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THE most noteworthy death of the past fortnight is that of Sir William Siemens, who suffered a rupture of the heart from a fall in the street near his house in London, and survived the injury only a few days. The deceased, it need hardly be said, was one of the best known and most distinguished scientific men of the day, sharing his reputation also with his three brothers, and sharing in theirs in return. Of the three members of the great firm of Siemens Brothers, all of whom were born in Hanover, Sir William was known as the "London Siemens," Werner, an inventor of equal rank, living at Berlin, and Carl, the youngest of the family, representing it at Saint Petersburg. The establishment of the London house followed the visit of William to England for the purpose of patenting and introducing a process for electro-plating, discovered by himself and his brother Werner, and a differential steam-engine governor, also perfected by their united efforts. Soon after the naturalization of the younger as a British subject, the brothers published their invention of the so-called "anastatic printing," a sort of lithographic process in which plates of zinc were employed instead of stone. This process, although interesting, never came into extensive use, but a few years afterwards Sir William introduced the device invented by himself and his brother Frederick, which, under the name of the Siemens regenerative furnace, produced a change in the art of steel manufacture second in importance only to that which followed the invention of the Bessemer converter. The Siemens process with its modifications brought wealth and fame to its inventors, who, like true men of science, employed their increased resources in further efforts for the improvement of metallurgical and engineering practice. Within the last twenty years, the attention of the firm has been more particularly directed toward electrical science, and the members have pursued unremittingly those private investigations which have at once placed them among the foremost of electricians, and have enabled them to undertake the manufacture of electrical apparatus and machinery on a great scale. Most, if not all the telegraph cables now in successful operation under the Atlantic, besides many in other places, were manufactured by the Siemens Brothers, who built for themselves the celebrated steamer Faraday, expressly for use in laying submarine cables. More recently, the firm has interested itself in electric lighting, and the transmission of electric force to moving locomotives, the electric railway exhibited at Berlin, Paris and London having been of its manufacture. It is hardly necessary to say that many special honors followed so brilliant a career, Sir William Siemens, besides the dignity of knighthood, having received many medals and decorations from public and private authority, and holding at different times the presidency of the British Association for the Advancement of Science, and the Society of Telegraph Engineers.

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THE coroner's inquest in the case of the catastrophe at Madison, Wisconsin, has arrived at a conclusion different from that of the official commissioners. An architect who took the trouble to come from Minnesota to examine the scene of the calamity testified before the jury that in his opinion the fall of the structure was due to the failure of the brick piers upon which the columns rested which supported the floors and roof of the ruined building. The earlier descriptions of the occurrence stated that one of these piers had cracked badly a day or two before the fall, and that the column above it was shored up, and the defective brickwork removed and replaced with new work, and the jack-screws immediately lowered, so as to bring the weight upon the freshly-built pier, but later accounts seemed to indicate that the iron columns alone were defective. The witnesses before the jury, however, agreed, in regard to the latter, that while the quality was poor, they were strong enough for their work; and that the examination of the ruins showed the fractures in them to have occurred at the time of their fall, and to have been caused in all cases by striking against some hard object, and not, so far as could be seen, in any instance by crushing. Between these conflicting opinions we can do nothing but reserve our judgment. In the absence of any evidence whatever, we should be more disposed to attribute such a failure to the weakness of a pier than to that of a column, for the reason that a much smaller factor of safety is generally used in calculating the strength of brickwork than that of cast-iron; or even, we fear we must say, because some sort of calculation is almost always gone through in proportioning iron beams and columns to their work, while brick piers are often planned and built without any attention to the strains which they will be called upon to resist. If a more serious inquiry should follow the inquest, as may happen if damages are demanded by the representatives of the injured men, there will be an opportunity for determining this point with certainty. Fortunately, the resistance of brickwork of any given kind is easily determined, and a few moments of calculation would show whether the piers were designed of sufficient size to carry safely the proposed load upon them.

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A PANIC seems to have fallen upon the unfortunate committee charged with the duty of raising money to build the pedestal for the great statue of Liberty, at the news that the statue is completed, and will in about two months be safely packed and on its way to this country in the ship provided by the French Government for its transportation. Up to the present time, out of the two hundred and fifty thousand dollars which the pedestal will cost, only ninety-four thousand have been subscribed, and all of this that is available will be exhausted in paying for the concrete footings which have been put in place for the pedestal to rest upon. No contracts have been made for the stone-work of the pedestal itself, for the reason that no funds were in hand, or in prospect, for paying the cost, and as the stone must be quarried and cut, even after contracts are made, the great statue, after its arrival, must be ignominiously packed away to await the opening of those founts of generosity which the New Yorkers seem so surprised to find closed in other people. The latest proposition for raising money is rather characteristic of all the proceedings thus far. Some one having suggested that the inhabitants of the high land along the Brooklyn shore of New York harbor will be able to see the statue from their windows, an appeal is to be made to them to contribute liberally in recognition of this privilege. As the number of dwellings on Brooklyn Heights, from the windows of which the statue will be visible must be considerably under three hundred, the cost to each householder of his view of it would be, on this theory, at least five hundred dollars, and it may be doubted whether the committee will not find that the Brooklyn people would prefer a good statue of their own, at the same price. The plain truth appears to be that the pedestal, if it is ever to be built, must be paid for by those for whom the statue was made, the citizens of New York. The process of collecting a quarter of a million dollars by hanging contribution boxes on the bridges to receive the half-dimes of the multitude is a slow one, whatever advantages it may have in other respects; but slow as it is, it seems likely to prove more rapid than that which seeks to gain its object by persuading the people of Chicago and Connecticut that they ought to pay the expense which those of New York would like to avoid.

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FIRE broke out in a hotel in Elizabethtown, Kentucky, a few days ago, at about three o'clock in the morning, followed by the somewhat unceremonious leave-taking on the part of the guests which is usual and necessary in American

hotels under such circumstances. The more deliberate persons stayed long enough to twist their bed-clothes into ropes and lower themselves into the street, while others simply jumped out of the windows, breaking their limbs in so doing. No attempt was made by any of the occupants of the building to save their clothes or valuables, and in fact, without that, their utmost agility proved insufficient to enable all of them to escape, a falling wall having buried two. The loss on the building and contents is estimated at sixty thousand dollars, so that the cost of this deadly trap must have been quite sufficient for the construction of a strong and incombustible structure, in which generations of guests might find comfort and safety. That the hotel was of the former sort, instead of the latter, is due, as every architect knows, to the effect of insurance, or, we might almost say, to the influence of insurance companies. If there were no such thing as insurance against fire, it need hardly be said that the owner would have built his house so as to insure itself, by making the walls solid with masonry, and substituting thick timbers for unsubstantial boards; but no sooner is this risk assumed for him than he turns his ingenuity to the discovery of means for lightening and cheapening the building, to save money for gilt wall-papers and tawdry carpets for the interior. In the end, the community, and particularly the careful persons in it, who pay an exorbitant price for their own insurance and a large portion of that of their reckless brethren in addition, suffer by this artificially cultivated carelessness, but no one seems yet to have thought of invoking the aid of the public authority in defence of better methods of building against the systematic policy of underwriters. Whether it will ever become necessary to do so, and if so, how to accomplish the end, are questions which will become important before many years.

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WE are very glad to get some further information in regard to the Pullman sewage-farm from the *Sanitary News*, of Chicago, which makes a positive statement, on the authority of the superintendent of the farm, to the effect that the return from the produce this year will, when all is sold, amount to about twelve thousand five hundred dollars; and that the cost of carrying on the farm for the year has been eight thousand dollars, leaving a net profit of forty-five hundred dollars as interest on an investment of eighty thousand dollars, which, as we infer from another article in the same journal, includes the cost of the land for the farm, sewers, pumping works and distributing pipes. This certainly seems a most encouraging exhibit; and if we were quite sure that the cost of pumping the sewage was included in the estimate of operating expenses, and that the outlay of eighty thousand dollars covered, if not the whole of the fifteen hundred acres which were, we believe, secured for farming purposes, at least enough for permanent utilization of the sewage of a town of the present population, we should say unhesitatingly, as we suggested before, that the account of the Pullman sewage-farm is one of the most important documents ever presented to the world. The *Sanitary News* goes on to say, that in the superintendent's opinion the cost of carrying on the farm was greater this year, and the profits less, than might reasonably be expected for the future; and judging from the results of the present season, the net profit next year will be eight or ten, instead of five and one-half per cent on the investment.

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SOME singular stories are told of the construction of the new Palace of Justice, at Brussels, which is now approaching completion. The design of the building was the cherished ideal of the celebrated architect Poelaert, who died three years ago, leaving, however, well studied drawings for nearly every detail of the vast edifice. So long and earnestly had he thought over the problem that he is said to have fixed upon the general design, and even to have worked it out in plan and elevation, long before the question of building such a structure had even been discussed, and when the time came, his scheme was all ready for putting into execution. As carried out, his plan is a very magnificent one, the situation, on the top of the highest elevation in the city, helping to make the building one of the most imposing in Europe. Considering that the original estimate of cost was less than two million dollars, and that nine millions have already been expended upon it, with the prospect that another million will be necessary to complete it, one may be excused for doubting whether the structure may not be a little too imposing for its purpose, and the Belgian attorney-general, who replied to the congratulations of the King upon the completion of so magnificent a temple to Justice, by asking whether it might not rather be called a temple erected to Architecture, probably expressed the feeling of a good many of the tax-payers.

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AN election was recently held at Paris, by the Academy of Fine Arts, to choose a new foreign member for that branch of the Institute of France, in place of the late Baron Ferstel, of Vienna. Several names were presented, the first among them being that of the Chevalier da Silva, architect to the King of Portugal, and President of the Portuguese Society of Architects and Antiquaries. The other candidates were M. Mercuri, an engraver, of Rome; M. Monteverde, a sculptor, also of Rome; M. Hansen, architect, of Holland; and M. Joseph Geefs, sculptor, of Antwerp. To us the selection of names seems rather a singular one, but it is impossible, at this distance, to judge of all the circumstances. The result of the balloting was the election of M. Mercuri, by twenty-seven votes out of thirty cast.

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*LA SEMAINE DES CONSTRUCTEURS* publishes a sketch of the street front, unfortunately without the plan, of some pretty little "hotels," — a "hotel," in Paris, meaning a private house of a certain distinction, although its dimensions may be very modest. In the present case two of the houses, out of a group of five, would be considered small even by Philadelphians, whose love of home is strong enough to attach itself to a very snug domicile; but the skilful planning of the French architects seems to have made the most out of the space in the way of convenience, while their trained taste has succeeded in imparting to the façades a picturesque interest which few houses in any of our cities can claim. Each of the two smaller buildings is two stories high, with a mansard roof above, and measures twenty-seven feet in front by thirty in depth, with an extension in the rear fourteen and a half by eighteen feet. In this space are contained a kitchen, with the usual storerooms and cellars, a dining-room and parlor, with the hall, a billiard-room, bath-room and eight bedrooms. The rear rooms, like those of all the best French houses, look out on a little garden, which is furnished with a piazza opening from the dining-room. It is hardly necessary to point out that the plan of dividing the rooms between the main body of the house and an extension, which is very common in the large New York mansions, and also, in a modified way, in Philadelphia, is particularly useful for smaller dwellings. In such houses as this, only thirty feet from front to rear, the air can draw through at all times, and the close and dark interior rooms of our sixty-foot city houses are replaced by wholesome and well ventilated space.

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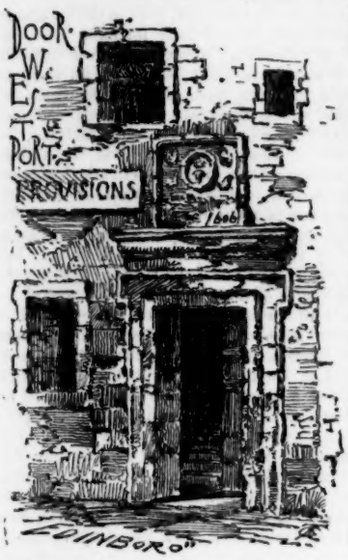
IT may interest some persons to know that the market value of mountains seems to be declining; at least, the most famous and beautiful mountains in the world, including the land about them, can now be bought for much less than they would have cost thirty years ago. This curious fact is attested by statistics gathered under the direction of the French Government in regard to the present value and productiveness of rural land in all the departments of the country, together with the fluctuations in value, as shown by actual sales, of all property not built upon, within the past thirty years. The total value of the agricultural land in France, at the present estimates, is found to be about twenty thousand millions of dollars, the average value per acre being about one hundred and fifty dollars, but varying from three thousand dollars in the Department of the Seine, where the ground is very closely cultivated, to thirty in Corsica. In all the fertile districts the price of arable land has risen more or less in thirty years, the average value of that in the Department of the Seine, exclusive of Paris, being more than ten times as great as it was in 1853. The land rated next in value to that of the Department of the Seine is contained in the districts along the Mediterranean coast, showing that scientific cultivation and a favorable climate have made the olive orchards and flower fields of that region nearly as profitable as the market gardens of the suburbs of Paris. The only exceptions to the general advance are found in the Departments of Haute-Marne, Ardèche, and Drôme, of which the two latter lie in the rugged region about the lower Rhone, while the former comprises the hilly country of upper Champagne; and in the mountainous Departments of Gard and Hautes-Alpes.

## A DERRICK ACCIDENT AND ITS CAUSES.[1]




IN the *Architect* (London) of March 17, 1883, an *accident* at Reading to a derrick-crane is reported; the report of the evidence tended to show that no allowance had been made for the extra strains produced on the structure by violent gusts of wind, and that there was not sufficient provision made in the design of the Gabbert to counteract the lateral thrust of the loaded jib, and the accidental and unavoidable oscillations produced by the sudden arrest of the momentum of a swinging load, and that the stages which were of the ordinary type should have been braced in not less than three directions by diagonal ties. The platform was sixty-three feet above ground. The jib was sixty feet long, and had an inclination of 65° at time of accident. It must be borne in mind that all this staging, derrick, engine, etc., are erected complete in advance of the commencement of the building, indeed, before the foundations are begun; that the wind exerts on it an enormous leverage before the walls are high enough to lessen the exposure. It was stated that the load (35 cwt.) at time of accident was suspended at forty feet horizontally from the pivot, and that in this position the crane was calculated to safely sustain and swing a load of three tons (60 cwt.); that it had lifted and set in position fifteen similar columns the previous day, and had the sixteenth column suspended and at rest the next morning when a severe gust of wind struck it, giving a "rick" to one of the side stages which, causing part of the crane to get out of plumb, the iron foot-pivot of the upright was thereby snapped, and the whole erection collapsed. It was also stated that the sixteenth column required the jib to be in a different position from those required by the previous fifteen columns, and that the sixteenth position was its weakest. The maker estimated that the 35 cwt. load in this position of jib produced a cross-strain of nearly three tons on the upright pivot. There is evident disparity in these elements of the problem, as they do not furnish the precise data for the results stated; thus, the 65° inclination from vertical of the sixty-foot jib would give a horizontal projection from upright pivot of fifty-four feet, but if forty feet projection be taken as ruling element it would give an inclination of 42°. Then, again, 35 cwt. vertical load, in order to produce a horizontal component or thrust against the swinging pivot of the upright of three tons (60 cwt.), would require an angular inclination of jib of 60° from vertical. The vertical height of jib-head would thus be thirty feet above the stage platform; the horizontal projection of jib would be fifty-two feet (the weight of derrick, hoisting-tackle, etc., not considered).[2]

Again, briefly consider the elements of stability of an independent braced-pier standard, six feet square and sixty-three feet high, weighted down by a load piled on a frame on the ground level, and attached to cross-beams on top by means of an iron rod or chain acting axially on the structure. It is evident that the stability, roughly considered, is the ratio between the horizontal and vertical leverages. Thus, as the weighted anchor-chain acts from the central axis towards the sides of the standard, only the radius or half side of square, three feet, opposes the vertical height or leverage of sixty-three feet, considering the force of horizontal thrust to act at height of stage platform; therefore $\frac{63}{3} = 21$; *i. e.*, a horizontal force of one ton acting at sixty-three feet high will require a weight of twenty-one tons acting centrally on left square pier to merely *balance* it (without any marginal allowance for *assumed* safety). Again, if we assume that the weighting material to be brick-bats, as used in this case, weighing in round numbers, one hundred pounds per cubic foot of piling space, and as they are usually piled up within the cage, say six feet square, it would require a pile twelve feet high to barely counterbalance one ton *thrust* at sixty-three feet above ground. Again, if we consider the sufficiency of the anchor rods, — the usual *safe* tensile strain allowed in England on common iron is five tons per square inch of section, or about one-fourth of breaking strength. Iron will stretch on an average about one ten-thousandth part of its length for each ton of tensile strain per square inch of section up to its elastic limit, which is nearly half of its ultimate strength, *i. e.*, about one-twelfth of an inch for each ton of strain, which for twenty-one tons would be one and three-fourths inches. So much extension of the anchor-rod produced by one ton horizontal thrust per square inch of section, would be liable to cause displacement of lines of normal stability, and cause an initial yielding movement which would enormously increase the resulting strains, and thereby cripple its rigidity. If a chain did the anchoring the elongation would be still greater. The ultimate strength of common chains is only about fourteen tons per square inch of section of both parts of link up to one inch diameter in the single part (average new iron, and one continuous rod are here considered), without any joint-eyes, hidden flaws, and with sound forgings; but practically, with ordinary samples of commercial iron rod or chain from retail stores, which have seen, too, several years' service on previous jobs, exposed to corroding and crystallizing influences, and bearing in mind that jobbing forge-work, etc., is not faultless, the above estimates would require to be modified according to the *real, not nominal* conditions of the materials employed in any particular case considered. We may also note in passing the independent stability of the central stage; it was twelve feet square and sixty-three feet high, hence $\frac{63}{6} = 10\frac{1}{2}$ ratio, therefore, one ton horizontal thrust at the level of the platform would require an *axial* load of $10\frac{1}{2}$ tons on the stage to merely counterbalance it; but the weight of the engine and derrick was nine tons, and, therefore, the central standard had not sufficient independent stability to withstand in its weakest direction one ton of horizontal thrust applied at the level of the platform (the engine was not bolted to platform), without reinforcement from back-stay standards, or shore braces spreading beyond the base of the standard.

Then again, as to what additional thrust the load swinging from the jib-head would have in producing horizontal movement: the dynamic element is involved, *i. e.*, rate of motion x weight of load, and called momentum, or what some would understand by impetus. Suppose in round numbers that the force with which the 35 cwt. load would swing, if the jib were suddenly stopped, would project it, say, 30° beyond a plumb line from jib-head; this would produce a horizontal component of 20 cwt. (= 1 ton), and if this occurred while the jib projected 40 feet in the direction of 130° on Figure 3, it is evident

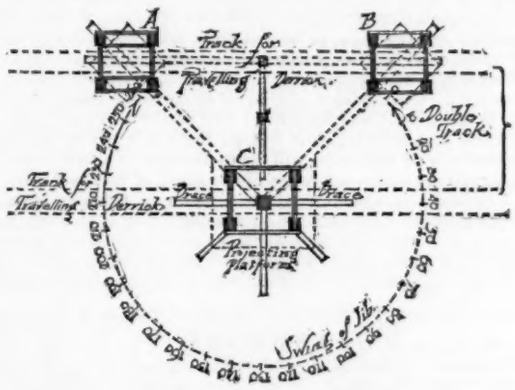



Fig. 3.

there would be a large amount of leverage action tending to overturn or twist the structure; the moment of which is expressed by 1 ton × 40 feet = 40 foot-tons. We have already shown the principle that the thrust or horizontal component produced by 35 cwt. load on a jib depends on its inclination; if, therefore, the head has 40 feet projection beyond its foot, it would develop a horizontal force of say 40 cwt. (= 2 tons), tending to overturn the structure, and acting at top of upright, or say 25 feet above platform. Of course we only speak in general terms, as our present object is not to investigate the strains upon the different parts of the combined structure, but rather to call attention to the fact of the great development of strains to which those are liable under certain conditions, with the view of guarding those who undertake to manufacture these cranes, while a novelty, ought to do so under a full knowledge of the maximum strains which their use is liable to involve. The proper investigations of the strains will have to form a separate chapter at a subsequent time.

