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A DECISION has been made by the Board of General Appraisers which is of considerable importance to persons interested in steel construction. As every one knows, the demand for structural steel in this country is so large that it is impossible to secure early delivery, and many thousands of tons of steel and iron, both crude and manufactured, are now imported, notwithstanding the heavy duties and the cost of importation. Much of the imported steel comes from Germany, and, a few weeks ago, a firm in Philadelphia had occasion to import a thousand tons of steel billets from that country, to be made up into sheets and rods. Under the Dingley tariff, the duty on steel billets, of the value of one cent a pound or less, is three-tenths of a cent per pound; but, if the value of the billets is between one cent and one and one-quarter cents, the duty is four-tenths of a cent per pound. The Dingley tariff further provides that the duty shall be calculated upon "the actual market value or wholesale price of such merchandise at the time of exportation to the United States in the principal markets of the country from which the same has been imported." A censorious person would be likely to say that this clause was, apparently, devised for the express purpose of involving importers in a lawsuit over every package of goods that they ventured to import, by substituting an indeterminate and arbitrary standard of value for the natural one of the invoice price. In the present instance, the importers of the steel billets, who paid for them eight-tenths of a cent per pound for the whole consignment of one thousand tons, thought, not unnaturally, that this fact afforded good evidence of the wholesale price of the billets at the time when they were bought, and in the market in which they purchased them, and prepared themselves to pay the duty of thirty-seven per cent. They reckoned, however, without their host. When their cargo arrived, it appeared that the custom-house officials held the view, based on evidence, the nature of which is not explained, that billets of this kind, although actually sold to the Philadelphia importers at eight-tenths of a cent a pound, were really worth one and one-thirtieth cents per pound. This valuable discovery brought with it the conclusion, perhaps not wholly unexpected, that the billets came under the second category of the Dingley law, and were, in consequence, liable to a duty of four-tenths of a cent per pound, or fifty per cent of the actual cost. In order to impress the circumstances on the minds of the people interested, a penal duty was imposed, in addition to the enhancement of the original duty, so that the importers, in place of the two thousand dollars which they had expected to contribute to the treasury of their country, were compelled to pay four thousand five hundred and fifty dollars. It should be observed that no claim was made by the Government of any undervaluation or lack of perfect integrity on the part of the importers, but the custom-house officials, under the present interpretation of the Dingley law, which assesses duties, not on what imported articles actually cost, but on what the officials

in this country think they ought to have cost, simply exercised their prerogative in fixing their ideal of the proper value high enough to bring the goods under a different class. The importers, who, of course, do not charge the appraiser with anything worse than misapprehension of the facts, say that the price of one and one-thirtieth cents per pound, which the officials take to be the wholesale price of such steel in Germany, is simply the quotation for small lots, large transactions in steel billets being unusual in Germany, where all the rolling-mills and other large consumers make their own steel. Under this view, the price which the custom-house officials had heard of was really the retail price, and the wholesale price mentioned in the Dingley Act might fairly be considered to be somewhere near that at which the wholesale transaction was made. It must be acknowledged that the importers' contention is strengthened by the consideration that if the steel-maker of whom they bought their billets had known of any market in Germany in which he could have sold his goods for a cent a pound or more, he would not have been likely to sell them to the Americans for less than four-fifths of that price; and he might be presumed to know as much of the markets of his own country as the custom-house officials in New York. However this may be, the question is one which affects importations of many thousands of tons of steel already contracted for abroad, and, through them the pockets of many thousands more of American consumers of articles into which steel enters as a material, of tenants of steel buildings, and travellers over steel rails, all of whom will be compelled to contribute their portion, in the shape of increased price, or higher fares, or extra rent, to the new view of duties on the raw material.

A SERIOUS effort is to be made, at the next session of the Legislature of Massachusetts, to have an act passed under which all labor unions must be incorporated. The proposed legislation will, it is presumed, be opposed by most of the present labor leaders, but it may be hoped that the advantages of it to the workmen themselves will, before the time comes for action, be better understood than they are now. The obvious effect of incorporation of the unions will be to make them responsible bodies, capable of suing and being sued, and therefore entitled to enforce their contracts with either individuals or corporations, at the same time that they are bound by their own agreements. The importance of this, especially at the present time, when so much business is done by corporations, is so great that one of the principal trade-unions in the West has declared itself in favor of incorporation, for its own benefit. There are, however, other advantages which the members of unions gain by incorporation. While labor organizations were shadowy affairs, consisting mainly in assertions of their pretended chiefs, it was difficult to impose any responsibility on those whose membership in them could easily be denied. Now, however, the labor unions are becoming every day more definite bodies; their contracts, although still often broken, and, under present circumstances, with impunity, are more respected than ever before; and those who belong to them are less likely now than formerly to deny or repudiate their membership. This increased dignity and stability of the unions brings with it, however, a certain danger. Under certain circumstances, for example, any member could be held personally liable for all the debts of his union; or, in case of violation of the laws, an innocent member might be made legally responsible for all the damage done by other members. It is, to a great extent, to protect men from unlimited liability for the acts of their associates that the laws governing corporations have been enacted, under which the responsibility of each member of the corporation is defined and limited; and the members of unions are quite as likely as the participants in business enterprises to find this protection of value.

THE New York Times tells a story which has a rather familiar air. Every one knows that Fifth Avenue, in New York, from Fiftieth to Ninetieth Streets, is inhabited almost exclusively by enormously rich people, who pay from one hundred to two hundred dollars per square foot for land on which to erect palaces. Notwithstanding the general character of the district, there are no restrictions on the use to which land shall be put, and ingenious speculators are, naturally,

exposed to the temptation to get hold of lots, and, by threatening to build objectionable structures on them, induce the neighbors to buy the lots at a good profit. Years ago, this artifice was practised on Fifth Avenue with great success, and a certain little liquor store is said to have been bought out many times, to the great advantage of its proprietor. In those days, however, thirty dollars a square foot was reckoned a good price for lots on "the Avenue," and all New York marvelled at the sale, at sixty-five dollars a foot, of a lot which would now easily bring three hundred. As the retail liquor business, even in New York, will hardly bear an investment of two or three hundred thousand dollars, at least, for a site for a small saloon, the millionaires of upper Fifth Avenue have enjoyed, for a long time, comparative immunity from alarm; but it now appears that a speculator has bought a twenty-five-foot lot in the very heart of the millionaire district, and proposes to erect upon it a fifteen-story structure, presumably an apartment-house, since an office-building in such a locality would look in vain for tenants. The *Times* is much distressed over this intrusion into a region which, whatever may be said of the architecture of some of the houses, has, in general, a pleasant air of solid and quiet wealth, but, in the absence of any restrictions, it is difficult to see how the proprietor of the lot, if he chooses to ruin himself by building an apartment-house on such costly land, can be prevented from doing so. The *Times* appeals to the example of what it calls the "paternal Government" of Paris, under which such intrusions would be impossible, and bewails the absence, in our cities, of a stricter regulation of the height and character of buildings on given streets.

It may be said, in the first place, that it is not the "paternal Government" of Paris, the Municipal Council of which would be much amazed to hear itself described by such a name, but the universal respect of the French for artistic propriety, which has led to the regulation, with the acquiescence of the public, of the heights and character of buildings. In the case of the Rue de Rivoli, the most uniform of all Paris streets, the land was condemned and purchased by the Government, and, after the widening of the street, resold under the restrictions as to the arcing of the first floor, and the heights of string-courses and cornices, which have made it what it is; and the Rond-Point de l'Etoile, which offers the richest and most imposing of the Parisian frontages, was restricted in the same way, although even more closely; but, apart from these instances, there is, so far as we remember, no case in Paris where any restrictions are placed on building except those intended to preserve light and air, by restricting the heights of vertical walls, and the profiles of roofs. It is true that these tend to produce uniformity, for the reason that every owner is naturally disposed, for his own advantage, to build to the full height allowed by law; but the artistic instinct of the French leads them so generally to build their houses with some regard, in design, to their surroundings that the effect is to produce a sort of uniformity of politeness, if we may use such an expression, which is not legally required in Paris, any more than it is in New York or Boston, but which very happily replaces the air of elbowing self-assertion so common in street effects in both these cities. We do not say that the proprietor of a house on Fifth Avenue or Beacon Street is any more likely to be rude in his manners than the dwellers on the Avenue du Bois de Boulogne or the Parc Monceau; on the contrary, the readiness with which the proprietors of American city lots enter into agreements for reserving space around their houses, or going without stables, shows that they are as well disposed as any others in the world toward that mutual courtesy which should display itself in their dwellings, as it does in their manners; but they do not know how to give to the brick and stone of their houses the expression that they would like, and it should be the part of the architects to lead them in the matter. In New York, and still more in Boston, where there are yet un-built upon whole districts of what will soon be a populous and fashionable quarter, it would be easy to establish limitations of height of cornices and principal string-courses, level of first floor, and, possibly, material of fronts, which would add greatly to the beauty of the blocks of new houses. To avoid monotony, the restrictions might differ, to a certain extent, in the various blocks, and care should be taken not to make such limitations as would shut out an interesting variety, even in the same block. If the question could be at first maturely studied by the architects, there would be little difficulty in persuading owners to accede to restrictions which would benefit them as much as their neighbors, and the example of a single block, built without the convulsed sky-line, the leaping up and down of front

doors, and the ham-sandwich effect of alternating vertical slices of red brick, white marble, brownstone, yellow brick and limestone, would do much to educate the public to a better conception of civic architecture.

It is to be regretted that certain journalists have created a little sensation by the discovery, which they profess to have made, that the acceptance of gifts of libraries, and other public benefits, from the munificence of private individuals, tends to pauperize communities. They call to mind a time when, as they allege, public improvements were made by voluntary contributions of the citizens, or by taxation, and draw a sad picture of the spread of municipal mendicancy. It would be interesting to the student of history to know at what time, and in what place, any library has ever been erected, or any park laid out, by the voluntary contribution of any considerable number of citizens. So far as we can judge from the experience of the world, for at least two thousand years, libraries, museums, universities, hospitals, parks and other important public benefits have always been conferred upon the community by some rich citizen, or, occasionally, by the coöperation of a few rich citizens, or have been paid for with money raised by taxation. With churches the case is different, and, although there are many examples of ecclesiastical structures erected at the expense of a single individual, the great majority have always been paid for by the contributions of a large number of people; while statues and monuments are commonly erected by the aid of a long subscription list; but it is safe to say that if the world had depended on taxation, or on voluntary contribution from a large number of citizens, for universities, hospitals and libraries it would possess very few of them. We are as much opposed as any one could be to the pauperizing of individuals by unwise charity, but it is a maxim of social science that a child is not pauperized, but, on the contrary, encouraged and strengthened for his future duties, by kindness, and the same rule holds good, to a great extent, of communities, which gladly and gratefully receive from individuals benefits which they are unable to provide for themselves, or which, in many cases, they do not understand the value of until they receive them. One writer on the subject mentions the case of a village which refused the gift of a library, because the citizens thought that the acceptance of the gift would "discourage self-reliance." This is commendable enough, but it may be fairly offset by the example of more than one small town, which has refused the gift of a library, on the ground that the citizens would have to hire a librarian, and buy coal to keep the building warm in winter, and that they did not wish to involve themselves in these expenses. A good library would do more, perhaps, than anything else to raise a community to a higher appreciation than this of the benefit of books; but it may be imagined that it would be a long time before such a village as this would change its disposition so far as to appropriate money to provide the library itself, as well as the cost of maintenance. In fact, the necessity for providing maintenance for the libraries and hospitals given or bequeathed to a municipality involves a sacrifice which, in itself, removes the pauperizing element from the gift. A boy who receives a present of a chest of tools, which he could not pay for out of his own small store of pocket-money, is happy in using the tools to make things for his friends, and gains in all good and manly qualities by doing so; and, in the same way, a community, through the sacrifices which it has to make in utilizing the gifts of benefactors, becomes more intelligent, more efficient, and less selfish. Americans have a reputation, of which they may well be proud, of being the most public-spirited people in the world; and it is a pity to do anything to discourage the habit of using one's superfluity for the advantage of other people which has done more than anything else to raise the world from barbarism to civilization, and which has still an ever-widening field before it.

THE Italian Government has done a wise thing in purchasing the Villa Borghese, just outside the walls of Rome, for conversion into a public park. Rome is now a great modern city, full of a poor and hardworking population, which has little opportunity for breathing fresh air, and the Borghese gardens, which are on high land, overlooking the city, will supply a ready-made park of the best character. The pictures and sculptures of the Villa Borghese were purchased by the Italian Government some time ago, and removed to a place of safety, and it may be hoped that the acquisition of the gardens will prove profitable to the Government, as well as to the poor people whom it has sought to benefit, through the increase in taxable value of property surrounding them.

RELATIVE COMPRESSIVE STRENGTH OF GRAVEL AND
BROKEN-STONE CONCRETES.

THE tests outlined below were made for Messrs. Woodbury & Leighton, of Boston, in 1896. Although the writer had no connection with them professionally, the results obtained show so interesting a comparison between the compressive strength of concrete made with gravel and the strength of similarly proportioned concrete made with broken stone as to warrant the publication of a condensed summary.

The result of the tests which were made at the Watertown Arsenal shows that under the conditions described in full farther on, concrete cubes 12 inches on a side, mixed in proportions of one part loose cement to 3 parts sand to 5 parts broken stone, are, after setting one or two months, 47 per cent stronger than similar cubes of concrete made with the same proportions of mixture, except that screened bank-gravel is substituted for the broken stone.

The experiments recorded are of special value on account of the lack of data bearing upon the subject in architectural and engineering literature. Formerly it was the general opinion that concrete made with gravel was stronger than similar concrete made with broken stone. Many architects and engineers still give an optional choice of these materials in their specifications, although the records of tests made are nearly all in favor of broken stone.

The best published results of tests bearing upon this subject are quoted in Baker's "Masonry Construction." Tests made in Washington, D. C., by the Engineer Department are there referred to, and the conclusion is drawn from them that broken stone concrete is undoubtedly stronger than gravel-concrete, but that as the age of the concretes increases the difference between them becomes less marked. Tests made in France with coarse materials also favor the broken stone. Various proportions of materials were experimented upon there. With the proportions similar to those of the Woodbury & Leighton tests the percentage in the French tests in favor of broken stone is considerably smaller than in the former, being about 26 per cent. This difference is probably due to the difference in the materials used. As the proportion of cement in the concrete increases the relative difference in strength between broken-stone and gravel concrete decreases.

We will turn now to the tests which it is the object of this article to describe. The experiments were made by the contractors, Messrs. Woodbury & Leighton, to determine the best materials to use in the foundations of the new Houghton & Dutton Building on Pemberton Square, Boston. Twenty-six cubes of concrete measuring 12 inches on each edge were made, and after setting thirty or sixty days, were tested by the United States Ordnance Department at the Watertown Arsenal, Watertown, Mass. Sixteen of these tests were made to com-

lose. This fact must specially be noticed because the resulting concrete was less rich than it would have been if the cement had been measured by the packed barrel, as is customary on a great deal of construction work. The gravel and the stone were measured in the same cubic-foot boxes, and then spread out on a platform. The cement and sand, after measuring, were mixed dry and spread on the gravel, the water being added as the entire mass was mixed. One cubic foot of water was used to each cubic foot of cement. This gave a mixture which was fairly wet, quaking slightly when rammed. The proportions of the mixtures in each of the cases which we are now considering were one part loose Portland-cement, 3 parts sand, and 5 parts broken stone or gravel.

A cubic foot of loose cement as it was measured in the experiments is equivalent to .78 cubic feet packed cement as measured in a barrel direct from the manufacturers. This ratio was determined from calculations made and published by the writer based on tests made for the Boston Transit Commission in 1896.² If the proportions, therefore, in the Woodbury & Leighton tests had been expressed in terms of packed cement, we should have had one part packed cement to 3½ parts sand to 6½ parts broken stone or gravel.

After setting, the compressed surfaces of the cubes were faced with plaster-of-Paris. A part of the cubes were allowed to set thirty days, and a part sixty days. They were then tested by direct compression in the United States Testing-machine having a capacity of 800,000 pounds.

The results of the tests on the ten cubes used for a comparison of gravel and broken stone are tabulated in full below. The dimensions given are of interest chiefly in showing the accuracy with which the tests are conducted by the U. S. Army Ordnance Department. The figures are copied directly from the Department reports, with the insertion of the column of "Ratio of Strength of Broken-stone to Gravel Concrete," and the "Remarks." The "Number of Test" is simply a mark given by the Arsenal and has no reference to the quality of the cube. It will be noticed that the ratios are figured for each pair of tests, since the gravel and stone concretes are tabulated alternately, the two tests in each pair representing similar conditions throughout. The fact that the tests of foreign cements, which are designated as A and B, ran higher than those of American cement, called C, is of no special value at the present time, because, as has already been stated, the qualities of cements are being continually improved. As a matter of fact, also, subsequent tests made by Woodbury & Leighton at the Watertown Arsenal show that first-class American Portland-cement is equivalent in crushing strength, when made into concrete, to first-class foreign cement.

