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CONTENTS.

THE Commission of Experts appointed to examine the ceiling of the Assembly Chamber in the new Capitol at Albany has presented its report, which, coming from persons so distinguished in their profession as Professors Trowbridge and Babcock and Mr. George B. Post, must be considered as a final presentation of the case. Most architects will remember that the ground under the building is not of the firmest character, and some very interesting work in the way of testing its resistance, and spreading the base of the structure by means of concrete, was done by Mr. McAlpine when the structure was first begun. By the change in design under the new architects, Messrs. Eidlitz and Richardson, some important modifications were made in the distribution of the weight upon the foundation, particularly on the portion under the Assembly Chamber, which was loaded with the weight of an immense stone vault in addition to that which it was originally intended to carry. Perhaps the masonry of the foundation was also less uniform than it should have been, but however that might be, the great vault was hardly finished before evidences of unequal settlement began to present themselves. The effect of this was naturally more marked in the vault than elsewhere, and the splintering of the stones and opening of joints in that conspicuous portion of the building excited an alarm which proves to have been justified. In view of the uncertainty whether the sub-soil, already loaded beyond the intended limit, can be depended upon for permanent resistance, as well as of the alterations in form which have already taken place, and may continue, the commissioners reluctantly recommend that the architect be instructed to remove all the stone vaulting, except perhaps the four small corner vaults, and to supply the place of the groined ceiling with a construction of wood. In that way, they observe, a very considerable weight would be removed from the foundation, and the thrust of the present vault being reduced to a trifling amount another element of possible danger would be avoided. The cracks which exist in some other portions of the building are not considered by the experts to be of serious consequence, unless the unequal settlement of the foundations or subsoil, to which they are due, should continue. There can be no doubt of the wisdom of these recommendations, and although it will be a matter of much regret to architects to see the noble ceiling, — one of the widest groined vaults in the world — removed to make room for a wooden shell, it would be foolhardy to retain it to the peril of the occupants of the room. Under the circumstances, no reflection is cast upon the architects of the building by the removal of the vault; and we can only regret that any part of the future reputation of the designer of the Assembly Chamber must rest upon the memory of those who have had the privilege of seeing his work before its demolition.

WE have received from the Secretary of the American Institute of Architects a revised list of the members of the Institute, brought down to the middle of last summer. The first observation which we make is that the number of Fellows of the Institute has increased very materially of late, so that, indeed, the constitutional limit is nearly reached. Two years ago, when the Convention of the Institute decided that no more than seventy persons should at any time hold the rank of Fellow, this number was thought to be quite large enough to include all who were, or would for a long time be, deserving and desirous of attaining it. Now, however, although but one Convention has passed since the determination to restrict fellowship was taken, two vacancies only remain to be filled, and unless the restriction should be removed, the list will in a month or two be complete. The intention of those who voted to restrict the number of Fellows, in order to make that grade a distinction to be conferred on account of professional eminence, was so good that although the limit of seventy members is now shown to be too low, it is to be hoped that the next Convention, which will undoubtedly have to consider the question, may, while extending the number of Fellows, perhaps to one hundred, improve the opportunity to provide for some mode of selection among the candidates. The Trustees, for instance, instead of accepting all unobjectionable applicants, as has hitherto been the rule, might with propriety be instructed to make choice among them, waiting, for instance, until ten candidates were listed, and then electing three, or in some other way exercising a discretion which would be beneficial to the Institute, since it would improve the value and significance of the grade of Fellow, while it would inflict no hardship upon worthy aspirants beyond a delay in their election, the length of which would depend upon the number of more distinguished candidates who might present themselves.

IN view of the extraordinary apathy which seems to have been shown by the people of New York in regard to raising funds for preparing a pedestal for their great statue of Liberty, a proposition was made a few days ago before the Beacon Club, an association of enthusiastic Bostonians, that the donors of the statue should be invited to change its destination, and present it to the citizens of Boston, who would, it was thought, be more disposed to appreciate the value of the gift and the friendly sentiments of those who offer it. The report of this suggestion naturally aroused the secretary of the New York committee appointed to secure the money for the pedestal, who explained that owing to differences among the members of the committee nothing had been done in the way of soliciting contributions, and not a dollar had been collected. As the inauguration of the statue is intended to take place next year, and something like a hundred and fifty thousand dollars' worth of stone-work must be done before the pedestal is ready, it certainly seems to be quite time that steps were taken toward opening the subscription lists. Bedloe's Island, the proposed site of the statue, has been cleared and transferred to the committee by the United States Government, which spent about seventy-five thousand dollars in preparing a foundation for the pedestal before the transfer was made. It is said that the disputes among the committee relate to the question whether the money should be solicited from capitalists or raised by popular subscription. If this is all that stands in the way of the completion of the enterprise, it seems as if a compromise might be effected by having certain members of the committee circulate subscription papers among the populace, while the others labor with the capitalists. If any excess of funds should flow in as the result of this two-fold appeal, we would suggest that a portion of the surplus might be expended in paying somebody to write a letter of thanks for their gift to the Union Franco-Americain and M. Bartholdi, who must be almost tired of waiting for this ceremony.

