

THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT

No. 264

SATURDAY, JULY 2, 1904

VOLUME LXXXV
No. 1488

ENAMETILE.

IN no way is the progress of the day more clearly shown than in our homes. Recent years have seen many and great changes in home building that have improved the appearance, increased the comfort and reduced the cost. With discriminating taste and good judgment in selecting, the modest home can be made almost as attractive in appearance and as comfortable as the mansion.

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Pure Flake Graphite gives free and easy action to valve gear, and the reverse lever can be held with one hand even when full boiler pressure is used. The wear of link and valve motion is reduced to a minimum, and the hauling capacity and life of the engine are greatly increased. An engine will work closer in cut-off, because of freer valve action, effecting a saving in cylinder and valve oil. It prevents squealing of air-pumps and groaning of cylinders.

Through the courtesy of the editor of *Railway and Locomotive Engineering*, we have come into possession of the following report. As we have not been given the liberty of publishing the names, we suppress same, believing that the report will be interesting in itself:

"A fast run was made on — division

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of — Road, with Engine No. —, which we consider quite good; the engine was one of our Richmonds received from the works last year. We think her performance has been exceptionally good. She was first put in fast passenger service, and during the first month she ran 6,940 miles without one minute's delay. She has made about 60,000 miles in passenger service during the past eight months, and she is the most convenient and easiest riding, and in every way the most comfortable engine that we ever saw. We consider that a large portion of her success is due to the liberal use of Dixon's Pure Flake Lubricating Graphite. We mix it with the valve oil and feed it through relief valves, and through direct oilers on driving and trailer journals.

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"AS GOOD AS."

"Somehow as I was chewing this subject over in my mind I was reminded of Cousin Elviry Piggott's little boy Oswego. Oswego Piggott was so fond of candy that he ate it until his complexion reminded one of a white plastered wall that has been rained on. Visitors used to bring him candy because he would rather have that than anything else. The worst offender was Mis' Piggott's husband's cousin's wife, who always brought little Oswego broken candy, until finally Mis' Piggott had to remonstrate with her, because it was getting so bad for little Oswego's health.

"The next time Mis' Goswell came to spend the day Oswego nosed around quite a little, but he didn't say nothing. It was evident that he had met with some sort of a disappointment. Finally Mis' Goswell couldn't help noticing it, so she says:

"What is it, Ossie?"

"It seems to me," replied Oswego, "that I smells candy."

"This was too much for Mis' Goswell, so she fished around in her reticule and brought out a small piece of candy.

"There are a great many people who feel that they can break a promise in this way by breaking off a little piece at a time.

"Little Oswego looked at it earnestly for a full second, and then he said:

"Can it be possible that I smelled so small a piece."

"Just so with the architect. When he begins to look around town with some pride on the buildings he has put up, and especially when he looks at the roof of one of the best residences for which he is sure he specified the best material that money could buy, and finds that the tin is all full of little pinholes and is rusting away, and

(Continued on page 3.)

THE BUILDING NEWS

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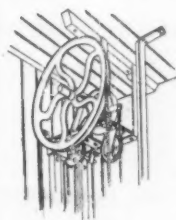


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that the eaves and gutters are leaking, and
that the owner is telling around town that
that architect what drew the plans did not
know his business, he says to himself:

"Can it be possible that I indicated so
poor a roof?" and yet he is the one that is
to blame. All he asked for was a tin as
good as 'Taylor Old Style,' and the dealer
had his notions about tin, and the result
was that it was the dealer's notion of what
tin was as good as 'Taylor Old Style,' and
not the architect's notion at all."—RUFUS
THE ROOFER, in *June Arrow*.

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The Barrett Specification

TO-DAY the subject of roofing is a confusing one. Claims of all kinds are made, but there is no *generally accepted standard*.

We believe, therefore, that Architects and Builders will not only welcome reliable information on this much discussed subject, but will support an effort to secure the recognition of a Standard Roofing Specification.

We herewith submit such a Specification for your consideration. It has been prepared by experts of recognized standing, and calls for the kind of roofing which over fifty years experience has shown to be pre-eminently the best *for most purposes* — a roof of five-ply Slag or Gravel.

This Specification calls for no particular brand of materials. There are several good brands. Our advice is to get the best, have a reputable contractor follow the Specification, and the result will be a roof that will give more years of service, without attention or repairs, and at less cost for its whole life than any other known roofing.

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"Over the foregoing shall be laid a five (5) ply Coal Tar Pitch, Felt and Slag or Gravel Roof, to be constructed as follows:

"The Rosin Sized Sheathing Paper or Unsaturated Felt to be used shall weigh not less than five (5) pounds per one hundred square feet.

"The Felt shall weigh not less than fourteen (14) pounds per one hundred square feet, single thickness.

"The Pitch shall be the best quality of straight run coal tar pitch, distilled direct from American coal tar, and there shall be used not less than one hundred and twenty (120) pounds (gross weight) per one hundred square feet of completed roof.

"The nailing shall be done with threepenny barbed wire roofing nails driven through tin discs.

"The Slag or Gravel shall be of such a grade that no particles shall exceed five-eighths ($\frac{5}{8}$) of an inch or be less

than one-fourth ($\frac{1}{4}$) of an inch in size. It shall be dry and free from dust or dirt. In cold weather it must be heated immediately before using. Not less than three hundred (300) pounds of Slag or four hundred (400) pounds of Gravel shall be used per one hundred square feet.

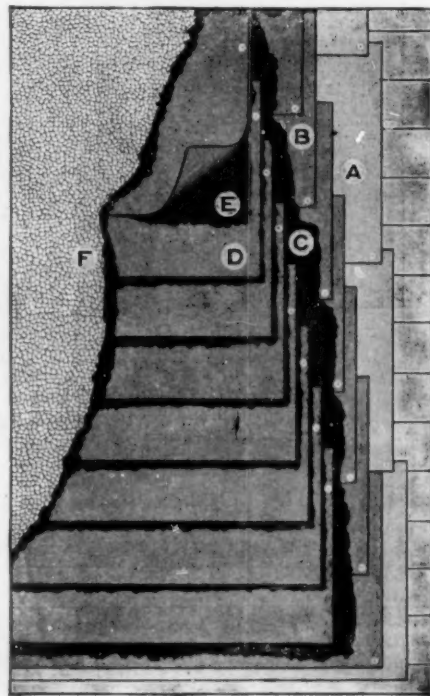
"The materials shall be used as follows:

"First lay one thickness of Rosin Sized Sheathing Paper or Unsaturated Felt (A), lapping each sheet one inch over the preceding one, and nailing only so often as may be necessary to hold in place until covered with the Tarred Felt (B), and the nailing may be omitted entirely if practicable.

"Over the Rosin Sized Sheathing or Unsaturated Felt lay two (2) full thicknesses of Tarred Felt (B), lapping each sheet seventeen (17) inches over the preceding one, and nailing along the exposed edges of the sheets only so often as may be necessary to hold the sheets in place until the remaining Felt can be applied.

"Over the entire surface of the Felt thus laid, spread a uniform coating of Pitch (C), mopped on. Then lay three (3) full thicknesses of Felt (D), lapping each sheet twenty-two (22) inches over the preceding one, and nailing, as laid, every three (3) feet, not more than ten (10) inches from the upper edge.

"When the Felt is thus laid and secured, mop back with Pitch



(E) the full width of twenty (20) inches under each lap. Then spread over the entire surface of the roof a uniform coating of Pitch, into which, while hot, embed Slag or Gravel (F)."

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WHATEVER the theory under which the managers of the Louisiana Purchase Exposition have acted in seemingly denying to the architects who designed the buildings the credit before the public which is certainly their due, it has just been abandoned, and they have announced that the names of the architects will now be attached to the buildings on tablets legibly inscribed with large gilded letters. This, if properly done, will, though somewhat belated, be well enough, but we do not think it will meet the situation in the best way. What, we believe, has excited, and justly, the indignation of the architects is the extraordinary pains the "Department of Publicity" seems to have taken not to attach the names of the architects to the innumerable photographs and electrotypes of the buildings that it has issued to the public press. The authorities should know that they were able to secure architectural service at bargain-counter rates largely because the architects counted on future returns from their greatly extended reputation as designers of the several Fair buildings; and to have this legitimate advertising denied to them by the practice of the Department of Publicity looks very much like the breach of an implied contract. In the case of any future fairs, architects will do well to make it a stated condition of their agreement that their names shall be attached to all illustrating documents put out by the promoters of the undertaking.

WHERE seems to be, as yet, very little interest taken in the St. Louis Fair, if we may judge by the paucity of information concerning it which is to be found in the daily papers, a scarcity so marked as to cause one to suspect that the authorities may have done something to lead the newspaper managers to feel that

it is just as well to let the affair pass as merely a local matter. This attitude would be very unfortunate for the financial outcome, but it is not the only misfortune that already attaches to the Fair. The wrecking of a bull-ring by a mob was not exactly a good advertisement and the recent order that the Exposition guards shall arm themselves with slung-shots is another warning that visitors to St. Louis this summer may expect exciting experiences before they get away from the town. Moreover, there have already occurred two or three fires in the smaller buildings within the grounds, fires, fortunately, that the excellent fire-fighting arrangements prevented from attaining dangerous proportions.

IN New York and some other cities it is the law that no contract for city work that will cost over one thousand dollars shall be awarded except after public advertisement, so that the city may have the benefit of the lowest bid. The regulation is sensible enough, although it has frequently impelled heads of departments to devise devious means, in the way, principally, of splitting up the work, by which the job could be given to a favored henchman of the municipal administration. This same principle is now being used in Kansas City to take a contract away from a Democrat, the present administration being Republican—for in the game of politics one excuse is as good as another. The case is interesting simply because the Republican mayor argues that the contract in excess of one thousand dollars that has been awarded is the five per cent fee which the city at present stands pledged to pay Mr. F. C. Gunn for his services as architect of the new city hospital. It appears that the design for the hospital was secured from Mr. Gunn direct and without competition or advertisement of any kind, and the Mayor argues that as his five per cent commission will amount to twelve thousand dollars or so, it is clear that a contract has been awarded to him in excess of the one thousand dollar limit and, so, in violation of the law. The point is curious and may be well taken; at any rate it points out one more matter for architects to be careful about in their dealings with public authorities.

ON the other hand, a city seems not always to be able to be the mistress of its own economies.

Trenton, N. J., recently appointed a school architect to do certain architectural work of a generally routine character. During his term of office he was asked to prepare plans and specifications for a high-school building, although work of this particular kind seems not to have been particularized in the terms of his engagement; but the city fathers evidently could not understand what an official architect was for unless he did all the architectural work the city wished to have done. The architect obligingly did what he was asked to do, and then presented a claim upon the city for seven thousand five hundred dollars in excess of the annual salary. Naturally the claim was protested, but the Supreme Court has recently decided that the city must pay it.

THE unquestionable advantage that a competing architect familiar, as a citizen, with the site and local conditions has over competitors who have no such personal knowledge is again illustrated by the award in the case of the Public Library for Louisville, Ky. The competition was of the "mixed" class, ten competitors being invited, while the volunteers numbered thirty-six. The drawings bore no name or symbol of any kind, but were numbered, as was the plain envelope containing the author's name, in regular order as they chanced to be received. The expert adviser and the librarian, making independent examination of the drawings, agreed in selecting the same design, and their reports with all the drawings were submitted to the trustees, who themselves examined the drawings and agreed on the same design. The envelope bearing the selected number, and that envelope only, was then opened and the authors were found to be Messrs. Pilcher & Tachau, of New York. The personal local knowledge of site and conditions was supplied by Mr. Tachau, who was born and obtained his early education in Louisville, his architectural training having been acquired at Columbia College and the École des Beaux-Arts, where he passed five years. Mr. Pilcher is Professor of Architecture at Vassar College.

THE vexations of a Presidential year are likely to be enhanced, so far as the building interests of New York City are concerned, by the suggested action of the bricklayers' union there, which is one of the strongest and most thoroughly organized trades in the country. The bricklayers, apparently, are making up their minds to demand, under threat of striking, as usual, if their demand is not acceded to, seventy cents per hour, or five dollars and sixty cents per day of eight hours, and this, for three-quarters of the work that is actually done, is exorbitant. Involved in the same matter is the question whether the National Fireproofing Company shall or shall not be allowed to set its own fireproof blocks in the city, so that in one way or another the chance for a strike of a serious character seems only too promising.