In the meantime we may further note that if the derrick-crane were bolted and fastened by dog-irons, etc., to the Gabbert-scaffold, and assumed to form an integral part of it, the elevation of the jib-head above the stage-platform at which the load is suspended must be added to the height of the platform; assuming the projection of the suspended load to be 40 feet as stated, the extra height of jib will be 45 feet, which added to 63 feet height of platform, makes a total leverage height of (63′ + 45′ =) 108 feet to be counteracted by the stability at the ground level.

Again, if we consider the breaking compressive strength of white-pine braced-pier standards of four posts, each composed of 2″ x 7″ stuff, doubled, divided into 10-foot vertical panels, it would only be 12 tons for each cage; but the total load of the weighted frame would only produce its maximum compression on any part of the braced pier when it should be tilted by side thrust, supposing the pier to remain rigidly in its normal shape, which it would hardly do under such a strain, with ordinary construction of bolting in timber, etc., as usually adopted for such structures.

[1] Continuation of the "Gabbert Scaffold," page 208, No. 410.

[2] A method of finding these strains, etc., graphically has been briefly considered in "Builders' Scaffolding," XIV, article 54, in connection with the two preceding articles. By the same simple method it will readily be found that the horizontal component produced by 35 cwt. vertical creates an oblique strain (in the direction of the inclination of jib) of 70 cwt., so that the hinge-pin of the jib should be proportioned accordingly.

An examination of plan of scaffold, Figure 3, in connection with the circular range of the jib shows certain parts of the circle in which the horizontal thrusts of a loaded jib are not so well counteracted as others. Assuming the range to be 260° as marked — though it will depend upon the spread of back-stays — it will be observed that when a jib is brought close against the back-stay *A* or *B*, or pointing towards 85° or 175° directly opposite, the thrust acts diagonally against the square plan of braced piers; but as there is no *internal* diagonal bracing in the pier, the resistance it offers is a double-angle diagonal, which is rather disadvantageous, *i. e.*, the diagonal does not act in any normal plane in which the line of action of thrust takes place, but at a horizontal inclination to it of 45°, and at the same time at a vertical inclination to it of 60°, which is sometimes called the bracing-angle. There is, therefore, the greater necessity for effectual lattice-bracing between the central standard *C*, and the two side standards *A B*. The dotted position of the side standards, which corresponds to those shown in elevation in Figure 1, page 207, has advantages, because the additional directions in which the planes of their panel-bracing lie, being diagonal with regard to the central standard, thus make four bracing vertical planes in which to meet horizontal thrusts, and also react directly to reinforce the lattice-bracing between the standards. The shore-braces shown around central standard at the corners are in these directions. Between these bracing-planes there is a more or less varying degree of effectual reaction against thrusts. Thus (1) from *A* to 40°, and from 175° to 220°, being the spaces between two consecutive bracing-planes; (2) from 40° to 75°, and from 220° to *B*, being another space; (3) from 75° to 130°, and their opposite points, being another intermediate space; (4) and from 130° to 175°, and the opposite points, another intermediate space. The planes being situated in the directions (1) *A C*, 175°; (2) 40° *C*, 220°; (3) 85° *C B*; and (4) 130° *C*. The shore-braces in the directions of 40°, 85°, 130°, 175°, and 220°, react against thrust of jib, and steady standard *C* against oscillations due to working of crane, etc.

The triangular plan of a Gabbert-frame is that which is least liable to change of form, provided the stiffness of the timbers of the frame, and their connection together are sufficiently strong, and hence possesses elements most requisite for obtaining stiffness, and if the vertical leg-standards, or braced piers are made correspondingly rigid by effectual bracing, anchoring, and shoring, the combination is the most simple and economical; and hence the oscillatory movement of a loaded jib or wind-force would *tend* to move the triangular frame bodily in the direction of its action; but as the derrick stands upon the central standard, which is braced independently by shores, the *main* tendency of movement will be to overturn it about base of *C*, in all directions within the range of the swing of jib; and also tend by its radical leverage to produce a rotary or twisting movement at the base of the three standards; the anchoring of standards *A B*, *tending* to counteract this tendency more or less effectively according to the degree of the angle of the thrust in relation to position of *A B*. Slight oscillations would create enormously increased strains.

## NEW BOOKS.


Most of our readers are aware that important experiments have been made in this country within the last ten years, on full-size specimens of iron, steel, and timber, the results of which tend to modify considerably our formulæ for the strength of these materials. The records of these experiments are mostly in reports not easily procurable, and even those fortunate enough to possess them find that much labor is necessary in tabulating and comparing the results, before practical formulæ can be deduced from them. Therefore the hope has often been expressed that some able and patient investigator would perform this labor and present us with the information in a condensed and practical shape.

Professor William H. Burr has taken upon himself this task, and the result of his labors is before us.[1]

The work, which contains the results of the best European experiments, as well as the American ones mentioned, is divided into two parts, "Rational" and "Technical." The author wards off criticism from the first part by informing us in the preface that it is intended for "few others than technical students;" but for the second and practical portion he makes no apology. Its scope may be understood from the headings of the chapters: Tension, Compression, Long Columns, Shearing and Torsion, Bending, Connections, Working Stresses and Safety Factors, The Fatigue of Metals, The Flow of Solids. In the chapters on Tension, Compression, Shearing and Bending, the author treats in succession of wrought-iron, cast-iron, steel, other metals, cement, brick and stone, and timber, and this systematic arrangement renders the book convenient for reference.

The chapter on Long Columns is very complete, both in the tabulated results of the latest experiments and in practical formulæ deduced from them. Under the head of "Bending" the author gives valuable information on the strength of rolled and built beams. The chapter on Working Stresses contains extracts from the specifications for some twelve important bridges, which illustrate in the clearest and most practical way the practice of the best American engineers.

In view of the increasing use of steel in place of iron, the author might have given more information on the effect of chemical composition on its strength and elongation. Under the head of cements, mortars, etc., no mention whatever is made of lime-mortar, or of the strength of masonry; but this may be because nothing new has been learned concerning them during the last ten years. The author has apparently gathered together the results of all the recent experiments made in this country on the strength of materials, and we know of no other work which gives such complete information on this subject.

We cannot let this occasion pass without making a mild protest against the use of the word "*eye*-beam," which occurs in the above work and also in the handbook of Carnegie Bros. & Co. We hope that the day may come when the English language can be spelled as it is pronounced; but until that time arrives, it is important to preserve the distinction between an eye-bar, which is a bar with an *eye* in the end, and an I-beam, which is a beam whose section has the *shape of a letter* I. We read in the Scriptures of a man with a beam in his eye, but have yet to find an eye in an iron beam. If it is allowable to spell I-beam "eye-beam," then we may expect to have this shape, T, designated as a *tea*-iron and this, U, as a *you*-shape.

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At first sight it seems a little strange that an architect almost never gives a thought to protecting city buildings from lightning, while it is sure to be one of the considerations attaching to the planning of a country building, and the proper steps to be taken often form a part of the original specification, and their execution is watched with anxious care. It is not that electric discharges occur less frequently over cities than over open stretches of country, and it may well be that a city may lie in the regular pathway which recent Austrian researches show electric storms habitually take, and yet escape injury, while isolated objects in the country in the range of the same storm are blasted.

A moment's thought, however, explains this immunity. In the first place, there are the great number of factory and mill chimneys which are now-a-days almost invariably properly protected, and from their great height afford ample security to buildings lying within a considerable radius from them as centres. Then, nowhere than in cities is there better earth-connection to be found, since, if one decides to rod his building, and can make his earth-connection by securing the rods to the city water-mains, he need give himself no further thought on the matter, other than to occasionally assure himself that his rods do not rust out at the couplings, or are not fused by some known or unsuspected discharge. But there is no absolute need of employing rods, since the greater part of the roofs are covered with metallic roofing, connected with the ground by metallic rain-water conductors, themselves connecting directly with the sewers — which do not form a bad earth. Even if the roof itself is not tinned, the building is not unlikely to have a metal cornice connected by rain-water leaders with the ground. Besides these, and the iron-fronted buildings, and the net-work of telegraph and telephone wires, which by themselves would probably protect a city, there are the thousands of soil-pipes rising above the roofs, each having an earth in the sewer, and indirectly, through the connecting plumbing, with the city water-mains. So, except in the case of churches and other lofty buildings, the architect building in the city need not necessarily concern himself with the electric protection of his building.

But in the country it is different, and though, owing to the faith we have in the doctrine of chances, we are far from believing it is absolutely necessary to rod a building, yet clients often have a prejudice in favor of securing a mental relief, even if they cannot assure themselves of a physical protection, by placing rods on their buildings, and as we are well assured that an imperfect system of conductors is more dangerous than no rods at all, we will recommend all architects who do not feel sure that they have already mastered the principles of electric protection to procure Mr. Spang's admirable little treatise[2], and spend an hour or two in studying it.

The principal requirements of good protection are conductors of proper size and sufficient conductivity securely attached to the building,— not insulated from it,— and to which all the metal-work of the building is attached, so arranged, too, as to offer no chance of short-circuiting, and ample earth-connections. This last requirement is easily stated, but is the most difficult of all to properly satisfy; indeed, in the face of recent French investigations (see *American Architect*, page 221, No. 358) it seems so hopelessly expensive a task to provide a *perfect* earth that it seems hardly worth while to attempt to do anything, unless the building stands on the bank of a stream or pond. To make an absolutely perfect earth in some of the arid situa-

[1] *The Elasticity and Resistance of the Materials of Engineering*, by Wm. H. Burr, C. E. John Wiley & Sons: 1883. Price, $5.00.

[2] *A Practical Treatise on Lightning Protection*, giving complete and explicit Instructions for the Protection of Buildings, and explaining the Defects of the Lightning Conductors now erected. By Henry W. Spang. With Illustrations. New and revised edition. New York: D. Van Nostrand, Publisher, 1883.

tions that architects have to build in would almost require the wealth of Crœsus drawn from the purse of Fortunatus. Fortunately, however, electric discharges occur most frequently during the fall of rain, and Mr. Spang has devised an earth-connection which seems to offer good security against any discharge which takes place during such fall of rain. He takes an iron pipe ten feet long with an inside diameter of two inches, and a shell one-quarter of an inch thick, which has been perforated on two opposite sides by quarter-inch holes about ten inches apart. This he buries upright near a rain-water leader, which may discharge directly into it, and connects the lightning-rod to it. In this way an area of moistened ground is formed around the earth-connection proportionate to the length and severity of the rainfall. Moreover, that the ground may never be wholly dry at this point, he connects with it the overflow from some neighboring hydrant or horse-trough.

To conclude, we would say to any architect who thinks of putting conductors on his building: Do not do it unless you thoroughly understand the principles of electric protection sufficiently, at least, to form an intelligent opinion of the method the "practical lightning-rod man" proposes to employ, and to correct any error of judgment on his part by pertinent criticism and advice.

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PAINTING is one of the many things that an architect is expected by his client to be thoroughly posted on, and certainly for his own comfort he should be. Yet how many architects are there who understand the matter? It is easy enough to specify "two-coat" or "three-coat" work, and to remember what parts of the building it is best to have treated in one way or the other; and to superintend the painting, so far as to make sure that wood is primed only when thoroughly dry: that it is properly rubbed down and filled is also comparatively easy, but to superintend the mixing of the paints, to be able to detect and condemn inferior and adulterated oils, to be sure that the lead is not mainly barytes, to be able to take the paddle yourself, and by a real knowledge of the properties of pigments to mix a tint that you desire to obtain, to know what of the many brands of "ready-made" paint it is allowable to use; these are attainments that the architect rarely has. Yet he should have them. He should know what varnishes will crawl and crack, and what will stand; he should know about stains, about wax and oil polishes, metallic paints, shellac, and the infinite variety of pigments. And we believe that some day he will find it well for him to know these things with a scientific if not a practical knowledge, and not leave them as now entirely to the honesty and intelligence of the painter's foreman, just as now he knows more about plumbing than the architect of ten years ago ever dreamed of knowing.

Of course this knowledge must be obtained mainly through books, and though there have been some books written on the subject, they have been mainly concise practical hand-books containing rule-of-thumb directions which were uninteresting to read, and difficult to remember if not enforced by immediate practical experience. But until the book [1] under consideration was published, there was nothing, so far as we know, which treated the subject scientifically and practically *de bas en haut*. The book appears under the joint authorship of Mr. Condit, who has done the writing and the scientific investigation, and Mr. Scheller, a master car-painter, we believe, whose long practical experience lends a weight of practical authority to the views advanced. There are also incorporated in the book chapters by special authorities, such as the chapter on "Pigments" by Mr. Drummond — one of the most instructive chapters in the book, and one useful to the artist as well as to the architect and painter — and one on "Decoration by Color," by Mr. W. H. Day, which is not the less useful from its capacity of exciting opposition to the theories of color therein advanced.

The great merits of the book are its thoroughness, both scientific and practical, its arrangement, and the admirable thoroughness with which it is indexed; for besides the usual table of contents there is the not so usual alphabetical index of subjects, and a special and still more valuable "Index of Pigments." There is, moreover, a useful appendix in the form of a bibliography.

With so many excellent points, it is a pity there should be any defects, and we are tempted to make light of the confusion that sometimes occurs in the writer's sentences, and to pass over an occasional inelegance in English, and smile forbearingly at the inadequacy of some of the definitions. Still we have rarely come across a book of any sort from which we were so tempted to make copious extracts as from this, and when in running over the index our eye was caught by the great number of references under the head of "red-lead" and saw how they were scattered at intervals throughout the book, we thought we could in no better way give an idea of the thoroughness of the work, and the style of the writer, and at the same time impart much valuable information concerning a substance whose real usefulness was probably unknown to most of our readers, than by transcribing these passages: —

"The kind and quality of the color is the second and all-important quality of a pigment. It decides against the use of red lead, which in many respects is the most valuable pigment there is." — p. 37.

"Red lead is a valuable addition [to iron paints] both as a drier and as supplying the qualities (except color) which iron paints lack." — p. 41.

"When lead is heated it takes up oxygen from the air and becomes: —

| | | Parts. |
|---|---|---|
| Yellow lead | Oxygen, about | 4 to 7 |
| | Lead | 93 |
| | | 100 |

"If this yellow lead is melted, it becomes litharge. If heated to 600°, it becomes red lead, which is a compound of yellow lead and another lead which contains twice as much oxygen." [2] — p. 89.

"It is evident why lead compounds, especially litharge and red lead, act as driers: when they are heated they give off oxygen and become to oil like concentrated air." — p. 89.

"*Boiled Oil Soaps.* — Lead, manganese and zinc and other substances give more soap in boiled linseed oil because it contains an abundance of free oil acids. These are hardened by the soaping and quickly dry into hard brittle substances. Red lead gives the hardest soap." — p. 94.

"It remains to discover whether longer life is given to oil by changing it into a soap. It is, however, an advantage to get a hard paint immediately, if by so doing we can also retain the elasticity of the oil. This we accomplish by using red lead as a pigment. The red lead gives up some of its oxygen to the oil and changes part of it into an oxy-linseed-oil acid, with which the lead unites to form a hard oxy-linseed-oil acid, oxide-of-lead soap. And yet red lead is a lasting paint, long retaining its elasticity and a certain power of holding itself together, more lasting than iron paints." — p. 113.

"Mulder thus sums up the method of making a cheap, hard and well-protecting paint: —

1. By boiling oil with two to three per cent of oxide-of-lead (litharge or red lead) to harden the soft, non-drying and free oil acids.
2. Some oxide of lead as a pigment: red lead the best (uniting with and giving additional hardness to the oil.)
3. Hard, indifferent powders, made as fine as possible, and as much used as the mixture will bear as a good paint. The above seems to represent the true theory of a good paint."

"We must have for a good paint substance one which not merely mixes with, but more or less links with, the oil. Barytes does not unite with the oil; zinc does so slowly; iron paints only partially if at all; — red lead is the substance which best fulfils this office, and it is the most lasting paint. White lead, as we shall see, owes all its value as a paint (not a color) to a substance like red lead which it contains. Nevertheless red lead is the most dangerous for the painter. Moreover it is a difficult paint to obtain pure, and is more inclined to blister than are iron paints, which are also much cheaper. *We do not advocate the use of red lead*, but it is necessary to show the facts as far as they exist." — p. 115.

"Wrought-iron needs a paint hard and elastic, which will hold itself together even if points of scale give away underneath it; *hence the value of red lead on wrought-iron;* while on cast-iron other paints, iron oxides, for example, will serve quite as well." — p. 142.

The Cincinnati Southern Railroad says that "red lead has proved far the best and most lasting paint. It is difficult to obtain in purity and is more expensive than iron oxide, but so much more lasting in the climate and region through which the road passes that it is used in preference." — p. 144.

Prof. Henry L. Coulton, after three years experiments with unlimited means at his command states that he finds "nothing equal to red lead for ship iron." — p. 144.

A pump-rod in an English well two hundred feet deep and protected by red lead lost nothing by rust in forty-five years. — p. 144.

"Red lead is adulterated with brick dust and other substances and in this way has lost, perhaps, some of its good reputation. Its value is that it unites with the oil, giving up at times part of its oxygen. No other substance which does not unite with the oil can replace it. . . Spur says that should chemical action commence, red lead is reduced to metallic powder. This is possible, and it is also probable that red lead under great heat will blister sooner than iron oxide paint. Red lead has also been accused of forming a battery with iron, and rusting the iron faster by unlinking the oxygen in water. No evidence within my knowledge as to the effects of dried lead paints upon iron has appeared except as to the effects upon two vessels, and on these below their water-line. . . Above the reach of the sea-water wherever the red lead was in good condition it had done no injury. . . Our Government vessels are painted with red lead and zinc; but the favorite paint for ships' bottoms in the merchant marine is, I believe, red lead alone. Red lead gives with zinc a very hard paint. Red lead softens tin and has been accused of eating holes in it; this is not probable. It should not, however, perhaps be used on tin. . . Finally, the color of red lead is not durable, especially not with white lead. Under the action of the sun it becomes less orange; and mixed with other tints, or under the influence of sulphur gas, its color is fugitive. Again red lead is perhaps more injurious to the workman than other paints, because he must mix it with oil as it will not keep for use ground with oil."— pp. 145-6.

