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THE Massachusetts Legislature has adjourned without doing so much as usual in the way of amending the Boston building laws; and such amendments as have been made are commendable. The builders of small houses have been favored by the mitigation of the unnecessarily harsh rules in regard to the thickness of walls, and party-walls between houses not more than thirty-six feet high may be built twelve inches thick to a depth of fifty-five feet, instead of forty-five feet, which has been until now the limit. On the other hand, a restriction has been put upon the space allowed to remain undivided in fireproof warehouses, limiting it to ten thousand square feet in area. The space in warehouses not fireproof is already limited to eight thousand square feet, and the restriction to ten thousand in fireproof buildings of the same sort wisely recognizes the danger which threatens any known construction from the burning of a very large mass of goods stored together. The third amendment affects only school-houses, and reduces the live load to be calculated for in school-rooms from an indefinite standard, set at the discretion of the Building Commissioners, but generally taken at about one hundred and twenty-five pounds per square foot, to eighty pounds, leaving the standard for assembly-halls in such buildings at one hundred and fifty pounds, where it has previously been. As the actual load in school-rooms, in which the desks render crowding impossible, seldom reaches twenty-five pounds per square foot, the limit of eighty pounds is certainly safe enough; and, as all school-houses in Boston must now be of fireproof construction, it is very proper to revise the standards of strength which might, perhaps, not give too large a factor-of-safety for such uncertain materials as wooden beams, but which, applied to modern steel and iron construction, would be unreasonable.

A LAW point of importance to builders was decided in England a few days ago. The owner of an estate on Dover Street, near Piccadilly, made an agreement with a builder by which the latter was to pull down and remove the old buildings on the land, and, within a certain time, erect a new one, upon which he should receive a lease, for eighty years, of the property, at a nominal rent for the first year, and at eleven hundred pounds per annum for the subsequent period. The contract provided that, if the builder should make default under the agreement, he should forfeit all benefit under it, and that it should thereupon be determined, and all materials and buildings on the ground should become the absolute property of the lessor; and that the lessor might, in such case, re-enter and take possession of the premises and plant, without making to the lessee any allowance or compensation in respect thereof. The builder took possession of the premises in June, 1896, and removed about a thousand dollars' worth of materials from the old buildings. The owner waited seven months for the fulfilment of the contract, but nothing further was done; and, as the time within which the new building was to have been erected had expired, he re-entered and took possession of the property. He endeavored to dispose of it to other parties, but was only able to make a lease involving a loss to him of thirty-six thousand dollars, and he sued the builder for this amount, as damages for the breach of the contract. The builder's counsel claimed that the agreement did not say anything about any damages, and as it provided specifically that the owner, in case of default, might take possession of any new buildings or plant on the ground, which should be forfeited to him, that this constituted the only penalty for breach recognized in it, and that the owner could claim nothing beyond. The judge, however, Mr. Justice Kennedy, of the Queen's Bench Division, held that this view could not be accepted. If the clauses in question had stipulated that the forfeiture described should be "as and for liquidated damages," or had made some equivalent declaration, the case might be different, but the Court could not read in this provision where it did not exist; and he found nothing in the contract to deprive the owner of the right to prove actual damage from the failure of the builder to perform what he had agreed to do. On the other hand, the same rule would apply to both sides, and, notwithstanding the stipulation that, in case of re-entry, the owner might take possession of the buildings and plant "without making any allowance or compensation in respect thereof," he considered that the agreement would not prevent the builder from having any value that might exist in the new buildings and plant when the owner re-entered estimated, and set off against the owner's damages.

THE Société Centrale des Architectes Français has issued an official code of professional ethics, as we should call it, which, however, the Society entitles, with the usual French precision, a statement of the "Professional Duties of the Architect toward Himself, his Professional Brethren, his Clients and his Contractors." The code was apparently drawn up for the Society by M. Guadet, who signs it; and it is countersigned by M. Charles Garnier, as President of the Society. Beginning by quoting the definition of the Dictionnaire de l'Académie Française, which describes an architect as "The artist who composes buildings, determines their proportions, plan and decoration, has them carried into execution under his orders, and regulates the payment for them," the document gives an interesting view of professional etiquette in France. "This profession," it says, "is incompatible with that of contractor, manufacturer, or dealer in materials or goods employed in construction"; and it declares that the architect must be paid only by fees, to the exclusion of every other source of profit connected with his building work, or the carrying out of the trust reposed in him; and must engage in no operation which would bring to him discounts or commissions. He must also abstain from all personal advertising, or distribution of prospectuses or circulars, and from all offers of service through newspapers, posters, signs and other devices employed in commercial business; and is prohibited from all attempts to get employment through the offer of concessions, commissions, discounts, percentages on his fees, or other advantages, to intermediaries, such as business agents, managers, or other representatives of owners, and, in general, from all transactions which would be concealed from an actual or possible client.

TOWARD his professional brethren, the architect must observe the rules "which conscience imposes on all artists worthy of the name in their relations to one another." He must not try to get away clients or business from others; and if he should be called to take the place of another architect, he must consider himself the guardian of the honor and the interests of his predecessor. To his client, the architect must devote all his knowledge and experience, and must do his best to defend the interests confided to him; but he must not, even at the demand of his client, assist in transactions injurious to the rights of others, or likely to endanger them; he must receive compensation for his work only from his client, and is forbidden to receive from contractors any commissions, fees, discounts or remuneration whatever, except that, where such provision is expressly made in a contract or other paper signed

or approved by his client, he may be reimbursed by the contractor for the expense of making tracings and copies.

ALTHOUGH Sir Robert Rawlinson was not an architect, his services to the science of sanitary engineering, which all architects must, to some extent, understand and practise, were too great to allow his death to pass unnoticed. Other engineers have won fame for their skill in working out details of sanitary practice, while Rawlinson was rather noted for the originality of his schemes; but he was, nevertheless, a master of detail, and could devise means for carrying out his boldest plans. It was he who suggested the idea of supplying Liverpool with water from North Wales, which was discussed for nearly forty years before the municipality could muster courage enough to adopt it; and he is said to have been the first advocate of the use of earthenware pipes for sewers, in place of the brick and wood conduits which were at that time universally adopted.

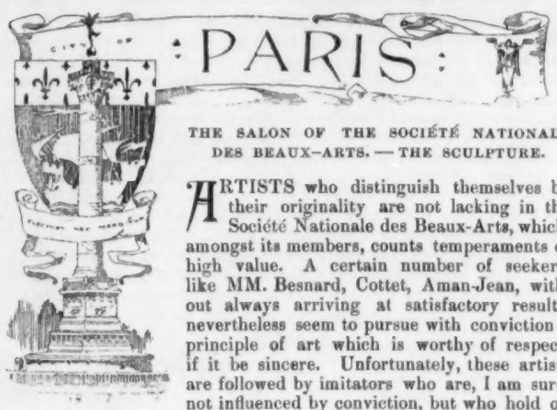
FOLLOWING the court-martial of Mr. Menocal, who was found guilty of neglect of duty in supervising the construction of the Brooklyn naval dry-dock, Civil Engineer U. S. G. White has also been arraigned before a similar court. The charges against Mr. White seem to relate chiefly to the supervision of the sheet-piling work, which is alleged to have been unskilfully and negligently done, and not in accordance with the contract, and to have been so defective as to allow leakage which has rendered the dry-dock unfit for use, "to the inconvenience, detriment, loss and injury of the naval service"; and it is claimed that the defects might have been avoided if Engineer White had properly performed his duty of supervision. There can be no doubt that a competent man, stationed where he could watch the driving of the sheet-piling, could have seen whether the piles were driven straight, close together, and to the required depth; and could also have ascertained whether they were furnished with proper wale-pieces; but it is not at all unlikely that Mr. White was obliged to be at some other place when the sheet-piling was driven, and, as no one can be in two places at once, it is by no means proved, because such defects exist, that Mr. White can be blamed for them. At the same time, it is an excellent thing to have all cases of defective workmanship in public contracts thoroughly investigated, and punishment visited on the persons responsible for it, either through negligence or otherwise. Whatever may be the case in private contracts, it is very necessary that, in work for the community, the faithful performance of duty should be enforced by severe penalties.

A CERTAIN amount of discussion is going on in the foreign papers about the statue of Balzac by Rodin, exhibited in the *Salon* this year and mentioned in the letter of our Paris correspondent elsewhere in this issue. M. Rodin, who is perhaps the most famous sculptor in France, is a person of rather eccentric notions, and his artistic friends were not very much surprised when his long-expected statue appeared in the shape of a sort of elongated pudding, stuck on a box-like base, and presenting at one end a semblance of a head, with features which may have resembled those of Balzac. The figure reminded one very much of the grewsome objects which the heroes of Hauff's tales find in the water or elsewhere, and the Société was so disgusted that it took the step, very unusual in France, of refusing to accept or pay for the statue. Meanwhile, although a few critics profess to have discovered deep thought and imagination in the unpleasant-looking lump, the Parisian world in general seems to see in it only one of those freaks to which the admirers of English art have long been accustomed, but which are new among the French.

PROFESSOR DEWAR, whose name will always be famous in connection with the liquefaction of air, has gained still higher distinction by producing, in considerable quantity, and at different times, hydrogen in a liquid condition. Most of our readers will remember that the text-books of physics that they studied in school divided gases into two sorts, the liquefiable, such as carbonic acid and chlorine, and the "permanent gases," such as air, oxygen, nitrogen and hydrogen, which were incapable of assuming the liquid condition. One by one, the "permanent gases" have been transferred to the list of liquefiable vapors, as efficient apparatus and scientific skill have reduced them to a liquid state; but even within a few years doubts have been expressed whether hydrogen would ever be liquefied. In 1895, by compressing hydrogen in small steel cylinders, and allowing it to expand suddenly, so low a temperature was produced, as was shown by a platinum resistance-thermometer set in the cylinder, that it was supposed that some of the hydrogen must have assumed for a moment the liquid form; but the phenomenon, if it occurred, could not be seen. Recently, however, Professor Dewar, with larger apparatus, and by the free use of liquid air as a refrigerant, was able to compress and condense hydrogen in the same way that liquid air is produced by other refrigerants, and collect it in a double glass bottle, with the space between the two walls exhausted, so as to prevent obscuring the contents of the bottle by condensation. In this form, it appeared as a perfectly colorless liquid, of very high refracting and dispersing power. In the first experiment, after half an ounce or so had run into the bottle, the tube carrying it became choked by the accumulations of particles of frozen air, which separated from the impure hydrogen used; but in a second trial, with purer hydrogen, fifty cubic centimetres, or about an egg-cup full, was collected in a few minutes. As the temperature of liquid hydrogen is very far below that of liquid air, and, in evaporating, is capable of producing a temperature within twenty or thirty degrees of the "absolute zero," it may be imagined that the new substance possesses some interesting properties. If a tube, open at the top, and closed at the bottom, is dipped in it, air condenses in the tube, runs down and collects at the bottom, and freezes there; while liquid oxygen, contained in a sealed tube, is instantly frozen into a blue solid; and, if the liquid hydrogen is left open to the air, it becomes milky, through the freezing of the air at its surface, and the precipitation of the air-crystals through the lighter hydrogen; and, after the hydrogen has evaporated, a sediment of frozen air remains in the bottle, which gradually melts and evaporates in its turn. After these experiments with hydrogen, only one gas, known to science, remained which had not been liquefied. This was the newly discovered gas, helium, and Professor Dewar, accordingly, procured a quantity of it, well purified, and sealed in a glass tube, and plunged it into liquid hydrogen, where it immediately condensed into a liquid, showing that its boiling-point is not far from that of hydrogen.

