia, had the latter beheaded into a large golden vase, and then washed his own feet in the blood of his victim. All these foreign wars were not unfrequently supplemented by internal dissensions, one of which ended in a manner closely akin to the tragic fate of the renowned Kilkenny cats. The reigning king of Siam having died suddenly, his two estimable sons instantly posted off to the capital from their respective provinces, not to pay the last duties to their father's corpse, but to anticipate each other in seizing his crown. Meeting upon a narrow bridge, these exemplary Siamese twins rushed upon one another with such fury that both were hurled into the water and drowned, their elephants tumbled in after them, and the bridge broke down.

Toward the close of the seventeenth century this monotonous bead-roll of bloodshed was relieved by the most striking episode in the whole history of Siam. One day a Siamese noble who had been sent as ambassador to Persia suddenly reappeared at Ayuthia, and presented to the king a Greek named Constantine Phaulkon (the coxswain of a small English vessel), who had befriended him when shipwrecked on the coast of Malabar. With this introduction, aided by the unscrupulous versatility of his race, and by personal abilities which his worst enemies never ventured to deny, the daring adventurer rose rapidly to power. Heaped with native honors and decorations, loaded with wealth, treated by the king himself as a friend and equal, married to a beautiful Japanese girl of high rank, wielding the whole power while warily declining the title of Prime Minister, he might well seem to be the spoiled child of fortune, and it is only fair to admit that while aggrandizing himself he used his utmost efforts to develop the internal resources of his adopted country.

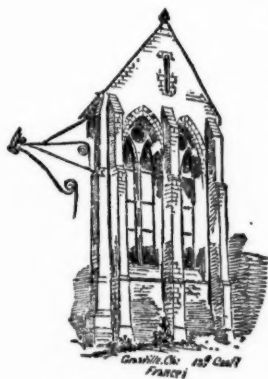
But all this splendor never blinded him for a moment to its hollowness, and he was not long in deciding by what means to consolidate his greatness. The embassy which he persuaded his royal master to send, in 1685, to the court of Louis XIV, at that time in the zenith of his power, at once established friendly relations between the two countries. French envoys, French scientists, even French Jesuits were welcomed at the court of Ayuthia. True, the Siamese monarch resisted all attempts to convert him, remarking, with his wonted dry humor, "that although the great king of the *farangs* (foreigners) was very kind to be so much interested in his soul's welfare, none but God could decide a matter of such importance." But for a time the able and ambitious Greek succeeded in making French influence as paramount at the Siamese court as the arts of M. Dufflex made it two generations later among the Hindu princes of the Carnatic.

With all his shrewdness, however, Phaulkon failed to see that the very means which secured his power on one side were undermining it on the other. That innate jealousy of foreigners which is never dormant in the Eastern Asiatic burst into a blaze at the sight of European missionaries striving to overthrow the national religion, and European soldiers garrisoning the most important national defenses. Phaulkon's own characteristic promptitude, aided by a fortunate accident, defeated one formidable plot against his life; but a second, kindled by his real or alleged design to exalt a creature of his own to the throne of the fast-failing king, proved fatally successful. A skilfully-forged message turned back the French troops that were marching to his support, and the sword of a nameless ruffian cut short a career which might have rivalled that of Clive or Albuquerque. The mighty public works that he had begun—canals, roads, fortresses, conduits, reservoirs—perished with him, and a few antique bricks in the Royal Museum at Bankok are now the sole memorials of the man who all but won a place among the sovereigns of Asia.

The vengeance which Phaulkon's last breath invoked upon his murderers, though long delayed, came at last in full measure. In 1759, just when the Seven Years' War was at its height in Europe, King Meng-Luang and his fierce Burmese spearmen came pouring down the valley of the Me-Nam like the floods of autumn. Disunion and mismanagement paralyzed all resistance. The land of the White

Elephant was once more overrun and conquered. Ayuthia itself fell after a prolonged siege in 1767, and was so utterly destroyed that even the great general and ruler who upheld in that evil hour the failing fortunes of Siam abandoned all thought of restoring it; but even out of this seemingly unmixing evil came a lasting good to the Siamese nation. One of the poor Phaulkon's last achievements had been the erection of a small European fort in a bend on the left bank of the Me-Nam, about seventy miles below Ayuthia. At that time the whole surrounding country was one mass of gardens, whence the tiny creek on which the new fort stood took the name of "Bank-Kok" (stream of wild olives). Here it was that in 1782 the new king Phya Tak—destined to accomplish in the far East a great work of reconstruction like that which Washington was then just commencing in the far West—founded, when the deluge of invasion had subsided, the famous capital which now contains nearly half a million of inhabitants. This transfer of the seat of government to a spot within easy reach of the sea, and in every way more convenient than its remote and at times almost inaccessible rival, was as great a boon to Siam as the creation of St. Petersburg was to Russia. With the founding of Bangkok Siamese nationality entered upon a new existence, more brilliant than all that had preceded it: but the history of that great development, and of the various rulers who presided over it, must be told in another place.—*Correspondence of the New York Times.*

"TRUTH" AND ILLICIT COMMISSIONS.



ON December 15 last, we published certain correspondence between the editor of *Truth* (London) and the Secretaries of the Royal Institute of British Architects. We now print the correspondence which has passed between them since that time, that our record may be complete.

November 20, 1883.

TO THE EDITOR OF TRUTH:—

Sir,—We yesterday submitted your letter of the 12th instant, since published in *Truth*, along with our letter of the 6th instant, to the Council of the Royal Institute of British Architects, and while acknowledging the courteous tone of your remarks, we are directed to invite your attention to the undermentioned points.

In our letter of the 6th instant we gave the most unqualified denial to accusations which you had published, reflecting on the honor and integrity of architects, and we invited you to state the particulars on which the calumny, as far as it regarded members of this Institute, was based. In reply you say—"It must be obvious to you that if the allegations be correct, it is impossible for me to accede to your request, for the tradesmen who give the commissions would not wish in their own interests to have their names made public."

The Council are of opinion (1) that you were not justified in publishing such allegations unless you knew them to be correct; (2) that if they be correct you are bound to substantiate them; and (3) that there is no impossibility or even impropriety in communicating to us, in the interest of the public, the names and addresses of the architects to whom you referred. If, therefore, you decline to respond to their invitation, the Council will deem themselves justified in concluding that you are unable to substantiate the grave accusations you have published. Your letter is mainly devoted to statements relating to what you call the "custom of the trade" in respect to certain articles required in building, and to trade-discounts thereon. It must, however, be obvious to you—to use your own phrase—that whatever foundation you may or may not have for such statements, they have no connection with the charge, which you have brought against architects, of accepting commissions from tradesmen whom they employ, a charge which, as far as it regards members of this Institute, we have repudiated as calumnious and untrue. You deny that the Council of the Royal Institute of British Architects succeed in protecting the public, but you are good enough to acknowledge their desire to do so. Why not assist them?

We are, sir, etc., J. MACVICAR ANDERSON, Hon. Sec.
WILLIAM H. WHITE, Secretary.

The foregoing letter was published in "*Truth*," December 6, 1883, and the comment thereon by the editor of that journal was as follows:—

I observe in the discussion between Mr. Morris and his critics respecting his right as a Socialist to make money out of his wall-papers, that he says it is the habit of the trade to have two prices—or in other words, to give a commission of thirty per cent on quoted price, and that he declines to follow it. As a matter of fact, the commission is often fifty per cent. Now, I do not suppose that these commissions are given to public charities. For whose benefit, therefore, let me ask, is this trade custom? Why is the quoted price one hundred, and the real price fifty? Evidently the purchaser does not receive the commission. Who, then, does? A employs an architect; he pays him a fee to protect him against undue charges, and for his professional skill. A wants wall-papers. He is shown patterns, and the price is stated; the money is paid either through the architect, or on the architect's certificates. Let us assume that the architect gets no commission; in this case, he certifies to what he knows is double the real price. Why should he do so? Is this protecting his client, or favoring the vendor of wall-papers? Why should he favor the latter? These are questions to which replies

are—if Messrs. Anderson and White will allow me to use the word again—obvious. I merely cite wall-papers as an instance, for the same trade custom prevails in almost every other article which goes to the making and furnishing a house. Of course, I do not believe that every architect takes commissions. Even in the Cities of the Plain there was one honest man. What I assert is that many do take commissions, and that if they did not this trade custom would not prevail. Messrs. Anderson and White ask me to give them names. Admitting that the allegation is true, and the trade custom proves it, a tradesman would suffer were he to disclose names. But I will produce a witness; he shall be an architect. On Friday, November 9, Mr. Cole A. Adams, the President of the Architectural Association, delivered an address to the members of the Association. Alluding to an "ugly charge frequently brought against us, of taking commissions from others than clients," he said:—

"That it does exist to some extent, is, I fear, too true. The temptation is a strong one, and so insidious that no great surprise need be felt that some men give way to it, and thereby swell their incomes. We have in our ranks young men in their articles, others acting as assistants, and some who are starting in practice, and I would fain, for their sake, raise a warning voice against this cancer, which, when once it has fastened on the system, grows and sends its poisonous fangs in all directions, until all that is best and noblest in a man's nature gives way to it."

Here, then, is the frankest admission that architects do take commissions, and that the cancer, which has fastened on the system, grows. I do not think architects are worse than other men; but they are not better. Commissions—secret commissions—are the curse of the age. A man who would not rob under other circumstances thinks himself justified in robbing his employer, because it is the custom of his trade. Let architects decline to deal with houses that have two prices, for so long as two prices are the rule, plain common sense tells us that there can only be one cause for them. Evidently they are no benefit to the tradesman. He would prefer to quote his goods at the price which he gets for them rather than at one hundred per cent above that price, which does not go into his pocket, but into that of some one else.