"Red lead forms a soap with oil and no paint is more lasting. . . Red lead, litharge, and to some extent all kinds of manganese, including umber, form soap with oil. Red lead is a good drier, both because it contains oxygen and because it thus unites with the oil." — p. 200.

"Mulder recommends red lead as giving the most elastic of all drying oils and at the same time the hardest." — p. 202.

"Oil merely heated to 212° with red lead for two hours is a quickly drying oil. . . The litharge or red lead should be thoroughly dried and ground to a very fine powder." — p. 203.

"Red lead, stability fair, strength of tone unpleasant." — p. 304.

"Red lead is composed of

| | |
|---|---|
| Lead | 91 parts |
| Oxygen | 9 " |
| | 100 " |

"Its color is more red as it contains more oxygen. It is of great value as a paint substance, but dangerous to use because it does not keep fluid in oil, and painters, mixing the fine powder with the oil, are liable to suffer thereby. It fades in mixture with white lead, and may become less orange in sunlight, but is more often whitened by the carbonic acid of the air, which changes it into white lead. It requires less oil than perhaps any other pigment. Test very difficult. The test usually recommended has no correct basis."—p. 319.

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[1] *Painting and Painters' Materials:* A Book of Facts for Painters and those who use or deal in Paint Materials. Treating of Oils in all their relations to Paint and Colors; of Pigments, their qualities, uses, changes, adulterations, and tests; Varnishes, their materials, comparative qualities, uses in decoration, and their mysteries and changes in use; of Driers, and their effect in the drying of paint and varnish; of Wood and Iron as preserved by paint and their relations to cracking and peeling of paint and varnish: of the Management of paint-shops, carriage-painting and car-painting: of the Decoration and Use of Color; and of the Effects of Paint on Health. By Charles L. Condit, under the supervision of Jacob Scheller, master-painter. New York: The *Railroad Gazette*, publishers, 1883. Price, $2.25.

[2] Red lead contains over nine per cent of oxygen.

"Red lead is darkened by the presence of sulphuretted hydrogen or ammonia. — p. 369."

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It would be a great assistance to the user of Vogdes's "*Pocket Companion*," and a still greater one to the reviewer, if the additions and alterations in each fresh edition, "revised and enlarged" as it is said to be, were indicated either in the index or in the body of the text. In the absence of such indications, we are unable to say how this edition differs from and is an improvement over its predecessors; but as the chapter on "Limes, Cements, Mortars, and Concretes" appears in a fresher type than other portions, as also an account of tests of brickwork made by Mr. Kidder, and tests of the brick used in the Indiana State House, it is fair to suppose that these portions are new. We can only say that this little pocket price-book [1] is a useful companion, and the plan adopted of giving approximate prices only, is as sensible a method as could be adopted. But we would like to see the prices so carried out in each item that one need not have to guess whether dollars or cents were intended.

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Another "pocket-book" which it is a pleasure to examine simply because of the size and clearness of the type in which it is printed is "*Dixons' Machinist's and Engineer's Calculator*," which has no great every-day value to architects except as a source of information to resort to at those long separated intervals when some question in dynamics comes up for solution; but it has a considerable amount of useful material in a complete, but concise exposition of the rules of arithmetical procedure, begining with the elementary definitions, and explaining by the aid of examples the chief arithmetical operations. This feature of the book [2] is amplified by a chapter of "Rules and Problems" which gives a great number of solutions of a considerable variety of problems, that may occur in the practice of a mechanical engineer. The chapters on "Pumps" and "Steam Boilers" are of considerable general utility.

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## THE ILLUSTRATIONS.

CONNECTICUT FIRE INSURANCE COMPANY'S BUILDING, HARTFORD, CONN. MR. J. C. MEAD, ARCHITECT, HARTFORD, CONN.

The building is of the Byzantine style of architecture, of brick, brownstone, and terra-cotta, 58′ x 120′, and as shown by the illustration, one and two stories in height, with a tower, hexagonal in form, extending above the main roof. An octagonal portico, entered from Prospect Street, is partly enclosed by a screen of glass and iron between the upper portions of the brownstone columns. From this portico we enter the vestibule lighted by a large east window and an alcove, two sides of which are composed entirely of plate and cathedral glass. The directors' room, measuring 20′ x 24′, leading directly from this vestibule is lighted by a window ten feet wide, of novel construction, and is conveniently connected with the president's room and the spacious general office, 40′ x 45′, and twenty feet high. Panelled wainscoting six feet high is continued all around this room, and with the panelled ceiling in oiled butternut wood makes a very handsome finish for the apartment. A characteristic feature of the building is the vault, which is twenty feet square inside and thirty-two feet high, all parts made easily accessible by light staircases and galleries conveniently arranged.

Adjoining the vault, which is entered from the general office, is a supply-room, well-lighted, containing a coat-room, lavatory and a stairway leading to the ground floor. Beneath this room is the boiler-room. Under the general office and of the same size is the large supply and printing room, lighted by four hundred and thirty-two square feet of plate-glass evenly distributed. Three offices, 13′ x 19′, 14′ x 22′, and 20′ x 28′, are provided in the front part of the ground floor, and are directly accessible from a door at the sidewalk level on Prospect Street. Returning to the vestibule, an archway opens on the south revealing a generous staircase leading to the apartments above. The rooms throughout will be mainly finished in hard woods; the basement to be in chestnut, the general office and vestibule in oak, the directors' room and private office connected with same in mahogany and the stenographers' room in white-wood.

HOUSE OF A. H. NORDYKE, ESQ. INDIANAPOLIS, IND. MR. C. A. WALLINGFORD, ARCHITECT, INDIANAPOLIS, IND.

OLD HOUSES IN NEW ENGLAND, SKETCHED BY MR. A. H. EVERETT, BOSTON, MASS.

HOUSE AT SAN ANTONIO, TEX. MR. C. I. BERG, ARCHITECT, NEW YORK, N. Y.

[1] *The Architect's and Builder's Pocket Companion and Price-Book*, consisting of a short but comprehensive epitome of Decimals, Duodecimals, Geometry and Mensuration: with tables of United States Measures, Sizes, Weights, Strengths, etc., of Iron, Wood, Stone, Brick, Cement and Concretes, Quantities of Materials in Given Sizes and Dimensions of Wood, Brick and Stone; and full and complete bills of prices for carpenter's work and painting; also, rules for computing and valuing brick and brickwork, stone-work, painting, plastering, with a vocabulary of technical terms, etc., by Frank W. Vogdes, Architect, Indianapolis, Ind. Enlarged, revised, and corrected. Philadelphia: Henry Carey Baird & Co., Publishers. 1883.

[2] *The Machinist's and Steam-Engineer's Practical Calculator.* A Compilation of useful Rules and Problems arithmetically solved, together with general information applicable to Shop-Tools, Mill-Gearing, Pulleys, and Shafts, Steam-Boilers, and Engines. Embracing valuable tables, and instruction in Screw Cutting, Valve and Link Motion, etc. 16mo, full morocco, pocket form. By D. B. Dixon. New York: D. Van Nostrand, Publisher. 1883.

HOUSE OF MRS. P. L. BENNETT, WILKES BARRE, PA. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

This house is of brick and half-timber work, the lower story of brick with stone quoins at corners, second story half-tin ber work with pebble-dashed panels. The peaks of gables are ornamented with repoussé lead-work, the roof covered with red slate. Cost, about $23,000.

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## OUR LAST WEEK'S ILLUSTRATIONS.

Too late to prevent the mailing of our last week's issue, we learned that, owing to imperfections in the manufacture of the paper on which the illustrations were printed, an unknown number of imperfect and inferior prints — particularly of the "Cloisters at Belem," and the "Houses on Beacon Street, Boston," — had been sent to the bindery, and had gone from thence to our subscribers. If any one who has received such imperfect or inferior prints will take the trouble to return them, we will replace them by perfect copies. To ensure against errors in making this exchange it will be well for the sender to write his name and address across the face of the rejected print.

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## CEMENTS.[3]


All the various kinds of hydraulic cement used on the public works are daily tested by me as to their tensile strength, and weekly reports of the results obtained, with an annotation of the points where used, have been submitted to Capt. R. L. Hoxie and Lieut. F. V. Greene, assistant engineers, District of Columbia.

Considering hydraulic cement one of the most important materials employed in the public works, I have devoted to it a great deal of time, both to ascertain the strength of the various kinds as actually manufactured, and to improve, if possible, their qualities.

Cement may be divided into two classes, the ordinary home-made and the Portland cements.

The ordinary home-made cements, such as Round Top, Cumberland, etc., which have come to the notice of the engineer department in the works of the District, are the Rosendale, the Maryland, and the Virginia cements. Although the two last named of the class designated as "slow-setting" are of but recent date, they are now manufactured very successfully in accordance with the formula given to the manufacturers by us, after a careful chemical investigation and analysis. In my last annual report to the Engineer Commissioner some formulæ were stated by which these cements are now manufactured. To-day they seem to command the market here, the manufacturers being able to furnish them at a less price than the Rosendale cement, whose qualities they even surpass, as will be hereafter demonstrated.

### SETTING OF CEMENTS.

A slow-setting cement of the home-made brands, when mixed with water in a sufficient quantity at 80 ° Fahr., ought not to be "set" before the lapse of fifteen minutes.

When it is put under water immediately after setting, it should keep on setting without crumbling, and ought to bear a tensile strength per square inch of at least: —

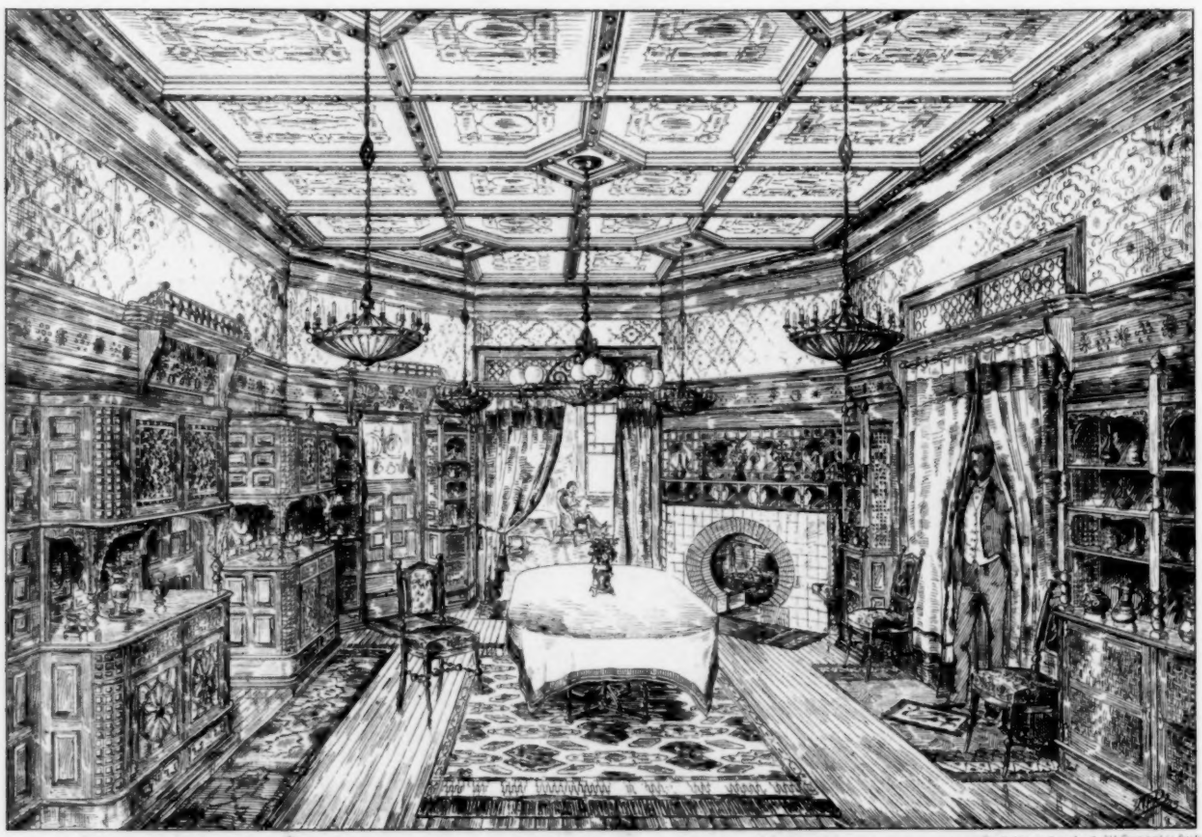
| | Pounds. |
|---|---|
| In 24 hours | 20 |
| In 5 days | 60 |
| In 15 days | 90 |
| In 1 month | 150 |
| In 2 months | 250 |
| In 12 months | 300 |

Hydraulic cement is a double silicate of lime and alumina, and is obtained by exposing the material to a degree of heat sufficiently high to produce partial vitrification. In this condition it contains no free lime, and constitutes a slow-setting cement of the Portland class.

The tests made in my laboratory for the engineer department of the District are mechanical tests and chemical analyses: —

1. Sifting, in order to ascertain the fineness.
2. Setting, to ascertain whether quick or slow.
3. Tensile strength; and
4. Chemical analysis, — the most important proof.

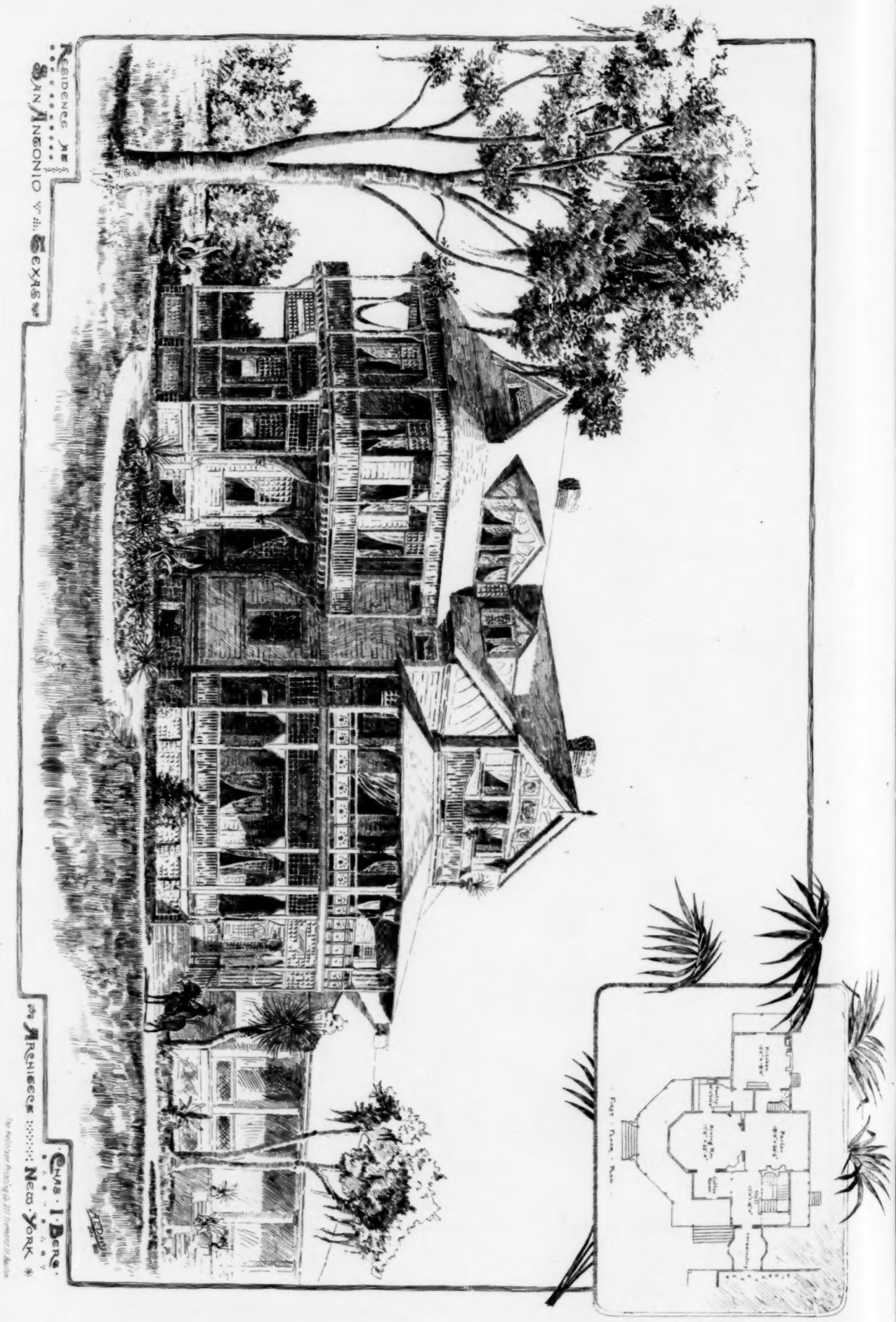
[3] Portions of a report made by E. J. De Smedt to the Commissioners of the District of Columbia for 1882.

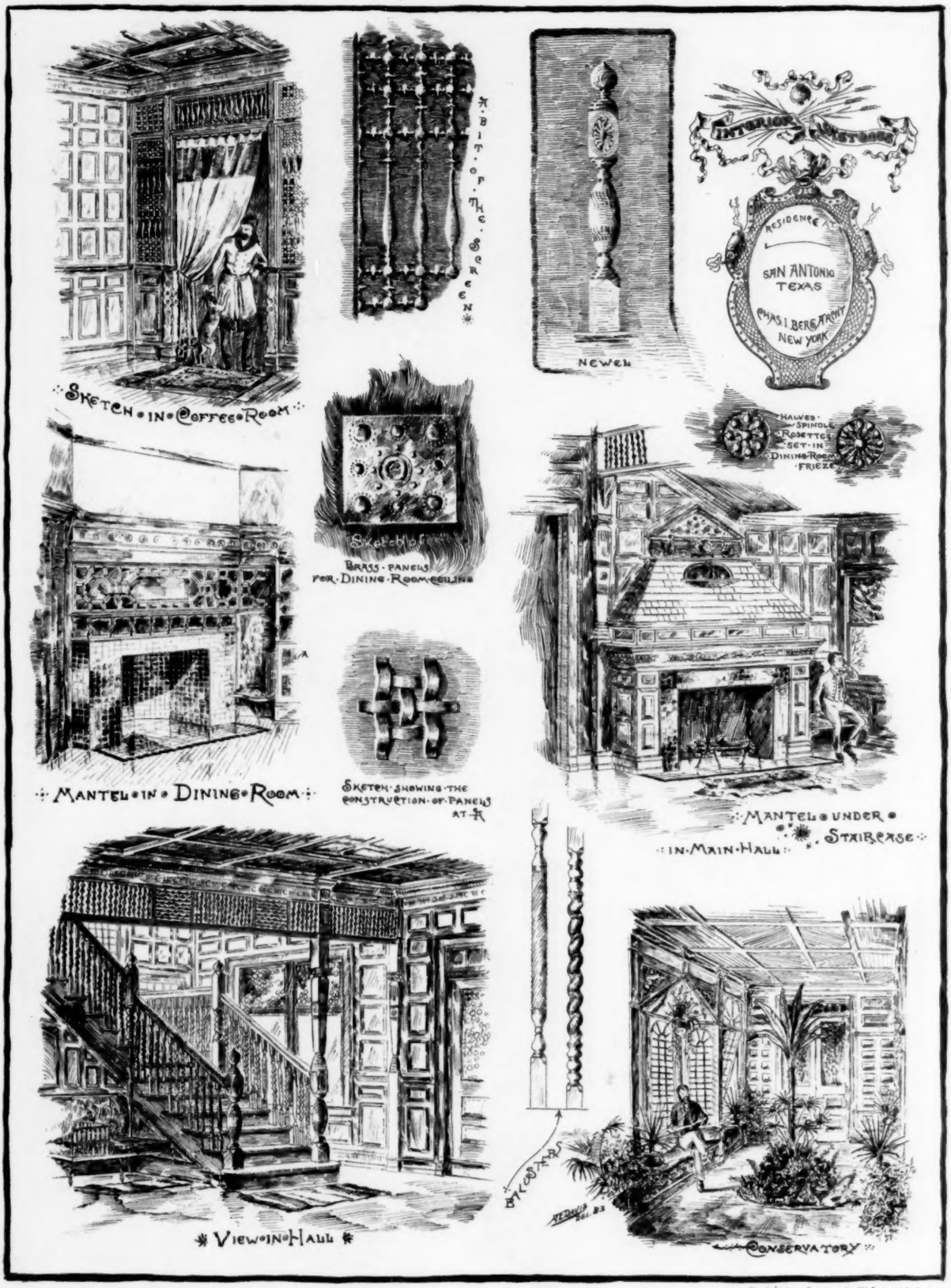



Dining Room Interior *for a* House *at* San Antonio, Texas.