SOME pictures by the late Sir Edward Burne-Jones were sold at auction in London the other day, and brought enormous prices. One, known as "The Mirror of Venus," sold for fifty-four hundred and fifty guineas, or about twenty-eight thousand dollars; and another, the "Chant d'Amour," brought thirty-two hundred guineas. Some pictures by Jones's friend and teacher, Rossetti, were sold at prices nearly as extravagant. One, called "Dante at the Bier of Beatrice," brought three thousand guineas; and another, known as "La Ghirlandata," sold for the same price. It may be remarked that both Rossetti and Jones were masters of the art of embellishing their pictures with sentimental names. They laid the Italian, French and Latin languages, to say nothing of mediæval and modern English, under contribution to furnish their work with titles which would allure the British public, always more susceptible to literary than to artistic charm, and they seem to have found their reward.

WHERE is so much, in England, of this artificial puffing of pictures and statues by means of names, intended to call up impressions which the incautious public imagines to be produced by the work itself, that it would be instructive to experiment with a view to ascertaining the pecuniary value to an artist of such literary appendages to his productions. If, for instance, Rossetti's "La Ghirlandata" could be sold at auction simply as a picture of a "Woman with Wreath on her Head"; or Jones's "Chant d'Amour" as a "Female Singing," or "Veronica Veronese" as "Italian Girl," the difference, if any, in the bids would give an idea of the commercial advantage of combining literary with artistic attraction. Whether there is any advantage except the commercial one is more than doubtful. The French artists, who regard with contempt the practice of borrowing literary plumes to ornament their work, find their fame at least as enduring as that of the Englishmen who have, from time to time, been "written up," or have written themselves up, to heights of profitable popularity, only to sink into oblivion when the help of their *impresario* was withdrawn; and the painter who contents himself with making pictures of simple girls, boys, women and men, instead of "Blessed Damozels," "Ghirlandatas," and such things, will at least escape an imminent danger of making himself ridiculous.



THE SALON OF THE SOCIÉTÉ NATIONALE DES BEAUX-ARTS. — THE SCULPTURE.

ARTISTS who distinguish themselves by their originality are not lacking in the Société Nationale des Beaux-Arts, which, amongst its members, counts temperaments of high value. A certain number of seekers, like MM. Besnard, Cottet, Aman-Jean, without always arriving at satisfactory results, nevertheless seem to pursue with conviction a principle of art which is worthy of respect, if it be sincere. Unfortunately, these artists are followed by imitators who are, I am sure, not influenced by conviction, but who hold on to a process which they adopt under pretext of breaking with what they call "classic convention." In truth, we shall meet in the Société Nationale des Beaux-Arts a certain number of false Puvis de Chavannes and false Besnards (to take two types generally adopted as heads of the school). It is not allowable to copy Puvis de Chavannes, as M. D'Anethan does in a religious composition which represents Helen discovering the Holy Cross while digging on holy ground to erect a temple. M. D'Anethan has felt it proper to appropriate the qualities of Puvis de Chavennes by copying the gray tones of the master, his simplified drawing, and the archaic attitudes of his personages, but he has only achieved a rather dirty tonality and awkward drawing. Let M. D'Anethan look at the Geneviève in "Geneviève, in her pious solicitude, watches over the sleeping city," which M. Puvis de Chavannes exhibits this year, and he will, perhaps, comprehend how widely he is separated from the artist he seeks to imitate. She is already aged, her hair has whitened; standing on the flat roof of her modest house, she gazes on the city which she loves and protects. The moon softly illumines this calm and simple scene, very decorative in its harmonious tones — a picture which will complete, at the Panthéon, the life of St. Geneviève by the same artist.

This dreaming contemplation before a sleeping city seems also to have been the inspiration for M. Carrière in a decorative painting intended for the amphitheatre de l'enseignement libre, at the Sorbonne. But what a difference there is between the two interpretations! Three-quarters of M. Carrière's canvas is occupied by smoky and dark silhouettes mid which one can scarcely distinguish the forms of houses. In the left-hand corner, two female figures, lost in the same gloom, gaze out upon this desolate panorama. Is this decoration? What effect can this black and dirty blotch make on an architectural surface which is clear and luminous? Such a canvas is calculated to make the hall for which it is unfortunately destined both gloomy and distressful. Surely, there are few painters who occupy themselves with purely decorative effects, and M. Carrière is the last of all to be called to take up this kind of art. His gloomy palette ought to be kept absolutely away from it.

As a contrast, let us examine the grand landscape which M. Montenard intends for the Hôtel des Agriculteurs de France. Here we are in full sunshine, and the light which was so lacking in M. Carrière's work is here, perhaps, in excess. Under the shade of a fine tree, Virgil glorifies the work of the fields; at his feet, the Muse of Poetry is seated and holding her lyre. Both gaze on the peasants, laden with the fruits of the earth, which they are carrying to a boat; in the background, the blue sea and the mountains are half veiled in a warm mist. Everything vibrates with light.

Entrusted with a decorative panel for the Ministère de l'Agriculture, M. Fourié also draws his inspiration from the life of the fields, and simply selects a laborer and two women, solidly and conscientiously painted.

For the Mairie at Suresnes, M. Jules Ferry has made a pretty landscape out of the environs of Paris, which will certainly have a happy effect. Finally, for some purpose which I can't guess, though they pretend that it is intended for a theatre curtain, M. Anquetin exhibits a horrible composition which he calls a decoration, and which I only mention for the sake of protesting against the praise which his complacent friends shower upon him. In a more homely style of decoration, M. Bieler has composed, for a hall, six panels in distemper [*à la colle de caséine*] in which graceful female forms are silhouetted against dull greens with a very pretty effect.

For the Zoology Amphitheatre, at the Sorbonne, M. Auburtin has conceived a grand composition which exhibits the flora and fauna of the submarine world. It is a section made through the ocean, of a greenish tone which is a little too uniform. The water-color studies which M. Auburtin exhibits by the side of his great canvas, showing fishes and seaweeds, are extremely clever, and have a Japanese character which it would have been very interesting to rediscover in his executed decoration.

Among the artist decorators faithful to *genre* subjects must be cited M. Guillaume Dubufe, who knows how to give to his female figures poses that, while elegant, are somewhat sensual. Amongst other things, he exhibits three pretty sketches for ceilings, executed in 1896 in the grand ball-room of the Elysée, in which are represented in blue the symbolic images of Art, while those of the Republic are in white, and those of Science in red.

I now come to one of the most beautiful works of the Société Nationale des Beaux-Arts, a work full of human life and feeling, obtained by simple means, without labor and pretentious effort. We are on the sea-coast; the middle portion of a triptych represents the farewell feast of the family of a sailor who is just leaving home. It is evening, and the lamp, suspended above the table, lights it with a soft glow. The sailor, standing by his mother, raises his glass; the others are sad, their grave countenances clearly expressing the fear that all now present will not rejoice with him on his return. Alas! the sea keeps too many of them in its depths. The young *fiancée* herself remains uneasy beside her lover, who clasps her hand and talks to her with assurance for the future, and of his safe return, which will bring them both happiness. I cannot express the feeling which this fine canvas inspires; it is painted with a sturdy and sure talent. M. Cottet has in it produced a work of art which his previous works had not led one to anticipate, for he has here softened the vulgar brutality and violence of his palette. The other portions of his triptych I like less. He has wilfully given them a very sombre coloring, which was clearly intended to enhance the value of the central portion, but this gloomy effect is, perhaps, a little exaggerated. On the left — a corner of a boat — we see "Those who are leaving"; the sailors, in the darkness, are, each for himself, buried in mournful thoughts. The right-hand panel, also a night scene, shows "Those who remain at home." Kneeling upon the cliff, they gaze over the sea with anxiety. This interesting work has just been purchased by the State.

We shall not find so much sentiment in those other painters who also delay us with their works of real talent, and we shall be rather interested than moved before "The Pilgrims of Emmaus," by M. Dagnan-Bouveret. We do not find this year that superior inspiration which enthused us in 1896 before "The Last Supper" of the same artist, and yet here is very nearly the same strange color-scheme, the same supernatural translucency exuding from Christ, seated at the table of the pilgrims, and casting around him this artificial and disturbing light. Perhaps it is precisely the remembrance of an effect already seen that quenches our enthusiasm. Do we have before us here a "process," an invention for religious paintings? Although somewhat troubled by this doubt, our admiration is undisturbed so far as it relates to the manner in which M. Dagnan-Bouveret has treated his personages. The two pilgrims gazing on Christ with adoration and surprise and the servant, with her troubled and frightened expression before a being who she feels is superhuman, are rendered with delicacy and an art that is marvellous. The artist has yielded to a whim, and has placed himself in one corner of the painting, standing by the side of his wife and son, who are kneeling; but the modern clothes of this group, although very well painted and very well studied as to expression, make a contrast which is rather shocking.

There are not many religious paintings this year, but symbolical art is represented in a curious fashion by MM. Leempoels and Frédéric. Both of them are inspired by the work of the early Flemings, whose minuteness of detail they rival. All the faces, all the hands, are executed with the same care and perfection; not the least little spot is unoccupied in M. Frédéric's canvases, for he crowds his personages one against the other in painful confusion, without any care for perspective. It is often difficult in this conglomeration to pick out arms, legs and bodies from this very ant-hill of heads rendered in minute detail. But there is always a symbolical idea very closely studied in the works of this artist, and his triptych, "The Ages of the Laborer," is a very page of philosophy, but, in my opinion, all too complicated. The idea is quite as much muddled as the painting. M. Leempoels is a little clearer, but very cold in the perfection of his workmanship. His painting is called "The initiation into ideal wisdom of men of all times: symbol of the revelation of a better future." One perceives by the title that it is likely to be complicated. The centre of the picture is occupied by Christ preaching; on each side, groups of men listen in different attitudes, some astonished, some thoughtful, some contrite, some sneering or indifferent. On the right, the side of Wisdom, in a corner, writes a wise man, near a soldier clad in armor; on the left, the side of Crime, two men are planning an evil deed. The whole interest of the painting lies in the extreme perfection of the workmanship, but it is absolutely lacking in emotional qualities. I have already named M. Aman-Jean, and I will merely speak of his portraits, rendered in a decorative fashion, in silhouette slightly modelled, and in pale tones, which give them a rather melancholy air.