THE New York steam-heating and power companies seem to have a very bright prospect before them. Two separate corporations, the American and the New York Company, have mains laid through the streets in the lower portion of the city. The former has not yet begun to furnish steam to its subscribers, but four miles of main pipe are laid, and delivery will commence in about two weeks. The New York Company already sells regularly eight hundred horse-power of steam, and within a week or two, at the beginning of the cool weather, received more than five times as many applications for private connections as could be filled. In Cortlandt Street and Maiden Lane about one building in every three has introduced the steam from the New York Company's mains, and the number will probably be much increased before the winter is over. The explosion which is reported to have taken place in Broadway not long ago proves to have been due to a defective valve, and other annoyances have resulted from the same cause. The condensation of steam in the pipes seems not to be serious, but the American Company, to reduce this to the smallest possible amount, protects its mains by laying them in trenches filled with lamp-black. One might suppose that plaster-of-Paris would be equally effective as a non-conductor, besides being more readily handled, and free from all danger of spontaneous combustion on the opening a trench; but the American Company undoubtedly understands its own business best.

The old Cradock house at Medford, Mass., the most ancient civilized habitation in America, is to be destroyed unless public interest can be sufficiently aroused to rescue it from the hands of its present owners. Built in 1634 for the first Governor of the "Company of the Massachusetts Bay," with the thick walls and loopholes for defence against Indian assaults which were then common, it has been almost constantly occupied for two hundred and forty-eight years, and although it has sunk from the position of a vice-regal mansion to that of a squalid tenement-house, it still possesses an interest second to that of no other building in the United States, and of very few dwelling-houses in the world. The number of inhabited houses two centuries and a half old is not very large in any country, and those whose construction shows them to have been the fortified outposts of civilization struggling in the midst of an almost forgotten barbarism are still more rare. Two thousand years ago the Romans built a magnificent temple to shelter the little hut of Romulus, which had been religiously preserved for five centuries in its place on the Capitoline hill; and while our early history affords no Romulus to be reverenced as the founder of the nation, the respect which we owe to our resolute and upright ancestors should make us hesitate to lay our sacrilegious hands on the few remaining memorials which we possess of their struggles and their victory.

A reporter of the New York *Evening Post* has had an interview with Mr. Edison on the subject of the dangers from exposed electric-light wires; the occasion of the interview having apparently been the death of a workman who was killed by the current from the wire of a Brush arc-lamp a few days ago. To the reporter Mr. Edison confided his opinion that such accidents would continue to increase with the multiplication of wires carrying powerful currents, until some dreadful accident occurred to arouse public indignation, and compel the placing of all such wires underground. In case of fire, particularly, the breaking of a great number of wires, which would be thrown down in inextricable confusion by the fall of a roof, might lead to serious consequences. Mr. Park Benjamin, a well-known scientific man, has already called the attention of the *Evening Post* to the fact that a stream of water from a hose nozzle, striking a broken arc-light wire, might easily serve to conduct the current through the body of the fireman who held the hose, with fatal consequences; while the cutting of such a wire with an axe, particularly if the handle of the axe were wet, might have the same effect upon the person using the axe. At this time, when fifty or a hundred telegraph and telephone wires are often stretched over the roof of a single building, the dragging of a broken arc-light wire over them might scatter destruction in scores of places. The Brush Company is said not to run its lines over roofs, preferring to use poles exclusively; but other corporations are not so scrupulous, and any one who has occasion to visit the tops of mercantile buildings must often notice, not without some apprehension, the heavy arc-light wires suspended very near him.