THE good people of Toulouse are much amused, and not a little vexed, because they have been made the victims of a curious case of transsubstantiation. The Cathedral in that city has long been a subject of local discussion, some maintaining that the real architectural value of the building lay in the Romanesque nave; while others chose to find that the later Gothic choir was the really significant portion; but in one thing both parties agreed, and by common consent it was granted that the general effect of the two portions of the Cathedral was most unhappy, and that it would be well to apply a remedy. As it is a matter of common knowledge that many an admirable scheme is never carried out because of lack of means, the citizens determined that this fate should not befall their undertaking; so, in place of wasting time in squabbling over the details of the design, they set themselves to work, thirty-five years ago, to raise the money. Accordingly, they procured permission to hold a lottery, and with its aid raised a fund of a million francs, which was entrusted to the care of the Ministère des Cultes. But while, having effected this, they were discussing whether the Romanesque nave should

be replaced by a late Gothic one to match the choir, or the reverse procedure should be followed, the Franco-Prussian war came along and distracted their attention from the matter. Whether the leading spirits in the movement were killed in the war does not appear; but though the fund was known to be rolling up interest, and though, from time to time, some one made bold to ask the Ministère des Cultes when something was to be done with it, they were easily disposed of with the answer that the matter was receiving proper consideration. In fact, various designs were brought to the attention of the officials,—one, at least, so modern in its conception as to draw from Cardinal Desprez the exclamation: "The fellow wants to make my Cathedral look like a railway station!" At length, after thirty-five years' incubation, the officials, finding the sum in hand getting troublesomely large, announce that they are ready to do something with it, but that, as all their consideration of the problem has not brought to light the proper solution, they have decided to use the fund not for the remodelling of the Cathedral, but for the restoration of the Church of St. Sernin! But, to abate the annoyance of charges of misfeasance that might follow this use of the fund, they agree that five hundred thousand francs—half the original principal—shall be used on certain needed repairs to the Cathedral and more or less new decorative work in the interior!

AT a recent meeting of the Council of the Royal Institute of British Architects it was voted to establish a Board of Professional Defence, the details of the scheme to be formulated and announced later. It is rather surprising to find this matter of mutual protection, which has been brought into successful operation by the Société Centrale des Architectes Français, as we have frequently pointed out, taken up in England before we in America have seen fit to do so. The Briton is a little apt to think that nothing good can come out of Gaul, while Americans, on the other hand, are prone to think that, where architecture is concerned in any way, a French model is the best to follow.

IT seems as if we might become easy converts to one of the newest theories that the increase of skyscrapers has evolved and join zealously in its propaganda, if by so doing we could put a check on the increase of these blights on urban life. The "Medical Record" makes it known that a certain Dr. Warner, an Englishman, who has examined one hundred thousand London children, has discovered that high buildings induce degeneracy. If he had announced that the designs for high buildings are produced by degenerates his "discovery" would have attracted less notice. One result of his examination of so many children is the discovery that degenerates always have small heads, and that not only is there a general tendency toward a smaller development of the cranium, but that children born in neighborhoods where high buildings abound can show a greater percentage of small-sized heads than those born amongst more lowly surroundings. As sky-scrapers are not yet very numerous in London and the oldest are only two or three years old, the learned doctor must have been an unusually acute observer to detect degeneracy in a sufficient number of small-headed infants-in-arms to warrant the enunciation of his amusing theory.

THE PLENUM SYSTEM OF VENTILATION.¹

IF the time at our disposal is to be well employed, the subject of ventilation generally must be dealt with on practical and scientific lines; and I venture to suggest some reasons which tend to show that plenum ventilation can be beneficially employed in certain buildings, and ought to be more closely studied by members of the architectural profession.

A primary necessity is to arrive at a concisely correct definition of what should be understood by the term "efficient ventilation" when applied to occupied buildings. Apart from outside contaminating influences which would affect ventilation by whatever means obtained, I suggest it is "continuous change of air within a building without causing discomfort or adversely affecting the health of the occupants."

The province of an architect in connection therewith is to dispose buildings on the ground, construct and equip them, so that the available air may be supplied in ample quantities, freed from suspended impurities, tempered and regulated to requirements without deterioration.

Buildings are erected principally to secure greater comfort than can at all times be obtained in the open.

By the erection of buildings, movement of air within them is necessarily less than it would be over the unoccupied site.

Change of air within a building is principally brought about by an ascertainable force—either of propulsion or extraction—although the law of diffusion—i. e., the process which brings about intimate mixture of gases without chemical combination—is a serviceable but less powerful agent in connection with ventilation.

If these premises be accepted, the question which has to be discussed is not whether by plenum ventilation a condition within doors can be secured equal to the open air at its best, but whether it can be employed in certain buildings, suitably constructed, so as to obtain at reasonable cost more constant and efficient ventilation than can be secured by other means.

A great hindrance to the proper comprehension of this subject is the employment of unscientific terms, such as "artificial ventilation," "automatic ventilation," "natural ventilation," "mechanical ventilation," because they prejudice the mind. Ventilation is a result brought about either by natural or by mechanical force. Moved by either, air is the same, just as water is the same, whether allowed to flow naturally or forced on by mechanism. Water may become fouled on its way, so may air, whether it pass in naturally or is propelled in its course from the outside to the inside of a building; but it does not in the least follow that fouling results from the power which caused its movement.

It is scientifically wrong to refer to a fire causing a "suctional" influence in a flue, for it does nothing of the kind.

Air when heated expands and is specifically lighter than an equal volume of colder air; it is the latter descending by the force of gravitation which propels the warmer air upwards; consequently an open fire in a room causes change of air by propulsion; moreover, the propelling force of wind is far greater than the suctional influence it exerts upon air within buildings. By realizing these facts it is easy to understand that "plenum" ventilation is more in accord with nature's methods than "exhaust" ventilation.

Notwithstanding the acknowledged extravagance of, the dust and dirt resulting from, and the unpleasant draughts at times set up by, the open fire, I for one appreciate its cheerfulness, and believe it will long hold an honored place in the British home. The mere fact that it necessitates an upcast flue is of the greatest service in connection with ventilation; but as the area of an ordinary smoke flue at the chimney-pot end does not greatly exceed half a superficial foot, the volume of air which can pass through it in a given time is limited, as is also the heating power of a single fire-grate. Consequently, for larger apartments two or more fires are required, and it is well known that, unless an adequate supply of air be otherwise provided, smoke will at times be drawn down one or other of the flues. For this and other reasons hot water, steam, air heated by stoves or electricity, are used, none of which demand an upcast flue or flues from the apartment to be warmed thereby. Yet for the health and comfort of occupants change of air is a necessity, and can only be brought about by providing suitable inlets and outlets. This is a simple statement of fact of the utmost importance in connection with ventilation, yet too often neglected, resulting, doubtless,

from difficulty in determining the positions, dimensions, and construction of such openings, and I incline to the belief that strong advocates of what they term "natural ventilation" are of the *laissez faire* order who expect nature to do everything for them; and as they do not consider whence the wind cometh nor whither it goeth, they provide neither suitable entry nor exit for it in the construction of buildings.

With regard to the possibilities and difficulties of ventilating an apartment warmed by other means than open fires, say a church or assembly room. Suppose it is a calm, frosty day, with the temperature inside several degrees higher than it is outside. If inlet-openings are provided at or near the floor level and outlets at or near the ceiling level, a steady flow of air will take place from the inlets to the outlets proportionate to the difference between the internal and external temperature, and to the relative sizes and positions of the openings, brought about simply by the propelling force of the colder air outside falling by gravitation; but it does not follow that ventilation will be "efficient" even if the openings are adequate and well placed, because the differences in temperature may not suffice to cause adequate change of air—the opening of a door or window will upset the relative proportions between inlets and outlets, probably causing draughts. Moreover, with a number of people seated on the floor area, and with air entering around the lower portion of the walls, it can only arrive at those in the centre after becoming fouled by passing over the bodies of those nearer the inlets; but it is more than likely that the bulk of air passing through the room will travel from the inlets to the outlets without changing the air in the central portion. Every variation in temperature or in the force of wind outside will alter the conditions within, and during summer weather the temperature may be considerably higher outside than in; every factor is then reversed. Some improvement may be effected in cold weather by giving the incoming air an upward tendency and providing upcast flues as outlets with well-distributed openings near the floor level. The incoming air will then fill the upper portion of the room, gradually descend, change the atmosphere throughout, and pass away up the flues; but this arrangement of flues is not altogether satisfactory in summer weather, and even under such conditions change of air will fluctuate with every variation in the force of the wind outside. Consequently, with the best possible arrangements, so long as natural means alone are relied on, there must be constant, intelligent, and personal attention if comfortable ventilation is to be secured; nevertheless I am bound to confess that with care in the design and arrangement of suitable inlets and outlets, with adequate heating power, and with proper means for regulation, it is quite possible with personal attention to secure reasonable ventilation by natural means in buildings only occasionally occupied. None but very sensitive people are quickly affected by breathing a partially vitiated atmosphere, and few remain for long at a time in crowded places, so that when rooms are unoccupied windows and doors should be freely opened, and ample change of air secured. If this were regularly done, and thorough cleanliness were observed in and about buildings, there would be less cause for complaint of defective ventilation.

Every individual by respiration and exhalation throws off moisture and animal matter, and when a number of people congregate within an apartment the defilement of the atmosphere is considerable. Rapid change of air will carry much away, but with defective ventilation much is deposited upon exposed surfaces in the building in consequence of variation of temperature, and only prolonged and greater change of air than would be tolerated while a room is occupied will dissipate the contamination.

In the hope of disposing of the charge which has been made against me, that I am a prejudiced advocate of "plenum" ventilation, I now state most distinctly that unless it is continuously applied it is questionable whether it can be permanently successful, and I am not inclined to advocate its employment unless its advantages are considered worth the cost of continuous working. I cannot think it is sufficient to ventilate a building simply for the periods during which it is occupied, and then to stop the mechanism and bottle up the air until the next period of occupation.

Let me illustrate this by directing your attention to a railway carriage. Standing still how stuffy it often is, particularly in hot weather; but when rapidly moving along it is freshened up. Yet, on again standing still, it loses its freshness. That is an example of ventilation produced by mechanical means intermittently employed.

Now I wish to explode another fallacy

¹ From a paper by Mr. William Henman, read before the Royal Institute of British Architects.

Downward ventilation has been termed "down draught," apparently in the hope of condemning it by giving it a bad name. Advocates of the open fire have stated that to propel air into the upper portion of a room and let it go out from the lower portion is unnatural. Fortunately this can be easily disproved. Take an ordinary room with an ordinary open fire and smoke flue. Test it as you will, and, apart from occasional strong winds setting up adverse currents, resulting at times in what are termed "smoky chimneys," it will be found that the only detectable outgoing of air takes place by the open-fireplace flue, the lower opening of which is about two feet six inches above the floor level. Many people open the upper portion of a window when the temperature of a room, heated by an open fire, is excessive, holding the idea that they are letting out the hot air; but with rare exceptions the temperature of the room is then actually lowered by letting in a larger volume of colder air, which compels a more rapid outgoing of heated air up the flue.

It is true that in most cases no special inlet for air is provided, and that in consequence air enters by any casual, and probably dirt-concealing holes, cracks, and crevices—mostly around the lower portion of the room—whence it makes its way in narrow streams, moving with considerable velocity towards the fireplace, causing unpleasant draughts, while little change of air takes place in the upper portion of the room. Yet, if the same room were provided with a suitable inlet at a foot or two below the ceiling, on the same side as the fireplace and as central thereto as may be, the incoming air would become tempered by contact with the ceiling, walls, furniture, etc.—previously warmed by radiant heat from the fire—it would, by its inflow, force the atmosphere of the room downwards towards the fireplace opening and up the flue to the open, without causing discomfort to occupants.¹ Under these conditions air is propelled into the room from a reasonable elevation, where it is generally fresher than near the ground level and more free from chance contamination. Force of wind outside, varying as it does in intensity, will materially affect velocity of change within. I have therefore devised a simple automatic regulating inlet, consisting of a curved enclosure to a resistless flap hung eccentrically so that the area of the inlet opening is diminished proportionately to the force of wind playing against it; but satisfactory results can be obtained even without this refinement, if the inlet be provided with louvers for distributing the air at low velocity. I am perfectly aware it is not the method usually adopted, nor is it the one recommended in most works on ventilation. Do not, however, condemn it without proper trial; think it out, and you will, I believe, come to the conclusion, as by practical experience I have, that it is most effective in securing the efficient ventilation of an apartment; and if so, then the relative positions advocated for inlets and outlets with the "plenum" system are correct.