Charles I. Berg, Architect. New York.

BUILDING FOR THE CONNECTICUT FIRE INSURANCE CO.
HARTFORD, CONN. JOHN C. MEAD, ARCHITECT.






The Heliotype Printing Co. 211 Tremont St. Boston.

Residence of Mrs. P.L. Bennett. Wilkes-Barre Pa.

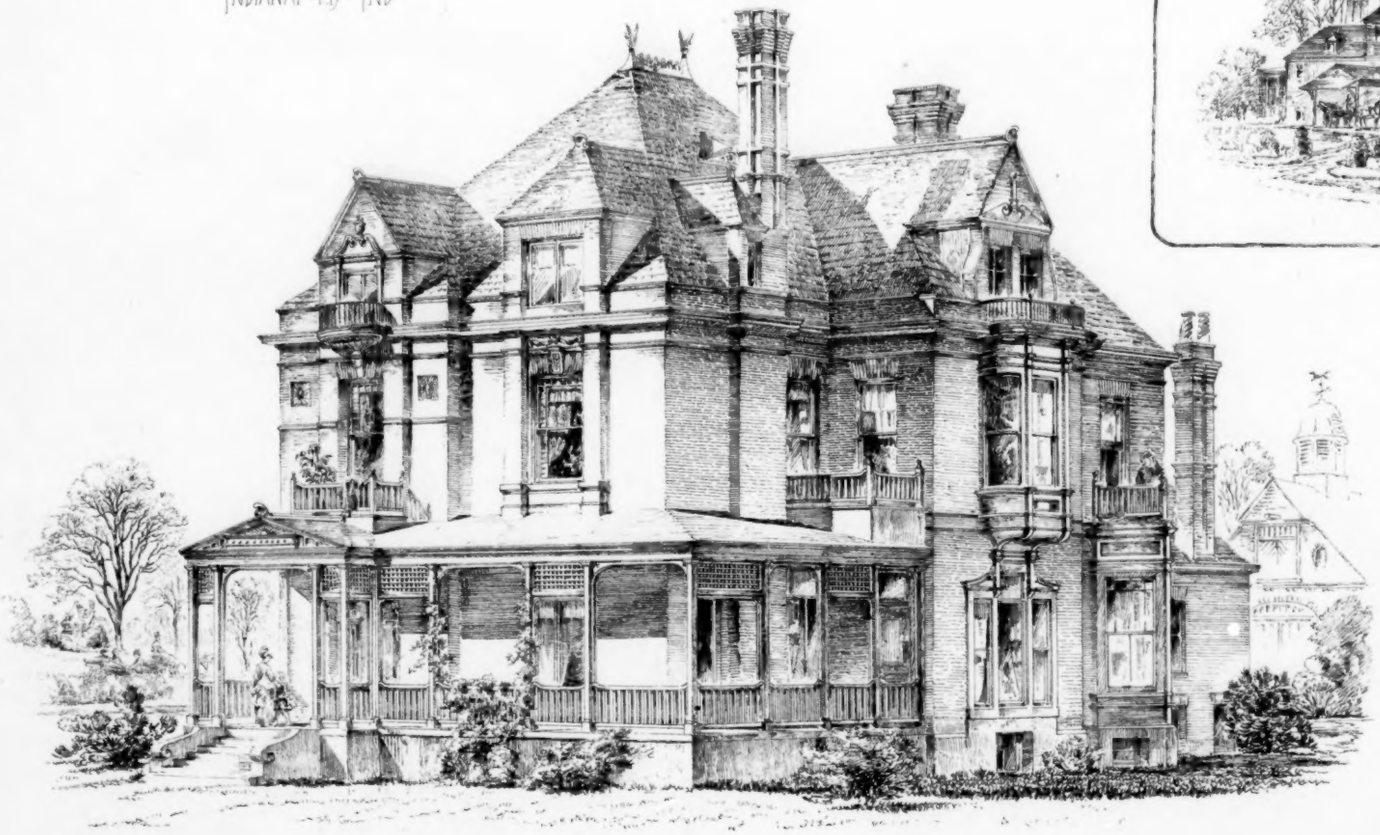
Bruce Price Architect N.Y.

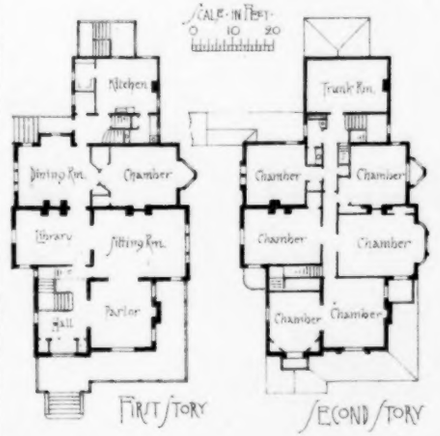
American Architect and Building News, Dec. 1 1883. No. 414



HOUSE FOR A.H. NORDYKE ESQ

INDIANAPOLIS · IND






C.A. WALLINGFORD ARCH.T

INDIANAPOLIS · IND.

The Heliotype Printing Co. 211 Tremont St. Boston.

### FINENESS.

Some experimenters have supposed that the heaviest cement is the best, and that a bushel measure filled lightly and levelled on the top should weigh 112 pounds. This weight in itself is no criterion of quality, and many cements of a high class weigh less, while some weighing even more are worthless. The specific gravity of the cement, which varies from 2.701 to 3.100, should be ascertained. The absolute gravity of a finely-ground cement will be less than that of one coarsely ground; and it is of the utmost importance that cement be ground as fine as possible — so fine that it becomes almost impalpable to the touch.

In the composition of a mortar or concrete, it is of an apparent importance that each particle of sand and aggregate is completely surrounded by a film of cement, thus uniting each particle; and it is also apparent that any two grains of sand or aggregate which are in absolute contact become a source of weakness to the mass, inasmuch as they are not cemented together, but are only held in position by their surroundings, and in order to secure the stronger position with the minimum quantity of cement, the first essential is that the cement be finely ground.

It may appear strange that after the cement has been sifted, no matter through what number of meshed sieve, the portion which is retained in the sieve has practically no setting power. This seems to prove conclusively that cement, in order to be entirely effective, must be ground to an impalpable powder and, further, that all granulations are inert.

Independently of the power of amalgamating with and surrounding each particle and aggregate of a concrete, fine grinding improves the quality of cement itself.

In the manufacture of cement it is impossible that all the clinkers burn to an equal degree of hardness, and in passing through the millstones, the softer pieces, or those which have received the least calcination, are those ground the finest, while the well-burned clinker is only reduced to granules, not to powder. As it is the best-burned clinker which will produce the best cement, the value of fine grinding of it when well burned thus becomes a necessity.

The fineness of the cement ought to be tested through a No. 60 sieve, of 3,600 meshes per square inch, and the residue on the sieve ought not to exceed 5 per cent, and yet I find an average of 8.43 per cent in the Portland cement used, which has come under my examination.

### SETTING.

A quick-setting cement will set after being mixed with a quantity of water necessary to make a stiff paste before ten minutes, and will evolve heat. A slow-setting cement requires twenty minutes to set, and even longer, and will not evolve heat to any apparent degree.

The meaning of the term "set," as used by me in connection with cement, is explained as follows: The cement is purely chemical in its action; it commences with the addition of water to the cement, and continues until the cement attains its ultimate hardness. Continuous as the chemical action may be, there are periods, however, during the early stages, that may be defined, and it is one of these periods that is meant when the term "set" is employed, as shown below.

When a sufficient quantity of water is mixed with the cement so as to form a stiff paste, pat or briquet, the first change observable is that the water comes to the surface; the next that it (the water) is absorbed by the cement, and this is the period I term "set."

This, however, has nothing to do with the hardness, as some cements may be sufficiently hard to withstand the impress of the thumb-nail at that time, while others will not be able to so resist until long after.

The advantage or disadvantage of using a "quick" or a "slow" setting cement must be determined by the nature of the work for which it is required, and it is therefore impossible to say that either property is good or bad. The peculiar characteristics of them, however, are that a "quick-setting" cement will attain firm strength in a short time, but will not improve much afterwards, while the "slow-setting" kind will require more time to "set" in the beginning, and will eventually attain a much greater strength by a gradually increasing gain.

In some inferior grades of cement, the "slow-setting" property is owing to an excess of non-active silica or other foreign matters contained therein. The home-made cements are of this grade, a characteristic of which is also that it is obtained by a lesser degree of heat.

### TENSILE STRENGTH.

No matter, however, what results may be obtained by the foregoing experiments and tests, after all they determine certain properties only, which a good class of cement should possess, but they give no definite information as to its strength. It is necessary, therefore, to carry on further tests, extending over any desired period, so that its strength at different dates may be ascertained and determined. The result of this test being the consequence of the chemical composition of the cement, the chemical analysis is necessarily the only foreteller of the ultimate strength of a hydraulic cement, which will be explained hereafter.

There is, perhaps, no better mechanical way of testing cement than by a tensile strain; it is easily applied and may be measured with great accuracy. This test is daily applied and recorded in the laboratory, and weekly reports made to Capt. Hoxie and Lieut. Greene, of the engineer department. Seven hundred and six tests were made during the year.

The following tables represent the average strength of the various kinds of home-made and Portland cements, at different dates, running over three years, and comprising: —

*Comparative statement of the tensile strength of various brands of home-made cements.*

VIRGINIA AND MARYLAND CEMENTS.

| Name of brand. | At one day. | At five days. | At ten days. | At twenty days. | At thirty days. | At sixty days. | At twelve months. |
|---|---|---|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. |
| Cumberland | 55 | 85 | 117 | 192 | 250 | 305 | 350 |
| Shepherdstown | 20 | 65 | 94 | 170 | 227 | 270 | 300 |
| Round Top | 50 | 83 | 100 | 190 | 250 | 308 | 352 |
| Average | 42 | 78 | 104 | 184 | 242 | 294 | 334 |

ROSENDALE CEMENTS.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Delafield & Baxter | 20 | 55 | 95 | 145 | 220 | 250 | 295 |
| Norton[1] | 20 | 50 | 90 | 120 | 200 | 217 | 290 |
| Lawrenceville | 18 | 30 | 70 | 100 | 150 | 185 | 200 |
| Average | 19 | 45 | 85 | 122 | 190 | 217 | 262 |

*Comparative statement of the tensile strength of various brands of Portland cements.*

| Name of brand. | At one day. | At five days. | At ten days. | At twenty days. | At thirty days. | At sixty days. | At twelve months. |
|---|---|---|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. |
| Saylor's | 150 | 250 | 300 | 340 | 380 | 450 | 600 |
| White's[2] (English) | 170 | 300 | 350 | 410 | 450 | 500 | 700 |
| Crown[3] (English) | 120 | 195 | 270 | 290 | 320 | 350 | 400 |
| Imperial | 115 | 230 | 300 | 330 | 350 | 400 | 640 |
| Average | 138 | 240 | 305 | 342 | 355 | 425 | 585 |
| Stuart's[1] (English) | 80 | 225 | 540 | ... | ... | ... | ... |
| Dyckerhoff's[1] (Ger.) | 100 | 250 | 550 | 600 | 700 | ... | ... |

Tests of home-made cements ..... 1,820
Tests of Portland cements ..... 500

Total Tests ..... 2,320

Since the preparation of the foregoing tables, I have endeavored to find the actual strength of the Portland cement: first, with the granules and without the proper screening; second, after proper screening, leaving out the clinkers; and, third, with the clinkers or granular residue retained and properly pulverized; and after a careful experiment with Saylor's Portland cement, I find that the grade usually furnished has a breakage at 1″ x 1″ for ten days of 300 pounds. The same cement without the clinkers, when screened through a No. 60 sieve (the same as heretofore mentioned), gives for the same number of days a breakage of 380 pounds. If the granular residue, after being pulverized to an almost impalpable powder, is added to the cement thus screened, the breakage point for 1″ x 1″ at ten days goes up as far even as 525 pounds.

So far the analyses made by me of the cement stones in this vicinity, producing our home-made Maryland and Virginia cements, viz., from the Cumberland, Round Top, and Shepherdstown quarries, give positive proofs of a probable manufacture of Portland cement from some of the strata of the quarries at those locations. I am now devoting as much time as can be spared from my other duties in experimenting on these strata, with a view of ultimately arriving at the result of manufacturing right here a cement in all respects equal to the Portland cement, and at a greatly reduced cost. My tests so far induce me to hope that within a very short time the object will be accomplished, and we will no longer, for our public works, have to depend on the importation from foreign countries of Portland cement, but we will be able to produce it in the immediate vicinity of the District.

*Extract of chemical analyses of the Portland cements.*

| Name of brand. | Loss by calcination. | Inert silica. | Granular residue by screening through No. 60 sieve. |
|---|---|---|---|
| | per cent. | per cent. | per cent. |
| Saylor's | 1.50 | 1.00 | 20.00 |
| White's | 1.30 | 1.25 | 4.00 |
| White's, condemned | 7.00 | 1.25 | 14.00 |
| Crown | 3.00 | 4.00 | 7.00 |
| Imperial | 2.00 | 3.00 | 6.00 |
| Stuart's | 0.40 | 0.00 | 4.00 |
| Dyckerhoff's | 0.45 | 0.00 | 4.00 |
| Average | .... | .... | 8.43 |

The loss by calcination represents the absorption of carbonic acid and moisture, viz., air-slacking or imperfect calcination.

Inert silica represents so much sand.

[1] These cements were not used in the District, but were from samples procured and sent here for comparative experiments.
[2] This cement frequently gives unsatisfactory results, even as low as 95 pounds in ten days.
[3] Condemned.

Granular residue by screening represents so much inert cement, and in effect may be considered as so much sand.

Comparing the above two tables of "tensile strength" and "extract of chemical analyses," it is at once observed that the mechanical tests and the chemical analyses will predict the ultimate results of any given brand of Portland cement.

In the foregoing the statement was made that in the home-made cements the slow-setting properties are generally due to an excess of non-active silica and other foreign matters, the addition of which reduces their tensile strength.

In order to obtain from a "quick-setting" cement a "slow-setting" one, I have tried several processes, without adding any foreign stone, introducing in the compound a relatively great quantity of inert and objectionable substances. My experiments were mostly directed towards changing the nature of the free lime, the cause of the quick setting, the evolving of heat, and the expansion of the mortar, and the researches in that direction have resulted most successfully.

Anhydrous lime, or free lime as it has hereinbefore been termed, when brought in contact with water evolves heat and expands. If this anhydrous lime CaO is changed into a bibasic carbonate of lime $(CaO)^2 CO^2$, or into hydrate of lime CaO $H_2O$, the addition of water will not evolve heat, and the mortar will not expand.

The hydraulic cement containing anhydrous lime CaO will eliminate heat and will expand; when this CaO is transformed into $(CaO)^2$, $CO^2$, or into CaO $H_2O$, it will be in a proper condition to combine with silicic acid $SiO^2$, it will not produce heat, and will not expand; it will then be a slow-setting cement, and will produce a mortar of much greater tensile strength than a cement made slow by the addition of other stones.

The desired results are obtained by the following processes: After calcining, at red-heat, limestone, hydraulic limestone, or hydraulic cement limestone, in the presence of carbonic acid, $CO^2$, it will be found that the carbonate of lime, CaO $CO^2$, in those stones has been transformed into bibasic carbonate of lime $(CaO)^2 CO^2$.

The operation is performed in ordinary furnaces or kilns. The carbonic acid used in the treatment is obtained from the top of the furnace while the stone is being calcined. It is conducted to and injected into the material, at red heat.

The proper theory of the calcination may be thus formulated:—

$$CaO\ CO^2 \left\langle \begin{matrix} CaO \\ CO^2 \end{matrix} \right\rangle (CaO)^2\ CO^2 + CO^2$$

The hydrating process is just as effective as that above described, and has the advantage of its great simplicity.

To change a "quick-setting" into a "slow-setting," the anhydrous lime CaO is converted into a hydrate of lime CaO $H_2O$, which, with the other constituents of hydraulic cement, will produce a hydraulic cement that sets "slow" without heating or expansion. The hydrating of the CaO can readily be accomplished. It is found in practice, that from one to two parts of water, by weight, to one hundred parts of calcined cement stone containing an excess of free anhydrous lime will suffice to produce the desired result.

The water is combined with the cement by sprinkling it over the calcined stone coming from the kilns; it is then milled, etc.

The latter process is now in operation with excellent results at the Round Top and Cumberland cement works, and, thus far, the quality of those cements has been improved at an average of 25 pounds in twenty days. This is due to the purer quality of the slow-setting cement thus obtained.

It has in the foregoing been shown that heretofore the Virginia and Maryland cements, viz., the Shepherdstown, the Round Top, and the Cumberland, were excluded from use on our public works: first, on account of their irregularity in quality; second, for their too quick setting properties. By the labors of this department, and by the advice given by it to the manufacturers of the above-named brands of cement, they have at this time been enabled to produce grades thereof far superior to the well-known Rosendale cement, as shown in the preceding table. Owing to the reduced price at which they are sold, to-day they command the market here. These brands of cements are furnished to our contractors at 90 cents per barrel of 300 pounds, while the Rosendale cement cannot now be purchased in Washington for less than $1.25 per barrel. Thus, there is a difference of 35 cents per barrel in favor of the Maryland and Virginia cements.

It may be estimated (with a very approximate degree of certainty) that 40,000 barrels, at least, of these kinds of cement are annually used on the public works of the District of Columbia. A saving of $40{,}000 \times 35 = \$14{,}000$ per year is thus made. With great pleasure I have to state that this is simply due to the indefatigable labor of the engineer department of the District of Columbia, and it is with the greatest pleasure I take this opportunity to thank the officers of that department for the aid, encouragement, and facilities they have granted me in the prosecution of my operations.