Much talk is made about a canvas by M. Simon, which represents a scene at a country circus. Lighted by a light which one cannot see, but which evidently comes from a smoky lamp, a rope-dancer is practising her steps before a country audience of Bretons who do not appear to be much amused by her. The ring-master, dressed like a clown, with a broken-hearted air, is probably bemoaning the insufficiency of the receipts. For myself, I think more of the insufficiency of the work, which can be considered merely as a good sketch, recalling those of Manet when they were good.

To such brutal talent as this, I prefer that of M. Muenier, who exhibits several scenes from country life which have an exquisite charm and feeling true to nature. Among other things, I must mention a remarkable little canvas which makes one think of Millet; its title is "Return from the Field." It shows a laborer returning

home in the evening. He draws near his house upon the threshold of which his wife awaits him with their child in her arms, who stretches out towards its father its little hands; and this simple movement is what pays the laborer for his weariness, for he finds at home the joys of home and family.

There are many nude studies in the exhibition of the Société Nationale and some of them are very good, particularly those of MM. Bouvet, Berton, Robinson and Stewart. The latter exhibits several very curious studies of women in woods which allow certain rays of sunshine to penetrate their shades and fall in luminous blotches on the flesh.

Portrait painters are also very numerous, and we can remark Mr. Humphreys, who has made a very sombre portrait of Madame Sarah Bernhardt in the rôle of Lorenzaccio. Mr. Sargent, with greater wisdom than formerly, exhibits a fine portrait of a woman in white which shows most masterly handling.

After having mentioned M. Rixens for the solidity of his painting, M. Weerts for the series of little portraits, all very well studied and very life-like, I come to the "Portrait de Théâtre" of M. Besnard. Why *portrait de théâtre?* It appears that M. Besnard wished to paint the portrait of Madame Réjane, the well-known Parisian actress, but it is said that the latter was not satisfied with the result. Perhaps this is the reason for this unpretending title, which allows M. Besnard's friends to consider his work as the synthetic personification of the actress rather than as her portrait. Leaving out of the question the matter of likeness, which is not successful, what is there in this painting that deserves the excessive admiration of his comrades? There is a rose-colored dress, deliciously painted, in the whirl of a waltz, against a background of green somewhat like certain backgrounds of Watteau's, or the drop-curtain of a theatre. The color effect is charming, but why was not Madame Réjane herself also satisfied? Because the gluing of her dress against her legs and body gives an outline of doubtful good taste; because she must have thought that it was useless to make people believe that if she did have arms they were grayish-rose color, that her shoulders were yellow, and her face red. At the theatre, before the footlights, it is possible to note these strange but passing effects, but these same things on canvas give a most disagreeable and *outré* impression. To this "Portrait de Théâtre" I prefer one by the same artist, "A Horse-fair at Abbeville." Here we find many horses in robes which are quite as showy as Réjane's, but nevertheless there is in this little painting much air and light.

We will end our visit to the paintings shown by the Société Nationale des Beaux-Arts by citing the fine Oriental studies of MM. Girardot and Girardet, and the remarkable landscapes of MM. Carin, Billotte and Lhermitte — a master in the study of nature and peasant life.

Amongst the 1,068 pieces of sculpture of the two *Salons*, we will only pick out those works that are really remarkable or much discussed, particularly those which bear relation to decoration or to architecture. Here we shall have much praise to accord, for it must be acknowledged that our modern sculpture is really of superior merit.

First, let us settle the Balzac-Rodin question, which at this moment agitates all the artists. M. Rodin, a sculptor of talent, was several years ago entrusted by the Société des Gens de Lettres with the execution of a statue of Balzac, our grand romancer. M. Rodin had some difficulty with the Société, who found that the work was not making much progress. He pretended he was not satisfied with his studies, wishing to bring to the task with which he had been trusted all the care and skill within his capacity, and to make out of it a work worthy of the genius whom they wished to honor. To-day, after several years' study, the work so impatiently awaited is offered to the public in the guise of a plaster sketch, formless and gross, which makes most persons laugh, while it saddens those ordinarily charmed by M. Rodin's talent. This statue of Balzac is either an error, or a most regrettable piece of irony. Fortunately, right in front of this most unfortunate statue is a marble group — "Le Baiser" — which by its grace and feeling bears witness to the talent of the same artist. This kiss, given and received with passion, makes these two young and supple bodies vibrate with an art which is marvellous. This makes it all the harder to account for the Balzac.

Amid the display of sculpture, the eye is drawn to the grand decoration which Mr. MacMonnies has made for the entrance of Prospect Park, Brooklyn. It is an immense quadriga, which is not wanting in a certain attractiveness. A woman stands on a chariot drawn by two horses, while upon the right hand and the left a Fame restrains a horse. I am inclined to criticise these animals because of their absolutely symmetrical pose, which gives to the quadriga a cold and formal aspect. But this central composition is accompanied on either side by a group of two horses which a bold rider is trying to control. These two groups have extraordinary life; the horses rear and neigh with much fire and naturalness. The entire composition is evidently going to be highly decorative.

M. Gauquié exhibits a pretty model of the monument erected to Mademoiselle Clairon, the famous tragedienne at Condé-sur-Escaut. The bust is placed on a graceful Louis XV pedestal, with a *cartouche* ornamented with a garland of roses held by two cupids, one of whom holds towards the bust a crown of laurel. The tragic mask lies at the bottom of the pedestal, the profiles of which have been very carefully studied by the architect, M. Henri Guillaume.

The statue of Carnot, standing before a socle over which is draped a flag, is intended for the monument erected at Dijon to the memory of the former President of the Republic. The sculptor, M. Mathurin Moreau, has given him a fine bearing which is at once cold and classic.

There are several fine funeral monuments shown by the Société des Artistes Français. That of Cardinal Bernadou, by M. Péynot, recalls those of the seventeenth century, like which it has both grandeur and nobility. The cardinal, with folded hands, kneels upon a sarcophagus which is partly covered by the folds of his large mantle. It is truly very fine and very architectural. There is more of feeling and sentiment in the child's tomb, by M. Soulés, who has known how to give to his work a highly decorative air. Behind the corpse of the little child kneels a winged St. Michael, holding his sword-point to the ground; an angel figure on the other side leaning over gazes on the child sleeping his last sleep; a richly embroidered drapery falls as low down as the base, about which are scattered flowers. This superb piece of marble work has an unquestionably monumental character. M. Gréber shows a young girl lying on her tomb with folded hands and an expression of calm repose, exhaling a sentiment which is at the same time painful and consoling; and M. Desvergnes, in his "Jeunesse éplorée" for the tomb of a young girl, recalls the attractive qualities of his master, M. Chapu.

On the Place de l'Observatoire, at Paris, is now building the base of a monument to the memory of the explorer, Francis Garnier, and the sculptor, M. Denys Puech, exhibits the plaster model of the monument, which is to be finally executed in bronze. The bust of the explorer is placed on a kind of little base, of Indian style, about which are three symbolical figures, one of whom stretches towards the bust a branch of laurel. The two other figures appear to represent Asia offering to Europe the fruits of her domain. These three figures are excellently treated and the whole composition is decorative.

Amongst the work which is more purely merely graceful must be mentioned the composition of M. Moncel, called "Vers l'Amour," which belongs to the City of Paris. A young girl sitting, gazing out and smiling while listening to the tender words of a young man stretched at length on the same bench behind her, who hugs her up to him; the expression of the young girl, showing the budding of love, is adorable, and from the whole group there exhales a feeling of youth and chastity that is ravishing.

"The Pearl," by M. Levasseur, also belongs to the City of Paris. It is a young woman standing on a shell supported by a triton; an excellent subject for a fountain, while the sculpture is both fine and delicate. "The Fountain," by M. Injalbert, is more original. A naked crouching child tries to stop the water flowing out from the mouth of a satyr's mask between his fingers and falling into a first basin of shell form. This motive, executed in colored sandstone, is very original and treated with great knowingness.

Amongst the monumental work, M. Bartholdi exhibits a quarter-scale model of the fountain erected at Lyons, which represents the Saône carrying off its tributaries. The Saône, personified by a beautiful female figure, rests on a car formed of a shell and dragged by fiery marine horses. Beside her, children represent the tributaries. M. Bartholdi certainly possesses an admirable sense of monumental sculpture.

After having mentioned the "Cardinal Lavigerie," by M. Falguière, a massive and somewhat heavy plaster, I will finish with the very curious "Tamerlane," by M. Gérome, who, if he has lost ground as a painter, gains strength as a sculptor. Last year we admired his equestrian statuette of Bonaparte, which to-day is in the Luxembourg. His Tamerlane of this year is a worthy pendant. On his neighing horse, caparisoned with gold and turquoise blue, the cavalier, clad in armor and casque of silver, pridefully maintains his seat. A heap of human heads at the feet of his horse bears testimony to the cruelty of the personage who, under the tool of the sculptor, has become an object of art, extremely delicate and elaborate.

Just as I finish this letter I learn that at its session of May 9th the committee of the Société des Gens de Lettres voted and transmitted to M. Rodin the following resolution: —

"The Committee of the Société des Gens de Lettres regrets to be called on to protest against the sketch which M. Rodin exhibits at the *Salon*, and in which it refuses to recognize a statue of Balzac."

One can only approve this step on the part of the Société, as M. Rodin really seems to be making sport of them, and there are pleasantries which a man of good taste ought never to allow himself to make.

The Elevator in 1830. — Says Justin McCarthy in the *Independent*: "I came, the other day, by chance on a passage in the '*Greville Memoirs*' which had somehow escaped my attention in former readings, and which has an odd sort of interest. I was always under the impression that the 'lift,' as we call it in England, or the 'elevator,' as I believe you call it — or at all events as you used to call it — in America, was entirely an invention of our own time. But here is Greville, who in the year 1830 is describing one of the palaces of the King of Sardinia, and who tell us that the king 'has had a machine made like a car, which is drawn up by a chain from the bottom to the top of the house. It holds about six people, who can be at pleasure elevated to any story, and at each landing-place there is a contrivance to let them in and out.' And I had always supposed that it was an ingenious 'Yankee notion,' and here you get the thing itself in Italy in 1830, the invention of a king, and the word 'elevated' ready to hand for the purpose."

SOME INSTANCES OF PILES AND PILE-DRIVING, NEW AND OLD.[1] — IV.

PORTSMOUTH DOCK.

AN interesting set of tests bearing on these points is found in Mr. Charles Colson's paper on "Portsmouth Dock Extension" (Institute Civil Engineers, 1881).