The ratio of strength of broken-stone concrete to gravel concrete has a final average in the table of 1.47. This means that under conditions

RELATIVE COMPRESSIVE STRENGTH OF GRAVEL AND BROKEN-STONE CONCRETES.

Number of Test.	Kind of Portland-cement.	Aggregate.	Dimensions.			Sectional Area.	First Crack.	Ultimate Strength.		Ratio of Strength of Broken-stone to Gravel Concrete.	Remarks.
			Height.	Compressed Surface.				Total.	Per Square Inch.		
			Inches.	Inches.	Inches.	Square inches.	Pounds.	Pounds.	Pounds.		
9,446	A	Gravel.	12.05	12 10	12 02	145.44	167,300	167,300	1,150 }	1.46	Set 30 days.
9,445	A	Broken Stone.	12.20	12.08	12.00	144.96	243,400	243,400	1,679 }		Set 30 days.
9,469	B	Gravel.	12.51	12.15	12.07	146.65	216,200	216,200	1,474 }	0.99	Set 30 days.
9,470	B	Broken Stone.	12.70	11.90	12.05	143.39	209,200	209,200	1,459 }		Set 30 days.
9,467	C	Gravel.	12.40	12 05	11.97	144.24	127,700	127,700	885 }	1.96	Set 30 days.
9,468	C	Broken Stone.	12 11	12.28	12 10	148 59	257,400	257,400	1,732 }		Set 30 days.
9,382	A	Gravel.	12.40	12 04	12 06	145.20	238,600	238,600	1,643 }	1.49	Set 60 days.
9,381	A	Broken Stone.	12.06	12 02	12 03	144.60	344,000	352,300	2,443 }		Set 60 days.
9,500	C	Gravel.	12.37	12 05	12 13	146 17	180,200	180,200	1,233 }	1.47	Set 60 days.
9,501	C	Broken Stone.	12.58	12 05	12 08	145.56	251,000	264,500	1,817 }		Set 60 days.
Average Ratio.....											1.47

Average Ratio..... 1.47

Note. — Proportions of all cubes were one part loose Portland-cement, 3 parts sand, 5 parts gravel or stone.

pare the strengths of concretes made with different proportions of materials, but the results from these will not be touched upon in this article. The quality of all Portland-cements has been gradually improving, even since so recent a date as 1896, and therefore the relative rather than the actual results of the tests are of value at the present time.

Three brands of Portland cement were used, two of these being selected as the best European cements on the market and the third as the best American Portland-cement. The gravel used for the gravel-concrete was of rather small size. The largest stones did not run over 2 inches in diameter, and the average size was considerably less than this. The gravel was obtained from the excavation for the building to be erected, and it was screened over a quarter-inch-mesh screen to remove the sand. It was clean, containing practically no clay or loam. The sand from both the gravel and the broken-stone concrete was the same, consisting of ordinary clean coarse bank-sand, which was purchased by the contractors and hauled to the site of the building. The broken stone was of uniform size, averaging but little over one inch in dimensions, the dust and coarser stone having been screened out.

For measuring the materials, cubical boxes exactly 12 inches on each edge were used. The cement was measured in these boxes,

similar to those in these experiments — that is, with mixture of one part loose cement to 3 parts sand to 3 parts stone or gravel — broken-stone concrete, after setting thirty or sixty days, will be 47 per cent stronger than concrete in similar proportions made with gravel for the aggregate. In making use of this result stress must be laid upon the fact that the tests were made under practical rather than laboratory conditions. The results from such tests are often more valuable than those made in a laboratory because the conditions are similar to those met with in actual building construction. The gravel was unwashed. If it had been made absolutely clean it is probable that the gravel-concretes would have shown greater strength and the ratio of strength of the two classes of concrete would have been smaller. As a matter of fact, however, the gravel used in building foundations, if it is fairly clean, unfortunately is apt to be washed so slightly that minute particles of dust and dirt remain on the stones. Hence, the tests in this respect correspond to practical conditions. The resultant ratio of the strength of broken-stone concrete to that of gravel-concrete obtained by these tests cannot be taken as exactly applicable to a comparison of concretes mixed with a larger or smaller proportion of cement. It is reasonable to assume

² See *Engineering News*, Vol. XLIV, p. 229.

that the relative difference in strength between broken-stone and gravel concretes will decrease as the quantity of cement used to the cubic yard decreases; that is, in a rich concrete it makes less difference whether broken stone or gravel is selected. This conclusion is borne out by the French tests mentioned above. In these the percentage of difference varies from 16 per cent to 30 per cent.

For practical purposes we may assume that the percentage of increased compressive strength of broken-stone concrete over gravel concrete runs approximately as is given in the following table. This table is based chiefly upon the French tests and the Woodbury & Leighton tests and applies to concrete which has set not more than a few weeks. In concrete which has set a longer time the ratios would probably be less.

Proportions of Concrete.			Ratio of Strength of Broken-stone to Gravel Concrete.
Parts Cement.	Parts Sand.	Parts Gravel or Stone.	
1	2	3	1.16 to 1.28
1	2	5	1.20 to 1.35
1	3	7	1.26 to 1.46
1	4	10	1.30 to 1.53

The fact that concrete made with broken stone is stronger than concrete made with gravel and having the same proportions of materials, does not necessarily prove that the use of gravel in concrete should be discontinued, nor that good specifications should always require broken stone. It does prove, however, that a very careful study of the matter should be made in any important undertaking. The economic side of the question will often determine that gravel is preferable, even although the strength of the resulting concrete is less. If great strength is required, it may be often cheaper to increase the proportion of cement in the mixture and use a gravel aggregate rather than to use the smaller quantity of cement with broken stone. On the other hand, it should be borne in mind that since broken-stone concrete is in general stronger than gravel concrete, a slightly higher cost per cubic yard of broken stone may often be more than balanced by the use of a less quantity of cement per cubic yard of concrete.

In deciding whether gravel or broken stone is the most economical, the fact should be noticed that since broken stone has in general a larger proportion of voids than gravel, a larger quantity of it as well as of cement and sand per cubic yard of concrete will be required than if gravel is used. This fact may not be obvious at first thought, and it is often disregarded in very careful estimates. A simple way of explaining it is that since a given quantity of broken stone has more voids, or spaces, than the same quantity of gravel, a larger proportion of mortar will be required to fill these voids, or spaces. If the proportions of the broken stone or gravel, the sand and the cement are definitely fixed with relation to each other, the mixture of the materials which have the greatest amount of solid matter will produce the largest quantity of concrete. As such small attention has been paid to this fact it may be worth while to illustrate it more fully with an example. We may assume for comparison that the broken stone has 50 per cent voids and that the gravel has 33 per cent voids. A mixture of 5 cubic feet of loose broken stone with, say, 3.5 cubic feet of mortar will give with perfect mixture 50 per cent of 5 cubic feet plus 3.5 cubic feet, or 6 cubic feet of concrete. On the other hand, 5 cubic feet of gravel mixed with 3.5 cubic feet of mortar will give 67 per cent of 5 cubic feet plus 3.5 cubic feet, or 6.8 cubic feet of concrete. In other words, in this assumed case the gravel materials will make over 10 per cent more concrete than the broken-stone materials, and conversely, approximately 10 per cent less in quantity of the gravel materials than of the broken-stone materials will be required to make a definite quantity of concrete.

For a small mass of concrete it may be cheaper to select materials and proportion them so richly that the result will be beyond question rather than to go to the expense of making tests. On large work, however, it is worth while, both on the score of economy and strength, to make special tests of the materials which are available in the locality where the job is situated. SANFORD E. THOMPSON.

CORROSION OF STEEL FRAMES OF BUILDINGS.¹

THE constantly increasing use of steel as a structural member in modern buildings has led to many questions as to the permanency of the steel as sometimes used for this purpose. The examination of buildings 10 to 15 years old, when, during alterations, the steel framework has been exposed to view, reveals all stages and conditions of disintegration of the steel. So great has been the corrosion, even in this short time, in some cases, that a note of alarm has been sounded by some engineers most familiar with the subject. The use of steel beams and posts is of so recent date that no very exact deduction can be drawn as to the exact time required for a very serious or destructive loss of steel through corrosion; but surely, when a steel-plate $\frac{1}{2}$ inch in thickness loses more than $\frac{1}{2}$ inch in 5 years, there arises a question as to the ability of the structure to last more than 25 years.

Some of the factors in the matter of corrosion of the steel we know; others we do not know, and cannot until after a lapse of some years.

There can be no question that moisture and carbon-dioxide are the active agents in causing much of the rusting of the steel. To what an extent the two are relatively responsible and in what measure they need renewal, to keep up the process, is uncertain. It has been held that the formation of a coat of rust upon the surface of steel was the beginning of a progressive action whereby the rust, or iron-oxide, acted as a continuous carrier of oxygen to the steel beneath. This process seems to require only moisture and atmospheric air containing carbon-dioxide to start it, but as to the depth of penetration of the process I know of no assignable maximum in any given time. It is extremely probable that in a comparatively dry place the process is extremely slow.

There can, of course, be no question as to the ease of access to the steel, in many cases, of both moisture and carbon-dioxide. When steel is bedded in the wall of the building, as is almost always the case, the changes in temperature from time to time, as well as the more or less constant difference in temperature between the two faces of the wall, tends to cause a condensation of moisture in the wall at different points. Further, the necessary carbon-dioxide is most plentiful in the large cities, while the steel-frame is most common.

When the walls of the building are of brick or stone, moisture and carbon-dioxide may usually enter at the joints and, to a greater or less extent, through the body of the stone or brick. Few stones are, however, porous to such an extent as to allow an appreciable penetration. Terra-cotta tile is of itself porous, and the existence of air-passages tends to increase the condensation of moisture and absorption by the terra-cotta and possible contact with the steel. Concrete, made of Portland-cement with sand and either cinders or stone, would seem to offer more protection to the steel than any of the materials just mentioned; yet, we hear from time to time of the loss, by corrosion, of steel bedded in concrete.

A study of the action of Portland-cement concrete on steel was begun under my direction by Mr. P. C. Pearson in December, 1901, and it is my purpose to report upon this and some later observations as a preliminary to more work of the same nature now under way.

It has been held by several engineers that the mere alkaline nature of Portland-cement was a sufficient guaranty of its protecting steel from rusting. There is, of course, good chemical reasoning for this, the familiar use of strong alkaline solution in boilers to prevent the formation of scale being based upon the same principle. This would seem to settle the matter once and for all, were it not a fact that steel bedded in concrete has corroded very rapidly, while other steel in a different concrete of the same kind of cement stands without change for 10 years or more.

The investigation was started not to find out that steel could not be protected by concrete or that it could be, for on that point we were sure, to start with, but we have tried to find a reason for occasional failure and to suggest a remedy.

An examination of several cases where expanded-metal had been embedded in concrete showed plainly that wherever the steel was exposed through cracking rusting began, even though the cracks were very fine. It would seem that the alkaline nature of the cement would be sufficient to prevent corrosive action occurring within a few hundredths of an inch on the moist surface of the steel, but such is not always the case.

To study the matter systematically, two brands of American Portland-cement (*Alpha* and *Lehigh*) were selected; two kinds of cinders, one from the Sugar Refinery, the other from the Boston and Albany locomotives; a sharp, clean beach-sand; and a hard, clean broken stone, the larger part being fragments of flint and trap-rock. Concretes were made up in bricks about 3" x 3" x 8", with the steel specimens near the centre.

The following mixtures were tried at first; others will be reported on later: Neat cement; cement, one part to 3 of sand; one part of cement and 5 parts of broken stone; and one part of cement to 7 parts of cinders. All briquettes were made in duplicate with both cements. There were later made up briquettes of one part of cement to 2 parts of sand and 5 parts of cinders, and of one part cement to 2 of sand and 5 of crushed stone. The table below gives a summary of the mixtures:—

Alpha Cement.	Lehigh Cement.	Sand.	Stone.	Cinders.
1	0	0	0	0
0	1	0	0	0
1	0	3	0	0
0	1	3	0	0
1	0	0	5	0
0	1	0	5	0
1	0	2	5	0
0	1	2	5	0
1	0	0	0	7
0	1	0	0	7
1	0	2	0	7
0	1	2	0	7

It was hoped to vary the density, the porosity and the nature of the contact with the steel, as well as the chemical composition of the concretes. The cements were tested chemically and physically and found good. The cinders, when washed down with a hose stream and dried, tested distinctly alkaline, and analysis revealed very small amounts of sulphur. The stone and sand were thoroughly washed and clean. The ingredients were mixed dry in every case and, when wet, thoroughly mixed and tamped until wet on top.

¹Report No. IV of the Insurance Engineering Experiment Station, Boston, Mass.

The cleaning of the steel was the most troublesome problem met with. It was necessary to scour the pieces, then pickle in hot dilute sulphuric acid, and finally dip into hot milk of lime. When cold, the lime was removed with a wire brush. This left the steel clean and bright, ready to be put into the test-bricks.

The specimens used were a mild-steel rod 6 inches long and $\frac{1}{4}$ inch in diameter, a piece of soft sheet-steel $6'' \times 1'' \times \frac{1}{8}''$ and a strip of expanded-metal $6'' \times 1''$, all three pieces being put in each brick. Since time would not permit of our exposing these specimens to natural conditions, we enclosed them in several large tin boxes, sealed tightly, and subjected one quarter of them to an atmosphere of steam, air and carbon-dioxide, and second quarter to air and steam, a third to air and carbon-dioxide, and a fourth stood upon the table of the room, with no special care as to their temperature or dryness. Of the entire number, about one-half were set in water for one day, the rest for 7 days, before sealing up.

At the end of 3 weeks the briquettes were carefully cut open and the steel examined and compared with specimens which had lain unprotected in each of the tin boxes.

Those specimens which were mixed of neat cement can be dismissed without discussion, for the protection was perfect. The steel was as bright as when put in.

The unprotected pieces were found to consist of rather more rust than steel. The steel was wrapped about pieces of uralite, to serve as a means of identifying it by number, the stamped numbers being nearly obliterated by the rust.

Of the remaining specimens, hardly one had escaped serious corrosion. The location of the rust-spot was invariably coincident with either a void in the concrete or a badly rusted cinder.

In the more porous mixtures, the steel was spotted with alternate bright and badly rusted areas, each clearly defined. In both the solid and the porous cinder-concretes, many rust-spots were found, except where the concrete had been mixed very wet, in which case the watery cement had coated nearly the whole of the steel, like a paint, and protected it.

Some briquettes made later of finely-ground cinders and cement, in varying proportions, when exposed to moisture and carbonic-acid, showed how effectually the presence of cement prevented rusting, even in a highly porous mass—one of cement to 10 of cinder, provided there were no cracks or crevices or distinct voids.

From the examination of these several hundred briquettes we were able to draw several conclusions:—

First.—Neat Portland-cement, even in thin layers, is an effective preventive of rusting.

Second.—Concretes, to be effective in preventing rust, must be dense and without voids or cracks. They should be mixed quite wet where applied to the metal.

Third.—The corrosion found in cinder-concrete is mainly due to the iron-oxide, or rust, in the cinders and *not* to the sulphur.

Fourth.—Cinder-concrete, if free from voids and well rammed when wet, is about as effective as stone-concrete in protecting steel.

Fifth.—It is of the utmost importance that the steel be clean when bedded in concrete. Scraping, pickling, a sand-blast and lime should be used, if necessary, to have the metal clean when built into a wall.

In the matter of paints for steel, there is a wide difference of opinion. I cannot believe that any of the paints of which I have any knowledge can compare with a wash or painting with cement. Moreover, if paint does disintegrate, it leaves a thin void next the steel, the worst possible condition. I examined some steel Z-bars not long ago, which were exposed in process of altering a building 5 years old. It was clear that the steel was rusty when painted and that moisture had penetrated through the paint, caused the rust to increase and split off the paint. This was a case where the steel was built into the brickwork with no attempt at any protection other than the paint.

It is, in my opinion, perfectly clear that the coating of all steelwork with cement before applying the concrete or tile or brick, as the case may be, is an absolute essential, if the formation of rust and consequent weakening of the steel is to be prevented. The thickness of the cement-layer need not be great, but it should be a continuous coating, without cracks. The steel should be perfectly clean; but if, as is often the case, the choice is between paint and rust which accumulates during construction, the paint is to be preferred.

Mr. Pearson suggested the use of Portland-cement in protecting the under side of railroad-bridges against rust and the blasting action of the gases and cinders from locomotives. I think this merits a careful trial.