Complaints being so frequent of defective ventilation—even in buildings where outlay has been incurred in the expectation of securing, let us say, comfortable ventilation by natural means—is it surprising, when we consider the marvellous results of mechanical power, now used for the benefit of mankind in almost numberless ways, that attempts should be made to employ it for improving the ventilation of buildings?

Mining operations and many occupations have for years been carried on which would have been impossible without the assistance of ventilation brought about by mechanical means. Thousands of power-driven rotary fans and air-propellers are in daily use, proving the possibility of changing the air of enclosed spaces. Centuries ago the necessity for securing greater change of air within buildings than could at all times be naturally procured was recognized, and a few advanced minds suggested the employment of bellows and other primitive appliances worked by hand or water power. I have seen quaintly illustrated treatises on the subject; and although failure doubtless resulted from inadequate knowledge and appliances, there is no reason why, with air-propellers and power appliances brought to the high state of perfection they are to-day, we should not take advantage of them for securing ventilation within buildings.

It is no argument to say, "I don't like plenum ventilation," or even to point to failures which have occurred; nor is it sufficient to bring forward some fanciful idea that in an undefined manner air moved by mechanical power is deprived of an unknown vital essence. It has been suggested that by warming air otherwise than by the sun's rays this intangible essence is destroyed, and that is given as a reason why some people condemn plenum

ventilation; but it is altogether begging the question, because in summer time, when "plenum" ventilation is so effective in maintaining a cooler atmosphere within doors than in the open, no heating is employed. Will it then be contended that, by lowering the temperature, such will-o'-the-wisp essence again disappears? Unfortunately my scientific knowledge is not sufficiently profound to enable me to determine if there is even an element of truth in these imaginings; but even if there be, which I strongly doubt, it is easy to demonstrate that with a carefully devised installation of "plenum" ventilation the necessary warming and cooling of air are effected with less chance of deterioration than by any other method. In addition to which the air is drawn from sources known to be at a distance from contamination; it can be cleansed from suspended impurities, brought to suitable hygrometric condition, and passed on to apartments without contact with impurity.

I am, perhaps, as painfully conscious as anyone that there have been many failures with "plenum," and so there have been with every other method employed for securing ventilation; but my experience convinces me that failure is not the fault of the system, but that it results either from want of knowledge and experience on the part of those who installed it, or from neglect. It is only by careful comparison of results and a minute examination of the means and methods employed that a true estimate of its value can be ascertained. Personally I have not the faintest doubt that by the "plenum" system the efficient ventilation of a building can be effected. The principle is perfectly sound; yet I realize there are two sets of objections to be met: the first I class as purely fanciful, most of which I have already dealt with; the second are more tangible, and relate to the means and appliances which should be employed and the cost. To review all the means and appliances at disposal is quite out of the question on the present occasion, but they have a very decided influence, not only as regards partial or complete success, but also a direct bearing on the question of first cost and maintenance.

Much as I dislike making comparison between the work of others and that with which I have been connected, this discussion has been forced on, and we are to meet in the hope of gaining instruction which may be placed at the service of the public. Consequently I shall briefly compare, principally as regards costs of power employed, a few installations of plenum ventilation, and as I shall make use of information derived from printed particulars given by the engineers themselves, we shall at least have fairly reliable data.

Building.	Cubic feet of air per hour.	Change of air per hour.	Power.	Estimated horse-power.	Annual cost for power.	Annual cost per million cubic feet.
Glasgow, Art Galleries.....	9,050,000	Not stated, probably 3 times	Electricity	66	£2,695	£298
Manchester, Technical School.....	12,000,000	3 1-2 times	"	80	3,224	269
Manchester, Midland Hotel.....	6,000,000	3 times	"	40	1,612	269
Birmingham, General Hospital.....	13,000,000	7 "	"	19	766	59
Belfast, Royal Victoria Hospital.....	5,000,000	7 "	Steam	5 1-4	100	20

Consider the importance of such a comparison as regards the number of changes of air effected per hour. May not success in great part depend upon giving an adequate change of air? And surely the question of cost would be a determining factor in many cases.

Reference to the paper by Mr. Henry Lea given in the Institute Journal for December 10, 1903, will show how this economy in cost of power is effected. In the discussion which followed Sir John C. Holder personally testified to the success of plenum ventilation in the General Hospital, Birmingham, which he has systematically visited, one may say almost daily, during and since its erection, and I could produce a large number of letters addressed to me containing congratulations on the satisfactory ventilation of that and the Royal Victoria Hospital, Belfast; but I prefer to place before you one because it was not written to me,

¹ See article on "Ventilation" in "Modern House Construction," Vol V. Blackie & Son, Ltd. 1899.

* The costs of running are worked out proportionately to the amount of power presuming it is employed continuously.

and because it is from an architect experienced in hospital design, viz., Mr. Batchelor, of Messrs. Carroll and Batchelor, of Dublin, neither of whom is personally known to me. It runs thus:—

"I had been greatly interested in the accounts I read from time to time of the progress of the Royal Victoria Hospital, Belfast, and more particularly in the arrangements for heating and ventilating it. I have had some experience of the plenum system, and have never been much in love with it. I looked therefore rather with distrust on a building which had been so designed as to make such a system obligatory. Mr. Henman is to be complimented and congratulated on his courage in designing such a hospital, and I am free to confess that the result, so far as I was able to judge during my short visit, affords him ample justification for his inversion of many of the accepted canons in hospital design. I was particularly struck by the wonderful uniformity of the temperature maintained in the hospital throughout the twenty-four hours—such as could not, I believe, be obtained by natural means. The freshness of the air in the wards was remarkable, and there was a complete absence of that peculiar odor which is familiar to everyone having to do with hospitals. These results are obtained, I was glad to see, without draught, nor was there any perceptible movement of air in the wards. Everywhere I went through the hospital I saw evidence of great forethought and skill in design, particularly in those small details which count for so much in the economical administration of the institution. The building is a credit to the architects and also to the contractors, who have put such honest and—if I may use the expression—sympathetic work into it. Everything appears to have been done as well as it was possible to do it."

It has been well said that the only way to arrive at a right judgment as to the practical utility of plenum ventilation is to carefully examine it in a building in which it has been applied with knowledge and experience. All I ask, in conclusion, is that the subject may be approached without prejudice or regard to merely personal interests and fanciful misgivings, for a right understanding by the architectural profession on the subject of ventilation must have a vital influence on the health and well-being of the people.

ARCHITECTURE AT THE EXPOSITION.¹

THE Centennial and the Columbian Expositions, the two Fairs of international importance thus far held in the United States, were epoch-making in our architectural history. The Centennial in 1876 gave the first impulse to the revival of taste and interest in architecture since English influence ceased to be felt in the early days of our national existence. By the year 1893 some good architectural work was being done, but it remained for the beautiful Court of Honor at Chicago to arouse public interest thoroughly and stimulate architectural practitioners as a body. The enthusiasm thus awakened has not abated. On the contrary, the general appreciation of good architecture has greatly increased, and correspondingly greater demands are made upon the architect. These demands require in him a more careful education and training and inspire him to his best efforts. As a result, professional standards have been raised to higher levels during the last decade. In these various signs many are reading a prophecy of an era of still greater progress. It would almost seem that it but remained for the Louisiana Purchase Exposition to give a third impulse to American architecture, the results of which should bring about an architectural period noteworthy in history.

The general architectural plan is familiar to the reader. It was determined by the natural ridge of ground, now named Art Hill, which was an obvious position for the focal point. An axis perpendicular to the general direction of this ridge was then the natural axis of the composition. It would follow that buildings which could not be grouped about this main axis would be placed upon another running transversely to it. On account of the boundaries of the site this axis could not be made straight. This is not necessarily unfortunate in a transverse axis. Had it taken the form of a long, sweeping curve instead of an abruptly broken line, a perspective effect of great beauty would have been obtained, and the continuity of the avenue made evident. The existing breaks confuse the beholder, and give the effect of a sudden termination rather than a mere

change in direction of an extended avenue. This may be cited as one of the lost opportunities to impress upon the visitor the great extent of area to which the Exposition may lay claim.

The natural ridge of Art Hill, with its long sloping approaches, formed a rare site for the culminating point of the main composition. The group of buildings upon the hill, Festival Hall, Colonnade of States and the Restaurant Pavilions, together with the Cascades and the extensive slope, as a whole form a fine monumental conception. In this hill Nature bestowed a favor that has not before been granted to the designers of expositions. But lest they should grow too exultant she turned the hill to the north so that, save in the early morning, the great group of buildings crowning Art Hill, instead of forming the brilliant point of the composition, remains a shadowy mass. This is undeniably a misfortune. It is also to be regretted that the costly and well-designed Art Building should be cut out and wasted as an effective element in the architectural grouping.

Effective as is the stupendous group of buildings on Art Hill, there seems to the writer to be too great a lack of continuity between it and the buildings on either side of the Grand Basin. There is but one point from which the main court appears to be a unit. That point is the boat-landing directly in front of the Louisiana Monument. From other points of view a wide gap separates the buildings of the lower and higher levels. Within the fixed limits of the Court of Honor the task imposed upon the designer was to emphasize the length of the vista, and, with the fortunate site for the main point upon an elevated ridge, to accentuate the height of the hill. The shape of the Grand Basin is a semi-circle joined to an elongated rectangle, the semi-circle, whose diameter is about twice the width of the rectangle, being at the farther end from the most advantageous viewpoint. This sudden expansion in width undoubtedly acts in opposition to the perspective effect of distance. The optical effect of the parallel sides of a rectangle seen in perspective is an apparent contraction at the farther end. Obviously a real contraction would enhance the effect of distance, and on the other hand an expansion would annul this effect. Hence the vast area of the half circle at the end of the rectangle is not realized; and yet because of its area and location it tends to dwarf the apparent size of the rectangle and to shorten the apparent length of the main vista. This arrangement of two groups of buildings, one upon a lower and the other upon a higher level, decidedly removed from the first with no connection between, tends by reason of perspective effects to diminish the apparent height of the higher of these groups. The absence of any connecting feature to carry the eye from one group to the other renders it difficult to realize the actual distance between them and compare their respective heights.

Had the Colonnade of States been arranged to form continuous lines with the court facades of the Electricity Building on the one side of the Grand Basin and the Education Building on the other, the true effect of the distance from the plain to the summit of Art Hill would not have been lost. The elongated rectangular form thus given to the Court of Honor would have greatly augmented the apparent length of the vista; while the long lines of colonnades sweeping up the slope would have emphasized the altitude of the hill, and brought out to its full value the height of the great dome of Festival Hall.

The buildings of the Fair are of uniform height and color, but beyond this individual fancy has run riot. The limitation of style, if it may be called a limitation, which was imposed upon the designers was the use of "free renaissance." A common understanding as to what interpretation should be placed upon this limitation was evidently lacking, and a certain impression of discord results. The varied designs express, no doubt, the ideas of the different designers as to what exposition architecture should be. The material used, as well as the purpose for which a building is intended, determine the character of its design. These festive and ephemeral nature of exposition architecture tends to loosen the bonds of restraint which should be felt in designing a permanent structure. Staff, the material employed in these buildings, is a light plastic substance, admirably adapted to rich and elaborated decorative forms. An architecture true to the nature of this material should observe its limitations of strength. It can not logically be used in structural forms primarily designed to be built of stone which, unlike staff, is capable of sustaining great weight. In sham stone architecture, then, we can scarcely expect to find all of the Seven Lamps of Architecture burning brightly. Its beauty must be somewhat

¹ Extracts from a paper by Mr. Frederick M. Mann in the *Bulletin of the Washington University Association*.

dimmed by the absence of the flame of truth. This type of architecture, however, has come to be considered legitimate, in this country at least, in exposition building, and until our cities are more replete with permanent structures of fine monumental character, we may perhaps be pardoned, as a people, for our fondness for such creations in plaster when an exposition presents the opportunity to build them.