After tabulating the results of the driving of 12,088 piles, wherein is given nearly everything except the ultimate sustaining power, he applies formulas, getting safe loads of fifty, sixty and seventy tons per pile. The strata are those immediately below the London clay, consisting of compact sandy beds, containing masses of hard concretionary stone or shell rock; some not containing the shell rock and some driven to a still lower stratum of hard clay.

The last sets were about ¼ inch from the fall of a 1,600-pound ram; height, 20 feet.

"During the progress of the work it was observed that on the resumption of driving, after an interval of some hours, the set of the pile was invariably much less than that observed on the cessation of driving, the fall of the ram being the same. The result is to be accounted for, in a great measure, by the fact that during the process of driving the ground is to a great extent disturbed; the vibration also of the pile causes the hole, from the surface downward, to be slightly enlarged, thus relieving the pile from the full frictional resistance.

"In order to obtain information as to the extent of such increased resistance accruing from quiescence a number of special observations were made upon piles the driving of which was completed, or nearly completed, immediately before leaving work for the night, as many as possible of the piles which gave an excessive first set being included. On the following morning one test blow of the ram, with a full fall, was given, and the resulting set compared with that recorded on the previous evening. It is shown by these observations that thirty-nine beech piles, averaging 13.076 feet in length, 123,863 square inches in sectional area, and showing 0.0540 feet set, gave, when tested the following morning, an average set of 0.0234 feet, showing an increased resistance in the ratio of 2.30 to 1.

"Seventy-four fir piles, averaging 19.74 feet long, 162.70 square inches sectional area, and showing 0.0366 feet set, gave, when tested the following morning, an average set of 0.0130 feet, showing an increased resistance in the ratio of 2.81 to 1."

Applying these new values in the formula he gets what he calls "augmented stability," running from 118.77 tons to 232.21 tons.

"These ratios have been calculated on the assumption that the whole pressure is supported by the piles; an assumption which is untenable, inasmuch as the whole space between the piles and up to the under side of the longitudinal sleepers being filled in solidly with Portland cement concrete, the pressure is of necessity distributed over the whole area of the foundation; in fact, particular care was taken to insure this condition.

"During the progress of the pile foundations observations were made with a view of obtaining data on which to found some idea as to the extent to which the ground was compressed by the piles. The effect of driving was to raise a cone of earth around the pile, the base extending to a varying distance; this being repeated by the driving of each pile, produced a raised, undulating surface over the whole area.

"The ground consisted of the compact, sandy beds immediately below the London clay; the mean rise of the surface, due to the driving, was found to be 0.75 feet. Therefore, over an area of 52′ x 24′, containing sixty-six piles, the heads of which averaged 1.33 square feet in area, the quantity of ground lifted would be equal to 870.17 cubic feet. Deduct one-quarter due to disintegration by driving, leaves 652.63. The quantity of timber driven as piles within the above area is 66′ x 12′ x 0.854′, or 676.36 cubic feet.

"Therefore, the displacement of ground due to the pile-driving will be equal to 96 per cent of the whole quantity of timber driven."

Other ground "of a somewhat more argillaceous character" gave displacement 64 per cent of the total quantity of timber driven.

Other strata still "of a compact blue clay," the upper surface being "more plastic and compressible," gave 47 per cent of the total quantity of timber driven.

Results like these last give a definite idea as to whether the piles act as simple columns to transfer the load to strata underneath, or whether they act as compressors of the interfluent soil.

AQUIA CREEK, VA.

Further experiments on the value of quiescence are those at Aquia Creek, Va., Major E. T. D. Myers, 1885.

Bents 12½ feet centres, six piles each, 15 to 18 inches butt, length 50 feet. Grade line 15 feet above low water; in use fourteen years. Piles driven in a liquid mud. Two bents, of six piles each, were driven, upon which a platform was placed, and upon this a weight of 75,000 pounds, uniformly distributed. The experiment was made nineteen hours after driving.

No settlement taking place, piles Nos. 2 and 5 in each bent were cut out, leaving four piles in each bent. Then No. 3 of the seventeenth and No. 4 of the eighteenth were cut out, leaving only three piles in each bent. About 5,000 pounds was then added to the load, when No. 6 of the eighteenth bent yielded, followed by No. 3 of the same bent, and sank until Nos. 4 and 5 were again brought to bear.

It required, therefore, about 13,000 pounds each to start the piles. The record of the driving was as follows: —

1	2	3	4	5	6

BENT 17.

Fall from 3 to 10 feet. 2,000 pound hammer.

Pile No.	1.	11	blows,	last	blow	7	ft.	11	in.
" "	2.	13	"	"	"	9	"	9	"
" "	3.	8	"	"	"	9	"	18	"
" "	4.	8	"	"	"	8	"	17	"
" "	5.	9	"	"	"	5	"	6	"
" "	6.	7	"	"	"	7	"	10 1-2	"

1	2	3	4	5	6

BENT 18.

Pile No.	1.	12	blows,	last	blow	5	ft.	10 1-2	in.
" "	2.	8	"	"	"	4	"	8	"
" "	3.	8	"	"	"	4	"	8 1-3	"
" "	4.	9	"	"	"	3	"	5	"
" "	5.	14	"	"	"	10	"	9	"
" "	6.	5	"	"	"	9.8	"	22	"

A pile 40 feet long, after sinking 30 feet with its own weight and that of the hammer weighing 2,000 pounds, was struck with a blow of 2-feet fall, and then settled 6½ inches in one minute, by the weight of the hammer. Four weeks after this a blow with a fall of 5 feet did not move it. A blow of 14-feet fall drove it 4½ inches.

"Also at the Gunpowder River piles 40 to 50 feet long were driven until they did not sink more than 18 inches under a hammer weighing 1,800 pounds falling 20 feet. Four piles to the bent. In neither case was a hard stratum passed through or reached."

"This," says Mr. W. M. Patton in his "*Foundations*," "is but the common experience in the Southern swamps. In all cases above alluded to, these trestles have carried, without settling, the heavy trains of the present day."

Mr. Patton continues: "Some eight miles of trestle constructed under the writer's direct supervision in the Southern swamps, the bents containing four piles, spans 12 1-2 feet, depth of pile in the soil varying from 30 to 35 feet, the penetration varying from 6 inches to 2 feet at the last blow of a 2,000-pound hammer falling only a few feet, has carried *for twenty years the heaviest trains without any settling.* In the abutments of some of the bridges in these swamps the piles have carried with perfect safety 17,000 pounds to the pile. How much more they are capable of carrying is not known.

"In one of these abutments, piles only 30 feet in the soil could not be moved, by continued hammering, with high falls, a few days after driving. The experiment was made, as the writer was not satisfied with the record of the original driving, and desired the piles to be driven to a greater depth. Finding it impracticable to move the piles, he determined to hammer one or two to destruction or move the piles; destruction was the result, and new piles were driven to take their place. We may therefore conclude that piles from 30 to 40 feet, in even the *softest alluvial soils*, will carry, by frictional resistance alone, from 20,000 to 25,000 pounds, or 10 to 12 1-2 tons.

"There are examples of piles driven in stiff clay to the depth of 20 feet that carry from 70 to 80 tons per pile; this is an unnecessarily heavy load, and when driven from 2 1-2 to 3 feet centres they will rarely have as much as one-half the above loads to carry. There are many instances in which piles carry from 20 to 40 tons under the above conditions.

"In sand and gravel, piles will carry to the full extent of the crushing strength of the timber, provided the depth in the material is sufficiently great to prevent vibrations from reaching the point of the pile; other considerations will require this depth to be at least 10 feet or, at most, 20 feet.

"Any further hammering on piles in such materials is a waste of time and money, and injurious to the pile itself. To hit such a pile 100 to 150 blows to drive it an inch, as has been done, is simply folly."

SOUTH STREET BRIDGE, PHILADELPHIA.

In spite of this testimony in favor of increase of bearing power with time, there have been instances of failure, due to various causes, not expected at the time of driving. Perhaps the most noted one, excepting London Bridge, is that of the western arched approach to South Street Bridge, Philadelphia, where nine segmental arches, 43 feet 6 inches span, 14 feet rise, 55 feet width, were destroyed, owing to the failure of piles in one pier.

The following is the theory of the constructive engineer, D. McN. Stauffer,[2] to account for the stability of the structure for a period of six or seven years before failing: —

"That at the south end of Pier No. 2 the piles were driven almost, if not quite, to the rock, there not being a sufficient thickness of hard material to prevent this being the case, and, as a consequence, that end stood firm; but at the north end of the pier, under the heavy driving, the piles penetrated almost *through* the hard stratum, say to within two or three feet of the upper limit of the 'mud pocket.'

"When this point was reached the direct and frictional resistance was sufficiently great to prevent further penetration. Just what this frictional resistance was, can, under the circumstances, only be estimated. Rankine's rule, as here applied, would give about 8 tons per pile. Be this what it may, from the nature of the material, it must have been considerable, and events prove that there was a sufficient amount of hard material between the mud and the toe of the pile to support the structure for a long time.

"But the tremor in the piles, produced by the heavy and constant travel over the approach, was in this case an element of destruction. This tremor had a tendency to loosen the pile from the impervious material into which it was driven and allow the surface water to slowly

[1] A paper by Horace J. Howe, member Boston Society of Civil Engineers, and read before the society, March 30, 1898. Continued from No. 1174, page 103.

[2] American Society Civil Engineers, 1878.

find its way down along the pile. In time this water would 'lubricate' the pile and destroy the frictional value of the mud, and constantly add *additional load* to that originally carried by the toe of the pile, which original load we will say, in this case, was 16 tons.

"Possibly before the whole of the 8 tons (previously carried by friction) was added to the 16 tons already on the toe the safe bearing value of the hard crust was reached and the structure began to settle into softer material beneath it. Whether the piles punched through the crust or whether piles and crust sank together cannot be ascertained.

"No borings or test wells were taken previously."

PROCTORSVILLE TOWER, LA.

Another instance of failure is that of the pile and grillage foundation for Martello Tower, Proctorsville, La., 1856–57. — *Van Nostrand*, 1882.

Major G. Weitzel says: "The site of the tower, as determined by actual borings, was found to have the following character, viz:—

"For a depth of 9 feet there was mud mixed with sand; then followed a layer of sand about 5 feet thick; then a layer of sand mixed with clay from 4 to 6 feet thick; and then followed fine clay. Sometimes clay was met in small quantities at the depth of 6 feet, as well as small layers of shells. By draining the site the surface was lowered about 6 inches.

"The foundation piles were driven in a square of 20 piles on a side, 4 feet centres. Twenty-four piles were omitted to leave room for fresh-water cisterns, and two extra ones were driven to strengthen supposed weak ones. Total number, 378. The piles were driven to distances varying from 30 to 35 feet below the surface, or from 10 to 15 feet into the clay stratum. The average number of blows to a pile was 55, and mainly hard driving. After all these piles were driven 10 additional hard ones were put in to strengthen supposed weak points. Each one required over 100 blows to drive it.