It is intended to take up the study of paints as a protection for steel, and to study, as well, the action of corrosion with long lapses of time in the walls and buildings of the Experiment Station now about to be erected. The first fire-testing work will also be upon the tile, brick and concrete protection of steel from fire. Next we propose to study the effectiveness of the many kinds of "finish" for buildings. A small two-story house of refractory material, into which the finish to be tested can be built, is needed for this work, and already several materials are waiting to be tested. The kiln for testing floor-spans, beams and posts is to be about $15'' \times 20''$, and it will be heated by a battery of oil-burners well above the melting-point of cast-iron.

CHARLES L. NORTON.

LABOR-TRUSTS THE WORST.

ONE of the sanest and most logical presentations of the really important rights and principles involved in such labor disturbances as the anthracite-coal strike that the recent popular newspaper discussion has brought to light is that made by Mr. Robert S. Minot in the following communication addressed to the Boston Transcript:—

"TO THE EDITOR OF THE TRANSCRIPT:—

"The present anthracite-coal strike is *prima facie* the fault of the miners, because they voted to strike and struck, and the burden of proof is on them to show the contrary. A corresponding lockout by the operators would be *prima facie* their fault, but such lockouts do not occur and would not be tolerated if they did. There is no more reason for tolerating such a strike. A strike is an act of selfishness and brutality to the employer, to the striker's own wife and children, to the non-union worker, who works at the peril of his life, and to the public who suffers, particularly the poor, of the striker's own class.

"Whatever the sins of the operators, they do not often lockout, nor kill nor wound, except in lawful defence, nor starve their own families or others. They do not paralyze industry by mob-rule and criminal violence. The worst sin they are usually charged with is excessive prices, and that charge has never been proved, the retail dealers being now the worst offenders.

"The great trust-issue to-day is the labor-trusts. The others are comparatively unimportant and can be dealt with later. At most they make prices high, but the labor-trusts arrogate to themselves the right to paralyze production to the extent of their power. They have attempted to paralyze railroad-transportation, notably in 1877; street-railroad transportation, as in Brooklyn, Cleveland and Boston; building-operations, as in New York and Chicago; and now the production of coal, which strike means, if much prolonged, paralysis of all industry, transportation, education, and even destruction of life.

"There is always about the same routine. The vote to strike and the strike with little or no notice, selfish, ugly, brutal and destructive; the abuse and killing and wounding of non-union men; the destruction of employers' property and distress of the consumer and the public. If the labor-trusts had unlimited power what limit would there be to these results? They dread the law when properly enforced, and public opinion when it is not poisoned with false sentiment, and the exhaustion of their own means. Thus their power ends and so their strikes. They talk of equal rights and liberty, but deny them without justice or mercy to the 'scab,' whose life they take because he tries to earn his daily bread for himself, and his wife and little ones, for something less than union wages.

"If the 'scab' has no right to work for wages satisfactory to him, there certainly exists no right for union men to strike, but granting that there is the individual right to work, or to stop working, should not, must not, strikes such as this coal-strike, which if much prolonged may perhaps mean anarchy paralleled only by such historical instances of mob-rule as the French Revolution, be made by law criminal conspiracies, to be justly punished?

"The manual laborers are forming themselves into a striking-class distinct from the rest of the community. Misled by bad leaders, outvoted by their more radical members, they are ever prone in time of strikes to lawlessness and crime. What a terrible inheritance for their children!

"The working-classes are, like all other classes, made up of good, bad and indifferent individuals. It is only when the bad are in control that a whole class goes wrong. Their only salvation lies first in submission and obedience to the law of the land, and in true loyalty to their own families, to their contracts with their employers and to the public which depends on their continuous labor. The American public is over-patient and long-suffering, but once it sees clear, and is aroused and antagonized, no enemy is safe.

"No just or humane man or woman but knows that employers are too often selfish, hard and unjust, and wishes justice and consideration, humanity and kindness for every deserving workingman or woman, but every reasonable man sees that strikes are essentially civil war and rebellion on a minor scale, and when they break out in lawlessness, the first step, even for the striker's sake, is to restore law and order. Then there should be State boards of arbitration and conciliation, or courts of justice, to which all such disputes could be referred, like all other disputes. Why should the manual laborers not settle their disputes as the rest of us do? Public opinion will do the rest.

"There are deep lessons to be learned from this strike.

First.—That the public interests vastly outweigh those of the operators or miners.

Second.—That selfishness, antagonism, injustice and brutality are not practical qualities in the higher evolution of mankind.

Third.—That the war-spirit, which Theodore Roosevelt, our President, has done somewhat to evoke and promote, is capable, in the midst of peace and unparalleled prosperity, of raising a hell too strenuous even for him, such as he has far more desire than power to quell.

Fourth.—Universal suffrage is in peril in the North. It no longer exists in the South, the Negro having lost the ballot with scarcely a murmur of protest in the North, which fought the War of the Rebellion but forty years ago to give that ballot with freedom. It is just and necessary that habitual criminals should be disfranchised. A

period of disfranchisement would be a just punishment for any serious lawbreaking. Should such disfranchisement laws be enacted (and none but criminals or would-be criminals could well oppose them), those classes who were most lawless would suffer this penalty the most, and thus the element of 'politics' would gradually be somewhat eliminated in dealing with lawlessness of all kinds. To plunge lawlessness deeper into politics would be to leap out of the frying-pan into the fire.

ROBERT S. MINOT.

"BOSTON, October 9, 1902."

FERRO-CONCRETE.

AT a meeting of the Society of Engineers held at the Royal United Service Institution, Whitehall, on Monday evening, a paper was read on "The Hennebique System of Ferro-Concrete Construction," by Mr. Augustus de Roban Galbraith. The author stated that the originator of the principle was M. Joseph Monier, a Frenchman, and that it was first applied to the manufacture of slabs and pipes in ferro-cement. He then described the ferro-concrete system invented by M. Hennebique, a French engineer, which system has been widely introduced in practice in France, including the construction of a bridge of three arches at Chatellerault, 26 feet 3 inches wide, and having a centre-span of 172 feet and two side-spans of 135 feet each. This system is also being adopted in this country in various engineering-works, notably in connection with the Old Quay widening, and new dock-works of the London and Southwestern Railway Company at Southampton. The Hennebique principle consists in embedding in concrete straight and cranked iron or steel tension-bars and stirrups, to take the shearing-stresses, together with distance-pieces, the system being applicable to, and employed in, entire buildings from foundation to roof, inclusive. The piles used at Southampton are built up in vertical moulds, in which are placed long steel rods, which give the required strength. These are laced together with wire stirrups, and Portland-cement concrete of the best quality is filled into the moulds and rammed round the steel. After a month the pile is taken out of its mould and driven in position, much in the same way as timber piles are. The ram is exceptionally heavy, generally 30 cwt. The head of the pile is protected from injury by covering it with a hemlet, or iron case, filled with sawdust; a timber dolly is always used. The author then pointed out the care required in the selection and preparation of the materials, explaining that the usual proportions of the concrete were five to one, and giving the preference to Siemens-Martin steel over Bessemer steel, owing to the purer and more uniformly good quality of the former. He then dealt with the application of the system in general construction, giving the results of some tests of Hennebique beams with and without stirrups, which proved the superior strength of the former. He then stated that the results of experiments by Professors Bauschinger and Ritter showed that the adherence of iron to concrete was about 570 pounds per square inch. The coefficient of expansion and contraction of steel and concrete was found by M. Durand Claye to be identical up to the fifth decimal, giving the breaking strain of concrete as between 3,000 pounds and 4,000 pounds per square inch. The advantages of the system as regards fire-resistance were then illustrated by the light of some severe fire-tests carried out at Ghent, together with the results of a fire which occurred at a spinning-mill at St. Etienne, Belgium, which proved that ferro-concrete structures were perfectly fireproof. The author then gave the following examples of the cost of the Hennebique system as carried out in different structures: The Chatellerault Bridge, £18 12s. per lineal foot; a grain-warehouse at Plymouth, 4½d. per cubic foot of space; a flour-mill at Swansea, 4½d. per cubic foot; grain-silos at Swansea, 6½d. per cubic foot, and some coal-hoppers at Portsmouth, 7½d. per cubic foot. — *Building News*.

THE STRENGTH OF FERRO, OR ARMORED, CONCRETE.

A SERIES of valuable experiments has recently been carried out by a commission appointed by the Ministre des Travaux Publics, with a view to ascertaining the precise rôle which the metal plays in armored-concrete construction. The results, as described by M. Considère in a communication to the Paris Académie des Sciences, are particularly interesting. The specimens used by the commission in the tests were generally in the form of bars 2 metres (2.187 yards) long, and had a cross-section 10 centimetres (3.9 inches) square. Each of these concrete bars was reinforced at the corners by four steel rods, having a total section of 113 square millimetres (.176 square inches). The concrete employed was made by mixing 300 kilogrammes (660.7 pounds) of Portland-cement with .800 cubic metres (28.25 cubic feet) of gravel, passing a 25-millimetre (.98 inch) screen, and .400 cubic metre (14.12 cubic feet) of sand, passing a 5-millimetre (.19 inch) screen. It was found that, in setting, the contraction of the concrete gave rise to an initial compression in the steel reinforcement amounting to 2,923.76 kilogrammes (2.87 tons) per square inch of the metal. The corresponding tensile forces simultaneously called forth on the concrete amounted to 33.57 kilogrammes (73.9 pounds) per square inch. Tested in tension it was found that the specimens stretched rapidly until the stress on the concrete was practically equal to the ordinary tensile strength of this material. From this point the tested bar stretched much less rapidly, and throughout this period the tensile stresses in the con-

crete remained constant, the whole increase of load being taken by the iron bar. It follows, therefore, that during this period the elastic modulus of the concrete was zero. In one case the test-bar was subjected to a load of 2,060 kilogrammes (2.2 tons), equivalent to a stress of 132.45 kilogrammes (291.7 pounds) per square inch of cross-section, under which the total expansion of the specimen was 6 millimetres (.024 inch). The reinforcing rods were then cut out, and the cross-shaped bar left was tested in cross-breaking, and in spite of being somewhat injured in the cutting out of the reinforcing bars, only failed under a calculated stress of 58 kilogrammes (127.7 pounds) per square inch. Summing up, M. Considère states that armored concrete submitted to tension acts in exactly the same manner as ordinary concrete, so long as the tensile stress does not exceed the usual breaking stress of ordinary concrete. Under higher stresses it will support without breaking extensions which, in the case of specimens hardened under water, have been as great as one five-hundredth of the total length; and, in the case of air-hardened concrete, have ranged between one eight-hundred-and-fiftieth, and one two-thousandth of the total length. When the ferro-concrete is stretched beyond the usual elastic range of ordinary concrete, the tensile stress on the concrete remains constant up to the ultimate breaking point, the whole of the additional load being taken up by the metal. When subjected to repeated tensile stresses, however, the fraction of the load carried by the metal tends to augment and that of the concrete to fall, until ultimately the working-stress on the concrete is only 70 per cent of its original value. If, finally, after a series of loadings and unloadings, the maximum load is raised 30 per cent, the concrete again exerts a tensile resistance equal to its primitive value. — *Stone Trades Journal*.

BOOKS AND PAPERS

PROBABLY most people, if asked whether another book upon Rembrandt were necessary, would reply in the negative; and yet, in spite of numerous volumes, small and large, this little three-and-sixpenny book is not only right welcome, but it can be highly commended — as examiners say. It is exactly what it pretends to be — a critical essay; not a mere bagful of facts strung together for the semi-ignorant. It supposes a certain amount of knowledge upon the subject, and an intimate acquaintance with the painter and his works. Moreover, it deals more with Rembrandt's drawings and engravings than with his pictures; but, in the author's own words, most of the details in the book "are drawn from Emile Michel's very full work on the subject." And yet the book is not only pleasant reading, but it fills up, in a small space, a certain void. There are no reproductions of Rembrandt's pictures, because, says M. Bréal, bringing them down to the size of the book would be a betrayal. So the author determined to reproduce the painter's drawings and engravings from the collections in the British Museum, his object being to make people "love Rembrandt, not to judge him. If we could help to get Rembrandt's work looked at in some degree as Rembrandt knew how to look at a shell, a tree, an old woman or the veiled line of the horizon, our end will have been attained."

The author is hard upon critics and experts who condemn an etching as not Rembrandt's because it is clumsy or in bad taste. As he truly says, "In him there is no formula. He renews himself in every work and has no other care than that of rendering visible what he feels to be. He pursues this aim by any and every method, and when he touches it he stops; this is the explanation of those 'changes of manner' which we shall often remark in the same painting or the same etching."

And the people who "interpret" painters are also criticised, the folks who discover "philosophic intentions at which the artist, not having supposed himself so clever, would have a right to stand amazed" — systems of thought of which the painter was quite innocent — these people discourse eloquently upon the coarseness of some of the subjects of his pictures as being quite "unworthy of Rembrandt."

Whether M. Bréal is right in his defence of the painter's nude studies, or rather the Dutch *fraus* who sat for him, is questionable. Certainly, one cannot defend an ugly *ensemble* as one can an ugly face, which loses its ugliness by its expression, whereas the "altogether" has to depend upon line and color; and there is no reason why, if we condemn nudités which are only unclothed *hausfrauen*, we should be supposed to admire Greuze's *double entendres* and harmful imbecilities. However, the chapter upon this subject (IV) is well worth reading; much of it is perfectly true, and all the argument is well reasoned and worked out.

The translation is good and reflects credit upon Miss Clementina Black.

ARCHEOLOGISTS interested in London should read "*Medieval London*,"² an excellently illustrated account of the city and its buildings. Many of the reproductions are from some drawings in the British Museum done by J. Wykeham Archer in 1841.

¹"Rembrandt: a Critical Essay." By Auguste Bréal. London: Duckworth & Co.

²"Medieval London." By William Benham, D.D., F.S.A., and Charles Welch, F.S.A. London: Seely & Co. Price, 7s. 6d.

They are wash drawings of places long since destroyed or restored beyond recognition, such as the crypt of a church in Aldgate, which had a fine vault. Those of the Tower are interesting, as showing the old seventeenth-century gabled houses which have been rebuilt as Victorian Norman.

Besides the above drawings are some exquisite pencil outlines by Antonio van der Wyngaerde, reproduced from the originals in the Bodleian Library, at Oxford. They are views of Westminster, the Strand, St. Paul's (the old cathedral), London Bridge, Billingsgate, the Tower, and Greenwich. Another, of Archer's, represents the Roman bath in the Strand, discovered in 1841. How many visitors to the metropolis have any idea that there is a Roman bath in London; indeed, how many Londoners, as they trudge along the Strand, are aware of the fact?

The letter-press is as good as the illustrations, which, of course, we should expect from two notable antiquaries, who are equally at home in relating historic facts as in discussing architecture.

AMONGST the many serial papers that have been first published in this journal and later republished in book-form, the latest now presents itself in the form of a reprint of Professor Edward S. Morse's journal-notes¹ made during a brief visit some years ago to some of the cities of China, at that time more or less open to the inspection of "foreign devils." The papers have too recently appeared in our own columns to require any extended notice of them, but it is worth while to explain that in preparing them for appearance in book-form Professor Morse has added other matter and illustrations, so that the book runs to over two hundred pages of lively, entertaining and instructive reading.

These journal-notes are to be looked on as merely the efforts of a man of science in his hours of relaxation and leisure; they are the plain, unvarnished records of personal impressions during a vacation-trip, jotted down on the spot without thought that they might later be laid before the public. If any one cares to know what Professor Morse's scientific work is he can find it in his important monograph on Brachiopods now in press; or get an equally good and more entertaining impression by examining his great catalogue of the Morse Collection of Japanese Pottery in the Boston Museum of Fine Arts, one of the most perfect specimens of modern book-making that can be found, and an imposing monument of what scientific accuracy, patient thoroughness and true scholarship can accomplish.

IT has always seemed to us curious and somewhat inexplicable that English draughtsmen should have such a passion for drawing, over and over again in aimless repetition, to seemingly fruitless end, the examples of the heavy old oak furniture of the sixteenth and seventeenth centuries that are to be found in museums and cherished in the domestic circle as reminders of the discomfort endured by the people of those days, and proofs that the artistic perceptions of the designers were hardly on a par with the skill of the workmen who so vigorously carried out the crude ideas of the furniture-designer.

These cherished examples of old oak furniture are wonderfully easy to measure, as the forms are all geometrical and the parts not too small to be accurately figured with the use of a foot-measure, and the ornamentation is so crude that it can hardly be wronged by the most careless and inaccurate sketching. The fact that these heavy and clumsy articles were so well and strongly put together that they have lasted, in spite of hard use and neglect, for two or three hundred years and still are serviceable seems but a poor reason for encouraging furniture-makers in these days to put on the market articles which textually repeat these archaic and clumsy forms. And if the preparation and publication of elaborate measured drawings have not for their purpose the enabling the thoughtless designer or the rule-of-thumb mechanic to reconstruct the article in question, what is their purpose? They may be intended as warnings showing what to avoid; they can hardly be offered as suggestions which invite the designers of to-day to seek a means of refining and adapting their heavy clumsiness to the needs of to-day. Archaeological veneration for the archaic work of elder times is respectable, but it is a virtue that the artist of to-day can leave uncultivated without losing caste.