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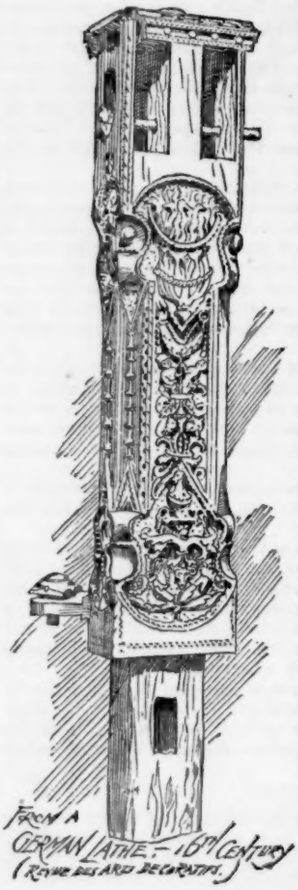
The English Nomenclature of Lumber.—Readers of lumber journals are often puzzled by the use made of the word "deal" by nearly all foreign publications, and some home ones. As generally used it means simply a piece of soft wood lumber; but the strict definition of the word, as understood by the English timber-merchant, is soft wood timber imported and sawn to the section of 3″ x 9″, or 4″ x 8″, or 4″ x 10″. Similarly, "planks" are 3″ x 12″ or 4″ x 12″, and "battens" 2 1-2″ x 7″ or 3″ x 7″, all irrespective of length, which varies considerably, and of the country or port they come from.—*Journal of Progress.*

## DEMERARA GREENHEART.




GREENHEART as a wood is well known, but it has been unnoticed save by ship-builders and marine engineers, by whom, from possessing special merits, it is highly esteemed. Its merits primarily are its durability and its power of resisting the ravages of worms and other forms of marine life. Outside the influence of the ship-builder and the marine engineer it is little known, and as a wood has been treated with undeserved neglect. We are of opinion that it possesses merits outside the influence of these trades, and that such merits have only to be pointed out to bring the wood into prominent use.

Greenheart is the natural associate of teak-wood, as it is used side by side with that wood, both in shipbuilding and in marine engineering. It is one of the ten woods classed A 1 at Lloyd's. Greenheart, although a product of the forests of South America, only rates at about half the price of teak-wood, the one being purchasable at about 3 *s.* 6 *d.* per cubic foot, and the other at about 7 *s.* Why this difference should exist it is not easy to explain. In shipbuilding it may be that the weight of greenheart is against it, for its specific gravity is 1,149, against teak 800, and oak 828. Teak, although a most expensive wood, and one not possessed of pleasing grain or color, has made considerable progress outside the above trades. It is well known in the building of railway-carriages, for staircases and floors where a great amount of wear has to be contended with; but its compeer, greenheart, is unknown in these special departments of trade. In railway-carriages it may be that greenheart is discarded on account of its weight, which, it will be seen, is about one-third more than teak-wood and one-fourth more than oak; but for stairs, floors, and a hundred purposes in the constructive arts, we fail to see why it is not adopted in preference to any other wood. It has the qualities of being hard, tough, strong, and elastic, added to which it is very durable in point of wear, and practically indestructible with regard to fire. As a building timber its price, compared with its strength and durability, ought to place it in the foremost rank. It is imported in logs, from 24′ to 50′ long, and in squares ranging from 12″ to 24″, and logs are recorded as long as 70′, and 24″ square, so that no objection can be taken to it on the score of size. In color it is not unlike oak, except that it has a greenish tinge. Its face is lustrous, but except in figured logs it cannot be termed an ornamental wood. The figure, which is somewhat rare, partakes of that found in American birch, caused by the fibres in the outer wood, under certain conditions of growth, taking a waved or tortuous course. It has the specialty of being remarkably free from knots, and of being more free from ring and heart shakes than any other wood. The sap-wood is most difficult to tell, and although there are experts who assert that it forms one-fifth to one-third of its bulk, there are others who assert that it is a wood free from sap, or, if not free, that the alburnum, like that of the lignum-vitæ, is as durable as the duramen.

As a weight-carrying wood, we question, when its size and practicability are taken into account, if it has a rival. The breaking weight of a specimen 7′ long and 2″ x 2″ square is 1,332 pounds, against teak 877 pounds, and oak 900 pounds. Its crushing weight on a cube of 4″ x 4″, is $98\frac{837}{1000}$ tons, against teak $37\frac{8}{100}$ tons, and oak (green) $33\frac{041}{1000}$ tons.

A peculiarity in greenheart is that it is liable to shake or split at the ends; this is such a marked movement in planks cut from the logs that they are invariably bound with hoop-iron. Charles Waterton, the great naturalist who travelled in South America from 1812 to 1824, speaks most highly of the greenheart; and the Rev. J. G. Wood, who reissued Waterton's work in 1879, says that Waterton brought some greenheart wood to this country, to be made into furniture for Walton Hall, Yorkshire, and very excellent furniture it is said to have made. Mr. Wood thinks it possible that this furniture may still be at Walton Hall.

As a furniture wood, its color, during the present fashion for dull goods and sage greens, cannot fail to be acceptable. Its great strength admits of its being used in small volume, its small dimensions compensating for its great weight. From its compact nature it is

susceptible of elaborate ornamentation, more especially in the lathe. In hardness it compares somewhat with ebony and satinwood, and hence, when used in the veneer, would admit of being cut to a fine gauge. As to its ornamental character we know very little; but there are figured specimens, the use of which is now under the consideration of practical cabinet-makers.

The Rev. J. G. Wood informs us that there are three varieties of greenheart: the yellow, the black, and the "mainop;" it need scarcely be said that the yellow is the variety generally known in this country, and the one to which the above remarks refer.

We have of late heard a great deal on the subject of fire-proof or fire-resisting materials. Cased wood and concretes have received prominent notice, and the opinion is general that wrought and cast iron are questionable materials. Wood, we know, is an inflammable material, and on the average forms the bulk of the fuel that keeps up the flames in burning buildings; but there are woods of a highly inflammable character, and others which are slow or difficult to burn. The ordinary fir-wood, which forms the bulk of the timber in every building, is highly susceptible of fire, and when once ignited is difficult to extinguish; on the other hand, it is well known that oak as a timbering wood will not ignite or feed a fire in like degree to fir-wood. The secret of this lies in the fact that oak is a hard, compact wood, whilst fir is soft and resinous. It thus follows that all hard, dense, or compact woods are in large degree uninflammable. Compared with greenheart, oak is a soft, porous wood, one that fire would make inroad upon, whilst greenheart would stand uninjured. As a wood, we do not maintain that greenheart is fire-proof; but if wood is to assume fire-proof qualities in any degree, such qualities are only to be found in hard, dense and compact woods, at the head of which we may safely place greenheart.

For bearing purposes greenheart has no rival, and we maintain that beams of this wood possess high qualities in the direction of resistance to the inroad of fire; such beams, if cased with plaster or other fire-resisting material, would stand uninjured in any ordinary fire, and would be more reliable in their conduct than cast or wrought iron.

This question of introducing hard-wood into buildings as a fire-proof material is a new one, and one that calls for our most serious consideration. There is no doubt that it is more qualified to resist the inroad of fire than ordinary fir timber, or than that highly combustible wood that is now so generally used, "pitch-pine." This being the case, what is to prevent us from using such non-inflammable woods as greenheart for the internal wood-work of our buildings? Taken as a timber for bearing purposes, we have to face the fact that it is double the cost of fir-wood or pitch-pine. Against this drawback we have the fact that one-third of the scantling size may be reduced throughout in the case of greenheart, to balance the bearing qualities of the three woods. The breaking weight of a 7′ scantling, 2″ x 2″, placed 6′ between the bearings, is as follows: —

| Fir-wood. | Pitch-pine. | Greenheart. |
|---|---|---|
| 876 pounds. | 970 pounds. | 1,332 pounds. |

This reduction of one-third in volume goes far to assimilate the cost of greenheart with firwood and pitch-pine, after which the difference is far outweighed by the advantage of introducing a less volume of wood into any given building, where it may in case of accident become food for fire, and in that less volume being of a hard or uninflammable character.

We are free to admit that the fire-resisting qualities of greenheart have not been tested in burning buildings, but we have the fact that fir-wood is soft and inflammable, and that hard-wood is in every way its opposite. This is well known so far as kindling is concerned, for if it be hard-wood, such as mahogany, a fire cannot be kindled with it, nor will it be readily kept alive by feeding with such wood. A block of such wood will invariably damp out a fire, where one of fir-wood or pitch-pine will prove a living coal. A friend of the writer, an old practical ship's carpenter, who has circumnavigated the globe, says of greenheart: "It is as hard and strong as iron, and so dense and compact that fire will scarcely touch it." This being the case, why not, we ask, bring it prominently forward as a building timber, and use it in place of the highly inflammable and cumbrous woods which are so undeservedly popular?

The test of inflammable and non-inflammable woods rests largely with their specific gravities, a light soft wood being more susceptible of fire than a heavy hard-wood, especially so if the soft wood is charged with oil and resin. To assist those interested in this subject, we give the specific gravities of the following woods, 1,000 being the equivalent of water — that is, those under 1,000 will float with more or less buoyancy, whilst those over 1,000 will sink below the surface:

| Quebec yellow-pine. | Baltic fir. | Pitch-pine. | English oak. | Greenheart. |
|---|---|---|---|---|
| 513 | 562 | 635 | 828 | 1,149 |

The above statistics are obtained from the Government dock-yards. We extract them from the valuable work by Laslett, "*Timber and Timber Trees.*" It may be said that the specific gravities vary greatly with different examples of soft woods, but that they are very uniform in the hard-woods.

The high specific gravity of greenheart is shown in the respective weights per cubic foot: Quebec yellow-pine, 32.08 pounds; Baltic fir, 35.09 pounds; pitch-pine, 39.37 pounds; English oak, 51.72 pounds; greenheart, 71.82 pounds.

On all hands we see that greenheart is a wood of great strength, durability, and size, one highly endowed with fire-resisting qualities, one that necessitates a less volume of wood being introduced into a building for a given amount of work, one, considering the lightness of the scantlings required, that is low in price, and, lastly, one practically within reach of the builder, when the policy of using soft, inflammable and bulky woods is set aside. — *Timber Trades Journal.*

## THE INCOHERENT ARTS.


PARIS is laughing just now over a curious picture-show — the Exhibition of the Incoherent Arts, in the Galerie Vivienne. It is, says a correspondent of the *Manchester Guardian*, in some sort the revenge of the men who cannot find a place in the coherent arts. Once a year — at least this is the second year of it — a sympathetic member of that order invites all his fellows to send in their wildest inventions in satire of the great existing schools. It is peculiarly appropriate just now, while the solemn triennial show in the Champs Elysées is still open. In the one you see the schools on their serious side; in the other, you see them in caricature, and the caricature is by a long way the more amusing. The brush seems, after all, the best implement for satire on the brush. No doubt in time to come many of the contributors to this modest show, when seeking for admission to the Institute, will feel glad to buy up all the copies of a certain small yellow catalogue which recalls their participation in this practical joke. For the moment, however, they laugh without a thought of the morrow, and it is impossible not to laugh with them. Their fun is pretty equally distributed among all the schools. A distinguished impressionist on our side of the water comes in for a share of it in the painting of a *Nocturne in Two Voices*— a few dabs of red and a few dabs of white in a cloud of gloom. It is not only impressionist, but, say what you will, it is impressive in its suggestion of an infinite mystery of darkness, though it was certainly never meant to be that. This mark of the school — its taste for vast, misty effects — is shown again in the study of *Hyacinthe in London*. Hyacinthe, the actor, as every Parisian is aware, is famed for his abnormal development of nose; in the picture we see this organ, and this organ only, in the foreground of one of our densest fogs. The impressionists receive another hit in an absolutely empty frame labelled *A Painting of the Future*. The realists are even more severely treated. In *The Macaroni Harvest in Naples* we have a woman, with a bundle of sticks of real macaroni on her back, in a field covered with a growth of the same kind. The catalogue informs you that you are quite at liberty to taste and try. *An Egyptian Frigate Chasing Three Cholera Patients* belongs to the same school of art. The three cholera patients are three red herrings fastened to the canvas, and realistic in treatment beyond all doubt. The *Paris by Night and Paris by Day* cuts with a double edge at the Realists on one side, and at the Prefect of the Seine on the other, who has lately caused an all but absolute block of traffic by simultaneously repaving half the city with wood. This is not a picture, indeed, but rather a statuary group, made up of a wheelbarrow, a pickaxe, a shovel and a lantern, in exact resemblance of the curious trophies of labor that are now to be seen everywhere in the streets. *The Genius of Naturalism*, dedicated to M. Émile Zola, is a figure of a winged boy with the head of a pig; and the *Portrait of M. de la Pommeroye*, the critic and lecturer, is realism carried to its furthest limit. Only the face is painted; the hair is real hair, the books in the foreground and the glass for water are real glass and real books, the eyeglass and the long drooping moustache are as real as all the rest. *The One-Year Volunteer* is another portrait study, treated with all that originality of invention in this style which the younger painters have brought so much in vogue. It is merely a hand and arm, the hand gloved with that huge coarse mitten which the French linesman wears on public occasions, and which is his most distinctive mark. The theory, presumably, is that you are to represent your sitter by what is most characteristic of him, and the characteristic of the little French soldier is his big-gloved hand; all the rest of his body is mere detail. Another portrait is more fantastic still. This is the *Venus de Mille Os*, and it bears a marked resemblance to Madame Sarah Bernhardt. The face is the face of Sarah, but the body is made up of innumerable bones, a rather retrospective satire on her thinness, for she has long since grown as shapely as most of her rivals. In the military series we have several square yards of canvas, which are at the same time only so many square yards of battle smoke, with here and there a *képi*, and here and there a sword. They represent *Jena, Solferino, Magenta, Wagram, Austerlitz;* and

you are to take your choice among them for any particular battle you want. There has been nothing more telling since that painting shown in a piece at the Variétés, which, if you held it up one way, was the desert under a blue sky, and if you turned it upside down was the Mediterranean under glowing heavens. The *Clarion sounds the Charge* is at once military and realistic. The warrior rushing at us right out of the picture is half painted and half real properties; his plume and his sword stand out in relief half a foot high. In the *Incoherent National Flag*, hung as a decoration on the staircase, the artist has finely typified the confusion of parties and factions as it must exist in the mind of a plain dealer. The ground of the flag is the red of the barricades, but this is dotted with the lilies of France; and the flagstaff is surmounted by the imperial eagle. Make what you can of it; but then make what you can out of the politics of the day! *Genre* does not escape. The French have always had a certain contempt for those pictures representing domestic or every-day incident that find so much favor on our side. Here we have a study of a street bootblack and his customer. The customer is a mendicant friar without shoes, and the astonished artist of the brush is asking him if he wishes to have the great toe blacked as well as the rest. The catalogue is a continuation of the jest; every artist, as in the dignified official volume of the *Salon*, is required to give his name and birthplace, and the name of his master. All sorts of names are given, partly no doubt from motives of prudence; and, still further to baffle inquiry, the birthplace is equally vague or misleading. One artist declares that he was "born at Bougival or elsewhere;" another, that he was born at Cape Horn; a third, that he has really forgotten his baptismal name; a fourth writes himself down a "pupil of Rembrandt;" another is "self-taught but vaccinated;" and one dates from the madhouse at Bicêtre. This gentleman contributes a row of figures in gingerbread, which may be said to be the masterpiece of the department of sculpture. Grotesque as it is, the show may not be without a wholesome effect upon certain eccentricities of the art to-day.

## HOUSE-BUILDING SUPERSTITIONS IN THE EAST.


In England house-building is a matter on which, in spite of "jerry" builders, one can look with comparative equanimity. In Indo-China it is a very different affair. Everything that is a source of trouble in the West disappears in those comfortable latitudes. A site can be found practically anywhere. The jungle furnishes for the trouble of cutting it, as much material as may be required. Comparatively so little skill is wanted to start as an architect that every man can be his own house-builder, and if he is tolerably diligent and not too ambitious, might finish his house in a few days; but as a set-off to all these advantages, it is a very difficult matter to raise up a house which is not rendered dangerous or ineligible by the nature of the soil, the idiosyncrasies of the surrounding spirits, or the revolutionary character of the timber used. Building houses is therefore a very critical operation, and not to be undertaken without very considerable Sabaistic lore, and an intimate acquaintance with all the animistic peculiarities of the neighborhood. For the instruction, therefore, of those who are forced by necessity, or are foolhardy enough to believe that they can build themselves houses without coming to any particular harm, there are elaborate text-books, both in Burmese and Siamese. The Burman Dehtton is a bulky treatise, containing a farrago of omens and signs with regard to all possible events and circumstances, and not merely to the process of building. The Siamese Tamra, or Manual of House-Building, is considerably more systematic, and, in addition, possesses the advantage that it sticks to the subject of which it professes to treat. The theories in both works are based on and elaborated from the Shastras which record the customs of the Brahmins. Notwithstanding their Buddhism, which prohibits all such beliefs, the Indo-Chinese have a very strong regard for the Brahminical observances. The house-building code is therefore a very popular institution. It persuades a man that he is pious when he has an internal conviction that he ought to be damned.

The first thing the would-be house-builder has to do is to find out the situation of the great dragon that encircles the earth with his body, like the Midgard serpent of Northern mythology. This must be ascertained before operations are begun at all, for it will have a great influence, not only on the time of beginning the building, but on the way in which the foundations must be dug, and the method of hoisting the posts into position. This the Burmese have recorded for them in a rhyme which every schoolboy can repeat. The Siamese are not less alive to the necessity of accurate information on the subject, and it is fully set out in the Tamra. The reason of this is that when you come to dig the hole for the main post of the house you must heap up the earth on the side toward the Nagah's belly. Terrible consequences follow if you do not observe this preliminary precaution. When you have settled generally how you ought to dig, there are a number of special rules to be observed in the digging itself. It will never do to go blindly ahead, for all the world as if you were a navvy on piece-work. In the first place it is well to dig at large all over the space your house is intended to cover; in fact, if you have any regard for yourself, you certainly will. There are divers reasons for this. If you find costly articles, silver or gold, or the images of men and deities, it is a most happy sign, and will go far to counteract all but willful remissness in other matters. On the other hand, when bones or ashes, or the figures of wild animals are found, the deductions are most unpropitious, and if you persist in going on, the house will have neither luck nor peace. If the remains of previous house-posts are found still lying buried in the ground, they must be carefully dug out and carried away, for if this were not done, and a new building were to be run up over the old remains, sickness and quarrellings would be the certain result.