The following letter, also addressed to the editor of *Truth* by Mr. C. Harston, architect, but which did not appear in that journal, was printed in the *Architect* of November 24, 1883:—

Sir,—The Secretaries of the Royal Institute of British Architects might, with propriety, have included in their defence the whole profession, and not only the members of their body.

You ask (1) "Why this extraordinary trade custom prevails?"—the custom in question being that of allowing large discounts on the list-prices of articles used in the building trades—and I will endeavor to give you a satisfactory reply. This custom, then, prevails at wholesale houses in all trades, partly for the purpose of keeping the retail buyers in ignorance of the actual profit of the retailer, and partly for the facilities which it offers for the adjustment of prices. You quote the discounts on certain articles in the building trade, but much higher discounts are customary on other articles. Take, for instance, screws, with a discount of about ninety per cent; wrought-iron pipes, 40 to 70 per cent; and drain-pipes, 20 to 50 per cent. In all these cases the list-price is permanent, and by means of the discount it is made to apply to the various qualities of the same article, and adjusted to the fluctuations of the markets.

You ask (2) "Whether the members of your Institute are in blaspheinous ignorance of it?"—i. e., the discount custom. Manufacturers and builders will, if possible, keep architects in ignorance of these matters, but they succeed only in the case of the very inexperienced men.

(3) "Whether they, or some of them, do not certify to the correctness of a builder's account when it contains items on which these discounts are allowed, without their being deducted?" With the exception of the very "green" ones before mentioned, certainly not.

(4) "Whether architects do not invariably insert the names of houses where these discounts are allowed in their specifications, and insist upon the builders dealing with these houses, and whether in these cases the builder does not receive from such houses a smaller discount?" This is a misleading question, to which it is difficult to give a short and plain answer. Seeing that discounts are customary at all wholesale houses, it resolves itself into this: "Do architects specify certain houses for certain goods?" They do, and further than this, they often include a lump sum on the specification for certain goods, and reserve to themselves the right to select the goods at any warehouse they deem fit. Take the cases of stoves, mantel-pieces, locks, gas-fittings, paper-hangings, etc. If you can show architects how these can be otherwise provided for you will do them a service for which they will thank you.

You ask, "does the builder in these cases receive a smaller discount?" That depends upon the nature of the contract. If it is stipulated that the goods shall be allowed for at the gross prices, then the builder receives the discount, and considers that fact when making his estimate. If the contract states that the builder's profit on provisional sums is to be, say, ten per cent, the item would figure in the account thus:—

Paid for stoves, gross.....	£150 0 0
Deduct 25 per cent discount.....	37 10 0
Net payment.....	112 10 0
Ten per cent profit.....	11 5 0
	123 15 0
Deduct provisional sum.....	120 0 0
	3 15 0

If by special arrangement with the manufacturer a net quotation is given, the builder should receive from the manufacturer no discount, but his profit is then added thus:—

Paid for locks, net.....	£112 10 0
Ten per cent profit.....	11 5 0
	123 15 0
Deduct provisional sum.....	120 0 0
	3 15 0

In these two last instances the builder very properly *does* receive less than the trade discount, and the client gets the benefit of the balance.

I have not read the original article which gave rise to this correspondence, but you appear to have stated that "almost invariably the architect

is paid a second commission by those whom he employs," and "when- ever, an architect particularly recommends mantel-pieces or grates, or any other such articles, which are made by some particular firm, it is about fifty to one in favor of his having a personal reason for the suggestion," and you put the questions which I have replied to in support of these assertions, adding, "so long as the trade custom pre- vails, so long as architects insert in their specifications the names of particular houses, instead of allowing builders to deal in the open mar- ket, I for one shall continue to believe that many architects take more care of themselves and their friends than of their employers."

If this be so, it is clear I shall never be able to inspire you with suffi- cient faith in the profession; but I do not despair. You have a reputa- tion for common sense, and, with the explanations given, you cannot fail to see the want of connection between your facts and inferences. As well say, "so long as newspapers are issued from Fleet Street, I for one shall continue to believe most editors are rogues," or "so long as barristers wear wigs, I for one shall continue to believe most solicitors are in the habit of committing bigamy!"

To say that in a body of men numbering thousands there are none dishonest would be manifestly absurd, whether with reference to ar- chitects, lawyers, editors, clergy, or men of any other calling; but I venture to assert that, considering the temptation to which they are exposed, architects are, as a body, as upright and honorable as the men composing any other profession or trade whatsoever.

Your obedient servant,

C. H.

THE BOSTON PUBLIC LIBRARY COMPETITION.

NEW YORK.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen,—I have been waiting, since the publication of the call to architects, in the Boston papers, to compete for the proposed new Public Library, expecting to see in your valuable paper the expression of opinion of some of the influential architects of Boston on the subject, and having been disappointed so far, I have felt impelled to give expression to my feelings in the following lines.

Taking into consideration the fact that the committee on the proposed Public Library of Boston is a committee of citizens working, or at all events intending to work for the public good, I shall not consider and I do not suppose that the committee will consider, that I am taking any undue liberty in thus calling in question the expediency of the committee's action in issuing an invitation to architects to send in competitive designs, hampered by the conditions imposed by the published "Preliminary Description."

Is it probable, or is it to be expected that the best and most respected architectural talent of the country will respond to this call, in the face of this reservation of the committee that "the premium plans will become the property of the city, with the right to use the whole or any part, or any modification thereof with- out further claim from the successful competitors for compensation or employment?" With this assurance it seems to me the competitor would feel that even in the event of his succeeding in obtaining the highest premium, not only would his design be subject to change and modification at the hands of a committee of laymen, or by other architects, but the work of carrying them into execution and the remuneration therefor might, at the option of the committee, be given to some other architect, possibly better and more favorably known to the committee, or even to some smart, practical and perhaps capable builder, at a "reduced price." He would also feel that the finished building, that would bear his name as far as regarded the principal features of the design, and Mr. Brown's or Mr. Robin- son's as far as regarded certain arrangements of dormer-windows, chimneys and area-steps, would nevertheless have brought into his treasury only \$4,000 instead of \$22,500, or five per cent on the \$450,000 to be expended—the legitimate and usual charge of archi- tects in good standing and Members of the American Institute of Architects.

If the reservations made by the committee only deprived the successful architect of his "filthy lucre" and still left to him the credit and perhaps honor of a design entirely his own, and carried out under his own personal supervision, they would be less open to criticism, but as they stand, with so precarious a chance for glory, the only show of talent that this competition can hope to command, other than will result from efforts of youthful and inexperienced genius (for which, by the way, it must be admitted this sort of com- petition is an excellent stepping-stone), will be from men who have not been sufficiently successful in practice to be able to ignore the \$4,000 bait held out to them, or from those who hope, by perhaps legitimate personal influence, or by forcing an acknowledgment of their ability and fitness to carry out their own design, to capture the committee in case they should be successful in the competition.

Certainly this is not a very dignified position into which to force the architectural talent of the country. Similar restrictions would not be tolerated in any other profession.

But still we are helpless; I cannot assert that even I, after this virtuous tirade, shall decline to ignominiously catch at this possible means of keeping the "pot boiling."

Our only salvation as architects is in closer combination. When the title of F. A. I. A. means something more than a mere mild sugges- tion that we should stand by each other professionally; when it is well defined and distinctly understood that every member of the American Institute of Architects is bound in honor and on pain of expulsion from the Institute to enter no competition except when the full professional control is awarded to the successful competitor together with a fair remuneration for his services, then, and not

until then, will the title mean something substantial; and the advan- tage will be not solely to the profession but also to the community at large, and the cause of art in architecture will gain greatly thereby.

Yours respectfully,

"ESPRIT DE CORPS."

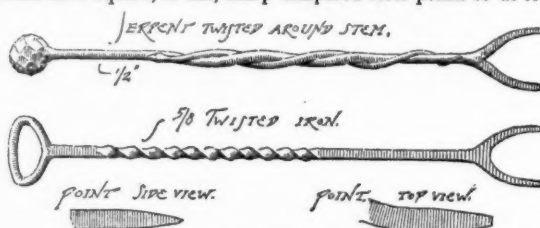
[THE Boston Society of Architects has addressed a letter to the commit- tee having in charge the Public Library competition, requesting further information as to the intention of the committee in regard to employing the author of the design placed first to carry it into execution, and asking also whether professional advice is to be employed in judging the designs. — EDS. AMERICAN ARCHITECT.]

A FIRE-FORK.

WASHINGTON, D. C., January 22, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Every one who burns wood in an open fireplace has learned that the tongs now in the market are too weak to handle a heavy stick, and that no tongs are convenient for this purpose. In a fireplace of the fourteenth century in the old palace of the Bargello at Florence, Italy, among the antique fire-irons is a wood-fork. This has been copied in the West and I have procured one. It is made of half-inch round iron with four-inch tines spreading three inches; a convenient length for the fork is three feet; the tines should have square, or flat, sharp tempered steel points so as to be



struck into a stick of wood, in which if properly formed they will stick fast enough to lift a considerable weight. They are released by a to-and-fro sideways movement.

With this tool it is easy to handle any log or stick ordinarily in a parlor fire. The handle may be of square iron twisted, the top ornamented and weighted with a knob, cross-bar or handle. Weight adds to the effectiveness of the tool. I enclose a sketch.

Probably the earliest representations of this fuel-fork are to be found in the early fresco pictures of Purgatory.

M. C. MEIGS.

DESIGNS OF CITY BUILDINGS.