Granted that another book of measured drawings of old English oak furniture were needed, we readily admit that Mr. Hurrell's book² fills the gap amply—even handsomely. He has shown all that there is to show, clearly, intelligently and intelligibly, but we question whether a large portion of his time has not been misspent, though we admit that this misgiving may not be shared by others.

The last forty of his one hundred and ten plates are more interesting than those which he devotes to furniture proper. Here we find collected measured drawings of miscellaneous details of the wood-worker's art of the period, panelling, ceilings, mantels, stair-rails, window-finish, etc. The forms are those proper to the period and the archaism of the decoration is essentially similar to that which is employed on the chairs, tables and chests shown in the earlier plates;

but they are more interesting, more agreeable, more useful and usable, finally, because the eye accepts them as the mere expressions of form, and does not suggest to the mind heaviness and bodily discomfort as it does in the case of tables, chests and chairs which must be lifted and moved at the expense of a real muscular effort, or used and sat upon to the undergoing of real physical discomfort.



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

UNITED STATES GOVERNMENT BUILDING: LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO. MR. JAMES KNOX TAYLOR, SUPERVISING ARCHITECT, WASHINGTON, D. C.

HOUSE OF JAMES MEANS, ESQ., NO. 191 BAY STATE ROAD, BOSTON, MASS. MESSRS. LITTLE & BROWNE, ARCHITECTS, BOSTON, MASS.

HOUSE AT DETROIT, MICH. MR. G. H. INGRAHAM, ARCHITECT, BOSTON, MASS.

HOUSE AT TORRINGTON, CONN. MR. E. G. W. DIETRICH, ARCHITECT, NEW YORK, N. Y.

(Additional illustrations in the International Edition.)

THE ZABRISKIE MEMORIAL CHAPEL, NEWPORT, R. I. THE LATE FREDERICK CLARK WITHERS, ARCHITECT.

LOWER STORIES: NO. 191 BAY STATE ROAD, BOSTON, MASS. MESSRS. LITTLE & BROWNE, ARCHITECTS, BOSTON, MASS.

DOORWAYS, ETC., IN AIX, BOUCHES-DU-RHÔNE, FRANCE:—THE TOWER OF ST. AUGUSTIN;—HÔTEL D'ESPAGNE, COURS MIRABEAU;—DOOR IN THE RUE ESPARIAT.

DOORWAYS AT AIX, BOUCHES-DU-RHÔNE, FRANCE:—HÔTEL DE PANISSE, RUE E. DAVID;—HÔTEL D'AGUT, PLACE DES PRÉCHEURS.

THE old capital of Provence is certainly an imposing city. As one passes through the spacious *Cours*, with its trees and fountains, one is attracted by many fine sculptured doorways, brass knockers and finger-plates. And yet, not a single doorway can be attributed to any particular sculptor—there are no records in the city archives of the buildings, and the names of the craftsmen and sculptors who designed these beautiful doorways are as unknown as the troubadours' who sang at the Court of Kings René or Raymond. But, if artists are known by their works, Aix is a place to go to for the study of doorways; not half a dozen, but dozens, may be seen in all the streets. They are all still known by the names of the original owners, but whether by native artists or strangers, there is no evidence.

Two monuments in the Cathedral, of the fifteenth century, display grotesqueness rather than grace. The Eygossy Monument is interesting as an example of a most benevolent and soft-eyed *Tarasque*, that fearsome beast who, after devouring half the townsfolk of Tarascon, was subdued by S. Martha, and gave its name to the home of our much-respected Tartarin. But neither this nor the group of S. Martin—the beggar and the dog—are above the ordinary work of the period. They are Burgundian in character, whereas the doorways are Italian. The modelling of the caryatides of the Porte de Hôtel d'Espagnet, in the Cours Mirabeau, is superb. In the bas-relief above the door, Rue Espariat, we can trace the spirit of Prud'hon. So similar are these little winged Amours to some of Prud'hon's inventions, that one is almost tempted to assert that he must have designed them and the little people firing the cannon.

We are indebted to the courtesy of M. Heiricis for permission to reproduce his photographs.

STATION OF THE ELECTRIC ELEVATED AND UNDERGROUND RAILWAY, BERLIN, PRUSSIA. HERREN GRISEBACH & DINKLAGE, ARCHITECTS.

This plate is copied from *Blätter für Architektur*.



THE NEW YORK STOCK EXCHANGE.—Next to the light, the two features of the room which it is of greatest importance should be as convenient as possible are the telephones and the annunciator. At the present time, Exchange members have about 500 telephones on the floor. In the old building they were placed everywhere that room could be

¹ "Glimpses of China and Chinese Homes" By Edward S. Morse, formerly Professor of Zoology in the Imperial University, Tokyo, Japan. Author of "Japanese Homes and Their Surroundings," etc. Illustrated from sketches in the Author's Journal. Boston: Little, Brown & Co. 1902. Price \$1.50.

² "Measured Drawings of Old Oak English Furniture," also of some Remains of Architectural Woodwork, Plasterwork, Metalwork, Glazing, etc. By John Weymouth Hurrell. London: B. T. Batsford, 94 High Holborn, 1902. Imported by Charles Scribner's Sons, New York. Price \$15.

found for them. In the new structure, however, the greatest attention has been paid to placing the telephones in the most convenient possible location on the floor. The instruments are to be placed against a row of parallel partitions at the New Street end of the floor. They also encircle the great piers at that end which support the ceiling and floors above. An extraordinary amount of time and ingenuity was expended in planning these telephones so that every inch of space should be saved to the main floor and so that the clerks who operate the instruments should not be in the way of the brokers on the floor. To that end it has been arranged that these clerks shall enter the Exchange by their own door. They will not come into contact with floor-members except when it is necessary to the transaction of business. Second in importance only to the telephones is the annunciator. In the old Exchange Building the annunciator was a huge checker-board contrivance stretched across one wall. There were 1,200 squares—one for each member and officer—with a number on each. When a member was wanted at the telephone, his clerk would press a button, the flap covering his number would fall, and the member would run to his telephone to get the message. It is obvious that on a floor where perhaps 1,000 men are moving about it is not easy to locate any one, so that in the expeditious discharge of business these annunciators form an essential factor. In the new building there is a most ingenious contrivance. In each of the two side-walls of the room, other than those made by the windows, there is a great oblong checker-board, of 1,200 rectangles, each 9" x 12" in size. These rectangles are made of opaque glass and upon each of them a member's number is painted in distinct numerals. Behind each square are several incandescent electric-bulbs, with bulbs of different colors. Any one of the bulbs may be operated by the member's clerk. If the member is wanted at the telephone a red light may be turned on. If he is wanted at his office immediately, a green one. If some one wants him at the entrance, a blue globe. By alternating the colors, by duplicating flashes, and by other variations, it is obvious that an almost unlimited number of messages may be flashed to a member on the floor. In a business where seconds often count for everything, it will be possible to save a vast amount of time and money through this form of annunciator. One of them is fixed on each wall to save the members from looking one way all the time. Under the old system, the eyes of many members were injured from the necessity of continually looking at a single flapping checker-board. — *Ivy Lee in the World's Work.*

NEW FACTS ABOUT CLIFF-DWELLERS.—Dr. Henry M. Baum, President of the Records of the Past Society of Washington, D. C., has recently returned from a two months' visit to the ruins of the cliff-dwellers in Colorado, New Mexico, and Arizona, and will recommend that three groups of ruins—the Mesa Verda, near Mancos, Col.; the Chaco Cañon, in New Mexico; and the Cañon de Chelly, in the central part of Arizona—be set aside by Congress as national reserves. He is opposed to the project which is being agitated to set aside 480,000 acres which constitute Jaurito Park, near Española, in New Mexico. He will also urge Congress to order an archaeological survey of the Southwest. He will return to Colorado next summer, and will head an expedition which will go over the territory just covered in a more comprehensive and detailed manner. He asserts that the cliff-dwellers lived at least 1,000 years ago, and, possibly, half a century earlier, while evidences exist of the habitations of many millions of people. In speaking of his trip, Dr. Baum said: "During my trip I do not think that I averaged 10 miles in any one of the cliff dwellings districts where I did not come across some of the habitations in which these prehistoric people lived. I saw on my entire trip enough dwellings to accommodate 2,000,000 people. From what I saw I believe the country must have been inhabited by at least 7,000,000 persons. I am firmly convinced of one fact, and that is that the cliff-dwellers and the mesa and valley dwellers were all of a contemporaneous civilization which dates back before the heavy lava overflow in the Southwest. The pottery, stone implements, and skulls found in these three classes of ruins are all the same. It is quite evident that the vast civilization of the entire country was extinguished by a flow of lava, an eruption similar to that which recently occurred at Martinique. Those who were not killed directly by the lava-flow succumbed to the pestilence which followed. There were numerous evidences of the lava-flow throughout the entire region. In one instance I saw a vast irrigation-ditch filled with lava, and in New Mexico there were numerous dwellings covered with it." — *N. Y. Evening Post.*

SEA-WATER AND PORTLAND-CEMENT CONCRETE.—A series of experiments, which are expected to extend over a period of 30 years, are about to be undertaken by the Prussian Government, in conjunction with a number of prominent cement-manufacturers, with a view to further elucidating the effect of sea-water on Portland-cement concrete. A number of large concrete blocks, made with cements of different compositions, are to be sunk in the sea off the coast of Sylt Island, and will be examined periodically. At the same time, briquettes of the mortar used and blocks of the concrete will be immersed in tanks on the land. Some of these tanks will contain fresh, and some salt, water. Both tensile and compressive tests of these briquettes and blocks will be made from time to time. The mortars used will be compounded so as to determine whether an addition of slugs or strass improves the resistance of the cement to sea-water. It must be mentioned here that both high-limed and low-limed cements are to be used in these tests. — *Stone Trades' Journal.*

VALUABLE FIND IN BEOTIA.—In a report to the Department of State, Charles S. Francis, United States Minister at Athens, Greece, announces that an unusually interesting archaeological discovery has just been made in the northern part of Beotia, in a plain of Cheronea, where the Greeks in 338 B. C. lost their independence by their defeat by Philip of Macedon. Mr. Francis says: "Dr. Solerides had been sent

there to examine the ruins of an ancient monument which the Greeks had erected on the spot where they had buried the fallen. In making a tentative examination he found a low tumulus on exactly the spot where Plutarch places the burial-place of the Macedonian soldiers of Philip. This tumulus he opened and found therein the remains of the Macedonian dead packed in layers. Most of the bones are charred, and the soil is mixed with ashes, showing that the bodies were cremated imperfectly. The importance of the discovery is that topographers will be able better to identify the sites of the battlefield, archaeologists will expect to find Macedonian accoutrements, etc., and ethnologists, by studying the skulls (some well preserved) will be able to come to some conclusion regarding the racial affinities of the ancient Macedonians." — *Exchange.*

PURIFICATION OF WATER BY OZONE.—"An examination of the results obtained in the purification of water by treatment with ozone has just been concluded by Drs. Ohlmüller and Prall, on behalf of the German Imperial Health Department," says the *Electrical Review*. "The apparatus used was capable of treating 10 cubic metres of water per hour. The water was sprayed through a rose to a bed of pebbles, beneath which ozonized air was forced under pressure. The down-flowing water thus came into very intimate contact with the up-flowing current of air. Bacteriological examinations were made both before and after treatment, while the effect of the process on color, clearness, and taste of the water was also observed. The bacteria which survived appeared to be of a specially resistant type, since their number was not reduced by prolonging the ozonizing action. It was found that the whole of the pathogenic bacteria were entirely destroyed by the process. None of the germs of cholera or typhus species survived. The process improves the color of the water and has no bad effect on the taste. The cost is given at about 5 cents per thousand gallons, one-third of which represents the actual cost of ozonizing."

RAISING THE LEVEL OF THE GREAT LAKES.—The Government's determination to investigate a feasible plan of maintaining, if not lifting, the present level of the Great Lakes has caused a great deal of comment in marine circles of this city, and has aroused great enthusiasm at all other lake-ports, and progress of the movement will be watched with great interest. Congress has made financial provision for the undertaking, and it is understood that the experts who will carry on the investigation will be appointed at an early date. The question of the practicability of such a plan is not altogether new, but it appears that former experiments along those lines have never been carried far enough, because until very recently there has been ample depth of water at various ports and through the rivers and channels connecting them. During the last few years, however, vessel-men say lake-levels have dropped at an alarming rate, and the point is now reached where much fear is expressed for the future of commerce. The condition becomes more noticeable, marine interest contends, since the tendency of ship-building is toward the larger and deeper draught craft. Experts claim that Lake Michigan has shown greater shrinkage, and old sailors bear out this statement. Some have claimed that the drainage-canal is largely to blame for the recent low water in Lake Michigan, although engineers of the latter scout the theory. It is understood, however, to be part of the Government's plan to investigate this particular condition. Many plans and suggestions are offered as reparatives. The one most talked of by practical marine men and engineers is that of building a dam at some point upon the lower waters of the Lakes, likely Lake Erie, near Niagara. Prominent engineers who have given the problem some study take the ground that it may be practicable to erect such a dam, and that the water could be raised fully 3 feet in Lake Erie thereby. The effect of such an elevation, it is held, would be felt in Lake Huron, but in lesser degree, the water being raised perhaps 2 feet. It is not obvious how such a plan would materially benefit Lake Michigan, and this point is causing much discussion. Some claim that the latter's level would be raised a foot by such an undertaking, although experts are aloof on that reasoning. Marine interests fear that the Government will be many years in getting down to actual work of relieving the condition of low water, for the project will cost many millions. It is argued that the saving made by the elimination of the necessity of dredging harbors and rivers, for which the Government lays out large sums every year, would be vast and in time would greatly offset the original expenditure. Marine interest maintains that something must be done or the next decade will see a revolution in the great inland waterways and their commerce. — *Chicago Inter Ocean.*

WHAT IS BIRD'S-EYE MAPLE?—"What is bird's-eye maple?" That is a question which just now seems to be baffling not only people who use furniture made of this particular wood, but even woodworkers themselves. In a recent number of a woodworking-magazine an article was published which stated that bird's-eye maple was not a peculiar maple, but simply ordinary maple cut in a certain way. In a recent issue of the *New York Sun* that statement is refuted. It is there stated, on the authority of a woodworker, that bird's-eye maple and curly maple are both cut only from the logs of the rock-maple tree, *Acer saccharinum*, in which a beautiful lustrous grain is produced by the sinuous course of the fibres. This tree is not at all the common hard maple. It is a hard maple, but is full of little gnarls called eyes. Men looking for bird's-eye maple logs go through the standing timber and pick out the bird's-eye maple trees, paying for them from \$30 to \$50 a thousand feet in the woods. Ordinary hard maple logs are worth only from \$6 to \$7 a thousand feet. It would be impossible to cut a piece of veneer with eyes in it from a common hard maple log, and it would be equally impossible to cut a bird's-eye maple-log, no matter how you cut it, so that it would not show the eyes." — *Scientific American.*

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BAIRD'S HAND-MADE SILVER GLASS.

THE proper utilization of natural light is sometimes a very difficult proposition to solve; in fact, it is but a comparatively short time since any practicable means have been projected for deflecting or transmitting the light of day into dark rooms or areas. There have been, it is true, many methods suggested and appliances introduced for this purpose, but they have very imperfectly met the requirements, so that in the majority of cases recourse has been had to artificial illumination.

Unquestionably, then, an invention which, it is claimed, solves this difficult problem satisfactorily must be of more than ordinary importance and value, for it means a vast economy in the use of all artificial illuminants, makes available for business and living purposes an incalculable amount of room which otherwise would be nearly or quite useless, or at least undesirable, and in many more ways must prove of great benefit.

So we feel that this article concerning a developing by Mr. John C. Baird, of Redding, Baird & Co., Boston, which, from all the testimony at hand, seems a very practicable thing for this purpose, will be read with interest. Certainly it is the discovery of a very practical man in his profession, and one who has been associated with former successes in similar lines.

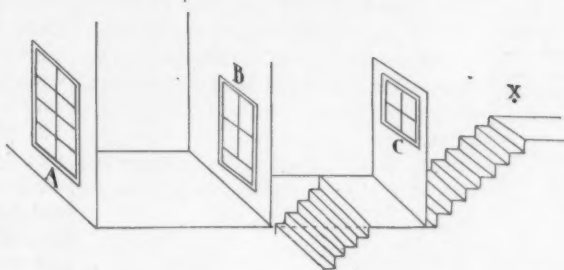
Baird's Hand-made Silver Glass, to which we refer, has, in a comparatively short period, become quite generally introduced throughout New England; to such an extent, we understand, that the factory has been considerably taxed to keep pace with the unanticipated demand, so that additional facilities are being arranged to provide for the growing trade in this particular specialty.