"Before beginning the foundation I drove an experimental pile exactly in the centre of the site. It was 30 feet long, 12 1-2″ x 12″ at top and 11 1-2″ x 11″ at butt. It was sharpened to a bottom surface about 4 inches square. Its head was capped with a round iron ring. Its weight was 1,611 pounds, and the weight of the hammer was 910 pounds. Its own weight sank it 5 feet 4 inches, and it required 64 blows to drive it 29 feet 6 inches deeper.

"The fall of the hammer at the first blow was 6 feet, increasing each successive blow by the amount of penetration, excepting the last ten blows, when the fall was regulated to exactly 5 feet at each blow. The penetrations in inches were as follows for the last ten blows: 3-8, 3-8, 1-4, 1-4, 1-2, 3-8, 1 4, 3-8, 3-8, 3-8.

"This pile, according to Colonel Mason's formula, should have borne 52,566 pounds. I loaded it with 59,618 pounds, and it did not settle. I afterwards increased the load to 62,500 pounds, when it settled slowly. The greatest weight to be carried by any one pile was *between* 30,000 *and* 35,000 *pounds*.

"The tops of the piles were sawed off on a level and the whole surface between them covered with a flooring of 3-inch planks tightly fitted in, the upper surface of this floor being flush with the tops of the piles. They were then capped in one direction by stringers 18″ x 18″ x 85′ long. Each of these stringers was constructed by splicing, using the regular scarf joint. These were bound together by 12″ x 12″ stringers let into the 18″ x 18″ so that their top surfaces were flush. In the little squares thus formed, and next to the 18″ x 18″ timbers, were laid short pieces 12″ x 12″ timbers and the intervals filled-in up to the level of the latter with concrete. The whole grillage was then levelled off with short pieces of 6″ x 12″ plank. This grillage was therefore 18″ thick. Long sheet piling was driven for the scarp of the wet ditch, the upper ends resting on the inside of the stringers on the outer row of piles.

"In order to distribute the weight of the tower uniformly over this foundation, strongly reversed groined arches were turned, the space between their backs and the grillage being filled-in with solid concrete masonry. When the brickwork of this tower, which was carried up evenly on all sides, was about half completed and the foundation had on it *less than half* the load it was designed to carry, the appropriation became exhausted and the work was stopped. This was in the spring of 1858.

"When I visited the work six months after I found *a marked settlement*. The four salients apparently remained intact, but on every side the settlement was about the same, and largest about the middle, so that the courses of brick, which were laid perfectly level, had the form of a regular curve."

NEW ORLEANS CUSTOM-HOUSE.

G. T. Beauregard, captain of engineers, had ordered experiments to be made by Architect Roy, who had charge of the new Custom House at New Orleans, La., and these had been made in 1851–52. There were thirty-five tests made, with sizes of bearings on the soil varying from $\frac{1}{4}$″ x $\frac{1}{4}$″ to 24″ x 24″, and the conclusion was that, "contrary to the general opinion, a larger surface sinks more than in proportion to its area."

Major Weitzel further says: "The table of experiments sent by Mr. Roy, and the result of the experience gained at Proctorsville, La., show conclusively that although Mason's rule may hold good for an isolated pile, it cannot be depended upon for a system of piles such as are driven for foundations. In order, therefore, to determine the factor of safety for such foundations, the views and experiences of the officers of corps would be valuable," etc.

OVERLOADING STRATUM.

Considering this point of the entire bearing area, Mr. J. Foster Crowell says (American Society Civil Engineers, August, 1892: "It is quite possible to overload the stratum by driving piles too thickly; it is sometimes thought that if three piles, for instance, are good in a certain area, six will 'make assurance doubly sure.' This policy is not only costly and foolish, but in many cases it is dangerous. A certain public building in New Orleans, of which the author has heard, stands on an enormous number of square piles, driven so as to touch one another; in other words, there is a solid wall of wood, and instead of each pile having four surfaces in contact with the sustaining stratum, only the outer rows have contact, and they but on two surfaces; there are, therefore, from four to six times too many piles used, and the support is still much less than could have been obtained."

Other instances of failure not expected at the time of driving are given in American Society Civil Engineers *Transactions*, August, 1892, data by J. C. Trautwine, Jr.

Continuing the evidence, not strictly experimental, however, we have a paper quoted in *Proceedings* of Institution of Civil Engineers, written by Prof. Franz Kreuter, of Royal Technical High School, Munich, 1896. After explaining the merits of the formula, he says: —

$$L = F\frac{h_1 - h_2}{s_1 - s_2}W$$

"Preparing to ascertain the supporting power of piles, by the method explained, the following precautions are of great importance: —

"*First.* The piles should rest for some time, in order to allow the stresses produced in the ground by the penetration of the piles to be relieved. It has been stated from experience that piles frequently penetrate *with renewed ease* after some days' rest. An immediate test-driving might therefore lead to erroneous results, and to too high an estimate of the supporting power of the piles.

"*Second.* The head of the test piles should be sawn off to present a sound and solid surface to the blows of the hammer.

"*Third.* The number and force of the testing set of blows should be such as not to crush the head of the pile."

Again, Mr. Charles Davis Jameson (Member American Society Civil Engineers) says (*Railroad and Engineering Journal*, 1889): "Another thing to be remembered in driving piles to a secure foundation is the difference between the ultimate load that is to rest on them and the quick blow of impact which is given them in driving.

"It is an established fact in mechanics, and also in practice, that a permanent load resting upon a pile will eventually have ten times as much effect upon it as that same load brought quickly upon it and as quickly removed. So that although the pile may penetrate a very little distance from each blow of the hammer, and the weight of the hammer, multiplied by the velocity which it has at the time of impact, may give a blow that in pounds is much greater than any weight that will come on it from its permanent load, still, after the permanent load has been resting some time upon the pile, we very often see examples where it begins to yield; the foundation sinks; and as in very few cases it sinks with regularity over its whole surface, the result is that, if the superincumbent load consists of masonry, one part sinks while the other does not, and there is a crack or fracture in the masonry."

Mr. Jameson apparently assumes that the pile receives its maximum skin resistance as it goes down, and does not increase it afterwards. He assumes that the same principle applies to pile-driving as to testing metals or timber in general; that is, that the ultimate strength may be made to depend considerably upon the time occupied in testing.

No experiments accompany his statements.

In several of the preceding papers much has been said in praise of the Nasymth type of hammer, and much more can be said on that point. At the present time it is rare to see one hereabouts. For sandy soils, there was a question at one time whether it was not more economical than any driver. The following report of Lieut. F. N. Abbot, United States Engineers, discussed the matter (Chicago, 1883): —

WATER-JET, ETC.

"The water-jet drivers on the long average do as much or more than the (Nasmyth) steam-hammer; and this in the class of work now under execution here, where the machine-shops of the company are available at any instant.

"The leads last between three and four times as long with the steam-hammer as with the drop-hammer. A hammer-line lasts the steam-hammer one month, while it needs replacing about once in five days with the other form. Say it will drive 500 piles on a jet, 3,000 on the steam-hammer driver.

"The steam-hammer leaves the pile head as good as it was before driving, while the jet driver injures the head to a considerable extent. On this account, in contracts for wharf work, it is not infrequently stipulated that all piles be driven by steam-hammering.

"On a car, in land driving, the steam-hammer is immeasurably superior, as there is much less jar and the water needed is not excessive.

"Sixty-five piles a day are expected of every driver in the Lake Shore protection; if less are driven the matter is looked into. Hard bottom is liable to reduce this number very largely."

As to the possible economy of using steam-hammer drivers on the Mississippi River, he says: "The cost of the Illinois Central Railroad driver of this form was: —

Steam-hammer (of weight 7,500 lbs.)	$1,593.50
License to build and use	500.00
Hull	2,000.00
Boiler and engine	2,333.59
Total	$6,427.09

"The weight of this size of hammer is too great for cottonwood piles; the second size, weighing one-half as much, would be what is required. Its cost, free of license, if obtained direct from the manufactory, is (price 1883) $875. The only possible saving would be in

lessening the time now spent in actual driving, and this, with our present form, is but a small fraction of that needed per pile. The difference in the cost of the present hammer ($80) and the steam-hammer ($875) is $795, and, under the most favorable circumstances, it would take a long time to pay for itself. The more simple the machinery used the greater is the chance of real efficiency when the work is carried on, as under this office, at a distance from machine-shops.

"If any saving is to be made by extensive change of plant it must be found in some method of driving more than one pile from each position of the flat, thus eliminating partly the slow and vexatious changes of position in severe currents."

Major O. H. Ernst further says: "Lieutenant Abbot ascertained that the rapidity of penetration of piles sunk by the water-jet and hammer combined is remarkably uniform when the average of a great number of piles is considered, and when the depth does not exceed 16 feet, the rate being about the same for the last two feet as for the first two."

It is not stated what is the cost of a pump to feed the water-jet. This item would reduce the balance of $795 referred to.

The price of steam-hammers to-day is not more than one-half the figures given. However, the manufacturers do not claim a superiority in sandy soils. In general they claim a superiority for foundations of buildings, docking and certain other classes of work. There has been recent evidence in support of their claims.

PILES DRIVEN BUTTS DOWN.

The jet has another advantage. Piles may be easily driven butt down, as appears in the report of D. M. Currie, United States Engineers (St. Louis, 1881), as to work on the Mississippi River. He says: —

"There were in this place strong scouring currents, with line of piles broken by ice at times. The piles were prepared for driving by sharpening the butt ends with glut points before they were placed in the water. They were driven 8 or 10 feet in the gravelly bottom, the hammer was lowered and used in connection with the jet, tapping the pile lightly with 2-foot fall, which, by keeping the pile continually in motion, prevented the sand from settling around it and stopping its progress. The piles were usually driven about 13 feet, and the actual time of driving was about 4 minutes.

"The saving in cost of driving the piles does not represent the whole advantage gained in using the jet. The piles being driven butts down give a greater sectional area at the bottom, where the strain is greatest upon piles performing the duties required in that and similar works. Further advantages of having the butt down are that the piles have a much stronger hold in the bottom and present less surface to the current. Piles were driven to any depth desired up to 18 feet, although before reaching that depth the progress became very slow.

"Owing to the great quantities of gravel found in this locality the maximum depth reached here would be lower than the same plant would accomplish under more favorable circumstances. It is safe to say, however, that whenever the ascending current fails from any cause whatever to bring the material excavated up to the surface of the river bottom, the maximum depth to which that pile can be driven by the force acting upon it has been reached. The river would fill the space around the pile with the material composing its bottom, and pack it as soon as the upward flow was checked.

"The causes which might conspire to bring about this result are numerous, one of the most prominent being the collection around the foot of the pile of the heavy material through which it has passed."

PILES DRIVEN BUTTS DOWN.