POUGHKEEPSIE, N. Y., Jan. 21, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—For some years past you have given your readers, in the *American Architect*, a most interesting variety of the elevations and plans of nice dwelling-houses, churches, hotels and cheap houses, but I wish, for one, that you would now return, after a long absence, to the city, and show the advances made in architecture there. The especial progress made in New York in the construction of apart- ment-houses offers a field for illustration. Please give us some of the newer plans and illustrations of apartment-houses or flats, and oblige, Yours truly,

A CONSTANT READER.

[We have much the same feeling about our illustrations as that expressed by "Constant Reader." We have in the few illustrations for the current year thus far published, presented a satisfactory variety of subjects, without drawing on that banal class, country dwelling-houses; and nothing would please us more than to have our contributors help us to keep this class, pre- eminently useful and generally interesting as it is, somewhat in the back- ground for a few months. —EDITORS AMERICAN ARCHITECT.]

DOUBLE WINDOWS.

MORRISTOWN, N. J.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Where can I get any advice as to permanent double window-sash, now used in Boston. Thanks for any information. Mrs. J. C. P.

[Window-frames, for the exposed side of houses, are sometimes made in Boston with boxes, pulleys and weights for two complete sets of sashes. Of course, the frame must be nearly double the usual depth, and needs a brick or stone wall to give room for it. A simpler substitute for this arrangement consists in double-glazing a single sash, the lights of glass being half an inch or so apart. Neither device is so tight against wind as the ordinary outside sash, screwed to the frame. — EDS. AMERICAN ARCHITECT.]

PAPER GAS-PIPES.—Paper gas-pipes are made by passing an endless strip of hemp paper, the width of which equals the length of the tube, through a bath of melted asphalt, and then rolling it tightly and smoothly on a core to give the required diameter. When the number of layers thus rolled is sufficient to afford the desired thickness, the tube is strongly compressed, the outside sprinkled with fine sand and the whole cooled in water. When cold the core is drawn out and the inside served with a water-proofing composition. In addition to being abso- lutely tight and smooth, and much cheaper than iron, these pipes have great strength, for when the sides are scarcely three-fifths of an inch thick they will withstand a pressure of more than fifteen atmospheres. If buried underground they will not be broken by settlement, nor when violently shaken or jarred. The material being a bad conductor of heat the pipes do not readily freeze. — *Rochester Herald*.

SUMMARY OF THE WEEK.

Baltimore.

CHURCH.—W. F. Weber, architect, has prepared drawings for the German Lutheran church to be erected on the cor. of Hanover and Hamburg Sts. It is to be built of brick, with stone and terra-cotta finish, 78' x 90', style, Gothic; seating capacity, nine hundred; cost, \$25,000.

BUILDING PERMITS.—Since our last report fourteen permits have been granted, the more important of which are the following:—

C. H. Blanch, 2 two-sty brick buildings, s w cor. Hudson and Hair Sts.; two-sty brick building, n s Hudson St., w of Potomac St.; and two-sty brick buildings, s s Lancaster St., e of Potomac St.

Chas. Seward, two-sty brick building, s s Monument St., between Bond and Dallas Sts.

Jacob Heinmar, three-sty brick building, w s Broadway, between Bank St. and Eastern Ave.

Richard Caruther, two-sty brick stable, in rear of s s Baltimore St., between Stricker and Calhoun Sts.

Max & Noe, two-sty brick building, s w cor. Monument St. and East Ave.

T. C. Fossett, two-sty brick building, e s Belair Ave., s of Washington St.

J. H. Thiemeyer, three-sty brick building, e s Caroline St., between Thames and Lancaster Sts.

George W. Hopper, s three-sty brick buildings (square), e s Fulton St., commencing s e cor. Saratoga St.

A. Giblein, 4 two-sty brick buildings, w s Patterson Park Ave., between Jefferson & McKelderry Sts. The Labor Report quotations remain unchanged.

Boston.

PUBLIC BUILDINGS.—Appropriations for the following new buildings are already provided for by the City Council:—

Primary school-house, Main St., Charlestown; cost, \$4,000.

Primary school-house, Parker St.; cost, \$30,000.

Primary school-house, Blossom St., land and building; cost, \$100,000.

Repairs and alterations of Engine-House No. 7; cost, \$5,000.

Land has been purchased on Minot St., Dorchester, as a site for a grammar school-house, at a cost of \$5,200.

A site also has been purchased on Savin Hill Ave., for a primary school-house, at a cost of \$6,200.

The estimated valuation of the several county and public buildings and school-houses, including furniture, land, etc., is as follows:—

County buildings; cost.....	\$2,840,500
Public buildings; cost.....	5,701,800
School-houses; cost.....	5,541,000
Total.....	13,983,300

Brooklyn.

BUILDING PERMITS.—Decatur St., s s, 36' w Summer Ave., 2 two-sty brownstone frame dwellings, tin roofs; cost, each, \$7,000; owners, architects and builders, Jas. Ashfield & Son, 1232 Fulton St.

Halsey St., n s, 450' w Reid Ave., two-sty and basement brick dwell., tin roof; cost, \$4,000; owner and builder, Geo. B. Woldean, 1906 Atlantic Ave.; architect, Amzi Hill.

Prospect St., n s, 168' 80" w Albany Ave., 2 two-sty brick dwellings, felt, cement and gravel roofs; cost, each, \$3,000; owner, J. Herod, 139 Atlantic Ave.; architect, A. Hill; builders, Ashfield & Son.

Jefferson St., n e cor. Central Ave., 4 three-sty frame stores and tenements, tin roofs; cost, each, \$4,300; owner, Leonard Eppig, Central Ave.; architect, Frank Holmberg; builder, not selected.

Locust St., n s, 120' e Broadway, three-sty frame double tenement, tin roof; cost, \$4,200; owner, Venetian Durschnidit, Meserole St.; architect, Frank Holmberg.

Manhattan Ave., No. 209, w s, 225' s Meserole Ave., three-sty frame store and tenement, gravel roof; cost, \$4,500; owner, Wm. H. Graham, 211 Manhattan Ave.; architect, Fr. Weber; builders, John Cashman and John Fallon.

Diamond St., w s, 300, s Nassau Ave., 2 three-sty frame tenements, gravel roof; cost, \$5,500 each; owners, J. J. Stanton and Thomas Keppie, 73 Calyer St. and 18 Oakland St.; architect, Thos. Keppie; builders, J. J. Van Tiper and Thos. Keppie.

Lewis Pl., e s, 90' s Herkimer St., 5 two-sty frame dwellings, gravel roofs; cost, \$3,200 each; owner, Karl Peter, 438 East Eighty-first St., New York; architect, John Schillinger; builders, Jos. Peters and Chas. Lorentz.

Twenty-seventh St., n s, 200' w Fourth Ave., three-sty brick tenement, felt and gravel roof; cost, \$3,500; owner, Michael Kenney, 202 Twenty-first St.; builder, Chas. Long.

Quincy St., s s, 125' e Summer Ave., 6 two-sty Philadelphia brick dwellings, tin roofs; cost, about \$5,000 each; owners and carpenters, Duryea & Losie, Fulton St., near Verona Pl.

Bedford Ave., e s, 72' s Fulton St., three-sty Philadelphia brick store and dwell., tin roof; cost, \$5,000; owner, Philip D. Mason, Fort Greene Pl.; architect, Amzi Hill; builders, P. Sullivan and D. H. Fowler.

Chauncey St., s s, 275' e Patchen Ave., three-sty frame tenement, felt and gravel roof; cost, \$4,000; owner and builder, Michael Sullivan, 482 Hancock St.; architect, Amzi Hill.

Stockholm St., n s, 135' e Evergreen Ave., 3 two-sty frame dwellings, tin roofs; cost, each, \$2,000; owner and carpenter, Andrew Schmitt, 238 Lynch St.

ALTERATION.—Fulton St., No. 174, and Henry St., Nos. 53 and 55, repair damage by fire; cost, \$5,000; owner, H. G. Hegeman, Sixth Ave., cor. Thirty-fourth St., New York City; builder, T. A. Remsen.

Chicago.

BUILDING PERMITS.—J. M. Gamble, two additional stories, 99 North Clark St.; cost, \$19,000; architect, Thomas.

Andrew Pearson, 2 cottages, 144 and 146 DeKalb St.; cost, \$4,000.

L. Robinson, two-sty store and dwell., 714 West North Ave.; cost, \$3,000.

R. Lancaster, 3 two-sty dwellings, 3210-3214 Groveland Park Ave.; cost, \$14,000; architect, C. M. Palmer; builder, C. Bussy.

H. D. Smith, 3 two-sty and basement dwellings, 331 to 335 Park Ave.; cost, \$9,000; architect, J. W. Cassel; builder, C. Champion.

C. Spearin, two-sty flats, 587 and 689 Warren Ave.; cost, \$6,000; architect, M. F. Wolf; builder, N. Cameron.

A. Stulmacher, 2 two-sty stores and dwellings, 2957 and 2959 Wallace St.; cost, \$4,300; architect, J. Frank; builder, M. Schmidt.

M. Dierks, two-sty and cellar flats, 235 Augusta St.; cost, \$2,500.

Denver, Col.

BUILDING PERMITS.—The total number of buildings erected during 1883 is 619. Total valuation, \$2,272,868. Of these, 33 buildings aggregated \$783,000 in cost. The permits are classified as follows:—

Brick business blocks, 12; brick stores, 54; brick residences, 301; frame stores, 2; frame residences, 52; brick stables, etc., 176; frame stables, etc., 22.

Grand Rapids, Mich.

BUILDING PERMITS.—Three-sty brick block, for Mrs. M. V. Aldrich; cost, \$15,000.