This Glass is for the transmission, diffusion and deflection of light in mills, workshops, school-rooms, offices, stores, basements, churches, libraries, dwellings, and in the many other places where such an appliance would be desirable. It is translucent but not transparent. It is inexpensive, for we are informed that its cost is but a fraction more than many illuminating glasses. No expensive installation is required. It can be placed in existing wooden sashes by removing the plain glass; or, with a trifling loss of lighting power, can be set inside the ordinary glass. The former plan is preferable. It will in-

crease many fold the natural light obtainable and is extremely restful to the eyes.

It lends itself readily to decorative effects in private houses and other places where an artistic scheme is desired. When leaded in conventional or geometrical designs, combined with stained-glass effects or jewels, its beauty is strongly emphasized, while at the same time practical benefit is gained from its use. Front doors, with over-windows and side-lights, if fitted with this Glass, make possible a well-lighted entrance-hall in houses, where otherwise this place would be the darkest part of the house. Rooms in city houses overlooking unsightly backyards may be made more attractive.

Its field of application is so broad that we could hardly enumerate every instance where its use might contribute to the healthfulness and attractiveness of our daily surroundings. In Hartford, Conn., one of the first places to adopt it, its value has been amply demon-



Baird's Silver Glass.

strated for use in school-rooms, and tired eyes during study hours are less frequent than before its introduction. In Lowell, Mass., and elsewhere through New England, several of the larger mills have adopted it, and have admitted its utility for strengthening the light by which their operatives work, and in these large spaces thus lighted the saving in cost of artificial illumination must be considerable, an item of interest in all large establishments.

Baird's Hand-made Silver Glass is pure white, and the rippling is effected by hand instead of being stamped by rollers as in the cheap translucent glasses; but, at the same time, the methods employed in its manufacture enable the makers to supply the market at prices—as above mentioned—slightly in advance of the cost for ordinary illuminating-glass.

To explain its possibilities in transmitting light under very difficult conditions we reproduce here a drawing and explanatory letter from Prof. Louis Derr, of the Faculty

of the Massachusetts Institute of Technology.

In explaining the test this gentleman writes as follows:—

"In complying with your request, it gives me pleasure to send you this result of an observation I made to-day on the ability of the Baird's Hand-made Silver Glass to get light into dark places. The place is a narrow passage and stairway leading from a slightly wider hall, the latter lighted by borrowed light from another room.

"The arrangement is as follows:—

"Omitting fractions, window *A* is 64" x 136", *B* averages about 41" x 100", *C* is in a door and is 32" x 39". All are glazed with Baird's Hand-made Silver Glass. *B* is 21½ feet behind *A*, and *C* is 21½ feet behind *B*. *A* faces north on an 80-foot street, on the other side of which are tall buildings.

"A little hall between *B* and *C* is painted in light color, and is well illuminated by the light through *B*, though the steps are of black rubber and reflect very little light. The stairway and passage leading up from *C* are only 4 feet wide, the steps are of dark wood and steep and the walls dirty—altogether a difficult case for illumination by natural light.

"With the sky outside heavily overcast—in fact, a snowstorm threatening—at 11 o'clock A. M., I found it possible at the point *X* at the top of the stairway and 61 feet from the outside window *A*, to read print of the size known to printers

as agate. The type of the ordinary newspaper is two, and sometimes three, sizes larger than this.

"A glance at the sketch will show that the experiment furnishes a proof of the remarkable transparency of the Silver Glass, as well as of its ability to get light into dark corners; for the light at *X* must come through three windows glazed with it. A little light falls upon the stairway between *B* and *C* from the street below, but not enough to alter the conditions.

"I should say that the photographs taken by me indicate that, under the conditions mentioned above, the light rendered available in the room by the Baird Hand-made Silver Glass must be several hundred per cent more than that given by the plain glass."

Mr. A. S. Covell, Treasurer of the Tremont and Suffolk Mills, at Lowell, Mass., in writing to the manufacturers, says:—

"We have installed in the Lower Weave room, No. 8 Mill, about 600 lights of Baird's

Hand-made Silver Glass, replacing the common glass.

"We find a very marked improvement in the diffusion of light and believe the claims for this Glass will be fully met.

"The weavers report a very marked improvement in the diffusion of light since the installation of Baird's Hand-made Silver Glass."

Mr. E. C. Fitch, President of the American Waltham Watch Company at Waltham, Mass., says:—

"We desire to say that the several lots of Baird's Hand-made Silver Glass which you have furnished us are very satisfactory, and for the transmission, diffusion and deflection of light of great value. In our judgment, it has a large field in manufacturing-establishments and offices. It is beautiful, and the price at which it can be purchased renders it possible to be used in large quantities. We expect to use it in our various work-rooms to advantage. We congratulate you upon its success, and the great benefit it will be to operatives in all kinds of manufacturing pursuits."

Its application to church purposes is mentioned by Mr. Geo. E. Tucker, Trustee of the East Congregational Church, Ware, Mass. He says:—

"The windows are very satisfactory, and you would be much pleased, I am sure, to hear the many compliments we have regarding them. They are doing all that we expected in increasing the light, and beautifying our chapel parlors. We feel very grateful to you for having called our attention to this Glass, as it is doing all that you claimed for it. We should certainly recommend it for the purpose for which we have it in use. We think it must have a large future for this and other uses."

Mr. George P. Field, member of the Executive Committee of the Boston Board of Fire Underwriters, writes to the manufacturers as follows:—

"It gives me great pleasure to write you that the Hand-made Silver Glass which you furnished for the windows in the Exchange Room of the Boston Board of Fire Underwriters has given the most perfect satisfaction to us all. It not only screens the objectionable view from the windows, but softens and diffuses the light. While the Boston Board, as a Board, never gives endorsements in any case, it gives me great pleasure as a member of the Executive Committee, under whose direction the Glass was installed, to write you and to authorize the reference of any parties interested in the Glass to me."

Another striking example of its value is shown in the installation made for Messrs. E. A. Shaw & Co., Cotton Buyers, Boston. These gentlemen say:—

"The erection of a seven-story building opposite the north side of the Mason Building cut off so much light from the interior of our office on the third floor that it necessitated our either moving or finding some artificial means of throwing natural light into the office.

"On making inquiries we were told by disinterested parties that Baird's Hand-made Silver Glass would be an efficient and economical means of getting the desired result. We accordingly asked you to put in on the 3d inst. this Glass in the upper lights of our three windows, believing it cheaper to try the experiment than to move our office. The result is perfectly satisfactory to us. The light that strikes our windows is now thrown well into the interior of the office, and the floor is sufficiently well lighted 25 feet back to enable us to examine cotton samples, which requires a steady, uniform light of good strength."

It has been used very largely at the Boston City Hospital, and has, apparently, met every requirement, for only recently an additional

order was filed with the manufacturers for a large amount.

There might be added many more similar commendations, all showing the different uses to which the Glass may be applied; but these ought to be ample, and they serve at least to show that even under very unusual and severe conditions it seems to attain the desired results. And when it is considered that though a comparatively short time has elapsed since its introduction it is already in use in over fifty of the best class of residences, in more than twenty public and society halls, and libraries, in a dozen or more large mills and factories, besides the installations in hotels, hospitals, stores and other places through the Eastern States, it may be assumed that its utility and value are already clearly demonstrated.

Messrs. Redding, Baird & Co. are to be congratulated upon adding to their long list of successes by the marketing of this product which apparently is gaining such deserved recognition.

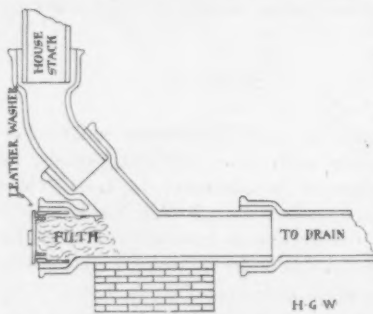
AN IMPROVEMENT IN DRAINAGE CLEANOUTS.

OUR attention has been recently called to an invention by Mr. David Craig, of Boston, the well-known constructing plumber and contractor. The device is so simple, and at the same time so practicable, that we think a description of it at this time will be of interest to our readers.

Certainly, anything which will contribute to cleanliness and health in our buildings should receive the attention of architects and builders, both on their new work and on reconstruction; and when an appliance of this kind may be obtained at an expense only slightly additional to the cost without it, its general adoption seems assured.

Mr. Craig has been so long and so successfully associated with plumbing-construction work that he should have a pretty clear idea of what may be needed to improve conditions and how best to attain desired results, and in his "Cleanout and Dead-end Stopper," an improvement in drainage cleanouts, he seems to have perfected a very simple and inexpensive device.

In the first illustration the ordinary end cleanout is shown as placed in position for



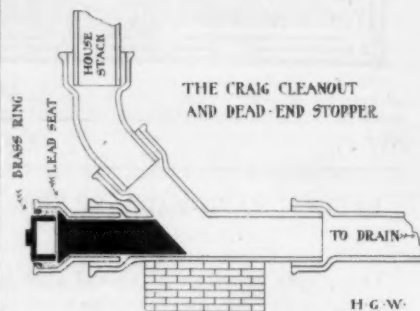
the purpose of cleaning out a stoppage in the house-drain.

The end of the *y* holding the cleanout under these conditions becomes a receptacle for filth, and the solid matter of the drainage becomes lodged there. As there is no way of flushing this part of the drain this accumulation of *filth* becomes putrid and emits foul odors and noxious gases which are liable to find their way into the building through leaky joints. The decomposing matter corrodes the metal comprising the cap, or cover, and it is thereby hard to remove.

If the joint between the cover and body of cleanout is made by a leather washer the washer will become eaten away, thus letting

the sewer-air into the building. If the joint is made with some other packing, say cotton wicking, the cover of joint may be tight, but the corrosion of the metal still goes on. If the cover be removed the accumulated filth will have to be disposed of before an entrance into the drain can be obtained. Where this arrangement of pipes and clean-out occurs at the bottom of a vertical rising stack of soil-pipe, the opportunity for a stoppage in the drain is largely increased, as foreign matter, such as rags, sticks, etc., have a secure place of lodgment in the *dead-end*.

The second illustration shows the Craig



Cleanout and Dead-end Stopper as applied under the same conditions.

The cartridge, or dead-end, stopper as shown in black is a hollow round pipe-casting open at the end toward the plug and closed at the end toward the interior of the drain. This inside end conforms to the angle of the branch of *y* and the interior circumference of the pipe. This cartridge fills up the dead-end of *y* and forms a gas and water tight seat at the point where marked *Lead Seat*. The cartridge is held in position tightly, by a standard-threaded cast-iron plug, the same diameter as the pipe it serves. The plug screws through a brass ring which is let into the outer end of the hub piece and is held tightly in position and forms a homogeneous piece with the lead forming the seat and wall of interior of hub piece, the thread for the screw-plug being cut continuously through the brass ring and lead walls, the bevel seat being formed in the lead after the thread ceases and beyond same. The plug is cast-iron with standard thread (not tapered) and cannot stick in position, as the metals surrounding it are non-corrosive and the sewage is kept away from thread of plug by the presence of the stopper. Means are provided to prevent the cartridge being placed in the wrong position. If the cartridge should be left out the plug will make a tight joint on lead seat. A modification of this appliance would be very practicable for the dead-ends of street water-mains and for idle branches of drains or soil-pipes.

EXPANSION.

We have just purchased a large tract of land at Thirty-fifth St. and Shields Ave., Chicago, and will immediately start the erection of a large manufacturing building. We will install the latest improved machinery for manufacturing the Wilks Hot-Water Heaters and Steel Storage Tanks.

For the present, we will continue using our old quarters at 53 South Clinton St. as offices and show-room and will also carry a large stock of Wilks's Heaters and Steel Storage Tanks for the city trade. We expect to be in our new quarters early in the coming spring. With our greatly enlarged manufacturing plant, we hope to be able to take care of our rapidly increasing business.

S. WILKS MFG. CO.,
CHICAGO, ILL.

Atlas PORTLAND CEMENT

The
Standard
American Brand.

Used Exclusively in the Following New York Buildings:

HAVEMEYER STORES

SINGER BLDG.

ST. PAUL BLDG.

UNIVERSITY CLUB

AMERICAN SURETY BLDG.

N. Y. LIFE INS. BLDG.

BANK OF COMMERCE

STANDARD OIL BLDG.

JOHNSTON and PRESBYTERIAN BLDGS.

AND MANY OTHERS.

Atlas Portland Cement Company

143 LIBERTY STREET
NEW YORK

THE LOVELL WINDOW AND SHUTTER OPERATING DEVICE.

THE G. Drouvé Company, of Bridgeport, Conn., have placed on the market a new device for operating sashes and shutters, called

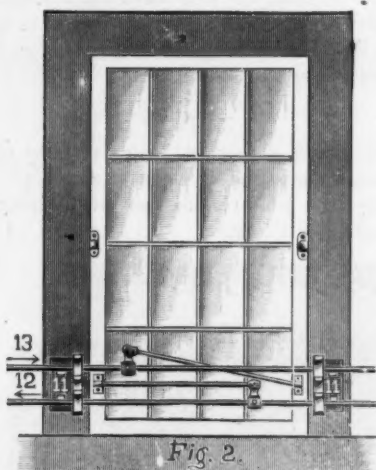


Fig. 2.

the Lovell apparatus, which on its merits should greatly interest architects. With this apparatus a line of sash 500 feet long can be operated from one station, if desired. It makes no differ-

ence in case of fire the windows can be quickly closed while the people are leaving the building. This is a feature which will appeal at once to the owners of large factories and mills.

The illustration herewith shows the apparatus as applied to the vertical windows in the monitor of a factory, but this is far from being the only way or only kind of window to which this useful apparatus can be applied.

Contracts have already been taken for the installation of the apparatus in some large buildings, both East and West. Owners of factories and mills have long been looking for a system which would give perfect ventilation and permit of being operated quickly and easily, and the Drouvé Company have at last succeeded in producing a perfect opening device. The accompanying illustration shows a section of 320 feet of sash, operated from

Figure 4 represents one of the adjustable hangers 11 for supporting the operating-rods 12 and 13, shown on Figure 2. This bracket is adjustably connected to its base 14 by the bolts 15. This base is adapted to be secured to any convenient place, either by means of the holes 16 in the foot, or the holes 17 in the face. The operating-rods 12 and 13, shown on Figure 2, pass through the openings 18 and are supported in the brackets by means of the anti-friction rollers 19.

MORSE PATENT STEEL TIES.

THE Morse System of Bonding as represented by the Morse Patent Steel Ties has

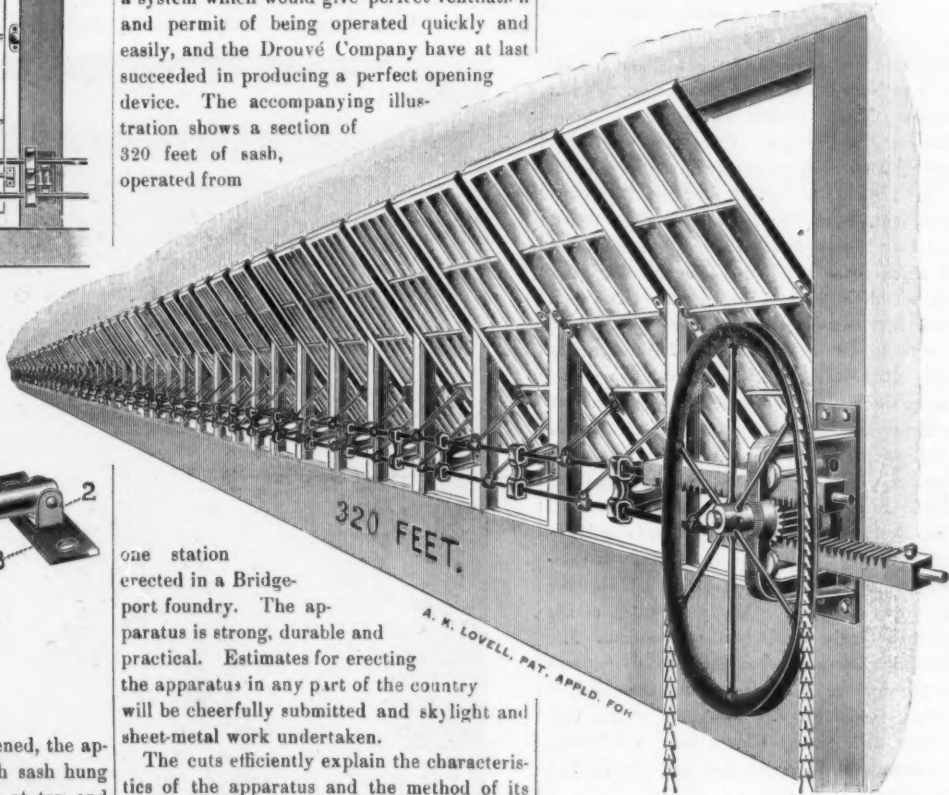


Fig. 1.