At any rate, whether you get the advice of an expert or not, it is imperative that you should carefully turn over all the ground where the new building is to be. Having done this, it is a matter of reasonable precaution to make offerings to the earth-spirit. Acquaintance with this Phra Phum and his belongings is no light matter, and is likely to be as good as an annuity to the man who has mastered the details. As he is an earthy spirit he is especially liable to mortal failings, and notably possesses a very short temper, which will brook no deficiency in reverence. Negotiations with this deity are therefore rather ticklish work, but it is perilous to leave them undone. The site being settled, and things made right with the guardian spirit of the earth, the next thing to be done is to dig holes for the reception of the posts. It is necessary to begin with that for the chief post, and the hole for this must not be dug square, but in the form of a triangle. This may imply more work, but that cannot be helped. When the hole for the main post is finished, go on with the others, but be sure to do it in regular order, working round in circles, from right to left, so as to follow the line of the dragon's body from head to tail. When it comes to the hoisting of the posts into position, the face must throughout be turned toward the back of the Nagah, a little inclining toward the tail, and the post must be heaved up toward this point of the compass. It is also necessary to be very careful in the selection of the timber for the house. Trees especially to be avoided are those which have no flowers, those which have no leaves, trees which grow on ant-hills, trees with birds' nests on them, and those from which the bark has been torn off from whatever cause. Unhappily these distinctions are not obvious in timber which you have not cut yourself, and rascally Chinese carpenters will not hesitate to palm off upon the unwary wood from a tree of which scores of egrets — the Byeing, or sacred paddy-bird of the Talaings — have nested. After you have got the posts up, the surface of the ground must be smoothed down, and then the posts are decorated with little bags of shells, coins, husked rice, and the like. These must be hung up by the hands of a maiden, and not by any rude male. The heads of the posts are also covered over with cloth, for the safe keeping of the guardian spirit of the house.

It would be neither seemly nor safe to leave him exposed to the elements. The final ramming in of the posts is done at an hour fixed by the astrologers, the culminating point of some happy constellation. There is much shouting and feasting on the occasion.

With the foundation of his house settled satisfactorily, the sensibilities of the great world-dragon and the guardian spirit of the earth soothed and conciliated, and the house-posts raised and decorated with proper profusion, the house-builder may consider himself past all his troubles. — *Saturday Review.*

## NOTES AND CLIPPINGS.

Cypress. — The cypress used in New England is principally of the yellow variety, and is obtained in Alabama and along the Gulf Coast. It is used in making cisterns, tanks and vats for breweries and mills, and seems to be growing in favor for dyeing and chemical vats, as the dye does not affect it so much as other woods. It is being used largely for shingles, gutters, sills, fancy and common fencing, doors and door jambs, and for sashes and blinds. It is also used for outside and inside finish, and polishes up handsomely. As a foundation for buildings on filled-in land where the wood becomes wet and then dry it is valuable, as it will not rot as other woods do. It is being used considerably at present by builders of row-boats and yachts. The lumber generally runs large and clear, is cheap and very durable, and as its merits become better known will be a very popular wood in the North. — *The Lumber World.*

The Lately Discovered Roman Remains at Paris. — The remains of the Roman arena which were brought to light in Paris some time ago are in a much better state of preservation than was at first imagined; and now that the passage, one hundred feet long by twenty feet wide, which leads down from the main entrance to the arena itself, has been cleared of the débris, it is easy to form an idea of what the ruins will look like when the other obstructions have been removed. "Descending into the amphitheatre by this passage," says the *St. James's Gazette*, "the visitor will have to his left the stone seats rising one above the other, in front of him the semicircle formed by the wall enclosing the arena, and to his right the outline of the stage, which is still very well preserved. Only one-half of the arena has been excavated; but the other half, which belongs to the Paris Omnibus Company, will probably be purchased by the municipality; and in the meanwhile the various fragments of columns, sculpture, etc., which are now in the Carnavalet Museum, and which are known to have been removed from the arena, will be taken back. Although this is the oldest building in Paris, dating as it does from the time of Hadrian, very few relics of great antiquity have been discovered during the progress of the excavations; but among the bones which have been dug up are some which apparently belonged to the wild animals killed in the amphitheatre."

# BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

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

## BUILDING PATENTS.

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

288,611. SASH-HOLDER. — Henry H. Asimont, Duluth, Minn.

288,612. SELF OPENING AND CLOSING HATCH-DOOR OF ELEVATOR-SHAFTS. — Samuel W. Bickley, Mexico, Mo.

288,613. MITRE AND FRAMING-SQUARE. — Jas. H. Bolles, Dallas, Tex.

288,621. FIRE AND WATER PROOF PAINT. — Wm. S. Chandler, Jackson, Mich.

288,624. SPIRIT-LEVEL AND PLUMB. — Leonard L. Davis, Springfield, Mass.

288,639. LATCH. — Charles Inward, Osage, Iowa.

288,649. BRICK-MACHINE. — Gaylord Martin, Milwaukee, Wis.

288,651. TRESTLE. — Michael Miller, Glenwood, Iowa.

288,655. WATER-CLOSET.—James Muirhead, Olneyville, R. I.

288,676. MANUFACTURE OF AUGER-BITS AND OTHER BORING-TOOLS. — George F. Stearns, Chester, Conn.

288,694. COMPOSITION FOR WALLS. — John R. Davis, Clarence M. Wyrick, and Samuel Parker, Moundsville, W. Va.

288,708. HEATER. — Robert Johnson and John F. Buerkel, Boston, Mass.

288,713. WRENCH. —John Lee, Sterling, O.

288,722. VISE. — Edward L. Morris, Boston, Mass.

288,731. FASTENER FOR THE MEETING-RAILS OF SASHES. — Frank D. Paradise, Memphis, Tenn.

288,736. MICROMETER-CALIPERS. — Leopold L. Remacle, New York, N. Y.

288,748. BIT-BRACE.— John Watson, Buffalo, N. Y.

288,751. WINDOW-SASH. —Francis R. Wolfinger, Chicago, Ill.

288,756. FIRE-ESCAPE LADDER. — Frank H. Anthony, Brooklyn, N. Y.

288,758. — WATER-WASTE PREVENTER. — William Bartholomew, Doulton's Sanitary Engineering Works, Albert Embankment, County of Surrey, England.

288,769. FAUCET. — Leopold Brandeis, Brooklyn, N. Y.

288,770-771. CALIPERS. — Reuben H. Brown, New Haven, Conn.

288,781. FAUCET. — Bernard Duerstock, Cincinnati, O.

288,793. EAVES-TROUGH HANGER. — Daniel Gottschalk, Dunkirk, N. Y.

288,798. SCREW. — Hayward A. Harvey, Orange, N. J.

288,806. SAFETY-APPLIANCE FOR ELEVATORS. — John Hodges, Westfield, N. J.

288,8 7. TRY-SQUARE. — Robert Hodges, Philadelphia, Pa.

288,834. SHUTTER-HINGE. — Lyman W. Merriam, Winchendon, Mass.

288,856. HEATING-FURNACE. — Justus M. Preston and John L. Bacon, Joliet, Ill.

288,865. FAUCET. — John R. Rueckert and Robert A. Hall, Baltimore, Md.

288,866. JOINER'S PLANE. — Solon R. Rust and Arthur E. Rust, Pine Meadow, Conn.

288,876. MANUFACTURE OF TILES, BRICKS, ETC. — Isaac B. Shaw, Tunstall, County of Stafford, England.

288,882. RATCHET-DRILL. — Albert Söderström, Stockholm, Sweden.

288,884. ELEVATOR-HATCHWAY GUARD. — Nathan K. Sprague, Milford, Mass.

288,887. SPEAKING-TUBE. — Henry C. Strong, Chicago, Ill.

288,894. BRICK AND TILE MACHINE. — William W. Wallace, Frankfort, Ind.

288,902. FIRE-ESCAPE. — William Wightman, Denver, Col.

288,918. DOOR-HANGER. — William B. Botsford, Millport, N. Y.

288,920. DOOR-SECURER. — Frank Burrows, Washington, D. C.

288,921. WINDOW-SCREEN. — Volney R. Chamberlin, Cambridge, Mass.

288,924. WOOD-SCREW.— Isaac Cole, Newark, N. J.

288,927. WRENCH. — Henry Crowther, Providence, R. I.

288,935. FIRE-PROOF COMPOUND AND SHEET. — Nathaniel C. Fowler, Boston, Mass.

288,943. WINDOW-SCREEN.—Edwin Hunter, Allentown, Pa.

288,961. CALIPERS. — Oliver D. Warfield, Chicopee Falls, Mass.

## SUMMARY OF THE WEEK.

### Baltimore.

DWELLINGS. — Chas. E. Cassell, architect, has prepared drawings for Mrs. Dulin for 2 three-st'y marble front buildings, 25′ x 80′ each, on the s s Monument St., between Cathedral and Pearl Sts.; cost, $30,000.

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

Wm. H. Oler & Co., two-st'y brick shop, 30 ′x 60′, w s Eden St., between Lancaster and Aliceanna Sts.

Chas. H. Callis, 13 two-st'y brick buildings, w s Chester St., commencing n w cor. McElderry St.

J. P. Brandau, 11 two-st'y brick buildings, commencing s w cor. Charles and Heath Sts., fronting on Charles St.

John Daugherty, two-st'y brick building, w s Carrollton Ave., between Pratt and Lombard Sts.

E. W. Gorman, 5 two-st'y brick buildings, s s Hampstead St., between Patterson Park Ave. and Bradford Alley.

Robert Rennert, five-st'y brick building, s s Fayette St., between Charles and St. Paul Sts.

Mrs. Fannie Lurman, two-st'y brick stable, e s Foster Alley, between Mosher and McMechen Sts.

John L. Brooks, two-st'y brick building, 20′ x 30′, in rear of No. 357, s s Pratt St., between Greene and Emory Sts.

John Scherer & Son, two-st'y brick building, s s Raborg St., between Poppleton and Fremont Sts.

Chas. E. Willis, 4 two-st'y brick buildings, e s Monroe St., between Coale and Eager Sts.; and 7 two-st'y brick buildings, n s Eagle St., commencing n w cor. Fulton Ave.

W. G. Divan, 2 two-st'y brick buildings, e s Gilmor St., s of Baker St.

John Schem, two-st'y brick stable, in rear, s e cor. Hanover and Heath Sts.

Susan C. Poultney, 5 three-st'y brick buildings, n s Pratt St., between Payson St. and Goldsmith Alley; and 5 two-st'y brick buildings, s s Lemmon Alley, in rear of above.

Pikesville Dairy Co., two-st'y brick stable, 31′ x 40′, w s Wilmer Alley, n of Mosher St.

There will be no change in the Labor Market Report for the month of December.

### Boston.

BUILDING PERMITS. — *Brick.* — *Commonwealth Ave., Nos.* 340-348, Ward 11, for Geo. Wheatland, 5 dwells., 22′ x 58′, three-st'y mansard; Vinal & Dodge, builders.

*Newbury St.*, near Hereford St., Ward 11, for Henry Whitwell, dwell. and stable, 22′ 6″ x 78′, two-st'y flat; Joseph M. Keening, builder.

*Wood.* — *Prentiss St.*, Ward 21, for Babette Ehrlich, stable, 27′ x 35′, two-st'y pitch.

*Bower St., No.* 74, Ward 21, for Albert R. Wentworth, stable, 22′ x 28′, one-st'y pitch; Mr. Craber, builder.

*Wayne St.*, near Blue Hill Ave., Ward 21, for Augustus Parker, dwell., 28′ x 35′, two-st'y pitch; Wood & Wetherbee, builders.

*Forrest St.*, rear, near Adams St., Ward 24, for John L. Gurney, greenhouse, 13′ x 85′ 6″, one-st'y pitch; Wm. H. Gordon, builder.

*Capen St.*, near Dyer St., Ward 24, for Charles A. Ufford, dwell., 19′ x 26′, two-st'y pitch; Mr. McKenzie, builder.

*Dorchester Ave.*, junction Adams St., Ward 24, for Henry Godfrey, dwell. and stores, 30′ x 40′, two-st'y flat.

*Leslie Pl.*, near Centre St., Ward 23, for Joseph Page, dwell., 17′ x 18′ and 24′ x 30′, two-st'y pitch; Melvin V. Ayers, builder.

*Harvard Ave.*, near Fairington St., Ward 25, for A. S. Richardson, stable, 33′ x 40′, one-st'y pitch; C. W. Bowers, builder.

*Parker St., Nos.* 721 *and* 723, Ward 22, for Jacob Goldsmith, 2 dwells., 20′ 6″ x 44′, three-st'y flat; Robert D. Ward & Co., builders.

### Brooklyn.

BUILDING PERMITS. — *Bergen St.*, n s, 345′ e Grand Ave., 2 two-and-one-half-st'y brick dwells., felt and gravel roofs; cost; each, $3,000; owner, Francis O. Irish, Bennett Building, New York City; architect, A. Hill; builders, S. Nash and J. Brown.

*Willoughby Ave.*, s s, 120′ w Steuben St., 2 four-st'y brownstone front tenements, felt and gravel roofs; cost, each, $6,000; owner, Geo. W. Brown, 718 Fulton St.; builder, L. E. Brown.

*Waverley Ave.*, w s, 100′ s Myrtle Ave., two-st'y brick stable, tin roof; cost, $2,500; owner, P. M. Dingee, Clinton Ave., cor. Myrtle Ave.; architect, Chas. Werner; builders, Burns & McCann and Jno. Lee.

*Greene Ave.*, n s, 125′ e Stuyvesant Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $4,5 0; owner, A. S. Walsh, New York City; builder, A. Miller.

*Berkeley Pl*, s s, 136′ w Eighth Ave., 4 three-st'y brownstone front dwells., tin roofs; cost, each, $13,000; owners and architects, J. Doherty & Son, 280 Flatbush Ave.

*Pulaski St.*, n s, 150′ e Sumner Ave., 18 two-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner, Thos. J. Moore, 72 Sumner Ave.; architect and builder, Jno. Erickson.

*Hart St.*, n s, 149′ 8″ e Sumner Ave., two-st'y brownstone front dwell., tin roof; cost, $4,500; owner, Thos. J. Moore, 72 Sumner Ave.; architect and builder, Jno. Erickson.

### Chicago.

SOCIETY-BUILDING. — An attempt is making to raise money for building a temple for the Knights of Pythias.

BUILDING PERMITS. — John Cassidy, 3 three-st'y stores and dwells., 2713 to 2717 Archer Ave.; cost, $12,000; architect, Wm. L. Carroll.

Mrs. Oatman, three-st'y dwell., Woodland Park St.; cost, $8,000; architects, Wheelock & Clay; builder, U. P. Smith.

Baird & Douglas, 4 two-st'y dwells., 790, 792, 800, 802 Walnut St.; cost, $10,000; architect, J. Austin; builder, A. Carlson.

O. D. Wetherall, two-st'y factory, 72 and 74 Ewing St.; cost, $5,000; architect, W. Drake; builder, Geo. Lehman & Co.

West Side Brewing Co., two-st'y barn, 191 Rumsey St.; cost, $4,000.

S. M. Bushnell, 2 three-st'y dwells., 175 and 177 Warren Ave.; cost, $16,000; architects, Edbrook & Burnham; builder, M. Mortimer.

Geo. W. Tilton, two-st'y dwell., 377 Warren Ave.; cost, $15,000; architects, Edbrook & Burnham; builder, M. Mortimer.

Frank Slatkin, three-st'y flats, 1 Henry St.; cost, $4,000.

Dr. E. W. Lee, 4 three-st'y stores and dwells., Van Buren St., cor. Laflin St.; cost, $33,000; architect, James R. Willett; builder, J. M. Dunphy.

G. W. Williams, 2 two-st'y dwells., 1102 and 1104 West Harrison St.; cost, $6,000; architect, A. Williams.

W. H. Thomas & Son, two-st'y flats, 1427 and 1429 Jackson St., cost, $6,000.

Mrs. Lena Clemens, two-st'y dwell., 3425 Dearborn St.; cost, $4,000.

H. W. Bliss, two-st'y dwell., 2963 Indiana Ave.; cost, $6,000; architect, B. Penner; builder, B. Davis.

Ida L. Place, three-st'y store and flats, 484 Van Buren St.; cost, $6,000; arthitect, C. A. Placey.

Fred. Volance, two-st'y dwell., 21 Zion Place; cost, $3,000.

Godfrey Snydacker, two-st'y barn, 2522 Michigan Ave.; cost, $3,000.

R. Garnett, two-st'y dwell., 760 Adams St.; cost, $3,700.

Bohemian Free Thinking School, three-st'y addition, 400 Eighteenth St.; cost, $17,000.

Theo. Ludis, three-st'y store and dwell., 2449 Wentworth Ave.; cost, $6,000; architect, J. F. Doerr; builder, A. Mueller.

L. C. Stebbins, two-st'y stores and dwells., 815 to 821 Clybourne Ave.; cost, $10,000; architect, H. M. Hansen; builder, L. Gottschalk.

A. Dreyer, 7 two-st'y dwells., 830 to 844½ Jackson St.; cost, $10,000.

Ela & Rogers, 2 three-st'y dwells., 207 and 209 Park Ave.; cost, $12,000; architect, Julius Huber; builders, Krieg & Demuth.

### New York.

Two holidays in the week have pretty thoroughly broken up business, and little new work is reported.

HOTEL.—An eight-st'y hotel, to cover a lot 100′ x 100′, is to be built on the n e cor. of Madison Ave. and Fifty-eighth St., at a cost of about $225,000, from designs of Messrs. D. & J. Jardine; Mr. V. K. Stevenson, owner.

HOUSES. — Six first-class houses are to be built on the s e cor. of Seventy-ninth St. and Park Ave., by Mr. Jas. A. Frame.

BUILDING PERMITS. — *Second Ave.*, n e cor. One Hundred and Fifth St., four-st'y brick tenement and store, tin roof; cost, $16,800; owner, Jacob L. Maschke, 210 Rivington St.; architect, J. C. Burne.

*Second Ave.*, e s, 25′ n One Hundred and Fifth St., 2 four-st'y brick tenements, tin roofs; cost, each, $15,000; owner, architect, etc., same as last.

*Second Ave.*, e s, 75′ n One Hundred and Fifth St., four-st'y brick tenement and store, tin roof; cost, $16,000; owner, architect, etc., same as last.

*One Hundred and Fifth St.*, n s, 75′ e Second Ave., five-st'y brick tenement, tin roof; cost, $15,000; owner, architect, etc., same as last.

*Third Ave.*, n e cor. Eighty-ninth St., four-st'y brick tenement and store, tin roof; cost, $21,000; owner, John McCarthy, 1480 First Ave.; architect, Eugene Parker.

*Tenth Ave.*, w s, 75′ n Seventy-fourth St., five-st'y brownstone front flat, tin roof; cost, $23,000; owner, Stephen H. Mapes, 333 West Fiftieth St.; architects, Thom & Wilson.

*Fifty-eighth St.*, n s, 100′ w Eleventh Ave., two-st'y brick boiler and coal-house, gravel roof; lessee, Jas. Eastman, No. 1 East Seventy-second St.; architect, J. E. Terhune.

*Fifty-eighth St.*, n s, 257′ w Eleventh Ave., two-st'y brick engine-room and brine-tanks, gravel roof; lessee and architect, same as last.

*One Hundred and Twenty-fourth St.*, s s, 137′ e Second Ave., 2 four-st'y brick flats, tin roofs; cost, each, $16,000; owner and builder, Thos. J. O'Kane, 144 Alexander Ave.; architect, J. H. Valentine.

*Second Ave.*, n e cor. Sixty-fourth St., five-st'y brick tenement and store, tin roof; cost, $19,000; owner, Thos. Hall, 219 East Seventy-fifth St.; architect; J. H. Valentine; builder, J. O. Hall.

*One Hundred and Twenty-second St.*, s e cor. First Ave., one-st'y brick store, tin roof; cost, $2,500; owner, Cornelia Austin, 25 Bond St.; builder, J. C. Henry.