I would refer here to a lack of success in driving piles butt downward by drop-hammer only, at St. Louis River Bridge, near Duluth (*Journal of the Association Engineering Societies*, E. H. Beckler, 1886). Tests showed that the expense was more, even for a less depth. Besides this, the small end was considered liable to decay. There have been no great repairs made there on account of ice.

A pile sunk by the use of the jet is said to stand more pressure than one driven by hammer alone, as the sand about it is better compacted (*Journal of the Association Engineering Societies*, December, 1881).

BORING MACHINE.

In certain soils it is possible to still further increase the efficiency of the jet by the use of revolving knives at the point. An account of this sort of machine and its successful use is given in *The Canadian Engineer*, April, 1895, by Major Henry A. Gray, Department of Public Works. He says: —

"In 1893 extensive pile-driving was done as protective work when widening the River Sydenham at Owen Sound, to increase the harbor area. Previous work had shown the difficulty of driving piles through the sand and other compact material found there of sufficient length to allow the lower ends to be below the depth required to be dredged in the harbor. With the boring machine shown here rock-elm piles 12″ x 12″ x 40′ were put down full length in three minutes, perfectly perpendicular and in proper place, with a few light blows. Eighty to 100 piles 20 feet long have been driven in 10 hours.

"The machine consists of a shaft to which a turbine about 5 inches in diameter and screw are fixed and contained in a cylindrical casing, supplied with water under pressure, and having openings arranged in such a manner that the water forced into said casing will, in escaping, act upwards against the soil loosened by the cutting blades fixed near the end of the shaft. These form a sort of two-blade propeller, forcing the earth, clay, etc., upwards. The machine is unsuited for a bottom where large stones are to be met with, and also, for obvious reasons, for pure sand."

The preceding collection of notes serves to give us a due respect for the subject and its uncertainties. The question of "prognosticating" is still before us. Would Sir Christopher Wren himself consider that the work of "registering past times" had gone on far enough to warrant it?

I leave this question and the general subject for your consideration.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

BAR ASSOCIATION BUILDING: FACADE ON 43D ST., NEW YORK, N. Y. MR. C. L. W. EIDLITZ, ARCHITECT, NEW YORK, N. Y.

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DETAIL IN THE "ASTOR GALLERY" OF THE HOTEL WALDORF-ASTORIA, NEW YORK, N. Y. MR. H. J. HARDENBERGH, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGN FOR THE STATIONS OF THE BOSTON ELEVATED RAILROAD. MR. C. H. BLACKALL, ARCHITECT, BOSTON, MASS.

DETAIL FROM THE CHAPEL OF THE CONSTABLE, BURGOS CATHEDRAL, SPAIN.

[The following named illustrations may be found by reference to our advertising pages.]

FOUNTAIN IN THE PIAZZA DI SAN PIETRO, ROME, ITALY.

TOWER OF ST. MARK'S CHURCH, HARROGATE, ENG. J. OLDRID SCOTT, ARCHITECT.

THIS plate is copied from the *Builder*.

THE "ZUM RAPPEN" RESTAURANT, MUNICH, BAVARIA. J. HEILMANN, ARCHITECT.

THIS plate is copied from *Architektonische Rundschau*.

[Additional Illustrations in the International Edition.]

BAR ASSOCIATION BUILDING: FACADE ON 44TH ST., NEW YORK, N. Y. MR. C. L. W. EIDLITZ, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print.]

PORCH OF "THE ROYALTON," 43D ST., NEW YORK, N. Y. MESSRS. ROSSITER & WRIGHT, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print.]

"OKEWOOD," SUSSEX, ENG. MESSRS. ERNEST GEORGE & YEATES, ARCHITECTS.

ADDITIONS TO EDGEWORTH MANOR, GLOUCESTER, ENG. MESSRS. ERNEST GEORGE & YEATES, ARCHITECTS.

NOTES AND CLIPPINGS

SIR ROBERT RAWLINSON, K. C. B. — The Society of Arts has lost an eminent and most active member in the person of Sir Robert Rawlinson, who died on Tuesday, 31st ult., at South Kensington. Rawlinson was born at Bristol, on February 28, 1810, and at the age of 21 he entered the office of Jesse Hartley, engineer of the Liverpool docks, as a measurer of masonry. In 1836 he was in the service of Robert Stephenson as assistant resident engineer on the section of the London and North-Western main line at Blisworth. In 1840 he returned to Liverpool as assistant surveyor to the Corporation, and it was here that he turned his energies to sanitary engineering, to which subject he henceforth devoted his life with such signal success. One of the chief works of his life was undertaken when he was appointed in 1855, by Lord Palmerston's Government, one of three Commissioners to proceed

to the Crimea to improve the condition of the soldiers. So great was the effect of the action of the Commission, that, from about 42 per cent in February, the death-rate fell to about 2 1-4 per cent at the end of June. During this arduous time Rawlinson was in constant communication with Miss Nightingale. The result of the labors of the Commission has been to permanently reduce the annual mortality of the British Army. The next great work which Mr. Rawlinson undertook was at the time of the Cotton Famine, in 1863, when he and Mr. Farnell were despatched to Lancashire to inquire into the feasibility of a proposal to start works of "utility, profit, and ornament," in order to provide employment at a fair wage for the starving workers. After visiting and inspecting ninety of the principal places, Mr. Rawlinson reported that, in his opinion, £1,500,000 sterling might be expended in permanent improvements of a beneficial character, such as main sewerage, drainage, forming and completing streets, making new water-reservoirs, and laying out parks and recreation-grounds. In consequence of this report, the Treasury authorized the advance, out of the Consolidated Fund, of a sum not exceeding £1,200,000, at 3 1-2 per cent on the security of the local rates, to facilitate the execution of the public works suggested. The experiment succeeded, and Mr. Rawlinson computed that if all the streets and roads in Lancashire that were at this time sewered, drained, paved, and generally improved were added end to end they would form a roadway 400 miles long. In this undertaking £1,850,000 was spent. In recognition of his services Mr. Rawlinson was made a C. B. in 1865. Sir Robert Rawlinson took much interest in art, especially in architecture. When he was assistant surveyor to the Corporation of Liverpool he was brought into contact with H. L. Elmes, architect of St. George's Hall, and he designed and constructed for that great hall the hollow brick ceiling, which is said to be one of the lightest works of the kind in existence. — *Journal of the Society of Arts.*

The Romance of Aluminium. — In Pliny's "*Naturæ Historiarum*" (lib. 36, cap 26), in which reference is made to an incident in Roman history which, up to the time of Sainte Claire Deville, had been overlooked by scientists for many centuries, it is related by Pliny (23 A. D. to 79 A. D.) that during the reign of the Emperor Tiberius (41 B. C. to 37 A. D.) a certain worker in metals (*faber*) appeared at the palace and showed a beautiful cup composed of a brilliant white metal that shone like silver. When the artificer was presenting it to the Emperor he purposely dropped it on the floor of the chamber. The goblet was so bruised by the fall that it seemed to be irretrievably injured; but the workman took his hammer, and in the presence of the Court he repaired the damage without delay. It was evident that this metal was not silver, though it had almost the same brilliancy, besides being much more ductile and considerably lighter. The Emperor questioned the artificer closely, and learned from him that he had extracted the metal from an argillaceous earth — probably the clay known to modern chemists as alumina. Tiberius then asked if any one besides himself knew the process, and received the proud reply that the secret was known only to himself and Jupiter. This answer was sufficient. The Emperor had reflected that if it were possible to obtain this metal from so common a substance as clay the value of gold and silver would be greatly reduced, so he determined to avert such a lamentable catastrophe. He caused the workshops of the discoverer to be wholly destroyed, and the luckless artificer was seized and decapitated, so that his secret might perish with him. M. Sainte-Claire Deville had no doubt that this metal was aluminium, and he asserted that the wanton cruelty of Tiberius had deprived the world of this valuable metal, which remained unknown for eighteen centuries. The extracting of aluminium, discovered by the Roman craftsman in the first century of the Christian era, thus became one of the lost arts. — *Aluminium and Electrolysis.*

The Date of the Elysee Palace. — Loud protests have been raised in Paris against the alleged desecration of the Elysée Palace, which has been the official residence of Presidents of the Republic since 1871. It was recently resolved that the Napoleonic eagles ornamenting the doors and locks should be taken down and replaced by the Republican initial letters, "R. F." This decision caused an outcry, and the archæologists and others composing the committee of historic monuments were called upon to interfere in order to prevent what was described as an act of vandalism, since the Elysée was arranged and decorated in Empire style. The complaint has been demolished by a high official of the Fine-Arts Department, who points out that the Elysée is not in Empire style at all, having been built in 1718, for Henri de La Tour d'Auvergne, Compte d'Evereux, after the plans of the architect Molet. Mme. de Pompadour, who subsequently lived there, sold it to Louis XV, to whose epoch it belongs. In 1808 the palace was bought by Murat, who gave it to the Imperial estate when he went to Naples as king. It was then that it was overloaded with Imperial ornaments and emblems. All these were removed during the Restoration, by order of the Duchesse de Berry, only one room — that called after Murat — being left intact as it stands at the present time. During the Second Empire the palace was again redecorated abundantly with Imperial eagles by the architect Lacroix, who endeavored to please Napoleon III. Thiers, when President, wished to depose the eagles, but died before he effected his purpose. — *N. Y. Evening Post.*

Wisconsin's Big Stone cut up. — The famous brownstone monolith at Washburn, Wis., is no more. It was quarried by Frederick E. Prentice in 1892 for the Wisconsin exhibit at the World's Fair. The labor alone cost over $5,000, but the money to transport it to Chicago was never raised. The monolith when completed measured 115 feet in length and nine feet at the base, being the largest block of stone ever quarried. It has lain in its bed of sand and water for six years, and as there seemed to be no probability of its being made use of in its original form it was sawed into blocks, and is being shipped to Menasha, where it will be used in the construction of a residence and a barn. — *Chicago Inter Ocean.*

The Old Water-gallery at Hampton Court. — An interesting discovery was made recently at Hampton Court in the course of the excavations for the effluent pipe of the new Thames Valley drainage along the towing-path by the palace gardens. Between the railings of the private gardens, opposite the end of Queen Mary's Bower, the foundations of the old water-gate, or "water-gallery," built by Henry VIII, has been cut through. The walls or piers are of immense thickness, being no less than twenty-five feet wide, of the hardest chalk, faced with stone. The opening through which the State barges passed is clearly discernible. On these massive foundations, which were built in the river formerly, rose a large picturesque building of several stories. The structure was famous for being the place in which Queen Elizabeth was kept by her sister as a prisoner of state. It was demolished by order of William III as obstructing the view of the river from his windows. — *Westminster Gazette.*