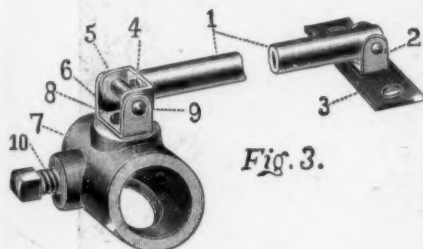


Fig. 3.

ence what kind of sash is to be opened, the apparatus working equally well with sash hung from top, pivoted at the sides, or at top and bottom, or hinged at the bottom. It can also

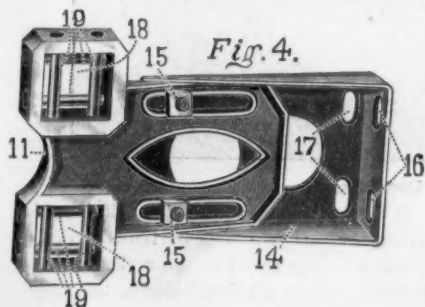


Fig. 4.

be applied to sliding or ordinary lifting windows. As the operating-station for an entire building is, unless otherwise ordered, always placed on the wall at end or side of building,

one station erected in a Bridgeport foundry. The apparatus is strong, durable and practical. Estimates for erecting the apparatus in any part of the country will be cheerfully submitted and skylight and sheet-metal work undertaken.

The cuts efficiently explain the characteristics of the apparatus and the method of its operating.

Figure 1 represents a perspective view of the device operating a line of windows, said windows partially opened.

Figure 2 is a front elevation of one of the windows closed, and a broken view of the operating-rods adapted to move in the direction shown by the arrows.

Figure 3 shows a broken view of the link-arm 1, whose forward end is pivotally supported to the U-shaped clip 2, which clip is swivelled to the sash-plate 3. The other end of the link-arm is swivelled on the headed pin 4, which pivotally connects said arm-link to the U-shaped clip 5. Number 6 is another U-shaped clip swivelled on the collar 7 by the headed pin 8. These two clips are also pivotally connected by the pin 9. Number 10 is a set-screw for securing the collar to the operating-rods 12 and 13 shown in Figure 2.

been accepted by leading architects and builders all over the United States as the most economical and efficient method of tying various forms of brick-and-stone construction now in use.



Morse Patent Steel Tie.

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practically educated the entire building-public to the advantages of their use as well as demonstrating their great superiority over any other system. The manufacturers issue a valuable catalogue in this connection which they will be pleased to mail on request.

SHEET-METAL SKYLIGHTS.

THE Goodall Worsted Co., Sanford, Me., has just completed a brick mill 104' x 150', the upper floor of which is used as a weave-room. The building is solidly constructed, and the weave-room is especially well lighted by sheet-metal skylights made and erected by E. Van Noorden Co., 953 Massachusetts Ave., Boston, Mass. Owing to the heavy snows that occur in that part of the country, it was not deemed advisable to use the saw-tooth style of roof, and Mr. Hollinrake, the superintendent, decided to use a flat roof, on which are four hip skylights 92 feet 3 inches long, of which three are 8 feet 4 inches wide, and the fourth is 6 feet 6 inches wide. Between these four and placed at regular intervals are twelve smaller skylights, each 7 feet 4 inches wide by 17 feet long, and in the space between the last skylight and the north parapet wall are four skylights 8' 9" x 8' 4". In all there are about 5,800 square feet of glass surface, of which 40 per cent is wired glass of the Maze pattern, and 60 per cent is unwired ribbed glass. The weave-room walls and ceiling have been whitewashed, and this, in combination with the overhead light, and also the windows on one side of the building, makes an exceedingly well lighted weave-room. Mr. Hollingrake was determined to spare no pains in the lighting of this room, and the result is entirely satisfactory. The room is also ventilated with twelve Clover Leaf ventilators, 30 inches in diameter, also made by E. Van Noorden Co.

"CYGNET" WATER-CLOSET.

It affords us pleasure to call the attention of architects to the "Cygnets" Water-closet as illustrated on Page v of this issue. By an ingenious device the contents of the bowl is discharged before the wash from the rim commences, thus entirely avoiding agitation and in other respects it appears to be of strictly first class material and construction. As the makers say in their advertisement, they cannot take it to you, but they are confident if you will examine the article you will be more than pleased. It is apparently a great improvement and would seem entitled to at least an examination, after which the makers say they are willing to accept the judgment of architects.

MODERN STEEL CEILINGS.

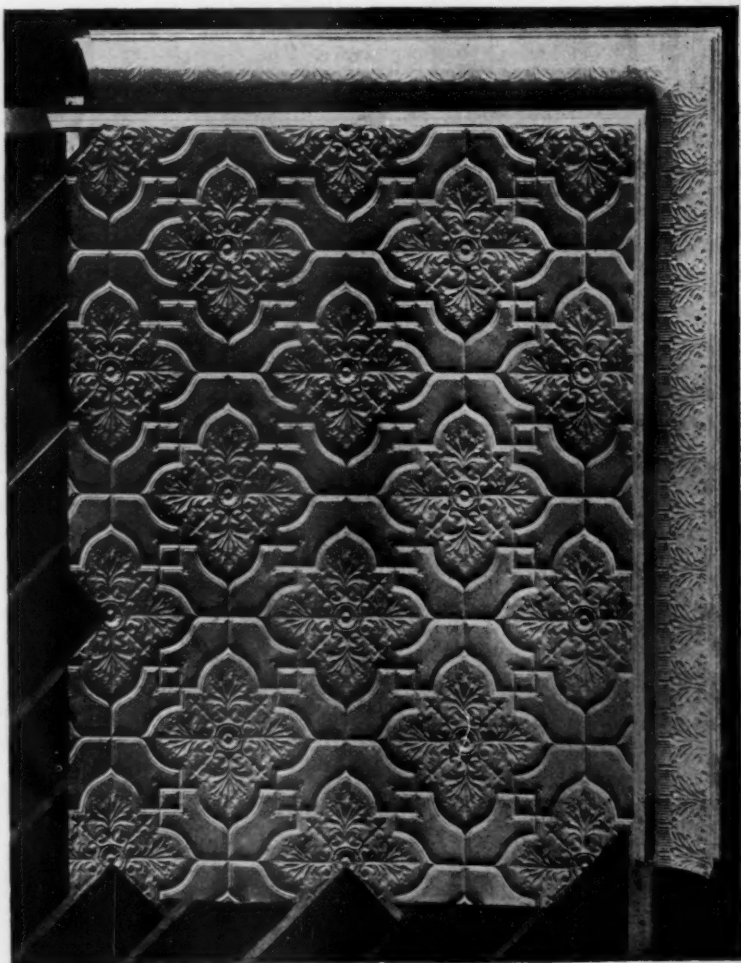
THAT Steel Ceilings will "stay up" is again illustrated in the adjoining engraving of a new pattern from the factory of H. S. Northrop, whose card is among our advertisements. This plan is an adaptation from modern English work, as put up by a prominent firm of English decorators at the Paris Exposition. It is intended for the dining room, library or hall of private residences. It is usually put up diagonally and can thus be used in rooms of irregular shape. Mr. Northrop's ceilings differ from the ordinary, not only in their

beautiful residence of C. S. Arnold at Scarborough on the Hudson, and a ceiling of polished brass to go in the new Safe Deposit Vault rooms on Broadway, near Twenty-fifth Street.

Mr. Northrop's Boston Office, Room 74 of the Equitable Building, is also getting a good share of first-class work.

NOTE.

THERE is perhaps no better economy to the steam-fitter and the engineer than a perfectly tight joint, yet one that can be easily taken apart if desired.



H. S. Northrop's Steel Ceiling.

design but in that the joints are not made on rows of beads and buttons running through and destroying the pattern.

Among the recent contracts given to Mr. Northrop were the ceiling of St. Michael's Church, Newark, N. J., all of groined arches and Gothic mouldings. The deep panelled ceiling of the Fort Lee Ferry House, West 130th St., New York; several rooms of the

It is possible to have such joints if Dixon's Graphite Pipe-Joint Compound is used. Flake graphite is impervious to the action of heat or cold, acids or alkalis. Hence, the value of a graphite compound when properly prepared.

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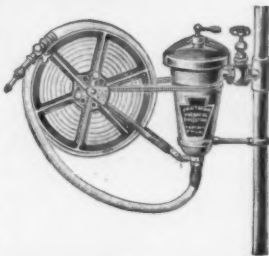
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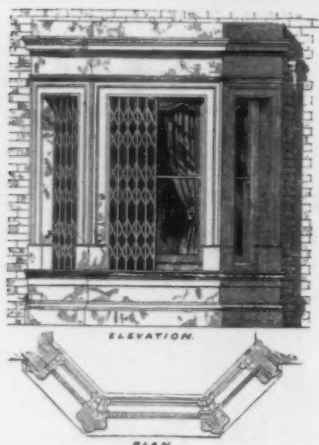
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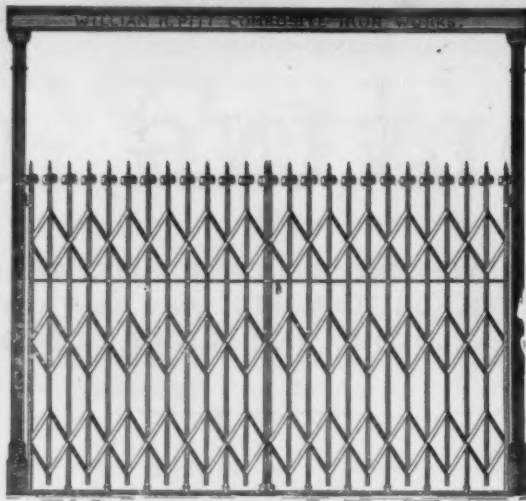
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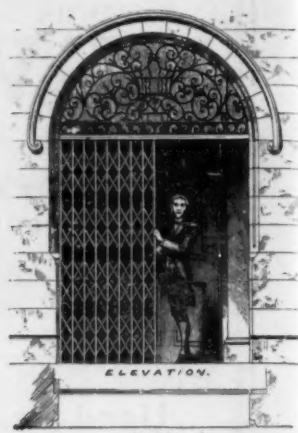
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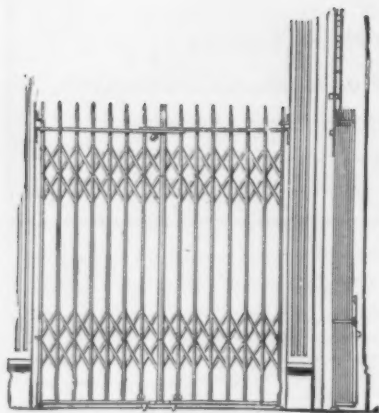


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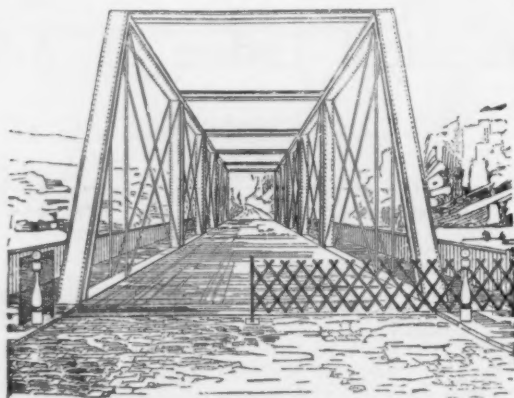
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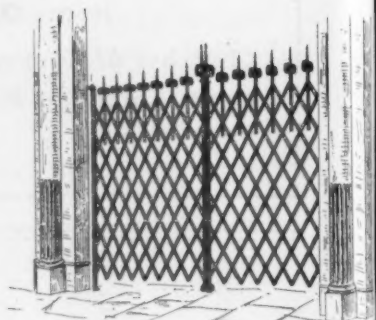


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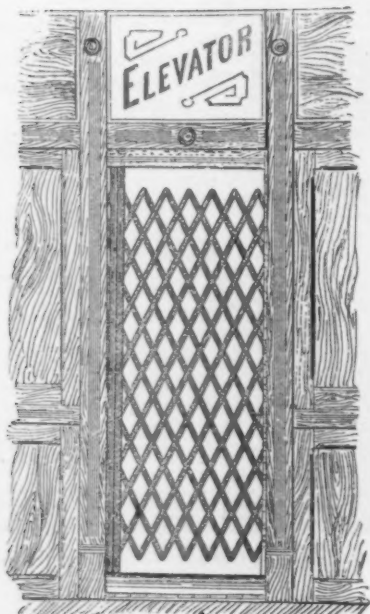
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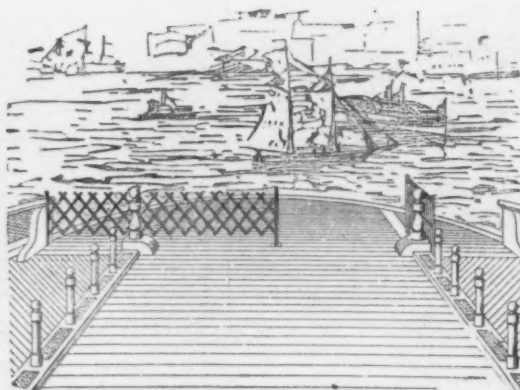
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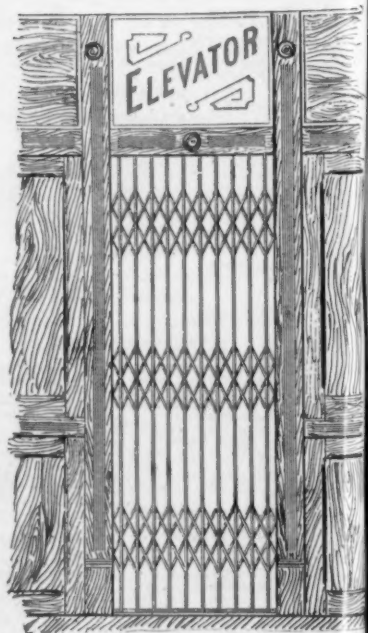
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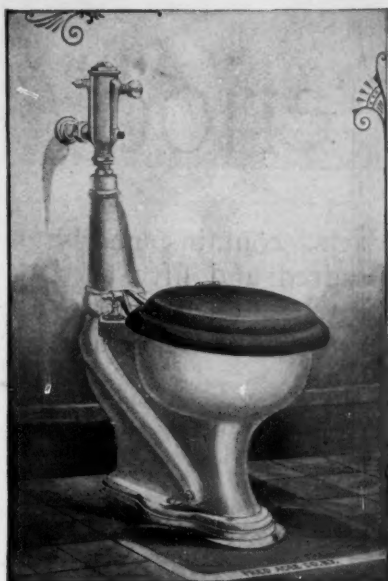
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The matter illustrated may in small part be classified thus:

PUBLIC BUILDINGS

City Hall, New York, N. Y.		Date 1803-12
Old State House, Boston, Mass.		" 1748
Pennsylvania Hospital, Philadelphia, Pa.		" 1755
Carpenters' Hall, Philadelphia, Pa.		" 1770
Independence Hall, Philadelphia, Pa.		" 1729
Faneuil Hall, Boston, Mass.		" 1741
and others.		

CHURCHES

King's Chapel, Boston, Mass.		Date 1749
Seventh-day Baptist Church, Newport, R. I.		" 1729
Christ Church, Alexandria, Va.		" 1767
Christ Church, Philadelphia, Pa.		" 1727
St. Paul's Chapel, New York, N. Y.		" 1764
Old South Church, Boston, Mass.		" 1729
First Church, Hingham, Mass.		" 1681
St. John's Chapel, New York, N. Y.		" 1803
First Congregational Church, Canandaigua, N. Y.		" 1812
St. Peter's P. E. Church, Philadelphia, Pa.		" 1758
Gloria Dei Church, Philadelphia, Pa.		" 1700
and others.		

IMPORTANT HOUSES

Fairbanks House, Dedham, Mass.		Date 1636
Royall Mansion, Dedham, Mass.		" 1737
Philipse Manor House, Yonkers, N. Y.		" 1745
Tudor Place, Georgetown, D. C.		" 179-
Mappa House, Trenton, N. Y.		" 1809
Woodlawn, Va.		" 1799
Mount Vernon, Va.		" 1743
and others.		

Incidentally there are shown special measured drawings or large views of the following features and details:

Porches and Doorways		67 Subjects
Staircases		21 "
Mantelpieces		81 "
Pulpits		6 "
Fanlights		60 "

In addition to the subjects enumerated above there is a large quantity of measured and detailed drawings of Cornices, Ironwork, Gateposts, Windows, Interior Finish, Ceiling Decoration, Capitals, etc., together with elevational and sectional views of entire buildings.