Grace Church, rectory, cor. Cherry and Lafayette Sts.; cost, \$3,000.

George Seymour, two-sty house, Paris Ave.; cost, \$2,500.

Henry Ward Beecher, two-sty house, Paris Ave.; cost, \$2,500.

John Jewett, two-sty house, Paris Ave.; cost, \$3,000.

A. Doak, house, Union St.; cost, \$3,000.

Henry Bliven, house, South Division St.; cost, \$2,500.

John Stewart, house, Lafayette St.; cost, \$3,200.

Walter Giddings, house, Union St.; cost, \$2,500.

D. S. Hopkins, two-sty house, Paris Ave.; cost, \$3,500.

D. C. Underwood, house, cor. Wealthy and Paris Aves.; cost, \$4,000.

Henry Buckley, house, Union St.; cost, \$2,500.

Andrew Verbarg, house, Jefferson Ave.; cost, \$2,500.

Chas. Sligh, house, Sheldon St.; cost, \$2,500.

D. S. Hopkins, architect for all the above.

New York.

HOUSES.—Mr. A. A. Vantine will build, on the n s of Sixty-ninth St., 150' e of Madison Ave., 2 four-sty brown-stone houses, to cost \$40,000.

Mr. John Livingston proposes to build 9 three-sty and basement brown-stone houses, on the n s of Forty-sixth St., between Eighth and Ninth Aves., to cost about \$75,000; Mr. J. H. Valentine is preparing plans.

FLATS.—Mr. Morris Steinhardt proposes to build eight five-sty brown-stone flats, 27' x 85' each, on the n w cor. of First Ave. and Sixty-fifth St., at a cost of about \$150,000; and on the n s of Fifty-second St., 300' e of Ninth Ave., he will build 6 five-sty tenements (3 on Fifty-second St. and 3 on Fifty-third St.), at an estimated cost of \$100,000.

For Mr. Peter Albert, 2 five-sty double flats, brick and stone, 25' x 80' each, are to be built on the s s of Forty-first St., between Second and Third Aves., from designs of Messrs. Thom & Wilson; cost, about \$40,000.

Mr. P. Donahue will have 5 five-sty brick tenements, 25' x 80' each, built on the n w cor. of Broadway and One Hundred and Fortieth St., from designs of Mr. J. H. Valentine; cost, about \$50,000.

OFFICE-BUILDING.—Plans for the building to be erected for the Standard Oil Company, previously reported to be built at 24 and 26 Broadway, are being drawn by Mr. E. L. Roberts, assisted by Mr. J. M. Farnsworth. It is to be 60' x 200', at least ten stories high, and will probably cost in the neighborhood of \$400,000.

BUILDING PERMITS.—East Forty-seventh St., Nos. 321 and 323, five-sty brick storage-building, gravel roof; cost, \$20,000; owner, Henry Clausen & Son Brewing Company, on premises; architect, Adam Weber.

Courtland Ave., e s, 25' s One Hundred and Fifty-fifth St., three-sty frame dwell. and store, tin roof; cost, \$4,400; owner and architect, G. H. Hermann; builders, John Diehl and Fred Schwab.

First Ave., s e cor. One Hundred and Fifteenth St., five-sty brick tenement and store, tin roof; cost, \$10,000; owner, Jno. O'Brien, 510 East One Hundred and Twenty-first St.; architects, William Fernschild & Son.

First Ave., e s, 20' 100' s One Hundred and Fifteenth St., 5 five-sty brick tenements and stores, tin roofs; cost, each, \$12,000; owner and architects, same as last.

One Hundred and Fifteenth St., s s, 75' e First Ave., four-sty brick tenement, tin roof; cost, \$8,000; owner and architects, same as last.

Forest Ave., e s, and Tinton Ave., w s, 118' s Denman Pl., 12 three-sty frame dwellings, tin roofs; cost, each, \$1,800; owner and builder, John W. Decker, 841 Forest Ave.; architect, W. W. Gardner.

Willis Ave., w s, 50' n One Hundred and Fortieth St., four-sty brick tenement and store, tin roof; cost, \$9,000; owner, Carl Sotschek, 311 Willis Ave.; architect, Carl Pfeiffer; builder, not selected.

McDougal St., No. 52, five-sty brick tenement, tin roof; cost, \$14,000; owner, Ernest Ohl, 56 Second Ave.; architect, G. W. Kient.

One Hundred and Seventy St., n s, 70' w Second Ave., 2 five-sty brick tenements and stores, tin roofs; cost, \$16,000; owner, Wilhelmine Juch, 307 East One Hundred and Sixth St.; architect, C. V. Biela; builders, Ed. Hammer and P. Duden.

ALTERATIONS.—Fifth Ave., No. 148, alterations to front and on basement, first and second stories, for business purposes; cost, \$2,600; lessees, N. E. Mead & Son, 234 Fourth Ave.; architects, Berger & Baylies.

St. Mark's Pl., No. 71, internal alterations for flats; cost, \$3,000; owner, Geo. C. Stiebling, 45 St. Marks Pl.; architect, Julius Kastner.

Third Ave., No. 920, one and basement story brick extension, etc.; cost, \$3,500; owner, Henry N. Markert, 101 Waverly Pl.; architect, Wm. Graul.

Broadway, s e cor. Exchange Pl., repair damage by fire; cost, \$5,000; owner, John J. Astor, 21 West Twenty-sixth St.; builder, John Downey.

Washington St., No. 89, one-sty brick extension; cost, \$3,000; owner, John Woods, 10 Greenwich St.; architect, Chas. Reed; builders, P. Cusack and Joyce & Creigh.

Lawrence St., No. 98, put in new tier of floor-beams and other internal alterations; cost, \$3,000; owner, John Sugebrand, n e cor. Manhattan St. and Tenth Ave.; builder, Chas. A. Cowan.

West One Hundred and Twenty-fifth St., No. 258, three-sty brick extension; cost, \$3,000; owner, Mary E. Ewing, on premises; architect, Geo. Codling.

East Twenty-ninth St., Nos. 302 and 204, raise one sty, etc.; cost, \$10,000; owner, D. M. Koehler, 120 East Twenty-seventh St.; architects, Hugo Kafka & Co.; builder, not selected.

East Broadway, No. 177, three-sty and basement brick extension and internal alterations; lessee, Mina Harris, on premises; architect, John B. Franklin.

Broadway, No. 13, raise roof; also a one and basement sty brick extension on rear, new front and internal alterations; cost, \$12,000; owner, Chas. F. Fay, Weehawken, N. J.; architect, W. W. Gardiner.

Los Angeles, Cal.

BUILDING PERMITS.—The following is a list of some of the buildings for which the plans have been drawn by B. Keeve, architect:—

Four-sty building, Ponet Block, Spring St.; cost, \$12,000.

Four-sty building, Buniller Block, Spring St.; cost, \$22,000.

Four-sty school-building, Spring St., for the Educational Board; cost, \$28,000.

Second Presbyterian church, East Los Angeles; cost, \$7,500.

Two-sty house, Main St., Downey tract, for Pedro Fossas; cost, \$3,200.

Two-sty house, Ninth St., Downey tract, for Pedro Fossas; cost, \$2,800.

Two two-sty houses, Fort St., Downey tract, between Ninth and Tenth Sts., for Pedro Fossas; cost, \$5,800.

Two-sty house on Main St., between Pico and California Sts., for Barclay; cost, \$3,500.

George D. Rowan will shortly put up four houses near the corner of Virgin and New High Sts.

Mr. Ward has started three fine cottages on Wall St., near Fifth St.

Six two-sty houses are to be built on Pico St., w of Pearl St.

Miss Graney is preparing to build on her lots in West Los Angeles.

Mr. Lambdy will shortly build four houses on the Hollenbeck tract.

T. S. Hughes has purchased two lots in the Glassell tract, 50' x 150' each, and will immediately erect a house on each lot.

St. Louis.

BUILDING PERMITS.—Seventy-seven permits have been issued since our last report, twenty-two of which are for unimportant frame houses. Of the rest, those worth \$2,500 and over are as follows:—

Green Tree Brewery Co., two-sty brick wash-house; cost, \$3,000; Jungensfeld, architect.

Ed. Pipe, two-sty brick dwell.; cost, \$3,000; G. W. Pipe, architect; Ed. Pipe, contractor.

T. P. Kiddle, two-sty brick dwell.; cost, \$10,000, C. K. Ramsey, architect; contract sublet.

E. A. Merriweather, three-sty brick dwell.; cost, \$9,000; J. B. Legg, architect; J. Strimlie, contractor.

Phoenix Planing Mill Co., two-sty brick warehouse; cost, \$3,000; Phoenix Planing Mill Co., contractor.

F. H. Goss, 3 separate two-sty brick dwellings; cost, \$4,500 each; J. B. Legg, architect; F. H. Goss, contractor.

J. Allan, two-sty brick dwell.; cost, \$3,000; Kerr & Allan, contractors.

J. S. Thomas, 3 separate two-sty brick dwellings; cost, \$10,000 each; J. S. Thomas, architect and contractor.

St. Louis Mutual House-Building Co. No. 3, two-sty brick dwell.; cost, \$3,000; Mortimer, architect; M. Britt, contractor.

St. Louis Mutual House-Building Co. No. 3, two-sty brick dwell.; cost, \$3,200; Mortimer, architect; M. Britt, contractor.

St. Louis Mutual House-Building Co. No. 3, two-sty brick dwell.; cost, \$3,300; Mortimer, architect; M. Scanlan, contractor.