Festival Hall, together with the Colonnade of States and Restaurant Pavilions, form a consistent group. Scarcely any other work on the grounds approaches this group in quality and strength of design. We consider, however, the lack of connection between the Colonnade and the Pavilions to be a fault. The Restaurant Pavilions, though comparatively modest in size, are exceedingly attractive in composition. The form of their domes, however, seems to be too little harmonious with that of Festival Hall. Their ornament is well disposed, admirably filling its place and in excellent scale. These small buildings show the results of careful study and may be ranked among the most successful. The design of the Colonnade of States is also skilful and interesting. If its shadowy mass could have been arranged to be seen against the sky, a fine effect would have been gained. Deprived of sunlight by its northern exposure it needed a brilliant rather than its present sombre background. Whatever may be lost in the daytime, however, will doubtless be fully retrieved at night under the transforming influence of myriads of electric lights.

The evident lack of sympathy between the designs of the various buildings is nowhere more apparent than in the case of the group on Art Hill and the facades surrounding the Court of Honor. These two groups seem to belong to two distinct and separate species, as it were. The balance of stronger qualities is perhaps with the group on the Hill. The heavy though decorative architecture of the time of Louis XVI marks this group, while one finds around the rectangle below the lighter Italian influence predominating. Of the four facades about the Court of Honor, that of the Manufacturers' Building would seem to be the most worthy of note. Its skilful and spirited design shows an evident appreciation of the free, decorative character of exposition architecture. Its colonnade, if we must accept stone columns in plaster, is by far the finest on the grounds. The columns are heavier than the usual proportion for stone columns, and this undoubtedly gives a sense of adequacy for its purpose to a column of weaker material. The intercolumniation also is fine. An instructive comparison may be made by glancing across to the colonnades of the Varied Industries and the Education Buildings, neither of which is so well proportioned nor so vigorous in detail. The Education Building as a design, however, is open to little criticism. Its chief fault may be said to consist in its somewhat too serious character both for its material and its purpose as an exposition building. The facade of the Electricity Building, on the other hand, can scarcely be called successful. Its lines and masses are too much broken to give a feeling of repose. This is equally true of the Machinery Building, the detail of which is open to almost sweeping condemnation. Its heavy imitation stone trimmings—imitation even to exaggerated marks of the stone-cutter's tool—sink well nigh to absurdity. The use of a sham clock-face with plaster figures and hands as an ornament over the main entrance scarcely denotes inventive fertility in design. As if in rebuke, one of the finest groups of decorative sculpture, among many fine ones at the Exposition, is to be found as the crowning feature of this entrance directly above this futile time-piece. The Transportation Building may be counted among the successful designs. It has some exceptionally well designed and skilfully executed ornament. The slender towers at the ends of the facade seem to be too high and at the same time not sufficiently massive to fulfill adequately their combined function of terminating the sky line and serving as crowning features to the heavy end piers. The plainness of the sides of the building, acting as a foil to the rich end facades, is a very acceptable relief.

It is a serious question whether in the design of this exposition as a whole sufficient recognition has been given to the value of such plain spaces. With their proper and desirable use a considerable sum might have been saved and directed not only to the concentration of richness at focal points, with a consequent relief to senses overpowered by a constant bewilderment of effects, but also to the adequate termination of incomplete vistas and other similar omissions which are at present much to be regretted.

The Mines and Metallurgy Building is both original and interesting. Perhaps it is more out of sympathy with most of the other buildings than they are with each other; but a frank difference is almost always preferable to a slight discord. In this respect the designer's somewhat radical departure may be counted to his credit. The building lacks scale, and its central motives, with crowning globe and flanking obelisks, are not entirely satisfactory; but as a whole and in many details it is of great interest. It was evidently designed for a rich color treatment, which it apparently is not to receive. This leads one to wonder at the general absence of color treatment, the cheapest and most effective agent that could have been employed to unify the whole architectural scheme, rendering it brilliantly festive and at the same time more restful to the eye than a desert-like monotony of universal monochrome.

The United States Government Building occupies a fine site, but is badly dwarfed by the colossal exhibition buildings flanking the avenue leading to it. The elaborate sweeping ramps forming a main part of its approaches are somewhat superfluous, being entirely lost to view behind the big buildings in front of it. The little building of the United States Fish Commission has much charm and interest, considerably more, in fact, than the main Government building itself. It appears upon first glance to be of pure Greek inspiration, but an examination reveals that it is not archaeological in the least, but full of charmingly original detail.

PROPERTY RIGHTS UNDER THE CONSTITUTION.¹

IN this case John T. Underhill sought an injunction in the Circuit Court of Kenton County, Ky., against Walter Murphy and others. Underhill was an employing plumber, and had been engaged in the business in Covington, Ky., for a number of years and had built up a profitable trade. He had on hand at the time of the trouble giving rise to this action a number of important contracts. His workmen were members of a labor union, and, a difference having arisen between Underhill and his employees, they left his service. Underhill then employed non-union men to assist him in carrying out his contracts, whereupon his former employees instituted measures to break up his business by the use of threats, intimidation, force and violence, all of which was pleaded and sufficiently proved, it appearing that not only was the plaintiff's place of business picketed, but that actual assaults had been made and the assistance of the police had been required at different times to safeguard Underhill and his workmen. The court stated that "the proof shows a determined effort by conspiracy on the part of the defendants to break up and destroy the plaintiff's business by force and violence unless he acceded to the demands of the union to which they belonged." The prayer for an injunction had been denied in the court below (see Bulletin of the Department of Labor No. 37, p. 1203), from which judgment Underhill appealed to the Court of Appeals and obtained a reversal, the granting of an injunction being directed. The following selections from the remarks of Judge Hobson, who delivered the opinion of the court, set forth the grounds of the court's action:—

WHEN a man has, by years of toil and fair dealing with his customers, built up a valuable business and good will, he is as much entitled to protection by the law in this species of property as in the home that shelters him, or the coat that protects him from the winter's cold. The right of the plaintiff to carry on his business and to carry out the contracts which he had made was a valuable property right, and no less intrinsically property than if the same amount of money had been invested in a stock of merchandise or a city lot. If the defendants had conspired together by force and violence to burn up the merchandise, or to carry off the surface of the lot, upon elementary principles, the chancellor would protect the plaintiff from the destruction of his property. The acts of the defendant as truly destroyed the plaintiff's property when they broke up his business by force and intimidation as they would have done in the case of visible property by burning it or carrying it off. Among the inalienable rights which by the first section of the State constitution are guaranteed as inherent in all men is "the right of acquiring and protecting property." The right to acquire and protect property

¹Injunction — *Stalkes* — Criminal Law — Bonds to Keep Peace — Property Rights — Adequate Remedy — *Underhill vs. Murphy et al.*, Court of Appeals of Kentucky, 78 *Southwestern Reporter*, page 482.

is as sacred in the case of intangible property as tangible, and an injunction may be granted to protect intangible rights no less than those that are tangible.

The learned circuit judge refused to interfere on the ground that the acts committed by the defendants are criminal in nature, and punishable by the police department; that, if he had jurisdiction to enjoin the commission of the acts, it necessarily followed that he had jurisdiction to enforce a penalty for a violation of his order; and that this would amount, in substance, to holding that he could try and convict the defendants for a criminal act without the intervention of a jury. We cannot concur in this reasoning. If the defendants were undermining the plaintiff's house, or about to slide it with his family in it into the Ohio River, an injunction would not be refused on the idea that, if they thus drowned any of the people in the house, they might be punished for murder, or, if they destroyed the house only, they might be indicted under the statute for the wilful destruction of private property. The reason is plain: The punishment of the defendants for murder or for the destruction of the house, while it would vindicate the majesty of the law, would not help the plaintiff in any way. To relegate him to the processes of the criminal law is to allow his property to be destroyed, and to give him no remedy therefor but the satisfaction of seeing the wrongdoers punished. The inherent and inalienable right of acquiring and protecting property which is guaranteed by the constitution means nothing if it means only this. If a man must stand by and see his property destroyed, and has no remedy but the slow process of the criminal law, which only punishes the offender, but restores nothing to him, then the constitutional guaranty of the enjoyment of life, liberty and property under the law is a meaningless generality. If, in this case, the defendants are fined in the police court, this will not restore to the plaintiff the loss he has sustained by reason of the interruption of his business and his consequent inability to carry out his contracts. When his customers are driven away, and the good will of his business is destroyed, it will be too late, so far as he is concerned, for the punishment of the appellees by the criminal law to re-establish his ruined business, or even prevent future loss. If the Circuit Court had granted the injunction, and the defendants had disobeyed it, and he had punished them for contempt, the punishment would have been for their disobedience of the order of the court, regardless of whether their acts were also a violation of the criminal law of the land for which they might be indicted and punished in the criminal court. His judgment punishing them for contempt would have been no bar to the criminal proceeding against them for their violation of the law, and would not have affected this proceeding in any way. His judgment would have established nothing more than that they were guilty of contempt of court in disobeying his orders. Whether they were also guilty of a criminal offense would have to be tried in the proper forum, and not in this action. The power of a court to punish for contempt is as old as the common law, and inherent in every court. The punishment for contempt would relate only to acts done after the injunction was granted, in disobedience of it; and even in this proceeding the defendants are protected as to a jury trial by section 1291, Ky. St., 1903, which provides: "A court shall not for contempt impose upon the offender a fine exceeding thirty dollars (\$30), or imprison him exceeding thirty hours, without the intervention of a jury."

It is also urged that the plaintiff had an adequate remedy under the criminal code by having the defendants to give security to keep the peace and be of good behavior. The rule that an injunction will not be granted where there is an adequate remedy at law refers to legal remedies, and not to criminal proceedings. In no case has it ever been otherwise applied, so far as we can find. It looks to the prevention of offenses, and not to the redress of private wrongs. It is begun by a warrant issued in the name of the Commonwealth, and is a prosecution by the Commonwealth, under the control of its officers. If a bond is required, it is taken to the Commonwealth. When the plaintiff's property is about to be destroyed, he is entitled to a remedy in his own name, and which he can himself control to protect him in the enjoyment of his own. The fact that the Commonwealth might also take out a proceeding to require the defendant to give security for good behavior is immaterial, for both proceedings may be prosecuted at the same time—one in the criminal court by the Commonwealth, and the other in equity by the plaintiff; one to prevent the commission of offenses, the other to preserve the plaintiff's property from destruction.



WASHINGTON ARCHITECTURAL CLUB.

At a meeting of the Washington Architectural Club officers were chosen as follows: *President*, C. L. Harding; *Vice-president*, P. C. Adams; *Secretary*, Arthur M. Burt; *Treasurer*, J. H. Blohme; *Board of Directors*, Percy Ash, J. J. Bissegger, Louis A. Simon.

The travelling scholarship, value of \$250, money to be spent in travel and study in Europe, was awarded to H. Descum, a graduate of Cornell University Architecture School, and the second place to Fred V. Murphy. A special prize of \$100 was voted to Mr. Murphy by the club. Third place, to Milton Dana Morrill, and honorable mention to Eugene T. Parker.

The jury of award in the scholarship was made of the following architects: Glenn Brown, Arthur Brown, E. Frere Champuly, Theo. W. Pietsch, Percy Ash.

The prize membership to a student of the Columbian University architectural department was awarded to Chas. R. Lombard.

The prize membership to a student in the Washington Atelier to W. G. Noll.

CLEVELAND ARCHITECTURAL CLUB.

The Architectural Club at its annual meeting elected as *President*, Charles S. Schneider; *Vice-president*, Raymond S. Parsons; *Secretary*, Alex. Wolf; *Treasurer*, M. James Bowman; *Librarian*, Ralph M. Hulette; *Chairman Current Work Committee*, Stephen Gladwin; *Chairman Entertainment Committee*, Herman Kregelius.

The retiring officers made reports, and F. W. Striebing, the retiring president, delivered an address. The club voted \$5 to the Mizer monument fund.



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

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PLANS OF THE SAME.