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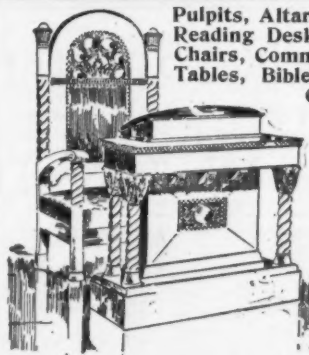
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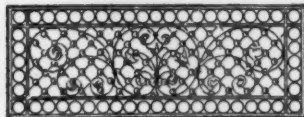
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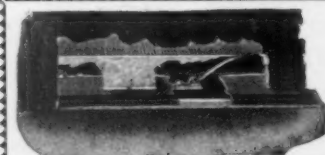
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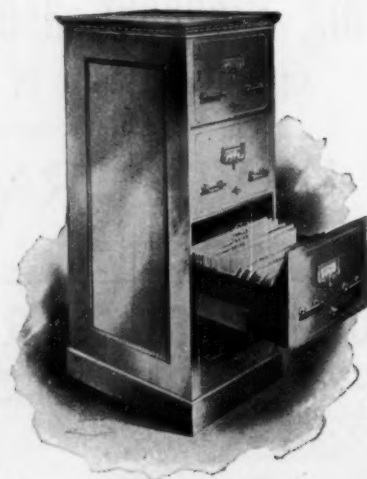
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Important Litigation Relating to Magnesia Covering Patents

THE KEASBEY & MATTISON CO., the owners of the patents for magnesia covering, have commenced a suit in the United States Circuit Court for the Southern District of New York against the Philip Carey Mfg. Co., George D. Crabbs, J. E. Breese, Schoellkopf, Hartford & Hanna Co., J. F. Schoellkopf, Jr., James Hartford, W. W. Hanna, C. P. Hugo Schoellkopf and Jesse W. Starr, to restrain the defendants from making and selling magnesia covering for boilers and steam pipes containing more than 50 per cent of magnesia, and especially coverings containing 85 per cent magnesia.

The Bill prays for a preliminary writ of injunction, to be continued during the pendency of the suit, and upon the final determination thereof to be made perpetual, and also demands an accounting and damages.

☞ All persons are respectfully requested to refrain from purchasing covering infringing these patents, as such purchasing must of necessity lead to suit. ☞

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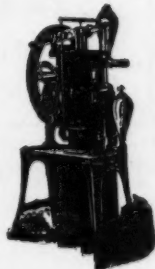
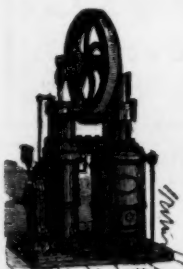
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Architect F. A. Norcross, 110 Tremont St., has filed plans for a block of 9 three-story houses to be located on Magnolia St.; estimated cost, \$55,000. Owner and builder, J. J. Driscoll, 10 Sewall St.

It is reported that A. H. Vinal, 19 Milk St., has prepared plans for a theatre for Weber & Fields, to be erected on Washington and Beach Sts., to cost about \$200,000.

The press states that Shubert Bros., of New York City, have purchased a site on Tremont St. for the erection of a theatre, to cost \$750,000.

Shepley, Rutan & Coolidge, Ames Building, have prepared plans for a ten-story office-building to be put up at State and Devonshire Sts. for the Fred L. Ames Estate; steel frame, fireproof. Estimated cost, \$500,000.

The Italians purpose to build an asylum for children in memory of Christopher Columbus.

Bradford, Pa. — Louis Kamper, Miner Building, Detroit, Mich., has been invited to prepare plans for a \$50,000 residence to be erected here for C. A. Unruh.

Brooklyn, N. Y. — Plans have been filed for a brick extension to St. Cecilia's Church, 84 Herbert St., to cost \$40,000. Architect, T. H. Poole, 13 W. 130th St., N. Y. City.

Chicago, Ill. — Press reports state that plans are being prepared for a large building in the business district for Chicago University to cost \$2,000,000. In it will be located the business offices of the university, the proposed musical college of the institution. Negotiations for a suitable site are pending, but the location most likely to be secured, it is said, is on Michigan Ave., near the Fine-Arts Building.

Danbury, Conn. — The contract for the erection of

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

a passenger station, 42' x 125', of buff brick, with sandstone trimmings, on White St., for the N. Y., N. H. & H. R. Co. has been awarded to A. R. Malkin, of Norwalk. Will have a slate roof and steam heat.

Des Moines, Ia. — Proudfoot & Bird, Crocker Building, are reported to have completed plans for two buildings which Des Moines College will erect next year on its campus on W. 9th and Washington Sts. One will be the main building, to cost \$65,000, and the other a gymnasium, to cost \$25,000.

Dickinson, N. D. — The corner-stone was recently laid for St. Joseph Catholic Church. Cost, \$30,000.

Donora, Pa. — The Donora Lumber Co. has secured the contract for erecting a school here for \$60,000.

Dover, N. H. — Foundation work will start at once on a large brick power-house here for the United Gas & Electric Co. Plant will cost about \$75,000.

Fergus Falls, Minn. — The contract for the construction of the U. S. Government building in this city is stated to have been awarded to Lauritzen Bros., for \$80,073.

Fond du Lac, Wis. — The Advancement Association is considering a proposition from a Chicago manufacturing company which offers to establish a plant employing 500 hands here, if given a building costing \$35,000.

Georgetown, D. C. — Thomas C. Kennedy, 113 N. Charles St., Baltimore, Md., has drawn plans for a three-story brick and stone hall and school building, 62' x 125', for the Holy Trinity R. C. Church, to cost \$50,000.

Hamburg, Ark. — The Ashley Co. Comrs. have decided to erect a \$50,000 court-house.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Hanover, N. H. — Plans by Architect Chas. A. Rich, 32 Nassau St., New York City, have been accepted for a brick college building to be erected at Dartmouth College. The structure will cost \$60,000. A. A. McKenzie, Supt., college buildings.

Hingham, Mass. — Additions and alterations are being made to the high school that will nearly double its capacity, adding six more rooms and otherwise making it much more convenient and commodious, from plans by J. Sumner Fowler, Boston. The building when completed will be a harmonious structure and an ornament to the town.

Ithaca, N. Y. — At the annual fall meeting of the board of trustees of Cornell University a plan for the future expansion of Cornell University on most magnificent lines was adopted and for this purpose the president was authorized to purchase immediately 16 acres of land to the west of the library building. It is proposed to erect six new costly buildings on this plot immediately and eight more in the remote future. Pres. Schurman's recommendation of immediate erection of a hall for arts and humanities, to cost \$250,000, was adopted, and the site selected. The location of the Rockefeller hall of physics, which will cost \$250,000, was decided upon.

Juneau, Wis. — St. Mary's congregation has had plans prepared for a new church to cost \$15,000. Rev. J. J. Salentine, pastor.

Ligonla, Me. — The Portland Iron & Steel Co. will rebuild its plant here upon a larger scale than original works which were recently destroyed by fire. New buildings will be of steel construction and contain all modern equipment. Cost, exclusive of machinery, will aggregate \$100,000.

Los Angeles, Cal. — The Los Angeles Ice & Cold Storage Co. is about to erect a \$65,000 building at 4th St. and Central Ave. Architects, Elser & Wyman.

Lynn, Mass. — P. B. Magrane bought recently at public auction the property known as the Batchelder estate at the corner of Market Sq. and South St. It is understood that Mr. Magrane will immediately improve the property by erecting on Market Sq. a block with stores on the street floor and apartments above. On South St. apartment-houses will be erected.

Madison, Wis. — A. L. Fiegel & Co., of Racine, have completed plans for a two-story brick factory building for the American Mfg. Co., of Racine, 100' x 310', inclusive of the foundry, which will be 60' x 100'. Cost when completed will be about \$20,000.

McKees Rocks, Pa. — It is reported that Seymour Davis and Paul A. Davis, 3d, 907 Walnut St., Philadelphia, have been commissioned to prepare plans for a \$30,000 Y. M. C. A. building to be erected here for the Erie R. R. Co.

A press report states that the Pressed Steel Car Co. is to erect an office building here to cost \$50,000. Architect, U. T. L. Peoples, Times Building, Pittsburgh.

Merrill, Wis. — Wm. H. Nelson secured the contract for the erection of the Masonic Temple; cost, \$20,000.

Monticello, Ia. — Netcott & Donnan, of Independence, have drawn plans for a church for the Presbyterian Society, the corner-stone for which was laid recently; cost, \$16,000. The committee wishes proposals for 600 seatings.

Munising, Mich. — The Munising Paper & Pulp Co. will erect an immense plant here to cost \$1,000,000.

New Orleans, La. — The new court-house will be erected on the partnership plan, the State to appropriate \$200,000 and the city \$375,000.

New York, N. Y. — Reginald De Koven has bought as a site for his new theatre, No. 213 W. 42d St., and three houses in the rear of No. 214 to 226 W. 43d St. Plans have been drawn by V. Hugo Koehler for a theatre seating about 1,500 persons. Work will be begun within sixty days and the theatre will be opened on October 1, 1903, with a musical piece composed by Mr. De Koven. The theatre will probably be known as the Lyric. It will be devoted to light musical works of the higher class, and in its productions American composers and authors will be given preference.

Plans have been filed for 2 three-story brick/sub-stations for the Rapid Transit Subway Construction Co., one on the south side of 143d St., 125 feet west of Broadway, 50' x 99' 3", the other in W. 132d St., Nos. 73 and 77, 56' 3" x 99' 11". They will cost \$110,000. F. C. Hunter, of 21 Park Row, is the architect.

It is stated that Boehm & Coon have taken title to the block front in Central Park West, between 73d and 74th Sts. from Frederick A. Clark, and retransferred it to James H. Rowan. It is likely to be improved in the near future on an extensive scale.

Norfolk, Va. — Work on the new public library, for the erection of which Andrew Carnegie has given the sum of \$50,000, will begin very soon. The library will be located at the corner of Freemason and Thomas Sts., in the heart of the best residential section of the city. The site for the library has been given by the Misses Julia S. and Charlotte Selden and Mrs. Mary Selden Grandy as a memorial to their father, the late Dr. William Selden, who was one of this city's most prominent physicians. This city has appropriated \$5,000 annually for the maintenance of the library.

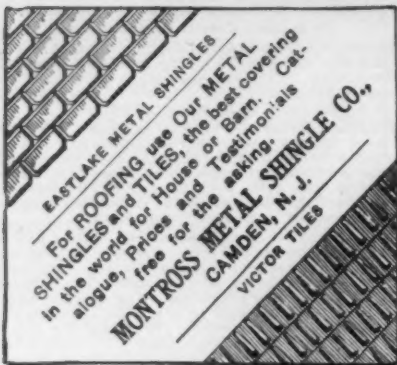
North Attleboro, Mass. — Mr. Arthur T. Sylvester has purchased one of the three spacious building lots on Broadway adjoining property of Dr. Dody. Mr. Sylvester will build thereon early next spring and is now considering plans for an extensive modern residence.

Norwood, Mass. — At a recent town meeting \$8,000 was appropriated, in addition to \$26,000 voted last July, for a school-building in the North End. One thousand dollars was also appropriated for the re-grading of Washington St.

Olneyville, R. I. — An important addition will be made to present plant here of the Atlantic Mills. New building will be occupied in part for dyeing purposes and cost about \$30,000.

Owatonna, Minn. — It is proposed to erect a \$35,000 dormitory building at Pillsbury Academy. \$26,000 has been subscribed.

Peshigo, Wis. — The Wisconsin & Michigan Ry.



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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

will make improvements to terminals here to cost \$100,000. There will be a brick and stone office, a brick round-house and a machine and repair shop.

Philadelphia, Pa.—George F. Payne & Co., 401 S. Juniper St., has taken out a permit to erect an eight-story store and office building for Perry & Co., at 16th and Chestnut Sts., to cost \$280,000. Wilson Bros. & Co., Drexel Building, architects.

G. R. Curry is stated to have secured the contract for erecting an addition to the Union Mission Hospital. Cost of building, exclusive of equipment, \$50,000. Architects, Stearns & Castor, Stephen Girard Building.

A press report states that estimates aggregating over \$1,000,000 in appropriations for the Philadelphia Hospital and Almshouse for next year have been passed upon by Council's Com. on Charities and Correction. Several items for new buildings are as follows: \$80,000 for a pavilion for consumptives, \$150,000 for a new operating room, \$50,000 for a pavilion for nervous diseases, \$50,000 for bacteriological and pathological laboratories, and \$150,000 for a laboratory for clinical medicine.

Pittsburgh, Pa.—D. H. Burnham & Co., Rookery Building, Chicago, Ill., have drawn plans for an eighteen-story hotel to be erected on 5th Ave. and Grant St. for Henry Clay Frick, to cost about \$3,000,000.

Providence, R. I.—Plans by Martin & Hall for the proposed mortuary chapel at the North Burial Grounds were accepted at a recent meeting of the committee held in the office of the City Engineer. The building is to be constructed in a substantial manner and will be carried out on classic lines, yet all effort has been aimed to have it simple in design.

Rangley, Me.—Architect E. M. A. Machado, 9 Church St., Salem, has completed plans for a summer residence for Mrs. A. M. Wheatland of Salem. It will be 50' x 80'.



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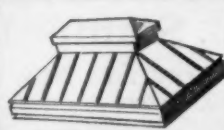
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Savannah, Ga.—The National Bank of Savannah and the Oglethorpe Savings & Trust Co. will erect a ten-story office-building on Bull and Broughton Sts. early in the coming year. Herman Myers is Chmn. of Bldg. Com.

ALTERATIONS AND ADDITIONS.

Chicago, Ill.—S. Albany Ave., No. 980, one, two & four-st'y additions to brewery, 24' x 56', 24' x 30'; \$14,000; o., Garden City Brewery Co., Albany Ave. & 21st St.; a., Richard Griesser, Schiller Building; b., F. C. Laver, 1327 Millard Ave.

Van Buren St., Nos. 136 to 164, four additional stories, 152' x 215'; \$370,000; o., L. S. & M. S. and C., R. I. & P. Railroad Companies; a., Frost & Granger, 806, 184 La Salle St.; b., William Grace Co., 1408 Wabash Ave.

APARTMENT-HOUSES.

Chicago, Ill.—Fifty-second St., Nos. 252-262, 2 three-st'y aparts., 50' x 120'; \$50,000; o., John Hamilton; a., E. M. Newman, 415 Stock Exchange Building; b., William Ritchie, 92 La Salle St.

Monroe Ave., Nos. 6130-32, three-st'y apart., 47' x 74'; \$25,000; o., L. C. Wagner; a., S. M. Seator, 825 97 Clark St.; b., William Ritchie, 92 La Salle St.

Worcester, Mass.—Pelham St., three-st'y fr. apart., 27' x 62', pitch roof, furnace; \$5,000; o. & b., Aaron & Joseph.

BUILDING INTELLIGENCE.

EDUCATIONAL.

Chicago, Ill.—Fortieth St., Nos. 195-200, two-st'y school, 123' x 157'; boiler-house, 36' x 132'; \$100,000; o., Board of Education; a., W. B. Mundie, Tribune Building; b., J. W. Snyder.

HOSPITALS.

Brookline, Mass.—Lauriat Ave., cor. Lancaster Terrace, 2½-st'y & base. bk. hospital, 45' x 108', steam; \$40,000; o., Dr. Joel Goldthwait, 372 Marlboro St.; a., Kendall, Taylor & Stevens, 93 Federal St., Boston.

HOUSES.

Chicago, Ill.—Forquer St., No. 172, two-st'y dwell, 25' x 69'; \$5,000; o., E. W. Dunn; a., Egan & Prindle, 715, 85 Dearborn St.; b., Henri Pardi & Co., 17, 194 La Salle St.

Kimball Ave., No. 5724, two-st'y dwell, 40' x 46'; \$10,000; o., W. S. Jackman; a., Howard Shaw, 615, 175 Dearborn St.; b., John Peterson Co.

Lakewood Ave., No. 4177, two-st'y fr. dwell, 34' x 46'; \$5,000; o., W. H. Barry; a., Turnock & Ohrenstein, 112 Clark St.; b., H. S. Gilbert, 232 Lunt Ave.

Millford, Mass.—Two two-st'y fr. dwells, 24' x 46'; \$10,000; a., F. M. Hughes, 40 Jefferson St.

New Haven, Conn.—Rock Ave., two-st'y fr. dwell, 33' x 38', furnace; \$5,000; o., Mrs. Ella Smith; a., Richard Williams.