S. C. Van Houten, 2 separate two-sty brick dwellings; cost, \$5,500 each; J. Stewart, architect and contractor.

Simeon Ray, 3 separate two-sty brick dwellings; cost, \$5,000; J. Stewart, architect; C. H. Burch, contractor.

Camp Spring Milling Co., three-sty brick mill; cost, \$5,000; J. Stewart, architect and contractor.

J. A. McKeighan, three-sty brick dwell.; cost, \$10,000; J. Stewart, architect and contractor.

Dr. J. H. McLean, four-sty brick store and factory; cost, \$50,000; J. Stewart, architect and contractor.

Mullanphy Saving Bank, three-sty brick bank-building; cost, \$13,000; A. Beinke, architect; M. Kerkiseck, contractor.

E. O. Stanard, two-sty brick dwell.; cost, \$7,000; A. Beinke, architect and contractor.

Geo. E. Benz, two-sty brick dwell.; cost, \$3,000; builder, H. Ellermann.

Dr. C. I. Kolling, two-sty brick dwell.; cost, \$4,950; architect, C. F. May; builder, J. P. Riechers, Theodore Rick, two-sty brick dwell.; cost, \$3,500; architect, W. G. Gains; builder, F. W. Ledtgen.

Wm. C. Hank, two-sty brick dwell.; cost, \$3,150; builder, J. E. Truitt.

F. Koch, two-sty brick dwell.; cost, \$4,000; architect, B. J. Goesse; builder, A. Bauer.

Washington, D. C.

BUILDING PERMITS.—The following permits for new buildings worth \$3,000 and over have been issued since last report:—

N St., between Nineteenth and Twentieth Sts., n w, 2 three-st'y brick dwells., for Mrs. L. W. Guild; cost, \$18,000; R. Stead, architect.

Eleventh St., between I and K Sts., n w, 2 three-st'y brick dwells., for C. V. Trott; cost, \$6,000.

Q St., between Sixteenth and Seventeenth Sts., n w, two-st'y brick dwell., for Mrs. A. M. Smith; cost, \$3,000; Henry Lansdale, builder.

Twenty-fifth St., between I and K Sts., n w, two-st'y brick dwell., for Jas. Gowans; cost, \$3,500; Peter McCartney, builder.

Nineteenth St., cor. R St., n w, 5 three-st'y brick dwells. for C. C. Martin; cost, \$40,000; J. Gernuller, architect.

Bids and Contracts.

BUFFALO, N. Y.—The following is a synopsis of bids for cut-stone for the superstructure for the custom-house, etc., extension:—

M. A. McGowan, \$32,100, buff Amherst (accepted).
W. D. Collingwood, \$34,550, Amherst, rubbed.
W. D. Collingwood, \$35,350, Amherst, tooled.

Rheinheimer, Ruehl & Co., \$36,500, Amherst.

P. G. Straub, \$36,900, Amherst.

D. R. & H. Fogelsonger, \$36,900, Amherst.

Jacob Veilmeyer, \$38,650, Amherst.

Belknap & Dumesnil Co., \$43,400, Bowling Green.

Hallowell Granite Co., \$44,943, Bedford.

Albert Neukom, \$48,000, Amherst.

New York, N. Y.—The following is a synopsis of bids for steam freight-elevator for the Public Stores Building:—

George C. Howard, \$1,432 (accepted).

Otis Bros. & Co., \$5,272.

Whittier Machine Co., \$5,760.

Copeland & Bacon, \$6,660.

The following is a synopsis of bids for steam freight-elevator for the Assay Office Building:—

Copeland & Bacon, \$2,486.

George C. Howard, \$2,721 (accepted).

Otis Bros. & Co., \$2,725.

Whittier Machine Co., \$3,525.

BOSTON, MASS.—Bids were opened at the Treasury Department on the 11th inst., for hardware for the extension of the post-office and sub-treasury as follows:—

The Hopkins & Dickinson Manufacturing Company, Newark, N. J., \$3,955.27.

P. & F. Corbin, New Britain, Conn., \$3,616.42.

CINCINNATI, O.—The following is a synopsis of bids for plastering the custom-house, etc., at Cincinnati, Ohio:—

Smith & Crimp, \$31,790 (accepted).

Joseph Eastman, \$35,691.

Lawrence Grace, \$37,158.

James Hughes, \$39,982.

M. P. Scully, \$41,000.

Levi B. Hancock, \$41,600.

Robert Blair, \$46,300.

Marks & Burgess, \$82,785.39.

John L. Phillips, \$99,943.55.

D. W. Lloyd (received and opened at 1:10 P. M., December 14, 1883), \$42,000.

PROPOSALS.

SCHOOL-HOUSE.

[At Fergus Falls, Minn.]

FERGUS FALLS, MINN., January 16, 1884.
Until February 15, 1884, the undersigned will receive sealed bids for the building of a brick school-house in Fergus Falls, Minn.

Right reserved to reject any or all bids.
The plans and specifications can be seen at the office of the clerk, and, upon application to him, full information and conditions will be furnished.

CHAS. L. LEWIS,
Clerk Board of Education.

CONCRETE.

[At Providence, R. I.]

BOARD OF PUBLIC WORKS,
OFFICE, CITY HALL,
PROVIDENCE, R. I., January 24, 1884.

Sealed proposals will be received at this office until 11 o'clock, A. M., Thursday, February 7, 1884, for such concreting as may be required for the season of 1884.

A bond satisfactory to the Board of Public Works in the sum of one hundred dollars as liquidated damages for failure to execute the contract within ten days, if awarded, will be required of each bidder, and a satisfactory bond in the sum of five hundred dollars, conditioned upon the faithful fulfillment of the contract will be required of the successful bidder.

Specifications may be obtained on application at the office of the City Engineer.

The Board reserves the right to reject any or all proposals.

CHARLES ANTHONY, } Board
F. E. ANTHONY, } of
SAMUEL M. GRAY, } Public Works.
City Engineer.

CANAL LOCKS.

[St. Lawrence River, Canada.]

DEPARTMENT OF RAILWAYS AND CANALS,
OTTAWA, CANADA, January 21, 1884.

Sealed tenders, addressed to the undersigned and endorsed "Tender for St. Lawrence Canals," will be received at this office until the arrival of the eastern and western mails on Tuesday, the 12th day of February next, for the construction of a lock and regulating weir and the deepening and enlargement of the upper entrance of the Cornwall Canal.

Also for the construction of a lock, together with the enlargement and deepening of the upper entrance of the Rapide Plat Canal, or middle division of the Williamsburg Canals, and the deepening, etc., of the channel at the upper entrance of the Galops Canal.

PROPOSALS.

A map of the head or upper entrance of the Cornwall Canal, and the upper entrance of the Rapide Plat Canal, together with plans and specifications of the respective works, can be seen at the Resident Engineer's office, Dickenson's Landing; and for the works at the head of the Galops Canal, at the Lock-keeper's house, near the place, and in each case plans, etc., can be seen at this office on and after Tuesday, the 29th day of January, inst., where printed forms of tender can be obtained.

Contractors are hereby informed that trial-pits have been sunk on the Cornwall and Rapide Plat sections of the works, and they are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and be accompanied by a letter stating that the person or persons tendering have carefully examined the locality and the nature of the material found in the trial-pits, etc.

In the case of firms there must be attached the actual signatures, the nature of the occupation and residence of each member of the same; and further, a bank deposit receipt for the sum of four thousand dollars must accompany the tender for the Cornwall Canal Works.

The tender for the Rapide Plat works must be accompanied by a bank deposit receipt for the sum of three thousand dollars.

The tenders for the deepening, etc., at the head of the Galops Canal must be also accompanied by a bank deposit receipt for the sum of three thousand dollars. The respective deposit receipts (checks will not be accepted) must be endorsed over to the Hon. the Minister of Railways and Canals, and will be forfeited if the party tendering declines entering into contract for the works at the rates and on the terms stated in the offer submitted. The deposit receipts thus sent in will be returned to the respective parties whose tenders are not accepted.

This Department does not, however, bind itself to accept the lowest or any tender.

By order,
A. P. BRADLEY, Secretary.

STONE-WORK AND BRICKWORK.

[At Quincy, Ill.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., January 2, 1884.

Sealed proposals will be received at this office until 12 M., on the 5th day of February, 1884, for cutting, delivering and setting the stone-work, also for supplying and laying all the brick required for the court-house, etc., at Quincy, Ill., in accordance with drawings and specifications, which will be ready by January 15, 1884, and may then be obtained upon application at this office or the office of the local superintendent of the building.

M. E. BELL,
Supervising Architect.

IRON RAILROAD BRIDGE.

[At Pittsburgh, Pa.]

CHIEF ENGINEER'S OFFICE,
PITTSBURGH JUNCTION R. R. CO.

On and after January 22, and up to February 1, 1884, bids will be received for four spans of a double-track iron railroad bridge across the main channel of the Allegheny River, at the foot of Thirty-third St., Pittsburgh, Pa.

Plans and specification can be seen at the office of Theodore Cooper, Esq., Consulting Engineer, No. 35 Broadway, New York, and also at the office of the Chief Engineer, P. J. K. R., Allegheny City, Pa.

H. A. SCHWANECKE,
Chief Eng. P. J. R. R. Co.

EARTHWORK.

[Near Marlboro', N. H.]

ENGINEER'S OFFICE, B. & L. R. R.,
BOSTON, January 26, 1884.

Sealed proposals will be received by the undersigned on or before Saturday, February 16, 1884, for filling six trestles on the M. & K. R. R., near Marlboro', N. H.

The total amount of filling is estimated to be 176,000 cubic yards, and proposals will be received for doing the whole or any part of the work.

Profiles and specifications may be obtained at Room 10, Lowell Depot, Boston, Mass.