DETAILS OF THE DOME OF STA. MARIA DI CARIGNANO, GENOA, ITALY: TWO PLATES.

These plates are copied from *Zeitschrift für Bauwesen*.

Additional Illustrations in the International Edition.

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CHURCH OF THE FORMER PHILIPPIN BROTHERHOOD, NEAR GOSTYN, PRUSSIA. XVII CENTURY WORK.

THE CHINESE GOVERNMENT BUILDING: LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO.

COMMUNICATIONS

[The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.]

"BIG BEN."

BOSTON, MASS., June 24th, 1904.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs:—I have been very much interested in reading your article on Tower Clocks from the *London Mail*, but wish they had told us why that at Westminster was called "Big Ben." If you could tell us why and when it was called "Big Ben" I personally would be very much obliged to you. Very truly,

FREDERIC AMORY.

["BIG BEN" is said to have been named after one Benjamin Hall, an architect, though we are puzzled to guess what connection Mr. Hall had with the work of Sir Charles Barry that should entitle him to such tintinabulating fame. Even in the interesting libel suit brought against Sir Edmund Becket by the bell-founders—which may be found in our issues for July 23 and 30, 1881,—no explanation of the nickname is given.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

A FRAGRANT REPORT.—"Aloes, civet, myrrh, and incense" are the fascinating subjects discussed in a report from Consul Masterson at Aden. It seems strange that such things should be regarded as mere articles of commerce, but so it is. Mr. Masterson says that Aden is the export market of these four substances, and that no other port can ever oust it. Of aloes Aden last year exported 31,696 pounds, nearly all of it going to London. Civet, which is one of the essential ingredients of nearly every high-grade perfume made, is taken from the pouch of the civet cat, an animal found in Abyssinia. The annual production of civet ranges from 250 to 300 pounds, and about half of this amount is shipped to New York. The price at Aden is from \$1.60 to \$3.24 an ounce, according to purity. Myrrh is principally used as an ingredient in incense, and the amount annually exported from Aden is about 1,344,000 pounds. A strange use of myrrh is made by the Abyssinian hunters, who smear their bodies with it before hunting elephants, in the belief that their quarry will not attack them on account of the smell.—*Portland Oregonian*.

COST OF PARIS SUBWAY DISASTER.—The disaster which occurred in the Paris "underground" less than a year ago has proved a costly matter for the Metropolitan Company, lessee of the line. Compensation cost close upon \$235,000 and loss of traffic amounted to over \$160,000. The total income of the railway for the year was \$3,530,000, and of this, under the terms of the concession granted by the Paris municipality, there has had to be handed over to the relief of the city rates the sum of \$1,140,000. Then after deducting the working expenses, which were in the neighborhood of \$1,500,000 (forty-two per cent. of the receipts), it was possible to give a dividend of about six per cent. The year has been one of great moment to the Paris Company in the matter of capital expenditure upon the new power station, the conversion of the system of electrically working the trams to multiple unit, etc., and a great deal of new rolling stock is now in course of building. The lighting and traction supplies are now effected by entirely separate circuits, so that in future the stoppage of a train through failure of the power circuit will not mean that there will be no light available—a matter which it will be remembered was one of the chief causes of the panic at Paris. The undertaking so far completed represents about twenty-two miles out of the twenty-six miles which constitute the first section. The new generating station, which is now almost ready, has a plant of about 20,000 horse power.—*Boston Transcript*.

TO KILL VIBRATION.—Making machinery foundations elastic so as to minimize or even altogether prevent vibration of buildings, is a recently much-mentioned subject, special references having been made to the uses of a particular new kind of impregnated foundation felt which is claimed to have given very satisfactory results. It has been spoken of as intended chiefly for insertion beneath rails, girders and machine beds, and as being made in

sheets of varying thickness—from $\frac{3}{8}$ -inch to $1\frac{1}{2}$ -inch. The felt is impregnated with mineral fat, so as to be moisture-proof. In Germany it is said to be in extensive use in connection with steam-hammers, pumps, steam-engines and much other machinery; under bridge girders, railway ties, rail chairs, and car bodies; and between columns and joists in buildings, and on shipboard to separate machinery from steel decks and bulkheads. The sheets are made in different sizes up to sixty inches in length by thirty inches in width. Felt mats have for many years been used in anti-vibration expedients, so that there is ample reason to expect satisfaction from the employment of the so-called "foundation felt" here noted; but it may not be amiss to observe that in many instances the apparent desirability of its use is indicative simply of something wrong in the machinery installation. Small earthquakes from the operation of a steam-hammer, and trembling buildings from fast-running machinery, often are proofs that the machinery has not been properly put in. Foundations rightly proportioned and rightly laid would materially restrict the market for special foundation preparations and confine their use to the underlaying of rail chairs, bridge girders and such other more appropriate things as have already been mentioned in the above remarks. With these their services would seem to have a fitness entirely lacking where moving machinery is concerned.—*Cassier's Magazine*.

A LIGHTNING DEMONSTRATION.—Recently Sir Oliver Lodge gave at the Institute of Architects, to the members of the Lightning Research Committee and some others interested in the subject, a practical demonstration of the action of lightning, more especially as regarded lightning conductors. The electrically charged cloud was represented by a thin sheet of metal mounted on non-conducting standards charged from a battery at pleasure, and placed in a position sloping downwards from front to back, so that the model lightning conductors could have their points brought nearer to or further from the under surface of the "cloud" by shifting their positions on the table. Some of Sir Oliver's conclusions were much at variance with what are popularly accepted. He placed in operation successively conductors of three different substances—copper, iron and wet string. The copper was the most intense and rapid conductor, producing a sharp crack at the flash; the iron took it with less noise, the wet string with hardly any, yet it was efficient in protecting the two other conductors. Wet string is of course impossible in practice (the thunder-shower performs some of its function, however, in relieving pressure), but Sir Oliver maintained that iron was quite as efficient a conductor as copper—and more, that the intensity of action of copper was more likely than iron to set up side-flash, which, in protected buildings, has been the origin of most lightning accidents. Sir Oliver also illustrated and described his classification of lightning into two kinds, which he called "A-flash" and "B-flash." The former was the normal discharge of lightning from an overcharged cloud direct to earth; the B-flash occurred when a large cloud discharged into a smaller one, generally though not necessarily below it, which was overcharged suddenly and discharged to earth with great violence. Sir Oliver Lodge proceeded to show, by several illustrations, why the B-flash might be expected to be more sudden and intense than the A-flash, and proportionately more difficult to protect against, though he would not say that all lightning injuries had resulted from B-flashes. The practical outcome of the demonstration was that a building should have as many points of protection as possible, and that (if we accept Sir Oliver's teaching) the copper lightning conductor is dismissed with costs.—*The Builder*.

CAPSTAN UNEARTHED IN FORUM.—Giacomo Boni, the archaeologist, who is directing the excavations of the Forum, has found a heavy capstan, with eight fixed levers of wood. The wood is perfectly preserved, while the iron fixtures have become oxidized. This discovery is considered of the greatest importance, as being the first known mechanical contrivance dating back 2,000 years. The capstan, which was found almost intact, is over six feet in diameter. Signor Boni has ordered the capstan covered with a special preparation to preserve the wood.—*Exchange*.

A ROOF-GARDEN ON A PACKING-HOUSE.—A novel thing about new structure to be built for a bacon and ham packing firm. Cincinnati will be a large roof-garden. There will be a lake, oval in shape, 25x30 feet in dimension, with fishes in it. In the centre of this lake will be a small electric fountain. The lake will be from eighteen inches to two feet in depth. Besides the lake there will be regular grass plots, with trees planted in them and such flowers as thrive in this climate. The height of this garden from the street will be between 75 and 80 feet. In the summer time the place will be covered over with awnings, and everything arranged so that it can be used by the members of the firm, their employees and the business men of that locality as a pleasure resort.—*Cincinnati Enquirer*.

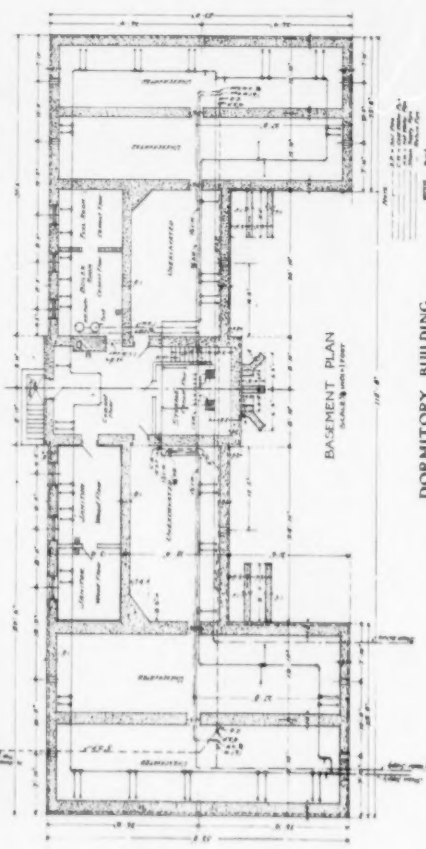
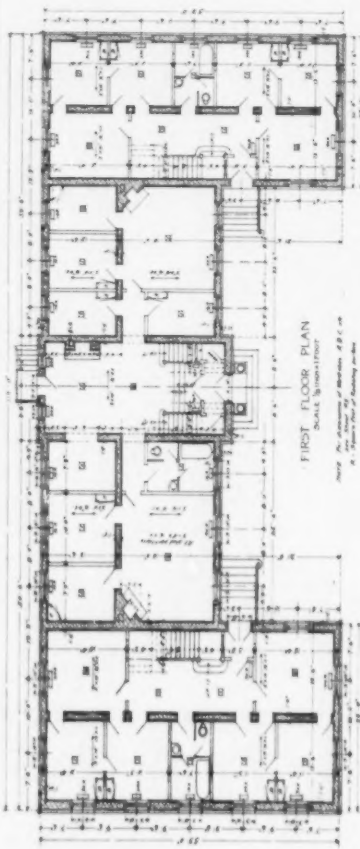
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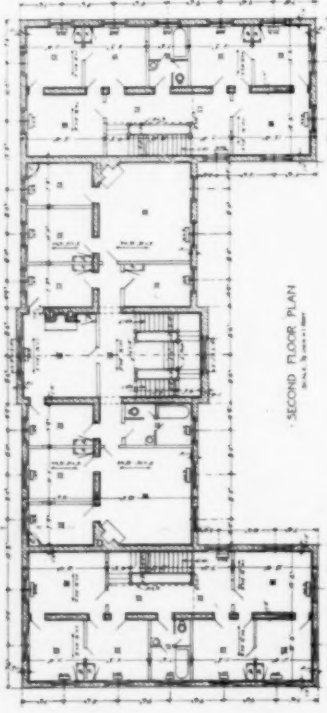
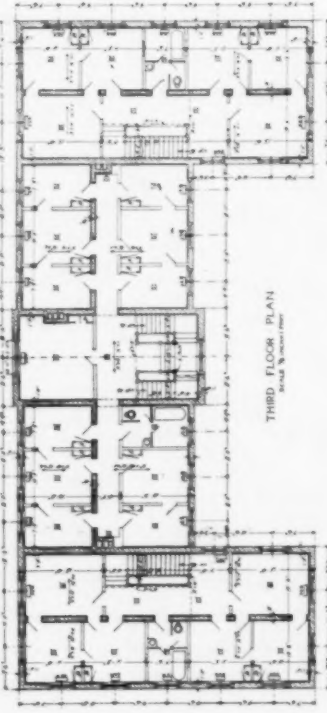
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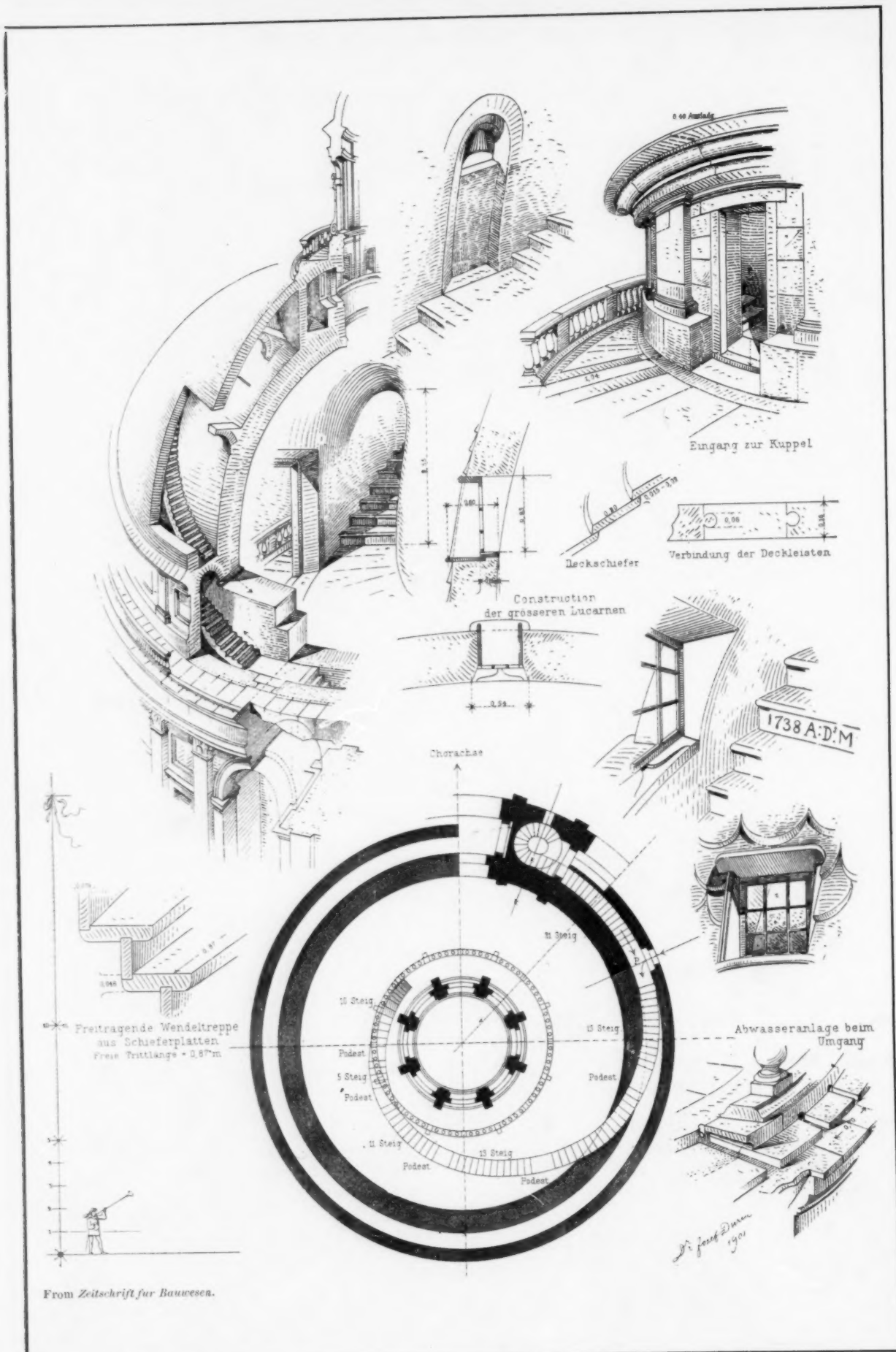
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Dome of Sta. Maria in Carignano, Genoa, Italy.