*Southern Boulevard*, s s, 190′ e Third Ave., one and part two-st'y brick store, gravel or tin roof; cost, $2,500; lessee, Thos. A. Mitchell, 670 East One Hundred and Thirty-fifth St.; architect, John Rogers.

*Fourth Ave.*, w s, 25′ s Eighty-third St., five-st'y brownstone front flat, tin roof; cost, $15,000; owner, Mary A. Foley, 1443 Fourth Ave.; architect, D. J. MacRae.

*Fourth Ave.*, w s, 50′ s Eighty-third St., five-st'y brownstone front flat, tin roof; cost, $12,000; owner, architect, etc., same as last.

ALTERATIONS. — *Fifty-fifth St., Nos.* 404 *and* 406, internal alterations; cost, $4,000; owner, H. Elias, 158 East Seventy-first St.; architects, A. Pfund & Son.

*East Fifty-fifth St., No.* 421, raise building nine feet; cost, $5,000; owner, Peter Dolger, 403 East Fifty-fifth St.; architect, Chas Stoll.

### Philadelphia.

BUILDING PERMITS. — *Frankford Ave.*, n of Green St., two-st'y addition to hall, 26′ x 34′; Jos. P. Yerkes, contractor.

*Wallace St., No.* 913, three-st'y dwell., 16′ x 40′; Israel Sopp, owner.

*Mill St.*, n e cor. Cumberland St., Germantown, two st'y addition to factory, 48′ x 60′; E. C. Sheppard, contractor.

*Poplar St.*, w of Twenty-seventh St., two-st'y dwell., 18′ x 38′; Rudolph Yendel, contractor.

*Orthodox St.*, between Tacony Road and Pennsylvania Railroad, one-st'y chapel, 26′ x 56′; R. H. Foulkrod, contractor.

*Dural St.*, s e cor. Adams St., 8 three st'y dwells., 16′ x 29′; Wm. H. Bruner, contractor.

*Third St.*, n w cor. Vine St., two-st'y addition to bank-building, 17′ x 60′; A. H. Rorke, contractor.

*Leithgow St., No.* 942, three-st'y dwell., 16′ x 25′; Jno. Honderer, contractor.

*Eighth St.*, s of Huntingdon St., 3 two-st'y dwells., 14′ x 50′; Jno. Loughran, contractor.

*York St.*, n w cor. Orkney St., two-st'y marble-shop, 20′ x 38′; Eldridge & Stewart, contractors.

*South Second St., No.* 210, three-st'y store, 18′ x 80′; Geo. Watson, contractor.

*Poplar St.*, w of Twenty-seventh St., two-st'y dwell., 18′ x 38′; Rudolph Yendel.

*Wynona Ave.*, between Morris St. and Township Line, three-st'y dwell., 16′ x 32′; J. T. Eldridge, contractor.

ALTERATIONS. — Messrs. Wm. Ayers & Sons propose making extensive improvements to stores Nos. 311 and 313 Arch St., from plans by Hazlehurst & Huckel, architects.

For the Estate of Henry Korn, a five-st'y addition to store-building, 28 North Third St.; Hazlehurst & Huckel, architects.

**Springfield, Ill.**

CHURCH. — The Society of the First M. E. Church, has purchased ground on South Fifth St., and will in the spring commence the erection of an edifice, to cost about $30,000. The plans have not yet been adopted.

HOTEL. — Reisch Bros. Hotel, cor. Third and Jefferson Sts., 60′ x 80′, three-st'y high, pressed-brick with stone trimmings; cost, $20,000; Geo. H. Helmle, architect; Charles Diehr, builder.

MONUMENT. — A wealthy St. Louis gentleman has given $10,000 for building a monument in memory of Menard, the first lieutenant-governor of Illinois. It is to be erected in the State-House yard; Joseph Baum is engaged upon the model.

SCHOOL-HOUSES. — Stuart school-house, on South Sixth St., two-st'y brick school-house, 4 rooms, cost, $8,000; Geo. H. Helmle, architect; F. T. Welber, builder.

McClearnand school-house, on North Sixth St., two st'y brick school-house, 4 rooms; cost, $8,000; Geo. Helmle, architect; F. T. Welber, architect.

STATE-HOUSE. — The State of Illinois will expend $25,000 for a flag-stone pavement around the new State-House. The appropriation for the same was made by the last general assembly.

STORES. — Three-st'y stone front store-building for Milton Hay, on South Fifth St.; cost, $9,000; C. W. Shinn, architect; Jno. T. Rhodes, builder.

Three-st'y store-building for L. H. Coleman, on East Washington St.; cost about $7,500; C. W. Shinn, architect.

HOUSES. — Two-st'y frame dwelling-house for F. H. Jones; cost, $6,500; A. Lyon, architect, Chicago; E. F. Gehiman, builder.

Remodeling dwell. for Dr. B. M. Griffith; cost, $3,500; Geo. A. Helmle, architect; Buck & McKee, builders.

Two-st'y dwelling-house for G. A. Van Duyan; cost about $12,000; C. W. Shinn, architect.

Two-st'y frame residence for Hon. C. E. Hay, on South Twenty second St.; cost, $8,500; George H. Helmle, architect; John Beam, builder.

Frame dwell. for Mr. Bennett, on South Fourth St.; cost, $3,000; C. W. Shinn, architect.

Two-st'y Queen Anne residence for John Capps, on South Fifth St.; cost about $4,000; George H. Helmle, architect.

Residence for Frank Myers, on South Seventh St., 8 rooms; cost, $3,800; Geo. H. Helmle, architect.

Residence for Geo. Kern, on South Eighth St., 8 rooms; cost, $3,500; Geo. H. Helmle, architect; N. Ritter, builder.

Dwelling-house for A. J. Smith, on South Douglas Ave., 8 rooms; cost, $3,000; Geo. H. Helmle, architect.

ALTERATIONS. — Remodeling residence for Charles Smorombi; cost, $2,000; Geo. H. Helmle, architect; Wm. Mayhew, builder.

Addition to H. W. Rokker's, book bindery on South Fifth St.; cost, $7,500; Geo. H. Helmle, architect; Henry Betinghouse, builder.

**St. Louis.**

ICE-HOUSE. — The Lafayette Brewery will at once begin the erection of a $10,000 ice-house.

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

James Cummiskey, 4 two-st'y brick dwells.; cost, $4,400 each, T. B. Annan, architect; T. Roach, contractor.

W. C. Popp, two-st'y brick dwell.; cost, $2,700; W. C. Popp, contractor.

C. Harrig, 2 two-st'y brick dwells.; cost, $5,000; A. Beinke, architect; Haesseler & Lewis, contractors.

A. J. Cramer & Co., two-st'y brick dwell.; cost, $3,000; Cramer & Co., contractors.

E. B. Mathews, two-st'y brick dwell.; cost, $2,500; J. H. Maurice, architect; Wm. Daman, contractor.

Mrs. Kate Bonsack, 3 adjacent two-st'y brick dwells.; cost, $7,500; F. C. Bonsack, contractor.

St. Louis Exposition and Music Hall Association, three-st'y brick and stone hall; cost, $400,000; J. B. Legg, architect; J. W. Givens, superintendent.

H. W. Kirchner, two-st'y brick dwell.; cost, $4,000, H. W. Kirchner, contractor.

Christ Pahl, one-st'y brick dwell.; cost, $2,500; Henry Debus, contractor.

St. Louis Mutual House Building Co., No. 3, 3 adjacent two-st'y brick dwells.; cost, $9,500; E. Mortimer, architect; Dan Evan & Brother, contractors.

Emile Karst, 2 adjacent two-st'y brick dwells.; cost, $5,666; J. B. Legg, architect; J. Stimple, contractor.

Emile Karst, 2 adjacent two-st'y brick dwells.; cost, $5,666; J. B. Legg, architect; J. Stimple, contractor.

Emile Karst, 2 adjacent two-st'y brick dwells; cost, $5,666; J. B. Legg, architect; J. Stimple, contractor.

P. W. Hassett, three-st'y brick dwell.; cost, $4,800; W. G. Gains, architect; P. W. Hassett, contractor.

T. M. Gilmore, two-st'y brick dwell.; cost, $3,000; Mortimer, architect; J. H. Randal, contractor.

**Toledo.**

HOUSES. — Double frame dwell., two-st'y, cor. Thirteenth and Monroe Sts., for Mr. W. H. Scott; cost, about $6,000; Jas. Hales, builder.

STORES. — Four-st'y brick store-building, Superior St., for Messrs. Hiett & Hartupee, 76′ x 116′; cost about $28,000; N. B. Bacon, architect; John Murphy, contractor for the stone masonry. Contract for superstructure not yet awarded.

Five-st'y brick and stone building for Toledo Blade, cor. Jefferson and Superior Sts.; D. R. Locke, ("Petroleum V. Nasby"), owner; size 40′ x 91′; N. B. Bacon, architect; cost of building about $35,000. The contractors for stone masonry, Henahan Bros.; contractor for iron-work, Herbert Baker. The contract for superstructure not yet awarded.

**Washington.**

BUILDING PERMITS. — The following permits for new houses worth $3,000 or over have been issued since our last report.

*K St.*, bet. Twenty-first and Twenty-second Sts., n w, 4 three-st'y brick dwells. for R. A. Buechler; cost, $14,000; B. B. Bradford, architect; Jno. H. Lewis, builder.

*Thirty-first St.*, cor. Q St., n w, two-st'y brick dwell., for Geo. T. Dunlop; cost, $25,000; C. H. Reed, Jr., architect; W. C. Morrison, builder.

*Iowa Circle*, three-st'y brick dwell., for Jas. Robbins; cost, $10,000.

*Sixteenth St.*, near Q St., n w, three-st'y brick dwell., for T. D. Wilson, U. S. N.; cost, $15,000; E. P. Friederick, architect.

**General Notes.**

BRUNSWICK, ME.— The Dennison Manufacturing Co., is building a new store-house.

CONCORD, N. C. — The new factory of the Yadkin Falls Manufacturing Co., will be 52′ x 100′, two-st'y.

CRAWFORDSVILLE, IND. — Opera-house, 80′ x 165′, for Crawfordsville Building Association; Reid Bros., architects, Evansville, Ind.

ENGLEWOOD, ILL. — S. E. Gross & Co. are about to build 14 houses for Dr. A. Brooks on Dickey St.

C. C. Landt & Co. are building by contract more new houses, and there is more building here than for years at this time of the season.

GEORGETOWN, D. C. — Bids are being received in the office of the building inspector for the erection of the extension of the Industrial Reform School, for which an appropriation of $5,000 was made at the last session of Congress.

GERMANTOWN, Pa. — The Reading Railroad Company has decided to build a new station at Duy's Lane, at a cost of $17,000.

KANSAS CITY, MO. — Five three-st'y brick houses for C. W. Whitehead; cost, $21,000.

MADISON BRIDGE, ME. — Possibly a woollen mill, 54′ x 154′, with a wing 40′ x 145′ will be built next season. The Madison Woollen Company also contemplates enlarging its mill.

MARYSVILLE, N. B. — Work on the large Gibson cotton factory is progressing rapidly.

OLDTOWN, ME. — Herbert Gray is erecting a new building, 30′ x 50′.

TOBYHANNA, PA. — A silk mill is building for the Standard Silk Company.

(*Continued on page 3, Trade Supplement.*)

## COMPETITIONS.

**COLOSSAL STATUE OF SIR W. WALLACE.**
**[At Aberdeen, Scotland.]**

10 BRIDGE ST., ABERDEEN, October 15, 1883.

The testamentary trustees of the late Mr. John Steill, of Edinburgh, hereby notify that they will receive models for a colossal statue of Wallace, in bronze, with basement of granite blocks, to be placed on the mound in the northwest part of the Duthie Public Park, near the city of Aberdeen, in conformity with instructions left by Mr. Steill, at a cost not exceeding £3,000.

Intending competitors, on application, accompanied with a remittance of 10 *s.* 6 *d.*, to Mr. John Otto Macqueen, 10 Bridge Street, Aberdeen, will be supplied with copies of (1) Mr. Steill's instructions, (2) conditions of the competition, and (3) lithograph plan of the Duthie Park, showing sections of the mound.

The author of the accepted model will be employed to execute the work, and the author of that next in order of merit will receive a premium of £50. The trustees do not, however, bind themselves to accept any of the models.

All models must be in conformity with the above conditions, and must be delivered in Aberdeen, free of expense, addressed to Mr. J. O. Macqueen, Municipal Buildings, Aberdeen, **not later than July 1, 1884.**

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**MONUMENT.** **[At Milwaukee, Wis.]**

The committee in charge is now prepared to receive designs and proposals for the erection of a granite monument on the lot in Forest Home Cemetery, in memory of the victims of the Newhall House Fire. The cost of the monument must not exceed $3,000, including the lettering on the monument of the names of the victims.

The foundation will be laid even with the surface of the ground, at the expense of the committee.

The monument is to be erected as early as possible in the season of 1884, and designs and proposals should be sent in **not later than the first day of January, 1884.**

The committee reserves the right to reject any or all of the designs or proposals submitted.

Proposals may be sent to, or any further information obtained from, WM. P. McLAREN,

414 Chairman Committee, Milwaukee, Wis.

## PROPOSALS.

**GRAVING DOCK.**
**[At Esquimalt Harbor, British Columbia.]**

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, November 12, 1883.

Sealed tenders, addressed to the undersigned and endorsed "Tenders for Graving Dock, B. C.," will be received at this office until Friday, the 8th day of February, 1884, inclusively, for the construction and completion of the partially finished Graving Dock, at Esquimalt Harbor, British Columbia, according to plans and specifications to be seen **on and after Monday, the 24th December next,** at the Department of Public Works, Ottawa, and on application to the Hon. J. W. Trutch, Victoria, B. C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and prices affixed to the whole of the items stated therein, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank check for the sum of $7,500 made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the check will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

417 F. H. ENNIS, Secretary.

**WATER-WORKS.** **[At Fort Smith, Ark.]**

The Board of Aldermen of the city of Fort Smith, Ark., desiring to obtain a system of water-works, will grant a liberal franchise to a company willing to erect and operate the same. To that end propositions will be received up to the **first Monday in February, 1884.** For information address

ED. M. KENNA,

418 Chairman Committee on Water Works.

**IRON LATTICE PARTITIONS FOR VAULTS.** **[At Chicago, Ill., Philadelphia, Pa., New Orleans, La., and Washington, D. C.]**

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., November 23, 1883.

Sealed proposals will be received at this office **until 12 M., on the 18th day of December, 1883,** for supplying and fixing in place, complete, the iron lattice partitions required for the silver storage vaults, in the custom-house and sub-treasury building at Chicago, Ill.; post-office and court-house at Philadelphia, Pa.; custom-house and post-office at New Orleans, La.; and treasury department building at Washington, D. C., in accordance with drawings and specification, copies of which and any additional information may be had on application at each of the above buildings and at this office.

M. E. BELL,

414 Supervising Architect.

**PIPE AND SPECIAL CASTINGS.**
**[At Catskill, N. Y.]**

CATSKILL, N. Y., November 12, 1883.

The Board of Water Commissioners of the Village of Catskill, N. Y., will receive bids **up to 3 o'clock,** P. M., **December 3, 1883,** for the following quantities of cast-iron pipe, viz.:—

| | | | | | |
|---|---|---|---|---|---|
| 1,452 | feet of | 12″, | weight, | 1,004 | lbs. per length. |
| 3,288 | " | 10″, | " | 766 | " " |
| 4,356 | " | 8″, | " | 557 | " " |
| 9,900 | " | 6″, | " | 377 | " " |
| 24,926 | " | 4″, | " | 226 | " " |

Also the price per pound for specials.

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

The pipe to be delivered at Catskill, N. Y., on or before the first day of May, 1884.

E. LAMPMAN, President.

W. S. PARKER, Engineer. 414

**ELEVATORS.** **[At New York City.]**

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., November 16, 1883.

Sealed proposals will be received at this office **until 12 M., on the 5th day of December, 1883,** for furnishing and erecting two steam freight elevators, one in the Assay Office Building, and the other in Public Stores Building, cor. Laight and Washington Sts., New York City, in accordance with specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent of Repairs at New York City.

M. E. BELL,

414 Supervising Architect.

**PUMPING ENGINES AND BOILERS.**
**[At Catskill, N. Y.]**

CATSKILL, N. Y., November 12, 1883.

The Board of Water Commissioners of the Village of Catskill, N. Y., will receive bids **up to 3 o'clock,** P. M., **December 3, 1883,** for two pumping-engines and boilers complete, of the capacity of seven hundred and fifty thousand gallons each per day.

Plans, specifications and requirements can be had on application at the office of the Engineer.

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

E. LAMPMAN, President.

W. S. PARKER, Engineer. 414

**CONCRETE SIDEWALKS, GRADING, ETC.**
**[At Philadelphia, Pa.]**

PUBLIC BUILDINGS, PENNSYLVANIA SQUARE.

Sealed proposals will be received at the office of the Commissioners, in the buildings, **until 12 o'clock, noon, of Tuesday, December 4, 1883,** for all the grading, concrete and permanent covering required for the sidewalks on the east, south and west fronts of the buildings.

The covering must be of suitable and well-approved materials, natural or artificial, laid in the best manner, complete.

Each proposal must be accompanied by a sample of the material proposed, together with description in detail of the manner of laying, and, if artificial, of its composition, and places and dates where and when used.

Full particulars as to form and every detail and requirement of the proposals, with the necessary blanks and envelopes, may be had on application at the Architect's Office in the Buildings, second story, south front.

The Commissioners reserve the right to reject any and all bids.

By order of the Commissioners.

SAMUEL C. PERKINS, President.

Attest: F. DEHAES JANVIER, Secretary. 414

# The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 18. SATURDAY, DECEMBER 1, 1883. Volume XIV. No. 414.


## THE PERMANENT EXHIBIT AND EXCHANGE OF BUILDING MATERIALS AND IMPROVEMENTS.

N. E. cor. Wabash Ave. and Washington St., Chicago.

The Exhibit and Exchange is intended for the permanent display of all kinds of building materials and inventions, and will be opened free to the public every business day of the year.

It is intended to make an exhibition ONLY of materials, either natural or artificial, that are from the hands of the producer; accordingly a local trades exhibition is not sought after, but it is intended to stimulate such trade by an exhibit of products that in detail form parts of construction and finish.

It is desired that manufacturers, inventors and special agents of the same be only represented, as covering the entire demand sought for in the exhibit.

The object and value of such a display is two-fold: for the building public it affords a valuable repository of information, and a ready agency for reaching desired articles; for the exhibitor it will prove a valuable advertising medium, placing the ACTUAL material before the *particular public* from whom the demand for the same is anticipated.

The business regulations of this enterprise, briefly stated, consist of exhibition-spaces, classified and arranged in departments of the same classes of materials together, and surrounded by broad aisles. Instructed attendants will be in charge of the several divisions, while exhibitors and patrons will have free access to transact business on the floor of the Exchange. The management of the Exchange will remain strictly impartial as to the merits of the exhibits; but will protect each and every display from abuse, and acts of petty jealousy by any one, and will deny admittance to every irresponsible party, or materials of known doubtful reputation.

Despatch-boys and telephone will be provided for communication with every local house and firm in the city that is represented; and those located out of the city will receive prompt attention by mail, regarding any inquiries for their goods. The limitation as to floor area of exhibit spaces will be confined in depth to full and half widths, by such frontage as may be desired by exhibitor; and a limitation of height of eight feet to all exhibits, except those against walls.