The Corporation reserves the right to reject any or all bids.

ISAAC M. STOKY,
Engineer B. & L. R. R.

CAST-IRON PIPE.

[At Providence, R. I.]

BOARD OF PUBLIC WORKS,
OFFICE, CITY HALL,
PROVIDENCE, R. I., January 24, 1884.

Sealed proposals will be received at this office until 11 o'clock, A. M., Thursday, February 14, 1884, for furnishing the following sizes of cast-iron water-pipes:—

10 tons of 2240 pounds, 4 inches in diameter.
550 tons of 2240 pounds, 6 inches in diameter.
290 tons of 2240 pounds, 8 inches in diameter.

85 tons of 2240 pounds, 12 inches in diameter.

To be delivered on wharf in this city.

The delivery to commence on or before May 1, 1884, and to be completed on or before August 1, 1884.

A bond satisfactory to the Board, in the sum of five hundred dollars, as liquidated damages, for failure to execute the contract within ten days, if awarded, will be required of each bidder, and a satisfactory bond in the sum of four thousand dollars, conditioned upon the faithful fulfillment of the contract, will be required of the successful bidder.

Specifications and forms of contract and of proposals may be obtained on application at this office.

The Board reserves the right to reject any or all proposals.

CHARLES ANTHONY, } Board
F. G. ANTHONY, } of
SAMUEL M. GRAY, } Public Works.
City Engineer.

PROPOSALS.

GRANITE.

[At Fall River, Mass.]

FALL RIVER, January 17, 1884.
Sealed proposals will be received at Fall River until February 13, 1884, at noon, addressed to the undersigned, for furnishing all the dressed granite for the B. M. C. Durfee High-School Building.

For plans and specifications apply at the office of the architect, 53 Tremont Street, Boston, Room 8.

JOHN S. BRAYTON.

SIDEWALKS.

[At Cincinnati, O.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., January 19, 1884.

Sealed proposals will be received at this office until 12 M., on the 18th day of February, 1884, for furnishing and laying complete, the sidewalks required for the approaches to the custom-house and post-office building at Cincinnati, O., which may be granite, Indiana limestone, or granolithic, in accordance with drawing and specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

M. E. BELL, Supervising Architect.

STONE-WORK AND BRICKWORK.

[At Peoria, Ill.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., January 2, 1884.

Sealed proposals will be received at this office until 12 M., on the 25th day of February, 1884, for cutting, delivering and setting the stone-work; also for supplying and laying all the brick-work required for the court-house, etc., at Peoria, Ill., in accordance with drawings and specifications, which will be ready by February 1, 1884, and may then be obtained upon application at this office or the office of the local superintendent of the building.

M. E. BELL,
Supervising Architect.

STONE AND BRICKWORK; also, IRON FENCES, GATES, RAILINGS, ETC., FOR APPROACHES.

[At Topeka, Kan.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., January 18, 1884.

Sealed proposals will be received at this office until 12 M., on the 6th day of February, 1884, for furnishing and setting in place the stone posts, etc., for fences and gates, street curbing, sidewalks, grading and sodding of lot. Also, for furnishing and fixing in place the iron fences, gates, railings and gratings required for the approaches to the court-house, etc., at Topeka, Kansas, in accordance with drawings and specifications, copies of which (for either class of work) and any additional information may be had on application at this office or the office of the Superintendent.

M. E. BELL,
Supervising Architect.

SCHOOL-HOUSE.

[At Piqua, O.]

PIQUA, O., December 20, 1883.
Bids will be received by the Board of Education of the city of Piqua, Miami County, O., for the erection of a High-School Building, until 12 o'clock, M., Saturday, February 2, 1884.

Plans and specifications for the above can be seen at the office of W. R. Brown, s w cor. Ninth St. and Broadway, Cincinnati, O., till January 1, 1884, after which time they can be seen at the office of the Clerk of Board of Education, in City-Hall Building, Piqua, Ohio.

The Board reserves the right to reject any or all bids.

By order of Board of Education.

F. A. HARDY, Clerk of Board.

BRICKS.

[Florida Coast.]

OFFICE OF THE LIGHT-HOUSE ENGINEER,
FIFTH AND SIXTH DISTRICTS,
BALTIMORE, MD., January 19, 1884.

Sealed proposals will be received at this office until 12 o'clock M., of Saturday, the 16th day of February, 1884, for furnishing 500,000 brick, more or less, for the construction of the Mosquito Inlet Light-House for the coast of Florida.

Forms of proposal and other information may be obtained on application to this office.

The right is reserved to reject any or all bids, and to waive any defects.

O. E. BABCOCK,
Major of Engineers, U. S. A., Light-House Engineer,

Fifth and Sixth Districts.

WORK-HOUSE.

[At St. Paul, Minn.]

Sealed proposals will be received at the office of the St. Paul work house, 56 East Third Street, until 10 A. M., February 15, 1884.

For iron-work at St. Paul work-house.

Separate bids will be received for the iron cells, and iron-work in brick cells in basement complete, and for labor only.

Separate bids will be received for window gratings, and separate bids for all stair and iron doors in walls leading to dining-room and court. The time of the completion of the work must be stated in the bid.

A bond of 20 per cent of the bid must accompany each bid.

The Board of the St. Paul work-house directors reserves the right to reject any and all bids.

Plans and specifications can be seen at the office of E. P. Bastard, architect, Gilliland Block.

Bids should be addressed:

GEORGE W. LAMSON,
President Board of St. Paul Work-House Directors,

424 56 East Third Street, St. Paul, Minn.

THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 20.

SATURDAY, FEBRUARY 2, 1884.

VOLUME XV.
No. 42.

FIRE-PROOF BUILDING MATERIALS.

THE use of Hollow Burnt Clay Bricks and Porous Terra-Cotta Bricks and Blocks for the fire-proofing of buildings, has so much increased during the past six years, that their excellence as fire-proof materials is now fully established.

The most important buildings in the country have had the Hollow Burnt Clay Flat Arch Brick laid in their floors, and the Hollow Burnt Clay and Porous Terra-Cotta Brick in their partitions and roofs, all of which have given entire satisfaction.

HOLLOW BRICK FOR FLAT ARCHES.

Among the many qualities possessed by the Hollow Fire-Clay Bricks in their application to fire-proof floors, between iron beams, the most salient are these:—

They are absolutely fire-proof, having been submitted during their course of manufacture to a white heat.

They are superior to any concrete material used for the same purpose, owing to their being free from shrinkage, thereby avoiding the unsightly cracks often seen in ceilings laid with many of the concrete blocks which have from time to time appeared on the market.

Their bottom line descends three-quarters of an inch below the iron beams that support them, so that the bottom flanges of the beams, after the plastering has been applied, are pro-

record and are therefore almost out of the market.

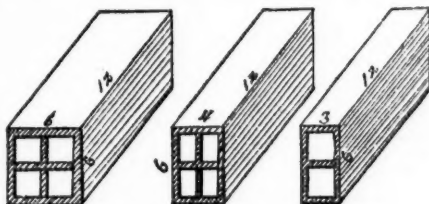
Hollow-bricks for floor purposes are usually made from four inches to twelve inches in depth.

HOLLOW BRICK FOR PARTITIONS.

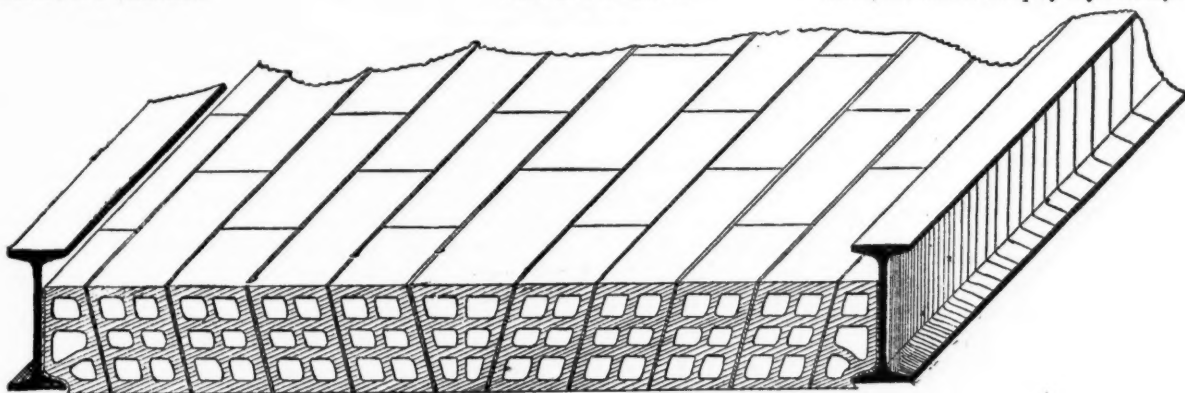
It is as important that any story of a fire-proof building should be divided into a number of fire-proof compartments as it is to have fire-proof floors.

A fire originating in any compartment cannot spread, and time and opportunity are therefore given to stop it before it has gained any headway.

For the purpose of fire-proof partitions, hollow burnt clay bricks of various dimensions and thicknesses, are made to answer the different requirements. They are light, vermin-proof, do not transmit cold, heat or sound, and can be set up by any bricklayer.



Hollow Brick for Partitions.



Hollow Brick for Flat Arches.

They are water-proof and can be erected as fast as the walls will admit of the beams being laid. In case of an incipient fire, water poured on the floors can have no bad effect as to their solidity.

They offer a flat surface on the bottom and top after being laid, thereby giving a flat ceiling ready for plastering, and a flat foundation for the floor-joists.

They are sound-proof, from the fact of their being hollow.