The American Architect
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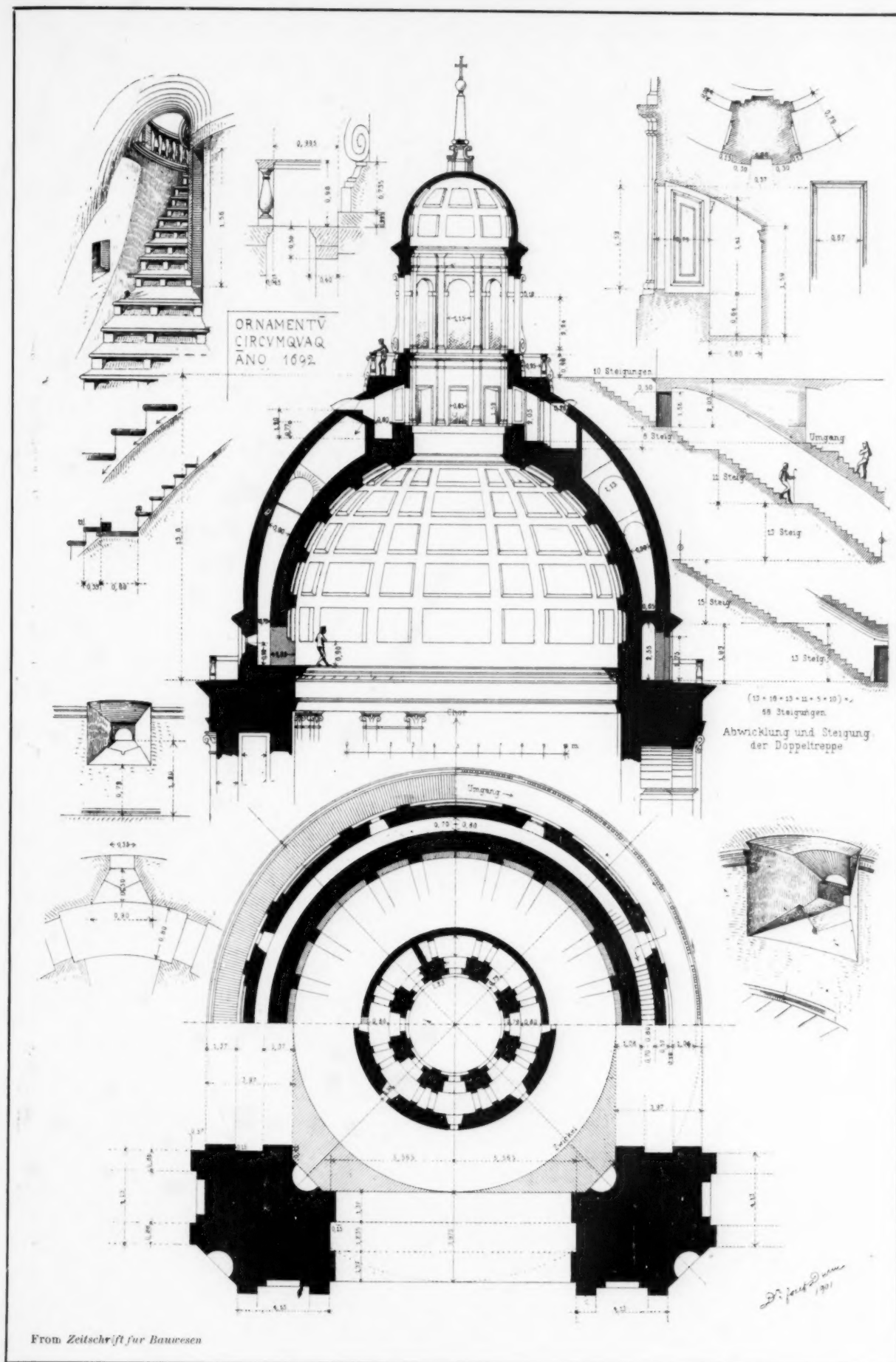
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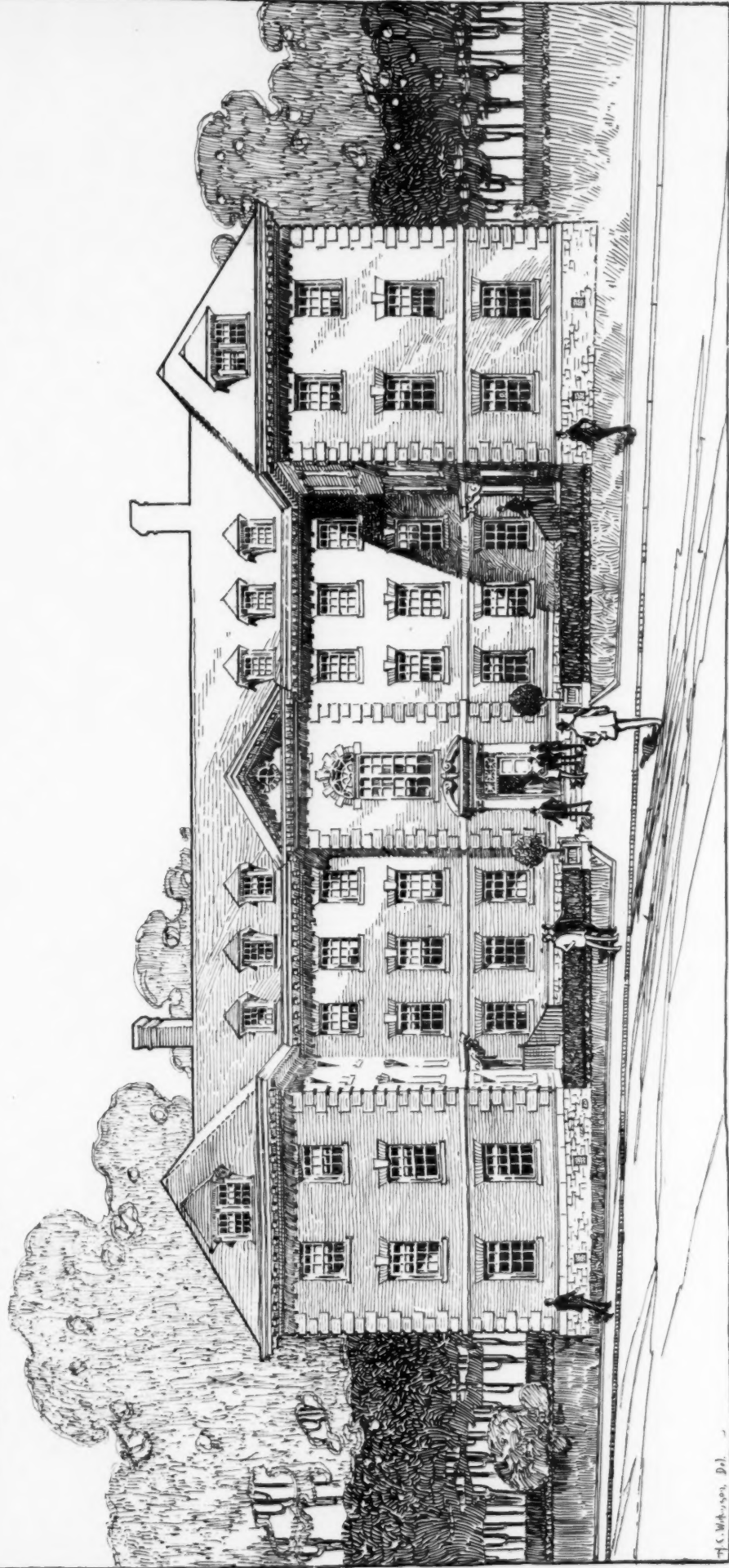