Coaches on the Community Plan in Genoa. — A curious custom exists in Genoa. Many of the well-to-do people as well as those in moderate circumstances do not own either horses or coaches; they own only an interest in them. Four or five or a half-dozen great families club together and buy a coach and horses, then they arrange among themselves the days the different families will use it. Thus one family uses the coach on Mondays, another on Tuesdays and a third on Wednesdays, so that an establishment that would be impossible for one family becomes perfectly practical when the cost is divided among five or six. Each family has a set of doors for the coach with their own coat-of-arms on the panels, which are changed according to the family which is going to use the coach. The builders of these vehicles seldom think of building a coach without five or six sets of doors, and arrangements are made so that they are very easily changed. — *Scientific American.*

Sand Roofs. — A very singular way of roofing is now not unfrequently employed in Paris for small dwellings. The roof is given a very gentle slope only, and is covered with battens and tarred cardboard, and then covered with a layer 3 to 4 cm. thick of sifted clean gravel. The most violent rains fall dead on such a roof, and neither hail nor sun has any effect on it. Even walking on it will cause no injury to the cardboard. Rain percolates through the gravel and runs off regularly, and habitations thus covered are much less exposed to the extremes of heat and cold which make themselves felt under zinc. It is necessary to rake up the gravel from time to time and to bring it back, as it works its way down the slope of the roof. When it has become earthy by being full of dust it is changed, but can be used again after a good washing. Thus the last cry of modern industry is a return to the earthen roof of our ancestors. The tarred cardboard is, however, an essential part of the scheme, as it prevents the passage of damp. — *Invention.*

The Marble Columns for the Baltimore Court-house. — A distinctive feature of the new court-house in Baltimore will be eight marble monoliths. In their finished state these columns will each be 32 feet long, 4 feet 3 inches in diameter, and weigh thirty-five tons apiece. While there are columns of greater size on buildings elsewhere, the Baltimore *Sun* says, there are no marble monoliths that equal the proportions of those that will adorn the Baltimore building. Marble columns even of equal size in other cities are built up in sections or drums, and are not composed of a single stone. The marble monoliths on the Capitol wings in Washington are not as large. On the north and south fronts of the Treasury Building in Washington there are granite monoliths of this size, but, owing to the regularity of granite at the quarries, it is not considered a difficult task to turn out monoliths of such proportions. Over a year has been spent in quarrying the Court-house monoliths, and before stones of sufficient size could be gotton out many times the weight of these monoliths was quarried. The drilling and channelling process necessary to get out such huge stones required expert work, and many failures were experienced before the attempt was successful. Another serious problem was to get the marble of the proper color. — *N. Y. Evening Post.*

Buried Wires in England. — The post-office authorities have laid about forty miles of the large telephone and telegraph trunk-line cable which is to extend from London to Birmingham, and to which reference was recently made in the *Daily Mail*. The laying of this cable is by far the largest piece of work the authorities have undertaken since they had control of the telegraphs. The cable, which is being manufactured by the British Insulated Wire Company, at their works at Prescott, has a total diameter of 2 5-8 inches, and the weight of each mile of cable is about twenty-two tons. It is made up of seventy-six separately insulated wires, each mile of which weighs 150 pounds. The manner in which the cable is constructed is interesting. Each conductor is separately inclosed in a tube of paper, so that it is entirely surrounded with air. The object of this is to get as much air around the conductors as possible without increasing the size of the cable. Air has a lower capacity than any known substance, and low capacity on a cable is equivalent to small absorption of current. This means that speaking is possible over a greater distance than under any other circumstances, and it was not until a cable was invented on this principle that it became possible to speak over any considerable distance by means of underground wires. The ordinary overhead wires are, of course, always surrounded by air, and this is why speaking is possible over such great distances, but long lines and many wires "cross talk," and the danger of breakage renders this system very troublesome and expensive. On the new cable the conductors are made up in pairs, the wires stranded together round one another, and the whole covered with a heavy sheathing of lead. At intervals of five miles pillars are erected, and at these points dry air is to be forced through the spaces into the cables, so that if the lead sheathing should become punctured the presence of the hole will be instantly discovered. — *The London Mail.*

S. J. Parkhill & Co., Printers, Boston, U. S. A.

ENTRANCE-HALL: BAR ASSOCIATION BUILDING, FORTY-

C. L. W. EIDLITZ, ARCHITEC

NG, FORTY-THIRD STREET, NEW YORK, N. Y.
TZ, ARCHITECT.

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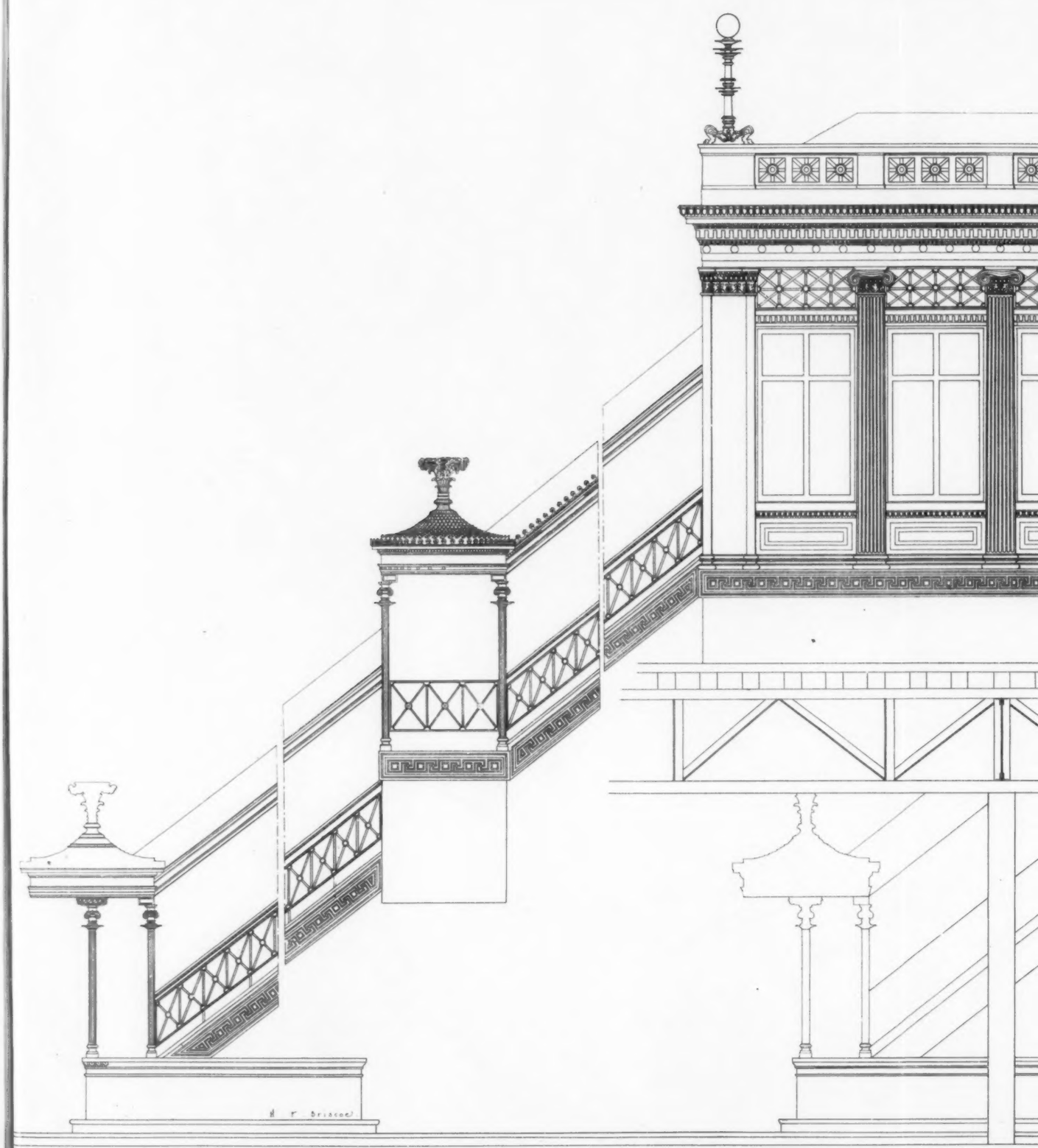
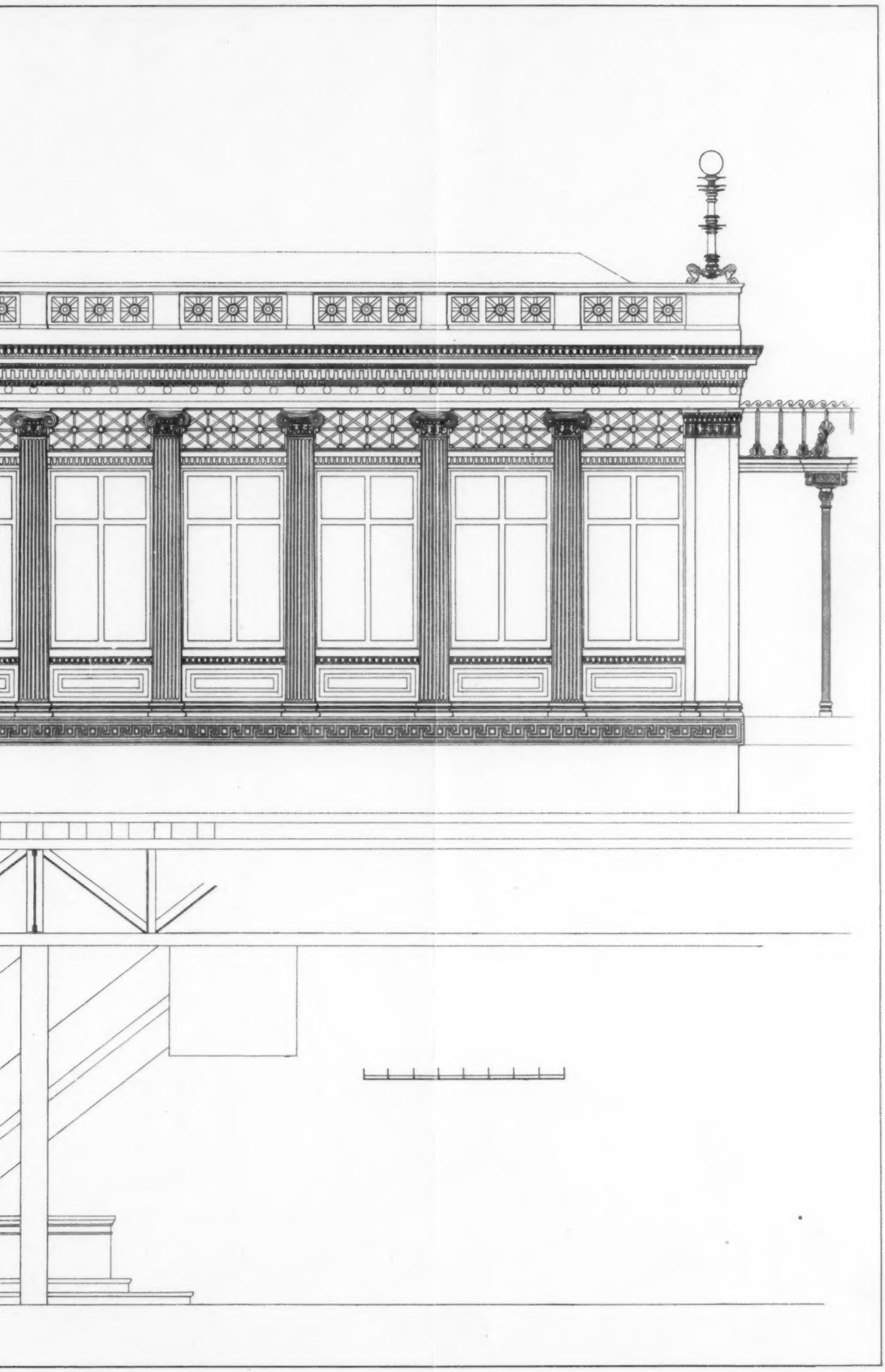
DETAIL OF THE ASTOR GALLERY: HOTEL WALDORF-ASTORIA, NEW YORK, N. Y.