Floors made of them are forty per cent lighter than by the old system of segmental solid brick arches leveled with concrete.

They are protected by at least an inch of non-conducting material.

The successful adoption of hollow-brick flat arches in the floors of the many buildings where they are now in use, shows conclusively that their strength is more than fully equal to the demands. Heavy safes weighing from two to five tons are almost daily moved and placed on these floors, and the test of practical use they have been subjected to is far more conclusive than any partial tests made in a small way, under the best conditions possible. The lime-and-plaster concrete blocks cannot show such a

They possess the same qualities as those mentioned in regard to the flat-arch bricks.

These bricks are thoroughly weather-proof, and when exposed to outside elements will withstand dampness, frost, etc., as well as the best common red brick.

For lining elevator-shafts they are invaluable, as their crushing strength allows of their being carried up to any practical height.

HOLLOW BRICKS—HAVERSTRAW SIZE.

These bricks are made of the same dimensions as the so-called "Haverstraw" or ordinary building brick, and are intended to form the inside face of the walls exposed to the

weather, thereby taking the place of furring either of fire-proof blocks or wooden strips, without increasing the thickness of the wall itself.

The plaster can be directly applied to them and the hollow spaces will prevent the moisture from striking through.

By using these bricks for this purpose the actual cost of the brick walls is only increased by the difference in price between common red brick and hollow brick, which is very slight.

All cost of wall furring of any kind is done away with, thereby saving time, expense and space.

No vermin can possibly harbor in a building where they are used, there being no channels through which mice or rats can find their way.

Another and a very important advantage which these bricks have over the ordinary mode of furring, is that they will effectually prevent the spread of fire from one story to another, for it is well known that furring made of wooden strips and lath forms combustible flues which carry the flames from basement to roof. These flues being done away with, the fire can more easily be confined to the story in which it originated.

In view of so many advantages, the adoption of these bricks for furring purposes recommends itself even in the cheaper class of houses.

POROUS TERRA-COTTA AND ITS APPLICATION.

The material known as Porous Terra-Cotta is a mixture of clay and any combustible material, such as sawdust, charcoal, cut-straw, tan-bark, etc. When put in the kiln and baked, the combustible material is consumed and leaves the brick full of voids, thereby producing a fire-proof material of little weight, great tenacity, strong, and yet capable of being cut with edge tools, and of receiving and holding nails as well as wood, when proper judgment and treatment have been used in its manufacture. It also receives and holds the plastering admirably.

The importance of these different qualities can readily be appreciated. Its property of holding nails renders its use applicable not only for partitions and furring, but also for roof lining, either flat or pitched, the protection of wooden beams, posts, girders, columns, etc., and very many other uses.

POROUS TERRA-COTTA PARTITIONS.

Hollow or Solid Partition Bricks are manufactured of this material, corresponding in size to those mentioned regarding the hollow burnt clay bricks, unless otherwise ordered. The thickness of the outside shell is greater than that of the hollow brick partitions, in order to receive and hold nails. They are erected in the same manner, except that no wooden strips are necessary, as a nail can be applied anywhere.

Moreover the possibility of cutting the material with edge tools affords the opportunity to cut at any time in these partitions any chases that may be needed for the conveyance of either gas, water or waste pipes, electric wires, etc.

OTHER USES OF POROUS TERRA-COTTA.

This material can be made into blocks or

slabs of various sizes and shapes for wall furring, roof lining, suspended ceilings, protection of wooden and iron beams, columns and girders; the application of these materials being so numerous that it is impossible to mention all its different uses, but estimates on especial shapes or sizes are made to order.

The Raritan Hollow and Porous Brick Company, of 115 Broadway, New York, is in a position to execute with promptness any contracts they may be called upon to perform for any of the above mentioned materials, and their facilities for securing proper raw material, for manufacturing and shipping are the best possible. The clay used in the manufacture of their materials is mined by themselves from a practically inexhaustible supply, thereby enabling them to secure a uniformity of good products at a much reduced cost. The factory, which is situated within two hundred feet of the clay banks, and is directly at the point of shipment on the Raritan River, two miles above Perth Amboy, has recently been enlarged, and is equipped with the most improved steam machinery, and has adequate drying and kiln capacity. During the past year they have manufactured and shipped over 1,000,000 square feet of material.

Among the buildings which they have supplied, are the following: "Dakota" apartment-house, Central Park, West; "Madrid," "Grenada," "Saragosa," "Tolosa" and "Valencia" apartment-houses, Fifty-eighth and Fifty-ninth Streets and Seventh Avenue; Lincoln National Bank and Safe Deposit Co., Forty-second Street; Pottier and Styms Building, Fifth Avenue; Mt. Morris Bank, One Hundred and Twenty-fifth Street and Fourth Avenue; Chelsea apartment house, Twenty-third Street; "Field Building," Broadway and Bowling Green; Williamsburg City Fire Insurance Co.'s building, Broadway and Liberty Street; "Mann Block," Utica, N. Y.; U. S. Powder Depot, Dover, N. J.; Physical and Chemical Laboratory, Cornell University, Ithaca, N. Y., and many others.

Send for illustrated catalogue further describing these materials, with directions for setting them, table of weights, etc., to the RARITAN HOLLOW AND POROUS BRICK CO., 115 BROADWAY, NEW YORK.

Edward Keasbey, President.

James C. Rossi, Superintendent.

Henry M. Keasbey, Sec. and Treas.

THE NOVELTY HOT-AIR FURNACE.

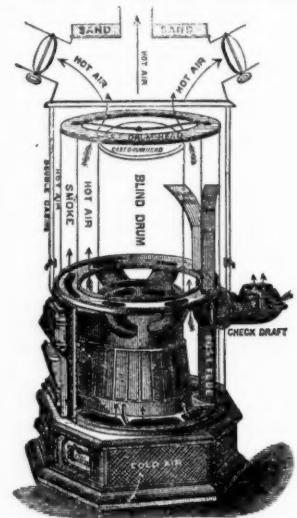
THERE appears in this issue the advertisement of an article, whose merit is at once appreciated on examination and is worthy the special notice we give here. The "Novelty Hot-Air Furnace" has been in use upwards of ten years, during which it has elicited much favorable comment by giving entire satisfaction under severe tests to numerous citizens of the United States from Maine to Omaha, being particularly appreciated in Minnesota and the North-West, one dealer in St. Paul setting about fifty this year, previous to December 15th; a continuous increase in his trade entirely due to their durability and great power.

When complete not differing in appearance from the multitude of so-called portable furnaces, an internal investigation opens up a marvel of power condensed with a view to durability, economy and convenience.

In construction it consists of a neat strong base containing an ash-pit of sufficient depth to insure a free circulation of air under the

grate, promoting its durability and affording a constant supply to the fire. Connecting with the back of ash-pit and the smoke-outlet, is a dust-flue perfect in its effect, controlled by a damper which is a very appreciable feature, cleanliness being next to godliness. In the top of the base is suspended an anti-clinker grate which is of less diameter than the bottom of the cylinder, allowing air to pass into the fire on its outer surface, promoting combustion at a point where its effect is greatest. On the top of the base surrounding the grate, and slightly above it to assist the anti-clinker feature, is a groove in which sets a cylinder of a shape conducive to the discharge of fine ashes instead of allowing their collection against its inner surface, so deadening the effect of the fire.

The groove, greater in diameter than the cylinder, allows it to freely expand and contract independently in any direction or shape, and being filled in with sand is gas-tight and dust-proof. On the top of the cylinder in a similar groove sits the crab, which is of peculiar construction, and the means of throw-



Furnace showing Interior Arrangements.

ing the heat toward the outer surfaces, which, being circular, are at all points equally distant from the fire, insuring an even heat.

The crab is a cylinder with a coal-shute in front, and hollow arms running from its sides at intervals upwards. On the upper edge of this cylinder fits a heavy wrought-iron drum, with a solid dome-shaped head, making a hollow receptacle; surrounding this central drum, sitting on the top of the arms, with openings into which they fit, is a cast drum-head with the smoke-outlet in the rear, and having upright flanges on its inner and outer edges to receive two outer wrought-iron drums, which are finished with a similar solid head at the top; between these two outer drums, fastening at each side of the smoke-outlet, inverted toward the front, and reaching nearly to the top, is a flue strip or partition, making an indirect passage for the products of combustion as they come into this drum through the hollow arms, securing their full effect. The wrought-iron portions being at the top of the crab continuing the feeder it is impossible to pile the fuel against them, and burn them full of holes. Shields of heavy wrought-iron surround both the cylinder and drums with

space on both sides for a circulation of air, protecting the galvanized casing from their intense heat, and keeping it cool.

This manner of arranging the drums is a feature that will favorably sustain the most severe tests and investigations, having attained continuously with ordinary usage at a register twelve feet from a No. 36, a temperature of 392°, and a velocity of 600 feet per minute, the air on entering the furnace being at 10°. With the aid of the cuts and this brief description but a meagre idea can be gained, so we solicit correspondence from the readers and subscribers of this journal, feeling that it cannot prove other than mutually beneficial. Full information and description furnished on application to the manufacturers.

Sold in all the principal cities.

ABRAM COX STOVE COMPANY,
PHILADELPHIA, PA.

CORNICE-MACHINE.

January 1, 1884.

We are now preparing matter and cuts for our new catalogue and price-list, which is well advanced, and which will be when finished the most complete of this class of machinery. It will contain among other things:

1. A partial list of our customers and patrons.

2. Carefully considered articles and certificates on the durability and longevity of galvanized-iron, showing when, where and how long it has been tested and used in gutters and for architectural purposes, in one case nearly half a century; by which its immense value and long life are proved. This will be exceedingly interesting information to all who may be engaged in this rapidly growing enterprise.