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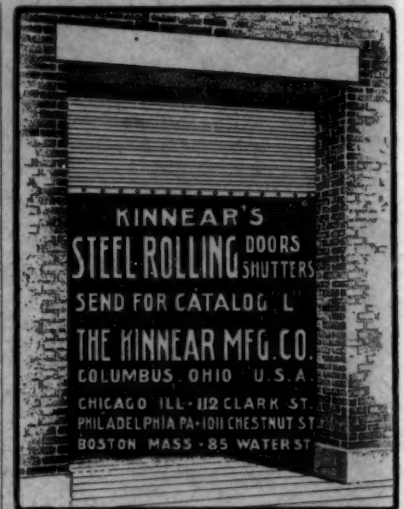
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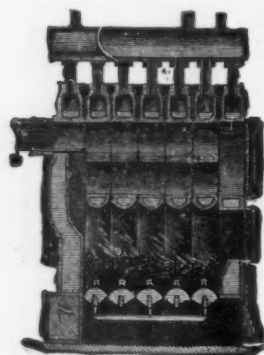
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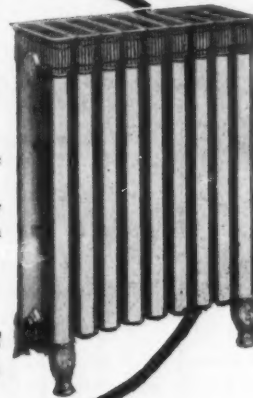
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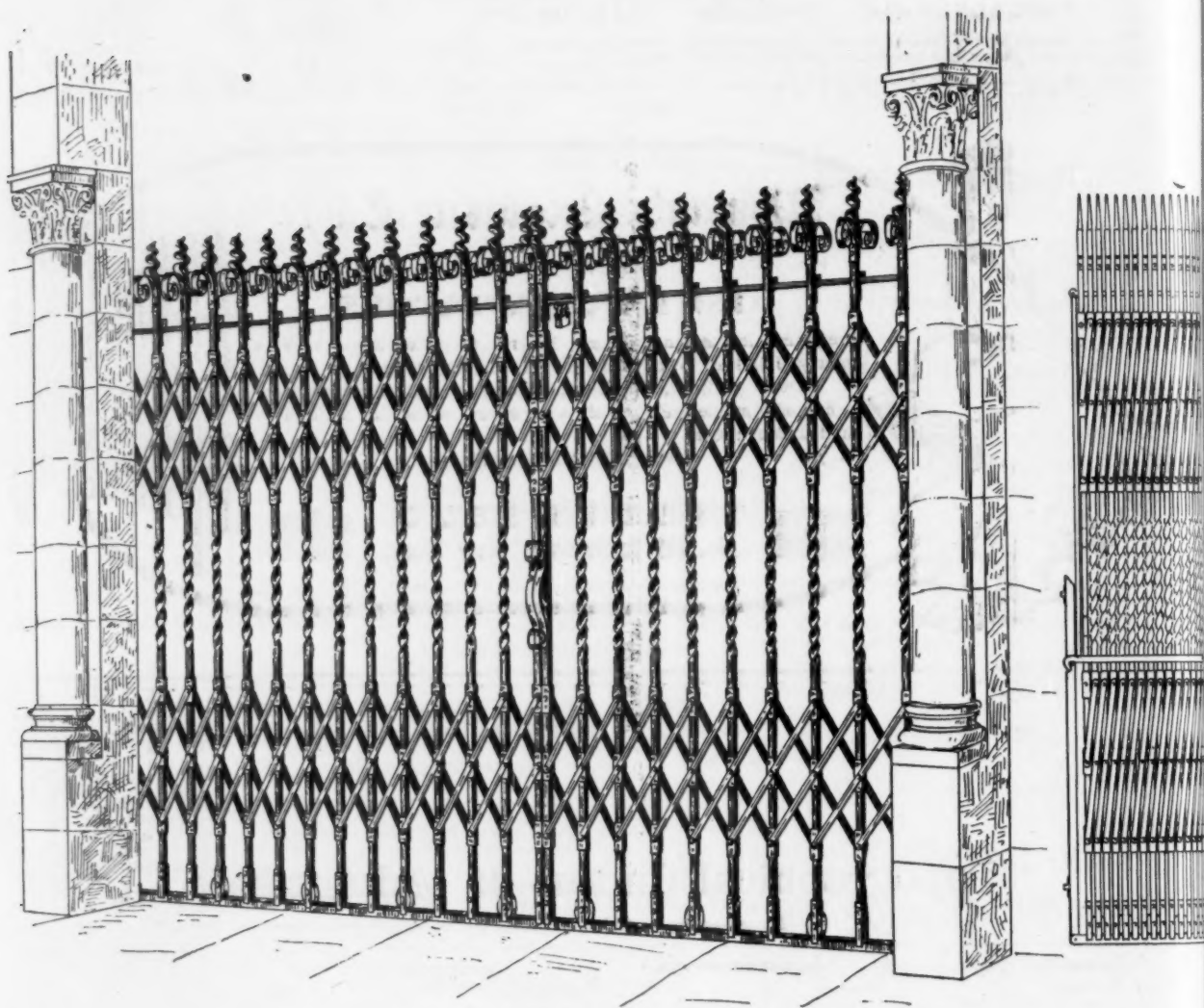
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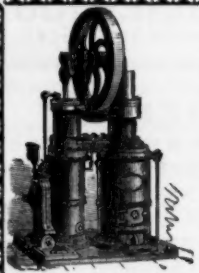
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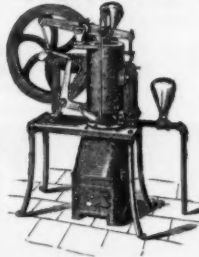
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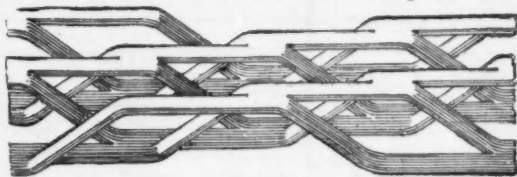
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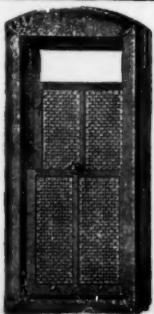
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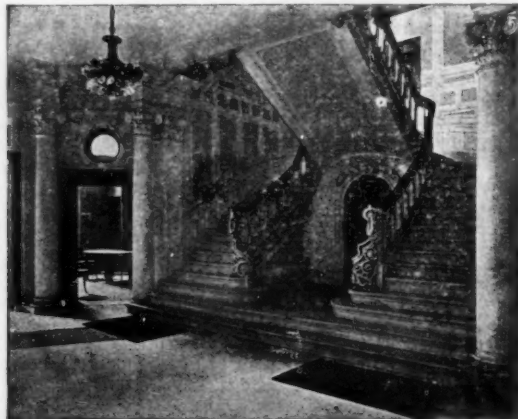
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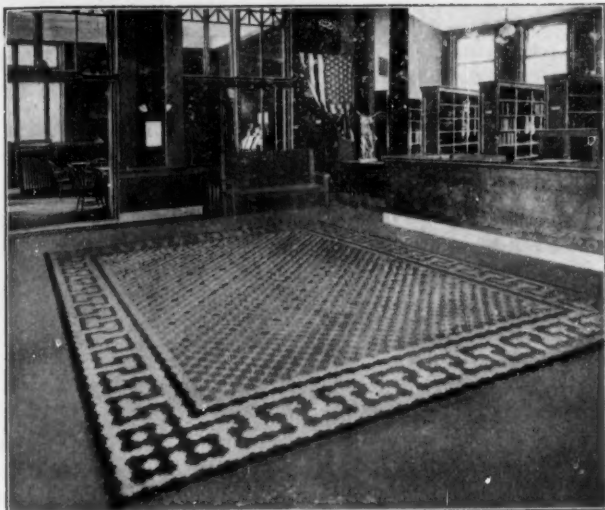
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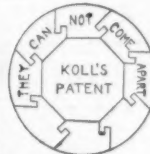
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See last or next issue for the following advertisements:—

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Cudell, F. E.
Charles J. Jager Co.
Kensley & Mattison Co.
Morse, Williams & Co.
Standard Sanitary Mfg. Co.
Thorn Co., J. S.

ARCHITECTS' REMOVALS, Etc.

OSCAR LOWINSON, architect and engineer, has removed his offices from 25 West 24th St. to the Spalding Building, 29-33 West 42d St., New York.

M. R. A. C. SCHMOOCK, architect, has opened an office at 416 Buhl Block, Detroit, Mich., and desires to receive catalogues, samples, etc., from the trade. 1488

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

ADVANCE RUMORS.

BALTIMORE, Md.—Ellicott & Emmart have completed plans for a block of nine warehouses to be built at the corner of Light and Lombard Sts. They are to be four stories in height, with cellar, and will cover a lot 200x81 feet. Owner, Safe Deposit and Trust Company.

Sperry, York & Sawyer have submitted plans for a three-story brick and stone

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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

building, 20x95.8 feet, for estimates. The site is at the corner of Baltimore and Little Sharp Sts. Estimated cost, \$28,000. Safe Deposit and Trust Company, trustees for Alonzo Lilly, owner.

City Comptroller Heffner has paid \$31,300 for the lot at the southeast corner of Broadway and North Ave., upon which the proposed new Eastern High School will soon be erected. The lot covers nearly a block. President Packard and Professor Remsen of the School Board recommend that architects be permitted to compete for the plans for the new school. As the structure will cost nearly \$250,000, the School Board desires that it shall be one of the handsomest in the United States. The Mayor approves the recommendation, and an ordinance in accordance with it will be drawn up by City Solicitor Bruce for passage by the Council. Building Inspector Preston, who prepares the plans and specifications for all new public buildings, including schoolhouses, favors the scheme.

BOSTON, MASS.—The New England Hospital Life Insurance Company have recently purchased the old Merchants' Hotel property on Change Ave., which runs from State St. to Faneuil Hall Sq., and is to be razed and a one-story bank building erected on the site.

CHICAGO, ILL.—James A. Patten will erect a twelve-story steel construction mercantile building at the southwest corner of Sherman and Harrison Sts., to cost around \$350,000. The frontage will be 120 feet in Sherman St. and 106 feet in Harrison, and the structure is expected to be ready for occupancy by Jan. 1. A feature of the exterior construction of the building will be the use of re-pressed paving brick above the granite base, the first time this material has been used in Chicago. The plans were prepared by Architect C. A. Eckstorm.

The Building Department has issued a permit to the Chicago & Northwestern R. Co. for constructing a fourteen-story

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(Advance Rumors Continued.)

building at 213-221 Jackson Boulevard, to cost \$2,000,000.

Bishop & Co. are the architects for two apartment houses, each three stories, for George O. Gordon, which will involve a total cost of \$75,000. One is to be built on the North Side, on Malden St. and Leland Ave., to cost \$45,000, and the other will be built in Hyde Park, at Calumet Ave. and Forty-fifth St., to cost \$30,000.

L. Mart Mitchell has let contracts for a three-story apartment building, 56x86 feet, to be built at South Park Ave. and Fifty-second St., for S. Moses, at a cost of \$50,000.

William H. Barry, the builder, has let



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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

contracts for a three-story flat, 100x60 feet, to be built at 1762-68 Racine Ave., at a cost of \$50,000.

COLUMBIA, TENN.—The contract to erect the Maury County Court House has been awarded to Hager Brothers, of Montgomery, Ala., at \$83,000.

DUNKIRK, N. Y.—Architect E. E. Joralemon, of Second St., Niagara Falls, has been given the contract to draw the plans and supervise the building of a \$25,000 Carnegie library for the city of Dunkirk and he will at once set about making the plans.

GREEN BAY, WIS.—Architect J. E. Clancy of this city has been commissioned to prepare plans for a new insane asylum for Marinette County to cost \$75,000.

HAMILTON, O.—The board of trustees of Miami University have awarded contracts to P. C. Lloyd, of Oxford, for two new buildings. A woman's dormitory is to be built this summer at a cost of \$38,000, and an extension to Brice Scientific Hall to cost \$28,000.

HOLYOKE, COLO.—Plans are being drawn for a new county court house for Phillips County, at Holyoke, by Cove & Harvey, architects, Denver. The building will have dimensions of 60x72 feet, two stories in height. It is to be of brick and concrete, and will cost \$25,000.

LANCASTER, O.—Plans have been prepared by Richards, McCarty & Bulford, Columbus, for a sixteen-room school, to be erected here.

LOUISVILLE, KY.—Lewis Pilcher & Wm. G. Tachau, a New York firm, were selected

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

as architects for the new Louisville Free Public Library at a meeting of the Board of Trustees held in the office of Library Superintendent A. H. Hopkins, in the Kentucky Title Company's building, recently. The selection was unanimous. The cost of the library, as designed in the plans, is to be \$230,000, and the architect's fee is to be \$11,500, or 5 per cent of the cost of the building. It will be several months before the detailed plans of the library are completed.

MALDEN, MASS.—The Second Universalist parish of Malden, Rev. Stanley Gates Spear, pastor, has bought a part of the David Ayers estate at the corner of Webster and Laurel Sts., Maplewood, for a location for a new edifice. The property has an area of about 6,500 square feet and a frontage of 65 feet.

MINNEAPOLIS, MINN.—Plans are nearing completion for the new administration building at the State Agricultural School, St. Anthony Park, and for the new bacteriological laboratory at the university. The plans call for an investment of about \$100,000 in the bacteriological building and \$200,000 in the administration building. It is too late to have these structures finished this year, but the board intends to have the foundations completed by the time winter sets in, so that work may be started as soon as spring breaks.