H. J. HARDENBERGH, ARCHITECT.



COMPETITIVE DESIGN FOR STATIONS OF THE BOSTON E

C. H. BLACKALL, ARCHITECT.



BOSTON ELEVATED RAILROAD.

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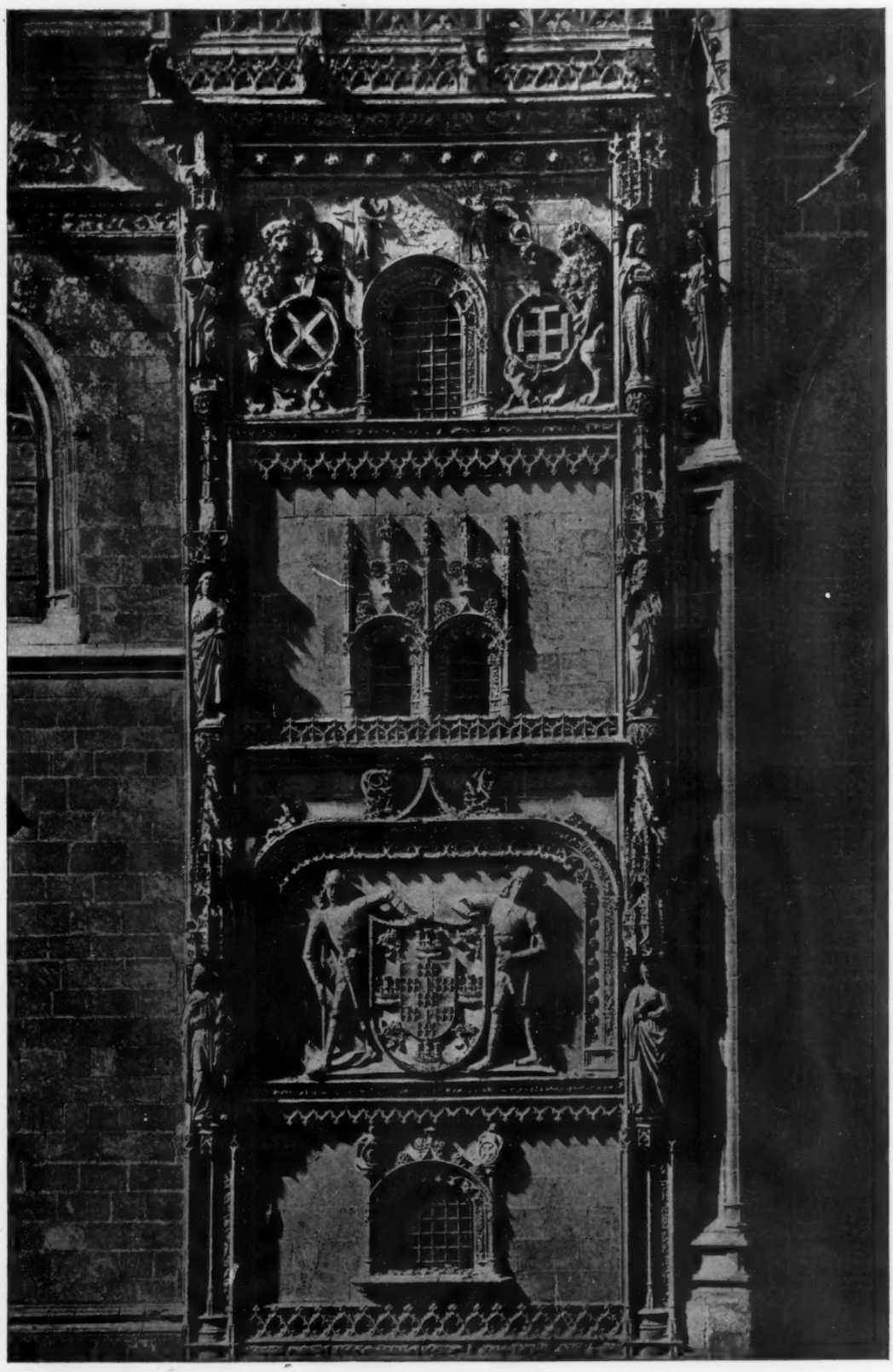

Detail of the Chapel of the Constable, Burgos Cathedral, Spain.

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 194. SATURDAY, JULY 2, 1898. Volume LXI. No. 1175.

SURFACENE.

SURFACENE is, as its name signifies, a first coat or surfacing varnish to take the place of shellac in all kinds of wood-finishing.

It was placed upon the market about six years ago by The Glidden Varnish Company, of Cleveland, Ohio, having been tried and tested first by Mr. F. A. Glidden, Vice-President of this Company, on his own new home.

He had his architect specify Surfacene in place of shellac, and when the painter had applied one coat of varnish over the Surfacene the architect remarked, "Well, this is pretty quick work: all ready to rub"; but Mr. Glidden informed him, No, that there was to be another coat of varnish applied, and then the architect replied that he had never seen one coat of varnish stand out like that over a coat of shellac, and that he would surely specify Surfacene from that time on.

The reason that Surfacene holds up the varnish so much better than shellac is that it contains a transparent mineral pigment which settles down into the pores of the wood and prevents the absorption of the finishing coats of varnish. In fact, it actually cements them to the wood, thus producing a far more elastic and durable finish.

Upon request we will send prepaid a practical demonstration of Surfacene as compared to shellac.

THE GLIDDEN VARNISH COMPANY,
CLEVELAND, OHIO.

THE Syracuse Construction Company, of Syracuse, N. Y., are erecting new buildings in connection with their electric-railroad plant. The building consists of a boiler-house 60′ x 90′, which is an all-fireproof building, having steel framework covered with corrugated-iron on the sides and roof. There is also an engine-room 65′ x 80′, having a steel framework and brick sides. The other building is a car-barn and repair-shop 65′ x 170′. This building also has steel framework construction, with corrugated-iron sides. All these buildings have been designed and are being erected by The Berlin Iron Bridge Company, of East Berlin, Conn.

A NEW BELT DRESSING.

THERE has been a growing demand among belt users for a more convenient form of belt dressing than the paste. The Joseph Dixon Crucible Company, Jersey City, N. J., are now placing on the market a solid belt dressing in round bars, about eight inches long and two inches diameter. It makes a package convenient to the hand, and easy to apply even to fast-running belts. The company does not claim that the solid dressing is as good a preservative of the life and elasticity of the leather as the Dixon paste, but it is quick to apply and quick to act, and that is what is wanted by the general run of belt users.

Note to the Editor. — By the above you will see that we have decided to meet the demand of the easy-going man, who wants something easy to handle and easy to apply, and who doesn't care if the belt doesn't last a hundred years.

JOSEPH DIXON CRUCIBLE CO.,
JERSEY CITY, N. J.

THE new power-house now being erected by The Port Chester Street Railway Company, of Port Chester, N. Y., is a building 45′ x 84′, and consists of a boiler-room, engine and dynamo room. The building has brick side-walls in which are built steel columns supporting steel truss-roof. In the engine-room is a travelling crane arranged so that any part of the engines or dynamos on the floor below can be readily lifted and moved from one place to another. The power-house is built in a substantial manner, and is a well-designed modern station in every respect. The steel work for this building was designed and is being erected by The Berlin Iron Bridge Company, of East Berlin, Conn.

THE GLOBE DOME AND PLATE-GLASS TOP VENTILATORS.

THE Globe Dome and Plate-Glass Top Ventilators are the most shapely, durable and effective of any kind on the market.

They are designed for use where it is desirable to secure the greatest amount of ventilation and the largest area of light.

Each unites in itself a rain and snow proof skylight, and an active, efficient and noiseless ventilator.

They are strongly built, firmly braced, and in many cases serve the purpose and save the expense of a skylight.

This device possesses all the virtues of the well and widely known Globe Ventilator.

It faithfully guards against the entrance of all storm and at the same time quickly exhausts all heat and impurities.

As in the regular "globe," the wind in striking the upper and lower edges is deflected and the ventilator responds promptly to every current of air.

The disks of our Dome Glass Ventilator, which are set in weather-proof cement, where they focus, concentrate and magnify the sun's rays, afford in fact a greater amount of light than the other. They are more symmetrical and practically unbreakable.

GLOBE VENTILATOR COMPANY,
203 RIVER ST., TROY, N. Y.

THE Wilmot & Hobbs Manufacturing Company, of Bridgeport, Conn., are making extensive additions to their manufacturing plant, which consists of two large buildings. These buildings are to be used as an engine and plating building, and a machine or manufacturing building. The engine and plating building is about 60 feet wide and 100 feet long, two stories high, steel frame construction, with brick side-walls and concrete floors. The machine building is about 80 feet long and 135 feet wide, and three stories high. This building is of steel skeleton construction throughout. The floors are designed for heavy loads and are carried on corrugated-iron arches supporting concrete filling. The aim in the designing of these buildings has been to get the most convenient structures possible and the maximum amount of light consistent with stability of structure and with economic construction. The designs of the buildings were made by The Berlin Iron Bridge Company, of East Berlin, Conn., who furnish and erect the structural steel work.

REMEMBER THE NAME.

REMARKABLE! That people will not tolerate an unsightly, creaking, bulky contrivance to close their doors.

When building they study and use all the resources of their taste in having everything beautiful. The entrance is most important; it always extends its silent welcome and is often subject to close scrutiny, should be noble in its fittings, therefore nothing is too good for it. Bommer Spring Hinges are the best. They combine utility with quiet beauty, and cost no more.

"Practically unbreakable" says the World's Fair Award.

Topographical Index of Advertisers.

[*For pagination, see Alphabetical Index on Cover* 2.]