3. Extracts from the *Metal Worker*, *Iron Age*, *Iron-monger*, of London, and papers of that class, showing the part our machinery has taken in the development of this profitable and growing industry, which, agreeing with that good authority, *The Metal Worker*, we consider is now in its infancy only.

It will also contain extracts from the testimony in the great Hays vs. Fisher Patent Cornice Machine suits, showing by expert testimony the immense value of our machines. These suits have been in the United States Court for over ten years, and they have involved large sums of money for testimony of experts taken all over the country, for depositions, models, drawings, lawyers' fees, etc., etc.; and no small item are lawyers' fees in such contests, "when the geese are fat." We

prove by this testimony the great value of our machines, and how they influenced the decisions of the court, so far as they have been given. This expert testimony shows that our automatic machines will do three times the work, other things being equal, of the machinery directly involved in the suits, at one-half the first cost.

Our patents are first or ground patents, and we hope to be able soon to look after our rights under them; and, that the parties who are now infringing will join us in an amicable and just settlement. An illustrated sheet, with cuts, and full and careful description of our Automatic and Hand-Forming Brakes and other machines, furnished upon application, together with prices.

THE CALVIN CARR CORNICE MACHINE CO,
NEWARK, N. J.

SINCE publishing M. Léon Malo's last paper on Asphalt, in which he mentions its use in the Tower of Babel as showing its antiquity, The New York Mastic Works has found that it was used before the Deluge; for they read in the account of the building of the Ark, Genesis vi; 14, "Et bitumine linies intrinsecus et extrinsecus."

NOW READY.

HINTS ON THE

Drainage and Sewerage of Dwellings

By WM. PAUL GERHARD, Civil Engineer.

One 12mo volume. Cloth. - - - - - Price, \$2.50

This book has grown out of a series of articles contributed to "Building," by Mr. Gerhard, under the pseudonym "Hippocrates," who is well-known to civil engineers, architects and sanitarians, through his many writings on sanitation, especially as regards the Hygiene of Dwellings. A large number of illustrations will be given in this book, which, for lack of space, could not be published in "Building," and several of the chapters have been largely increased. This book will contain about 300 pages, and 282 illustrations.

CONTENTS.

- CHAP. I.—Fresh Air versus Sewer Gas.
 " II.—Necessity of Ventilation in Rooms, containing Modern Conveniences, and Defective Arrangements of Plumbing Fixtures. Figs. 1 to 18.
 " III.—Soil and Waste Pipe System as usually found in Dwellings. Figs. 19 to 31.
 " IV.—Traps and Systems of Trapping. Figs. 32 to 38.
 " V.—Details of Traps. Figs. 39 to 159.
 " VI.—Insecurity of Common Water-Seal Traps. Figs. 160 to 164.
 " VII.—Defects in the Plumbing Work of Dwellings.
 " VIII.—Cellar Drains, and Drainage of Cellars. Figs. 165 to 169.
 " IX.—Usual Defects of House Drains, Sewer Connections, Privies, Vaults, and Cesspools. Figs. 170 to 181.
 " X.—System of Plumbing as it should be inside a Dwelling. Figs. 182 to 206.
 " XI.—Plumbing Fixtures. Figs. 207 to 262.
 " XII.—Removal and Disposal of Household Waters. Figs. 263 to 282.

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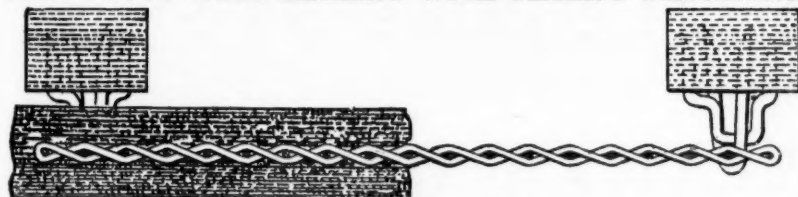
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Water-Tight Wood Floors.

Architects and Builders will find in Dolbeare's Water-Tight Wood Floors an improvement long sought for, combining lightness, durability, and absolute water-tight qualities. For horse-car, livery, and private stables, it is rapidly taking the place of caulking or concreting. For slaughter-houses, currier's shops, factory floors, bridges, etc., it is highly recommended. In first-class stores, hotels, and public buildings, by the use of this floor it is absolutely impossible for goods or ceilings to be damaged by water leaking through the floor in case of fire, bursting of water-pipes, etc.



Patented June, 1882.

In the above cut an end or sectional view is shown B representing a 7-8 matched boarding on Floor Timber, A, C showing a 3-inch planking with 3-8 Rabbeting or Grooving (this can be laid in thickness from 1 inch, upwards), and D showing the Filling in the seams, applied hot, which, when set, is thoroughly adhesive to the wood and sufficiently elastic to allow for any ordinary shrinking, swelling or settling.

Orders respectfully solicited, and personally attended to, by addressing

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Atlantic Avenue, Fort Hill Wharf, Boston.
MIDDLESEX HORSE RAILROAD COMPANY.

Boston, June 14, 1882.

W. L. DOLBEARE, Esq.

Dear Sir:—It affords us pleasure to recommend your process for "Making Floors Absolutely Water-Tight." In our new Bunker-Hill Stable, where we have stalls on three floors (one directly over the other), it has given the most perfect satisfaction, and makes no extra strain upon the walls of the building, as would be the case if the old method of "Caulking" was resorted to. In very many respects I regard your floor as very much superior to any caulked floor.

Very truly, **CHARLES E. POWERS, Pres**
SAMUEL D. KELLEY, ARCHITECT.

Boston, June 21, 1882.

W. L. DOLBEARE, Esq.

Dear Sir:—I have used Dolbeare's Improved Water-Tight Wood Floors for stable purposes to the extent of about fourteen thousand (14,000) square feet, and they have given complete satisfaction. I consider it superior to caulking or other Improved Water-Tight Floors.

Yours, &c.,

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Something New for the Stable.
Read's Patent Harness Bracket.



An Article long wanted but never before made. Holds the whole harness, takes no more room than the ordinary hook or peg, can be used for both single and double harness. Gives the harness-case a neat appearance, as it carries the harness up uniformly in width with the saddle, beside keeping the bridle and breastplate in their proper shape. They are neatly japanned, with gilt facings. Price \$18 per dozen. Are now in use in over 100 first-class private stables in and about Boston.

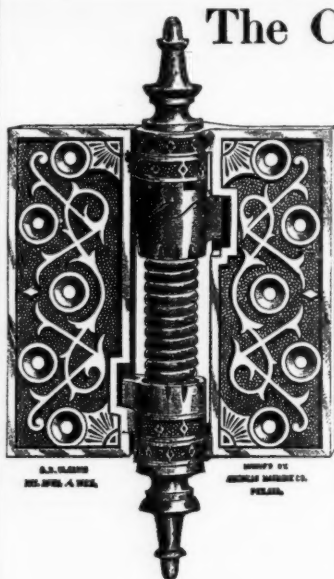
Each bracket lettered "J. J. Read, Boston, Mass." For sale by dealers everywhere. Indorsed and approved by the following named gentlemen, all of whom have them in use:

Boston: R. H. White, J. M. Sears, J. T. Morse, Jr., Thos. Motley. Cambridge: F. A. Kennedy. Portsmouth, N. H.: Hon. Frank Jones. Milton: H. P. Kidder, Col. H. S. Russell, J. M. Forbes. Dedham: A. W. Nickerson. Newton: J. C. Potter. Salem: Dr. W. Saunders. Waltham: J. H. Ellison. Readville: C. G. White. Beverly: Dr. Chas. Haddock. Swampscott: C. P. Curtis.

The public are cautioned against all similar brackets, not marked with my stamp, as such brackets are infringements of patents held by me.

Also cedar-top riding-saddle bracket. Price \$3.50 each. An whip-rack for English coach and straight whip combined. Price 50 cents each.

JAMES J. READ, 13 Tremont Row, Room 16.



The Crown Spring Hinges,
FOR SOLID DOORS.

C. B. Clark's Latest Improvements, Patented April 4, 1882.

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These Hinges have loose pins, are simpler in construction, less liable to get out of order, and the tension of Spring is more easily put on or released than in any other Spring Hinges in the market and without the use of any special tools. There are no loose pieces to the Hinge to be lost or mislaid. All joints are milled, the pins turned and pin holes drilled.

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5x5 " 1 1/2-1 3/4 " "	2.00	2.75	4.00		
6x6 " 1 3/4-2 " "	2.50	3.50	5.00		
DOUBLE ACTION.					
4 in. for doors 1-1 1/2 in. thick, per pair,	3.00	4.50	6.00		
5 " " 1 1/2-1 3/4 " "	4.00	5.50	8.00		
6 " " 1 3/4-2 " "	5.00	7.00	10.00		

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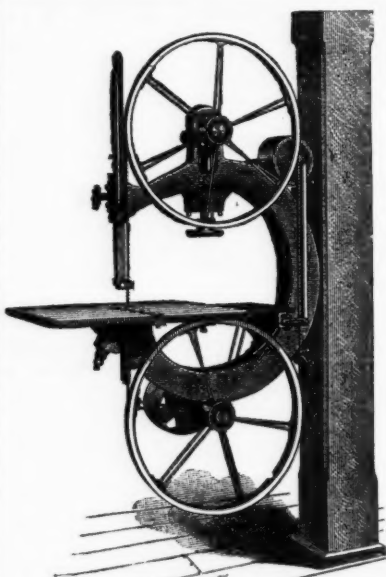
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