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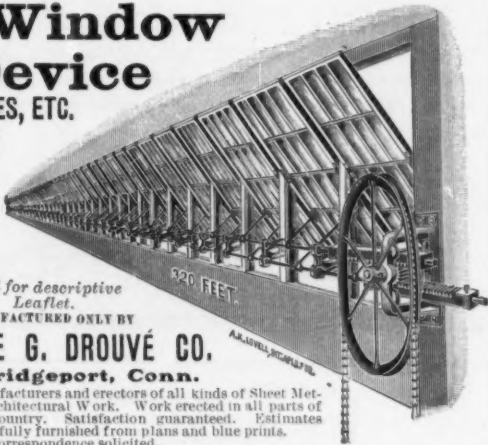


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THEATRES AND HALLS.

New York, N. Y.—*Seventh Ave.*, cor. 126th St., five-st'y bk. theatre, 99' 10" x 125' 9"; \$200,000; o., Associate Realty Concern, 247 Broadway; a., J. B. McElfatrick & Son, 1402 Broadway.

WAREHOUSES.

Chicago, Ill.—*One Hundred and Fifteenth and Stephenson Sts.*, four-st'y warehouse, 132' x 152'; \$200,000; o., Sherwin-Williams Co., 2629 Stewart Ave.; a., Jobson & Godfrey, Pullman Building; b., R. & S. Solitt, Hartford Building.

MISCELLANEOUS.

Brooklyn, N. Y.—*Pitkin Ave.*, nr. Watkins St., two-st'y bk. public bath-house, 50' x 58' 6"; slag roof, steam; \$60,000; o., City of New York; a., L. H. Voss, 65 De Kalb Ave.

Chicago, Ill.—*W. Fourteenth St.*, Nos. 313-315, three-st'y bath-house & flat, 44' x 100'; \$25,000; o., Gaff & Kaplan; a., M. Spitzer, 1413 315 Dearborn St.; b., M. Kadesbawitz, 7 1/2 La Salle St.

S. Clark St., Nos. 302-4, six-st'y printing-house, 49' x 95'; \$40,000; o., C. B. King; a., H. P. Harned, 524 218 La Salle St.

W. Seventeenth St., Nos. 926-938, one-st'y grain elevator, 35' x 56'; \$30,000; o., J. J. Badenoch, 44 S. Desplaines St.; a., George M. Moulton & Co., 1811 Fisher Building; b., Herman Mueller, 221 Pine Grove Ave.

New York, N. Y.—*City-hall Pl.*, Nos. 29-33, three-st'y bk. station, 58' 2" x 99' 1" x 99' 9"; slag roof; \$60,000; o., Rapid Transit Subway Co., 21 Park Row; a., Van Vleck & Hunter, 21 Park Row.

E. Nineteenth St., Nos. 108-110, three-st'y bk. station, 50' x 91' 10"; slag roof; \$55,000; o., Rapid Transit Subway Co., 21 Park Row; a., Van Vleck & Hunter, 21 Park Row.

One Hundred and Thirty-ninth St., nr. Locust Ave., three-st'y bk. gas-house, 45' x 127'; \$20,000; o. & a., Central Union Gas Co., 350 Alexander Ave.

W. Fifty-third St., Nos. 225-227, three-st'y bk. & st. subway station, 50' x 115' 10"; slag roof; \$55,000; o., Rapid Transit Subway Construction Co., 21 Park Row; a., Van Vleck & Hunter, 21 Park Row.

W. One Hundred and Thirty-second St., Nos. 73-77, three-st'y bk. & st. subway station, slag roof; \$55,000; o., Rapid Transit Subway Construction Co., 21 Park Row; a., Van Vleck & Hunter, 21 Park Row.

W. Ninety-sixth St., Nos. 264-266, three-st'y bk. & st. substation, 50' x 100' 6"; slag roof; \$55,000; o., Rapid Transit Subway Construction Co., 21 Park Row; a., Van Vleck & Hunter, 21 Park Row.

Fox St., nr. Westchester Ave., three-st'y & cellar, bk. & st. subway station, 50' x 99' 10"; slag roof; \$55,000; o., Rapid Transit Subway Co., 21 Park Row; a., Van Vleck & Hunter, 21 Park Row.

One Hundred and Forty-third St., nr. Broadway, three-st'y bk. & st. subway station, 50' x 99' 9"; slag roof; \$55,000; o., Rapid Transit Subway Construction Co., 21 Park Row; a., Van Vleck & Hunter, 21 Park Row.

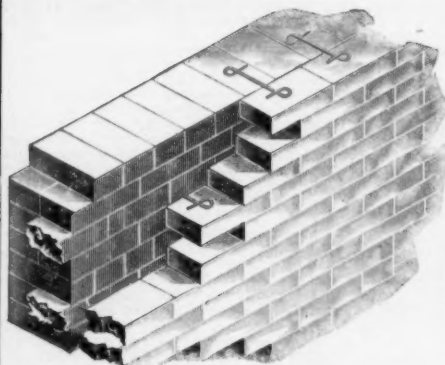
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Somerville, Mass.—*Ayer Ave.*, nr. Morrison Ave., two-st'y fr. dwell., 25' x 35', shingle roof, furnace; \$5,000; o. & b., W. P. Rice, 371 Highland Ave.

Somerville Boulevard, nr. Curtis St., two-st'y fr. dwell., 29' x 50', shingle roof, furnace; \$5,500; o. & b., L. E. Cliff.

Somerville Boulevard, nr. Curtis St., 2 two-st'y fr. dwells., 26' x 43', shingle roofs, furnaces; \$8,400; o. & b., L. E. Cliff.

Worcester, Mass.—*Pelham St.*, No. 6, three-st'y fr. dwell., 27' x 62', pitch roof, furnace heat; \$5,000; o. & b., Aaron & Jasper.

STORES.

New York, N. Y.—*Washington St.*, cor. Duane St., six-st'y bk. loft & store building, 25' 3" x 50' 2"; \$15,000; o., James Clark Estate, 1963 Seventh Ave.; a., Buchman & Fox, 11 E. 59th St.

Lewis St., No. 117, seven-st'y bk. lofts & store, 24' 11" x 96', plastic slate roof; \$15,000; o., Roudner & Berkowitz, 140 Lewis St.; a., A. E. Badt, 1 Union Sq. W.

BUILDING INTELLIGENCE.

TENEMENT-HOUSES.

Brooklyn, N. Y.—*Coney Island Ave.*, nr. Avenue C, 2 three-st'y bk. tenements, 15' x 80'; \$20,000; o., Annie Wingerath, 791 Coney Island Ave.

New York, N. Y.—*Madison St.*, No. 195, six-st'y bk. tenement & stores, 23' 10" x 87'; \$60,000; o., I. Jodis, 329 E. 116th St.; a., Bernstein & Bernstein, 111 Broadway.

Union Ave., nr. 168th St., five-st'y bk. flat, 42' 6" x 80'; \$45,000; o., Annie Chisling, 84 E. 109th St.; a., Moore & Landsiedel, 148th St. & 3d Ave.

One Hundred and Seventy-fourth St., cor. 3d Ave., 4 five-st'y bk. tenements & stores, 23' 27" x 6" & 35' 11" x 65' 6" & 77' 4"; \$106,000; o., Stephen M. Anderson, 309 W. 117th St.; a., F. W. Hester, 503 Manhattan Ave.

Avenue C, Nos. 112-116, six-st'y bk. tenement & stores, 55' x 70'; \$42,000; o., Samuel Brasch, 51 Bowery; a., Geo. F. Pelham, 503 Fifth Ave.

E. Twenty-fifth St., Nos. 235-237, six-st'y bk. tenement, 40' x 85' 9"; \$40,000; o., Leopold Kaufmann, 35 Nassau St.; a., Geo. A. O'Rourke, 603 E. 139th St.

COMPETITIONS.

SCHOOL.

[At Wahpeton, N. D.]
The Board of Education invites the submission of plans in competition until November 11 for a high-school building, to cost complete \$25,000. A. L. ROBERTS, clerk. 1401

LIBRARY.

[At Albert Lea, Minn.]
Competitive designs will be received by the Library Bd. until December 1 for the proposed \$12,000 Carnegie Library. 1403

PROPOSALS.

DORMITORY.

[At Lexington, Ky.]
Bids are wanted November 10 for the erection of the girl's dormitory. H. S. BARKER, chmn. bldg. com., bd. of trus. H. L. Rowe, of Lexington, archt. 1401

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PROPOSALS.

LIBRARY.

[At Tipton, Ia.]
Bids are wanted November 8 for erecting a library. Address W. N. TREICHLER, Pres. Library Bd. 1401

HEATING.

[At Sparta, Wis.]
The county board will receive bids until November 13 for a steam-heating plant for the county poor house, from plans by A. E. Parkinson, architect, of Sparta. 1401

QUARTERS.

[At Fort Wadsworth, N. Y.]
Sealed proposals for building one set of quarters here will be received until November 7, 1902. Information furnished on application. LIEUT. GEO. L. HICKS, JR., Q. M. 1401

COMPLETION OF COURT-HOUSE.

[At Riverside, Cal.]
Bids are wanted November 14 for the construction and completion before December 30, 1903, of the Riverside Co. Court-house. Burnham & Bleisner, of Los Angeles, are the architects. W. W. PHELPS, Clk. of the Bd. of Co. Surv. Cost, \$150,000. 1401

SCHOOL.

[At Viborg, S. D.]
S. J. Frederickson, clerk school district No. 43, will receive bids until November 10 for the erection of a school-house, 20' x 32'. 1401

STEEL BRIDGE.

[At Caddo, La.]
Bids are hereby invited for the construction of a steel bridge about 225 feet long, over Dooley bayou, at section six plantation, in ward one of Caddo parish, La., bids to be opened at meeting of the jury the second Thursday in November, 1902. P. P. KEITH, president. A. L. DURINGER, clerk, Shreveport, La. 1401

LIBRARY.

[At Fond du Lac, Wis.]
Bids will be received November 11 by the library board for erecting a library. Van Ryn & De Gelleke, architects, 211 Grand Ave., Milwaukee. Address J. W. WATSON, sec'y. 1401

WATER SYSTEM.

[At Newport, R. I.]
Bids are wanted November 26 for a water supply and storage system at the U. S. Naval Coal Depot, Narragansett Bay. R. B. BRADFORD, Ch. of Bureau of Equipment, Navy Dept., Washington, D. C. 1402

Treasury Department, Office of the Supervising Architect, Washington, D. C., October 27, 1902. Sealed

PROPOSALS.

proposals will be received at this office until 2 o'clock P. M. on the 3d day of December, 1902, and then opened, for the construction, including plumbing, heating and ventilating apparatus, electric wiring and conduits of the U. S. Post-office at Emporia, Kansas, in accordance with drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at Emporia, Kansas, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1402

TRUNK SEWER.

[At Washington, D. C.]
Office of the Commissioners, D. C., Washington, D. C. Sealed proposals will be received at this office until November 15, 1902, for constructing a portion of the low area trunk sewer in the District of Columbia. Specifications and blank forms of proposals may be obtained at this office. HENRY B. F. MACFARLAND, HENRY L. WEST, JOHN BIDDLE, commissioners, D. C. 1402

DOOR FRAMES.

[At Washington, D. C.]
U. S. Engineer Office, 735 N. Capitol St., Washington, D. C. Sealed proposals will be received here until November 15, 1902, for freight elevator door frames for new building for government printing office. Information furnished on application. JOHN STEPHEN SEWELL, capt., engr. 1402

HIGH SCHOOL.

[At New Prague, Minn.]
Sealed bids will be received by the undersigned for the erection and completion of a high school at New Prague, Minn., according to plans and specifications therefor prepared by H. C. Gerlach, Mankato, Minn. Said plans and specifications will be on file at the office of the undersigned, and at the architect's office. Bids will be received up to November 26, 1902, at the City-hall, New Prague, Minn. JOS. T. TOPKA, Sec'y B. O. E. 1403

BUILDING.

[At Fort Ethan Allen, Vt.]
Fort Ethan Allen, Vt. Sealed proposals for constructing 1 single barrack, 1 stable, 1 gun shed, will be received here until November 10, 1902. Information furnished on application. LIEUT. GEORGE GARITY, Q. M. 1401

ADMINISTRATION BUILDING.

[At Fort Banks, Winthrop, Mass.]
Proposals for constructing plumbing and electric wiring an administration building at Fort Banks, Winthrop, will be received until November 10. Information furnished on application. 1401

PAVING.

[At Portsmouth, Va.]
Sealed proposals will be received at the office of

PROPOSALS.

the City Clerk, addressed to C. W. Walker, Chairman of Street Committee, until December 22, 1902, for paving certain streets of the City of Portsmouth, Va., with sheet asphalt, asphalt block, vitrified brick, granite block and bituminous macadam, to be done according to specifications furnished upon application at the office of the city engineer. The work contemplated comprises about 45,000 square yards of paving. C. W. WALKER, chairman street committee. Bascom Sykes, city engineer. 1401

Treasury Department, Office of the Supervising Architect, Washington, D. C., October 16, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 20th day of November, 1902, and then opened, for the construction of the U. S. Post-office at Rome, New York, in accordance with the drawings and specification, copies of which may be had at this office, or the office of the Postmaster at Rome, New York, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1401

Treasury Department, Office of the Supervising Architect, Washington, D. C., October 21, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 29th day of November, 1902, and then opened, for furnishing the steam heating and ventilating apparatus, complete in place for the U. S. Public Building at Boise, Idaho, in accordance with drawings and specifications, copies of which may be had at this office or at the office of the Superintendent at Boise, Idaho, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1401

Treasury Department, Office of the Supervising Architect, Washington, D. C., October 21, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 25th day of November, 1902, and then opened for the installation of a conduit and electric wiring system for the U. S. Public Building at Boise, Idaho, in accordance with the drawings and specification, copies of which may be obtained at this office or at the office of the Superintendent of Construction at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1401

POST-OFFICE BUILDING.

[At Rome, N. Y.]
Bids are wanted November 20 for erecting the U. S. Post-office Building at Rome. Jas. Knox Taylor, Supv. Archt., Treas. Dept., Washington, D. C. 1402

JAIL AND RESIDENCE.

[At Marion, Ind.]
The board of commissioners will receive bids until November 25, for the construction of the \$125,000 jail building and a jailer's residence to be built by Grant County. Richards, McCarty & Bulford, "The Bugger," Columbus, O., architects. 1402

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assist in the award.

SECTION 11. No Member should submit draw-
ings except as an original contributor in any
duly instituted competition, or attempt to
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remains undecided.

SECTION 12. The American Institute of Archi-
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mum rates for full, faithful and competent
service. It is the duty of every architect to
charge higher rates whenever the demand for
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proper personal attention.

SECTION 13. No Member shall compete in
amount of commission, or offer to work for
less than another, in order to secure the work.

SECTION 14. It is unprofessional to enter into
competition with or to consult with an archi-
tect who has been dishonorably expelled from
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natural ability needed for the proper invention,
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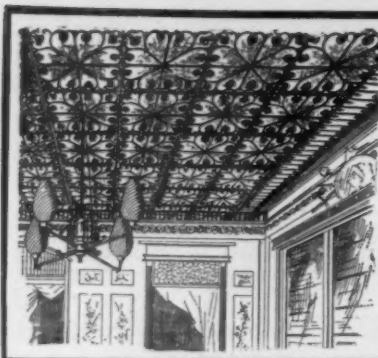
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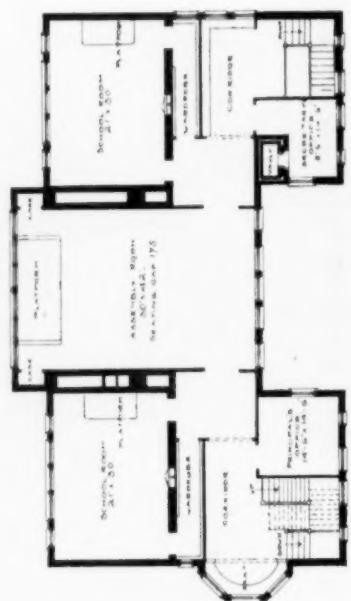
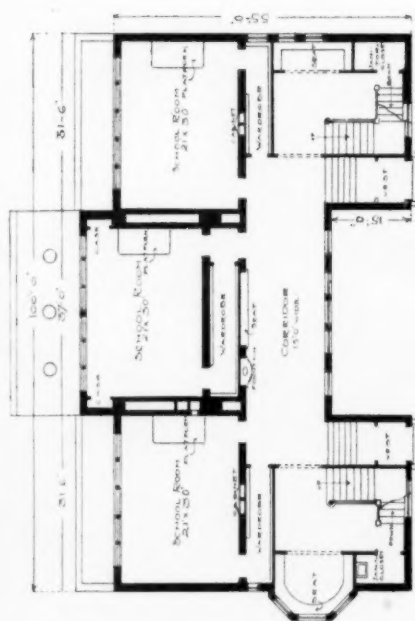
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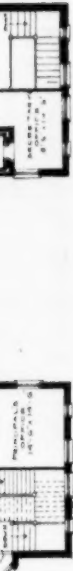
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