MONTGOMERY, ALA.—Plans for the new First Baptist Church, on South Perry St., have been adopted by the congregation. The building will cost about \$60,000.



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(Advance Rumors Continued.)

MORRISTOWN, N. Y.—Ludlow & Valentine, No. 1 East 27th St., New York City, are preparing plans for a house for Mr. A. F. Hyde. It is to be constructed of brick, 2½ stories high, 110x44 feet, with thirteen rooms and six bathrooms. They have also charge of laying out the grounds and designing of a stable.

ONEIDA, N. Y.—The Eumenia Lodge, No. 296, I. O. O. F., has decided to build a \$20,000 lodge building. O. Perry Tooker, clerk of Building Committee.

SCHENECTADY, N. Y.—The Board of Managers of the Ellis Hospital Association have decided to build at the corner of Wendall Ave. and Nott St. The new edifice will cost \$100,000 and will accommodate eighty-four patients. The building will be equipped throughout with all the latest appliances in use in modern hospitals. The building committee consists of Joseph W. Smitley, the Hon. Alonzo P. Strong, the Rev. Dr. J. Philip B. Pendleton, the Hon. John McDermott, Dr. D. L. Kathan and S. M. Hamill.

SEATTLE, WASH.—The "Woodmen of the World" have purchased a lot on Fourth Ave., near Pike St., and will build thereon a Woodmen's Temple, a five-story brick and stone structure, costing about \$75,000. The lot is 60x120 feet. The first floor is to be fitted for stores and the third floor for offices. Plans are now in preparation.

SPRINGFIELD, MASS.—A three-story brick office and lodge building is to be erected on Maple and Appleton Sts. by H. W. Cooley, at a cost of about \$40,000. W. B. Reid, architect.

ST. JOSEPH, MO.—The Sisters of Charity in charge of the St. Philomena Industrial School have purchased a lot at the southwest corner of Cabanne and Union Aves. for a consideration of \$32,500, and as soon as plans are drafted the contract will be let for the building of a new industrial school and orphanage that will cost at least \$250,000. The building will be constructed of brick, with stone trimmings, and will be thoroughly modern in every appointment. The lot upon which the building will be erected has a frontage of 214 feet on Union Ave. by 310 on Cabanne Ave.

ST. LOUIS, MO.—John F. Meyer, president of the John F. Meyer & Son Milling Company, has purchased a site at Ninth and Chestnut Sts., and will erect a \$350,000 office building.

TROY, N. Y.—The main building of the Rensselaer Polytechnic Institute, a four-story brick structure, was destroyed by fire on June 9. Loss reported to be about \$100,000. Reports state that the building will be rebuilt at once.

TWO HARBORS, MINN.—At the meeting recently held of the committee composed of the entire board of County Commissioners of Lake County, for the selection of plans and specifications for a new court house, to cost about \$45,000, the contract was



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(Advance Rumors Continued.)

awarded to Architect James A. McLeod, of St. Paul, Minn.

WAUKEGAN, ILL.—The plans of the Benedictine Sisters of Chicago to erect a convent on their valuable property on the North Sheridan Road, in this city, are to be carried through at once, and a structure to cost about \$100,000 will be erected, according to an authoritative statement given by Archbishop Quigley, who came here to look over the site.

WINONA, MISS.—The Bruce Architectural Company, of Birmingham, Ala., has been selected to prepare plans for the court house, which is to cost \$35,000.

WINSTED, CONN.—Edw. E. Benedict, of Waterbury, has prepared preliminary plans for the Y. M. C. A. building which it is proposed erecting here, at a cost of about \$20,000.

WOONSOCKET, R. I.—The School Committee of Central Falls has accepted plans for a new four-room brick schoolhouse, to be located on Dexter, Hunt and Wetmore Sts., on the west side of the city. The cost of the building will be \$35,000.

APARTMENT-HOUSES.

CHICAGO, ILL.—Hamlin and Park Aves., three-sty bk. flats, 24x80 ft.; \$85,000; o. S. H. Wheeler; a., Ivor L. Larbell.

NEW YORK N. Y.—One Hundred and Forty-third St., near 7th Ave., four-sty bk. and stone flats, 50x86.11; total cost, \$220,000 Levy & Rosenthal, 220 Henry St.; a., Geo. Fred Pelham, 503 5th Ave.

Ninety-ninth St., near Columbus Ave., five-sty bk. and stone stores and flats, 44 and 42x88.11, plastic slate roof; total cost, \$200,000; Smith & Roffler, 52 West 107th St.; a., Neville & Bagge, 217 West 125th St.

One Hundred and Twelfth St., near Madison Ave., six-sty and cellar bk. and stone stores and flats, 39.9x87.11; cost, \$38,000; Max Psaty, 112 East 98th St.; a., Geo. Fred Pelham, 503 5th Ave.

Jackson Ave., cor. 163d St., two five-sty bk. flats, 37x86.7½ and 38x88.9½; total cost, \$50,000; Mary Schaefer, 640 Eagle Ave.; a., Harry T. Howell, 3d Ave. and 138th St.

West One Hundred and Twenty-third St., Nos. 533 and 537, two five-sty bk. and stone flats, 37.6x88.11; total cost,

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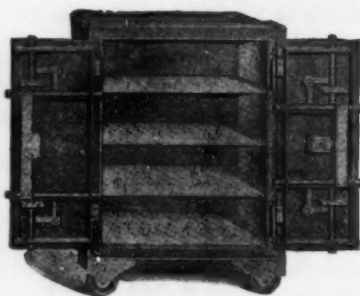
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East One Hundred and Nineteenth St., Nos. 158 to 164, two six-sty bk. and stone stores and flats, 38.4x87.11; total cost, \$76,000; Jacob Jung, 131 East 83d St.; a., Chas. Stegmayer, 306 West 82d St.

West Eleventh St., Nos. 45 and 47, eight-sty bk. and stone flats, 45.5x88.3, gravel roof; cost, \$150,000; a., Buchman & Fox, 11 East 50th St.

One Hundred and Forty-first St., near Willis Ave., six five-sty bk. flats, 38.6x88; total cost, \$102,000; Stephen J. Egan, 723 East 140th St.; a., Harry T. Howell, 3d Ave. and 138th St.

PROPOSALS.

JAIL, RESIDENCE, ETC.

[At Jamestown, N. D.] The County Auditor of Stutsman County, North Dakota, will receive at his office in the courthouse, in the city of Jamestown, N. D., separate bids for: 1. Erecting a Sheriff's residence, jail building and tunnel. 2. Erecting a boiler-house and tunnel. 3. For a steam-heating plant. 4. Plumbing for above buildings. 5. Steel and cell work for jail. All bids to be as per plans and specifications on file in the County Auditor's office and at the office of E. J. Donohue, architect, 58 Gilliland Block, St. Paul, Minn. Bids will be received until August 22, 1904. ANDREW BLEWETT, County Auditor, Stutsman County, N. D. 1490

HIGH SCHOOL.

[At East Cleveland, O.]

Bids will be received July 16 by J. F. Herreck, Clk. Bd. Educ., for furnishing and erecting a high school; probable cost \$20,000. Bids for labor and material must be submitted separately. Seales & Hirsch, Archts., 308 Electric Bldg. Cleveland. 1488

BUILDING.

[At Browning, Mont.]

Bids will be received July 12 by W. A. Jones, Com. Indian Affairs, Dept. Interior, Washington, D. C., for furnishing material and constructing dormitory, employes' quarters, water and sewer system, etc., for school, at Blackfoot Agency, Browning, Mont. 1488

PROPOSALS.

COURTHOUSE.

[At Hamburg, Ark.]

It is stated that bids will be received by the Co. Comrs. until July 15, for erecting a 2-story brick courthouse. W. F. McCOMB, Sec'y; Frank W. Gibb, architect, Little Rock. 1488

JAIL.

[At Aberdeen, Miss.]

Bids will be received Aug. 1 by the Co. Bd. Supers. for erecting a jail; estimated cost \$20,000. 1488

IRONWORK, ETC.

[At Elmira, N. Y.]

Bids will be received by Dr. Chas. F. Howard, Pres. Bd. Mgrs., N. Y. State Reformatory, Elmira, on July 12 for the steel, iron stairs, cut stone, etc., for the new Domestic Building at the Reformatory. 1489

LIBRARY.

[At Marengo, Ia.]

Bids are wanted July 6 for erecting a library. Patton & Miller, architects, 140 Dearborn St., Chicago, Ill. DR. W. C. SCHUTZE, Secretary, Library Board. 1488

ELECTRIC PLANT.

[At Boston, Mass.]

U. S. Engineer's Office, Boston, Mass. Sealed proposals for boilers, engines, generators, cable and conduit for electric light and power plants will be received here until 12 M., July 11, 1904, and then publicly opened. Information on application. W. S. STANTON, Lieut. Col. Engrs. 1489

LIMESTONE.

[At Washington Barracks, D. C.]

U. S. Engineer Office, Washington Barracks, D. C. Sealed proposals will be received here until noon, July 9, 1904, and then publicly opened, for dark-blue Indiana Limestone for Army War College Building. Information furnished on application. JOHN STEPHEN SEWELL, Capt., Engrs. 1489

CONSTRUCTION.

[At Puget Sound, Wash.]

Sealed proposals, endorsed "Proposals for Extension of Storehouse," will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until 11 o'clock A. M., July 30, 1904, and then there publicly opened for constructing a three-story brick building, 60 x 105 feet, at the Puget Sound Navy Yard, Wash. Plans and specifications may be inspected at the bureau or will be furnished by the Commandant of the navy yard named or the bureau, upon deposit of \$15 as security for their return. MORDECAI T. ENDICOTT, Chief of Bureau. 1489

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PROPOSALS.

Treasury Department, Office of the Supervising Architect, Washington, D. C., June 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 28th day of July, 1904, and then opened, for the steam heating and ventilating apparatus, etc., complete in place, for the U. S. Court-house and Post-office Building at Salt Lake City, Utah, in accordance with drawings and specification, copies of which may be had at this office, or at the office of the Superintendent at Salt Lake City, Utah, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1489

Treasury Department, Office of the Supervising Architect, Washington, D. C., June 25, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 2d day of August, 1904, and then opened, for the construction (except heating apparatus) of the U. S. Post-office and Court-house at Pierre, South Dakota, in accordance with the drawings and specification, copies of which may be had at this office or the office of the Postmaster at Pierre, South Dakota, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1489

Treasury Department, Office of the Supervising Architect, Washington, D. C., June 23, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 18th day of July, 1904, and then opened, for the low pressure steam heating apparatus, complete in place, for the U. S. Post-office, at Lawrence, Mass., in accordance with drawings and specification, copies of which may be had at this office or at the office of the Superintendent at Lawrence, Mass., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1489

Treasury Department, Office of the Supervising Architect, Washington, D. C., June 27, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 1st day of August, 1904, and then opened, for the construction (including heating apparatus, electric wiring and conduits) of the U. S. Post-office at Maysville, Kentucky, in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Maysville, Kentucky, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1489

Treasury Department, Office of the Supervising Architect, Washington, D. C., June 16, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 7th day of July, 1904, and then opened, for furnishing and delivering the draughting materials required in accordance with the specification and schedule, copies of which may be had at this office. JAMES KNOX TAYLOR, Supervising Architect. 1488

Treasury Department, Office of the Supervising Architect, Washington, D. C., June 20, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 26th day of July, 1904, and then opened, for the installation of a conduit and electric wiring system for the U. S. Court-house and Post-office at Salt Lake City, Utah, in accordance with the drawings and specifications, copies of which may be obtained at this office, or at the office of the Superintendent of Construction, Salt Lake City, Utah, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1488

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Edison Light, Boston.....

ELECTRICAL CONTRACTORS.

Erickson Electric Equipment Co., Boston.....

ELECTRIC SIGNALS.

Elevator Supply & Repair Co., New York.....

ELEVATORS, ETC.

Kimball Bros. Co., Council Bluffs, Ia.
Morse, Williams & Co., Philadelphia
Whittier Machine Co., Boston.....

ELEVATOR SIGNALS.

Herzog Telesome Co., New York....