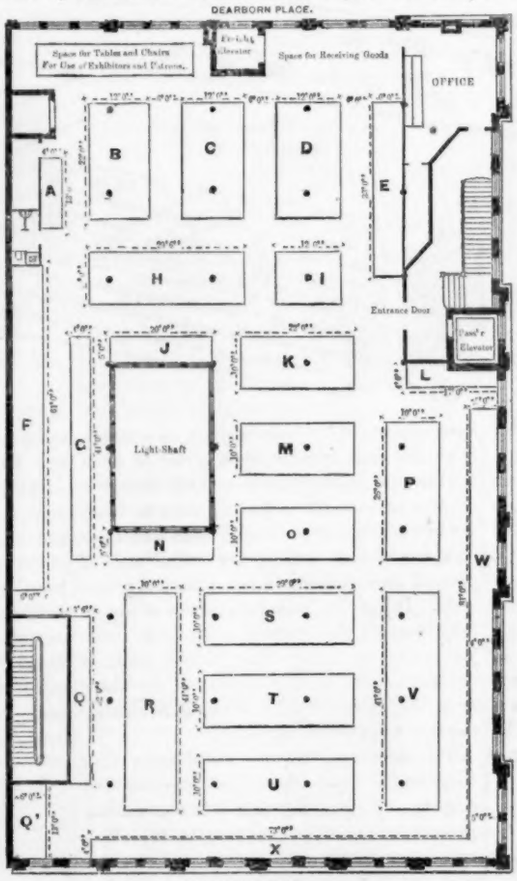
A charge of $5.00 per year per square foot for space taken will be made, and this covers the entire demand.

The management guarantees ample advertising in technical, local, and country newspapers, that the public may be continuously informed of the existence of the exhibit and exchange.

Prominent architects of Chicago, and officers and members of building societies have given encouragement to this enterprise, and it is designed to have a Builder's and Mechanic's Exchange Room (and Society rooms for the regular meeting of building associations) in connection, and it will be the aim to draw all building interests to this institution as a common centre.

The enterprise will be carried on solely by the undersigned, who owns the leases of the building and fittings of the establishment, and to whom all communications should be addressed.

HENRY LORD GAY,
80 LASALLE ST., CHICAGO.




## SAYLOR'S AMERICAN PORTLAND CEMENT.

D. O. SAYLOR, President and Superintendent of Saylor's Portland Cement Works, has prepared the following instructive notice for the architects, engineers, and masons of the United States: —

In order to make Portland cement, it requires a homogeneous mixture, containing, in proper proportions, carbonate of lime, alumina, silica and iron. This mixture must be subjected to a heat sufficiently high to produce a vitrified, dense and heavy clinker, whose specific gravity, when ground fine, should not be above 3.

In order to produce *pure* Portland cement, it is necessary that the manufacturer reject all the under-burnt and the pulverulent material, and carefully select only the vitrified clinker. The under-burnt contains free lime, and is light in weight; and the pulverulent is the over-burnt clinker, which falls to a fine powder the moment it comes in contact with air, and both should be rejected as foreign matter.

It is impossible to regulate the draught of the kiln so as to burn the material alike, and to a proper degree of calcination. Some manufacturers grind the contents of a whole kiln together, under-burnt, over-burnt, as well as the good, clinker, producing a cement weighing about one hundred and eight pounds per bushel, feeling fine and soft to the touch.

Properly burnt and well-selected Portland-cement clinker, when ground so as to pass ninety to ninety-five per cent through a sieve of twenty-five hundred meshes to the square inch, will not weigh less than one hundred and eighteen pounds to the bushel, and feels hard, sandy and coarse, when compared with the other containing the foreign matter, when ground much coarser.

Light-weight cement will test well in the popular "seven day test." The free lime, however, arrests the chemical action necessary to crystallize and harden the mortar, and it will never attain that stony hardness that pure, heavy cement will, and at the expiration of a

few months, if it does not disintegrate, will be as hard as it will ever get, while pure Portland cement, as General Gillmore says, in his valuable book on lime and cement mortars, will "continue to harden for ages."

The induration or setting of Portland cement consists in the formation of a real mineral, of a crystalline rock species, which appear to be analogous to natural zeolites. This fact can be confirmed by microscopic examination of Saylor's Portland cement. The set will be found to consist of translucent, and, to some extent, even of transparent crystalline particles of different forms, exactly like those of the zeolites of nature.

It is evident and a settled fact among chemists, that in the induration or setting (especially under water) of cement containing free lime, that no crystallization takes place, but it will form an amorphous mass, often penetrated by cracks and fissures, so frequently seen in constructions composed of cement.

None of the English, French and German engineers, writing on the subject, have ever argued in favor of light-weight Portland cement, especially in point of economy. It was left for the importers of light-weight cement to advance this erroneous idea. Some of the foreign manufacturers were quick to take advantage of it, and have decreased the gravity and price of their exportations, and their packages have increased to a size almost equal to our American natural cement barrels.

A few years ago the English and French Portland cement manufacturers pointed with pride to their small packages, arguing, and justly so, that in density and heft is strength. Since great competition in the trade has arisen between imported and the American production, the former is being produced at a price much below what it was some years since, when a heavy and dense cement was required.

I submit the above explanation of our manufacture for the benefit of those who may not be familiar with what does and what does not constitute a first-class Portland cement.

JOHNSON & WILSON, General Selling Agents,
91 Liberty St., New York, N. Y.

## ANDERSON'S PATENT BRICK-WALL BINDER, AND METHOD FOR PREVENTING "SALTPETRE" EXUDATIONS.

The matter of "saltpetre" exudations on the face of pressed-brick walls has long been a vexed question among architects, builders, and those desiring to select the best material for their structures, and the Anderson method of preventing this objectionable feature is advanced as the best and surest.

These exudations commonly appear in the form of unsightly whitish blotches on the surface of pressed-brick walls. These blotches are due primarily to soluble alkalies and alkaline earths, present as impurities in the lower grade of clays from which common bricks are made, and to the lime and magnesia from calcareous pebble deposits present in most of these clays; and to the lime and magnesia of the mortar with which the common brick are laid, the evil being promoted by the faulty construction of the walls. These walls, as heretofore constructed, have been laid up with the outer course of one width of pressed-brick, the rear part of the wall being laid up of two or more courses of common brick.

In laying these walls the facing course of pressed-brick has been tied to the main wall of common brick by interlacing heading-courses of common brick, which are made to penetrate and overlap the longitudinal rows or stretchers of face-brick at every fourth or fifth course. This overlapping or interlacing of the respective courses of pressed and common brick serves well for tying or binding the walls together, but is highly objectionable on account of the intimate capillary contact of the facing-course of pressed-brick with the common brick, and with the mortar of the common brick, thereby inoculating and supplying the efflorescing germs to the face-brick. In laying up such walls, the mortar paste for the front or facing course of brick is laid on sparingly, while the inner courses of common brick are laid up with thick seams of lime-mortar, the mortar being grouted into the joints, and into the adjoining seam between the two contiguous courses of front and common brick, thus making the entire wall of pressed and common brick practically one body. It has also been the practice to wet or fully saturate the common bricks with water just prior to laying them in the wall, to prevent the too rapid absorption of the water from the mortar by the brick, thus causing the mortar to set too quickly.

The substances of this wall-coating are: Sulphate of soda, sulphate of magnesia and sulphate of lime, the first being commonly present in variable quantities in the clays, especially the Western drift-clays, being the result of igneous agencies and of chemical changes. In the second place the magnesia in the brick-clay, or the magnesia in the lime of the mortar, is converted into the sulphate of magnesia by the sulphur acid fumes evolved in the burning in the kilns from iron pyrites present in the clays, or sulphur fumes of the fuel, or by the absorption of sulphurous vapors of coal gases from the general atmosphere, and a like conversion takes place from the lime of the clay and mortar, which is converted into the sulphate of lime. These salts are readily dissolved by the water with which the common brick are saturated, and the water of the mortar, and so dissolved are readily absorbed by the dry front or face brick of the wall, evaporating through the pores of such brick, and efflorescing upon the surface thereof.

Our method for preventing these exudations is as follows:—

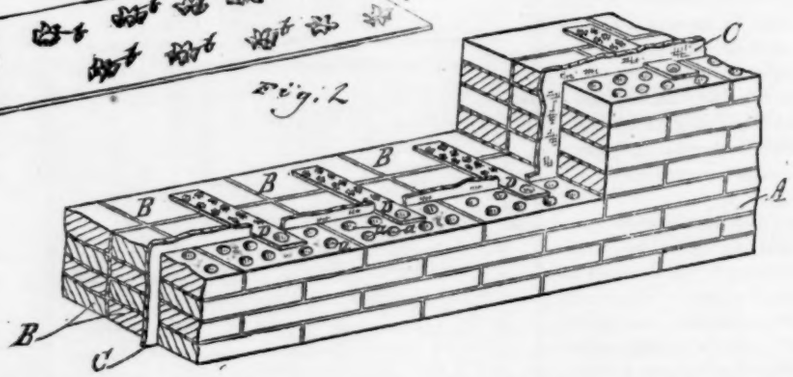
Referring to the drawings, Figure 1 is a view of the binding or tying strip, and Figure 2 a view in perspective of a wall constructed according to the method set forth.

*A* represents a front layer or wall of our pressed-bricks, which are free from any trace of saltpetre. These brick are laid in continuous courses as stretchers, without the use of headers, as is commonly the case. These bricks are provided with depressions or cavities, *a*, for holding the mortar, and also for holding one end of the binder strip. *B* represents the rear portion of the wall, and is built of one or more courses of common brick in the ordinary way, with headers and stretchers. The front course or face layer of brick is separated from the rear portion by a strip of tarred felt, *C*, or analogous material, so as to separate or isolate the two walls, and thus prevent the sulphate of soda, etc., contained in the common brick and the mortar of the rear wall, from penetrating the face layer, and causing the unsightly efflorescence.

*D* are binders or strips of sheet metal, for tying the front course of brick to the rear courses. The rear portion of binders are provided with burrs, *b*, or rough projections struck up, or punctured from the body of the metal. This end of the binder is laid in the mortar joints of the common brick, the punctured holes and burrs forming a firm hold or grip upon the mortar, while the front end of the binder is provided with a downwardly projecting burr, *E*, which engages with a depression *a* in the top of the face-brick *A*, by which means the facing and rear walls are held and bound firmly together. It will be observed that by our construction the facing brick will be effectually tied and secured to the main wall, and the necessity of clipping the facing and common brick to interlace and bind with each other is obviated, and the æsthetic effect of laying all the facing brick as stretchers is secured.

Fig. 1.


Fig. 2.




The expense of this method is merely nominal, and in view of the labor saved over the brick clipping and interlacing process, it is more economical. Forty to fifty binders to a thousand brick is sufficient. The cost is $1.50 per hundred, and of the felting not exceeding forty cents per thousand brick.

To any one using the Anderson Pressed-Brick we respectfully urge them to order the Anderson Binder, and adopt this method. We can refer those interested to many buildings wherein the perfect success of this method is evident.

CHICAGO ANDERSON PRESSED BRICK CO.,
157 La Salle St., Chicago.

## INTERIOR DECORATION.

SPEAKING of the handsome exhibit made by the Williamson Art Metal-Works, at the late Southern Exposition, Louisville, Ky., the *Courier-Journal* for August 19, 1883, says:—

"One of the most beautiful of the displays on this floor is that of the Williamson Art Metal-Works. It is a snug little room fifteen feet square, finished in black-walnut and ash, with an elegant mantel decorated with panels of etched brass and dark bronze. The wainscoting is of ash, with upright panels of bronze on the pilasters and geometric panels placed at proper intervals. The top moulding of wainscoting is decorated with a three-inch border of bronze, this border (wild blackberry design) showing leaves, flowers and fruit. The dark bronze decoration inlaid in the light-colored ash has a most pleasing effect. Something entirely new in the way of a frieze is introduced: this is formed of a bronze border nine inches deep, consisting of running scrolls and rosettes; the finish of this is a combination of light and dark bronze. The mantel of the room is a beauty. It is decorated with bronze tiles, tiger-lily design in bold relief, of natural size. The inside border is of oxidized yellow brass, with polished brass fenders and grate. Around the room are a number of bronze tiles set in bronze and brass frames; the designs are mostly from nature, occasionally, for variety, conventional forms being used. The flowers used are smilax, hawthorne, morning-glory, wild aster, etc. A set of panels suitable for mantel decoration and for inlaid wood-work is very pretty and artistic. The subjects are ferns and wild flowers, all cast in bold relief. The walls are decorated with bronze tiles, mounted in plush, and brass etchings. These etchings, which Mr. Williamson seems to think little of, are unquestionably the finest things in the exhibition. They are all worked by hand on polished and frosted brass. Some of them represent ferns growing; and the delicacy of this most delicate plant, every leaflet standing out, is beyond all praise. Some of them seem torn up by the roots, and the delicate rootlets are cut with marvelous fidelity and beauty. The walls of the room are papered in dark maroon, and the carpet of plain olive; some easels holding etched plaques, and nicely upholstered chairs constitute the furniture.

Altogether the display is a fine exhibition of native talent, and is well worth visiting.

While the *Industrial News* says:—

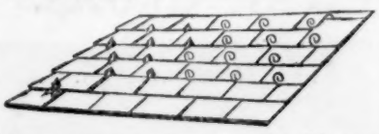
"One of the most effective displays in the great Southern Exposition is that of the Williamson Art Metal-Works. This consists of a room neatly fitted and adorned, and shows how much can be done in brass to make homes attractive. These casts in metal have been largely used in mantel work for some time past by local decorators, and the demand has increased so that it has now become an important industry, reaching into every important State and Territory. The Williamson Company shows how this work may be used for frieze, dado and panel decoration as well. The designs are all drawn by Mr. Williamson himself, whose powers as an etcher are well known."

WILLIAMSON ART METAL-WORKS,
227 AND 229 WEST MARKET STREET,
LOUISVILLE, KY.

## SNOW-SLIDES.

As each year brings its list of accidents to life and property from snow-slides, their prevention is of universal interest.

In the year 1876 there was invented a guard which effectually prevents snow-slides, and it is known to the trade as the "Folsom Patent Roof Snow-Guard."



The accompanying cut represents this invention, which consists of two styles of guards, one of wire and the other of zinc.

The wire guards must be applied when the slates are being laid. The zinc ones serve the same purpose as the wire ones, and can be applied at any time without disturbing the slates.

The guards are distributed over the roof at regular distances, holding the snow where it falls, thus allowing it to thin out gradually.

The selling agent is

MR. JOHN H. HILLER,
1410 TREMONT ST., BOSTON.

## THE OTTO GAS-ENGINE.

WE learn that in the action of "Otto *vs.* Ashbury, Sumner & Co," "Otto *vs.* Ogden," and "Otto *vs.* Bickerton & Co.," all of which were brought by Mr. Otto to restrain infringement of his patent, No. 2081, 1876, the respective defendants have submitted to orders for a perpetual injunction in terms similar to those of the judgment given by Court of Appeals in favor of the same plaintiff, in the action of "Otto *vs.* Linford," and further that in the similar action of "Otto *vs.* Whittaker" judgment has also been obtained for an injunction. — *Extract from "Engineering" of October* 19, 1883.

## NOTES.

THE Glass Veneer Company of Boston has just completed the following work:—

Baltimore, Md.: — Baltimore *Sun* Office, walls and ceiling; Mr. Diffenderffer, Park Square; four vestibules.

Washington, D. C.: — Dr. Reuben A. Bacon, ceiling, 529 Four and One-Half Street, S. W.

Bridgeport, Conn.: — G. W. Simmons, ceiling and walls.

St. Paul, Minn.: — Office Northern Pacific R. R. Co., ceiling and frieze.

New York: — Union Square Theatre, walls and ceilings in inner and outer lobbies.

THE Neuchatel Asphalt Co., 54 Astor House, New York, was awarded a gold medal at the recent exhibition at Amsterdam.

OUR readers may recall the illustration of two houses built at Toledo, for Messrs. D. W. Gibbs and D. L. Stine, published in our issue for November 10. As both of these gentlemen are architects, and were building houses for themselves, it is fair to suppose that they used only the best materials of their kinds, and hence the following letter from them to Messrs. Pratt & Lambert, 110 John St., New York, may be of interest to the profession: —

November 1, 1883.

MESSRS. PRATT & LAMBERT: —

*Gentlemen,* — It is with pleasure we certify to the very superior quality of the Hard Oil Finish and Spar Varnish manufactured by you. We have used it extensively in our work in the past, and find it all that could be desired. We shall not hesitate to specify it in our future work, and recommend it in the highest terms.

Truly yours,
D. W. GIBBS & CO., Architects.
TOLEDO, O.

## BUILDING INTELLIGENCE.

### General Notes.

BLOCK ISLAND, R. I. — Mr. John F. Hayes is building an annex to the Seaside House, 30′ x 51′, with basement, two-st'y, and mansard roof. Mr. Almanza Littlefield is building a smaller but similar annex to the Central House.

BRIDGEPORT, CONN. — The Howe Machine Company's Works in this city which were burned on the night of July 26, are to be rebuilt. The main building will be three-sty, and of brick.

BROCKTON, MASS. — City almshouse, 40′ x 104′; J. F. Beals, contractor; cost, $10,000.

Business block for E. H. Joslyn, four-st'y brick, containing stores, offices, and Good Templars hall; Washburn & Holmes, builders; day work.

Dwelling-house for Lon Weston; A. E. Woodward, builder; cost, $5,200.

Dwelling-house for W. A. Sanford; F. B. Porter, builder; cost, $4,500.

Dwelling-house for Mrs. Marshall Fuller; J. A. Jackson, builder; cost; $2,500.

W. V. Howard, Brockton, is the architect for all the above.

COLORADO SPRINGS, COLO. — A public school building is about to be built; probable cost, $15,000; R. S. Roeschlaub, Denver, architect.

DALTON, MASS. — It is said that Byron Weston intends to build another mill in the spring near his present ones.

GREELEY, COLO. — The Weld County Court-House is now under roof; cost, $30,000; Newell & Rubicam, builders.

HARTFORD, CONN. — The trustees of Trinity College have voted to erect a suitable building for the reception of the astronomical instruments offered the college last year by Dr. S. B. St. John of that city.

HENDERSON, N. C. — One-st'y brick passenger-station, 30′ x 71′, for the Seaboard & Roanoke Railroad; cost, $5,000; J. A. & W. T. Wilson, architects, Baltimore.

KALAMAZOO, MICH. — The contractors for court-house are Messrs. Miles, Cramer & Horn of Toledo.

LITTLETON, COLO. — The public school building is being remodeled and extended under the direction of Seely & Hale, architects, Denver. Contract price, $6,100.

LONGMONT, COLO. — The Masonic hall building, to cost about $8,000, is now under way; Seely & Hale, architects, Denver.

SPARTA, GA. — Brick and stone court-house, to cost $26,000; Bruce & Morgan, architects, Atlanta, Ga.

WELDON, N. C. — One-st'y brick passenger-station, 45′ x 55′, for the Seaboard & Roanoke Railroad; cost, $5,000; J. A. & W. T. Wilson, architects, Baltimore.