The question of repressing the reckless hydraulic mining in California, by which the channels of navigable streams are obstructed, and farming lands laid waste, has assumed great importance in that State, where it enters as an issue into political and personal disputes. As hydraulic mining is usually carried on, a mountain stream is collected in a strong iron pipe, and carried to some place from which it can be directed through a movable nozzle against a gravel bank. The hydrostatic pressure often gives immense force to the stream, tearing away the bank rapidly, and allowing the heavy particles of gold to fall into the receptacles prepared for them, while the lighter débris is carried down into the nearest water-course, and so to the rivers. As the farmers whose most fertile fields are thus deluged with silt and destroyed have no interest in the mining, they naturally look upon this unscrupulous appropriation of the rivers to drain away the mining refuse as a gross invasion of their rights, from which they think they should be protected by the public authority; and in this we imagine that most persons will agree with them. It is estimated that one hundred thousand acres of the finest land in the State has been covered with gravel and ruined, and much more will soon be destroyed in the same way. If this estimate is correct, considering, as we are probably justified in doing, that the product of these fields, if kept in order, would be worth a hundred dollars an acre every year, clear of all expenses except ground rent, the annual value in perpetuity of the land so destroyed would be ten million dollars, and the State, through its citizens, would be so much richer every year. The hydraulic mining, on the contrary, is a temporary expedient for extracting as rapidly as possible a deposit of gold already nearly exhausted, and the gravel banks once gone no further use can be made of the land occupied by them; so that in estimating the comparative value of the hydraulic mines and the fields sacrificed to them we must take the product of the former as a gross sum, while that of the latter may be regarded as the perpetual income of a certain capital. Placing the rate of interest at four per cent, the value as capital of the one hundred thousand acres of land now covered with débris would be two hundred and fifty million dollars; and unless the hydraulic mines have already produced the same, or a larger sum, in cash, they have been worked at a manifest loss to the community. It is, we presume, safe to say that nothing like this amount of gold has yet been taken from the mines whose débris is complained of; and in that case the owners of the mines have virtually presumed on the forbearance of their neighbors and the public to compel them to pay two, three, four, or five dollars for every dollar which they have put into their own pockets.

At a recent scientific congress in Switzerland Herr Riniker, the chief forester of the Canton Aargau, in discussing the cause and possible mode of prevention of hail-storms, asserted that hail was unknown in wooded countries, and mentioned, as an illustration within his own experience, that a certain district in the southern portion of his canton, at the foot of the chain of mountains known as the Lindenberge, was never visited by hail until about twenty years ago, when two wide gaps were cut in the forest which clothed the sides of the range. Frequent hail-storms then occurred in the valleys, the clouds being observed to descend through the gaps in the forest. In 1868 the wider of the gaps was closed by a plantation of young firs, and since 1871, when the trees had probably just obtained a firm foothold, no hail-storm had crossed the mountains. Herr Riniker's theory is that the hail-clouds being always charged with positive electricity, and the trees acting to diffuse the negative electricity of the earth into the atmosphere, the meeting of the two currents generates heat enough to thaw the hailstones. This explanation is not extremely satisfactory, but the record of the facts is none the less valuable on that account.

Some curious experiments are said to have been made by M. Le Bon to determine the character of the poisonous components of putrescent substances, and the action of disinfectants upon them. According to the *Scientific American*, the effect of antiseptics diminishes as putrefaction advances, while the disinfecting action of most substances bears no relation to their effect in destroying microscopic organisms. Moreover, the character of the noxious products of putrefaction changes materially as decomposition advances: the poisonous quality appearing to be contained at first in the non-volatile products, to make its appearance later, and with peculiar virulence, in the volatile compounds. To show this, frogs were confined in an enclosure with a small quantity of a liquid obtained by macerating chopped meat in water. The liquid soon became very offensive, and so poisonous as to cause death if injected under the skin of an animal; but the frog which merely breathed the effluvium was uninjured. After two months of fermentation the liquid lost its septic effect on the blood, and could be injected into the circulation without injury, but its vapor became excessively poisonous, so that the animals which inhaled it died. This observation, which seems to be quite new, explains the unwholesomeness of the air of cemeteries, which is sufficiently established by evidence, but has not been thought to be sufficiently accounted for as a scientific phenomenon.

THE SIPHONAGE OF TRAPS.

In the interest of chronological exactness, if for no other reason, it is proper to say that nearly two years ago I applied to the National Board of Health for an appropriation for experimenting on the siphonage of traps. This was granted, and the work was carried on with some thoroughness between June 6, and December 22, 1881. Subsequently, I reported my results to the National Board of Health, and the report was put in type for publication in the *Bulletin*. Publication was postponed for a time because the results shown and the deductions drawn were not in accordance with the theories on which the prescriptions of several Boards of Health had been based. It was thought best not to embarrass the efforts of these bodies to obtain certain legislation by calling attention to what might be considered an error in some of their recommendations. Some time after this, the National Board requested Mr. E. S. Philbrick, of Boston, to repeat my experiments, I think in 1882, with apparatus somewhat differently arranged. Mr. Philbrick's report has been published in these pages. As no allusion is therein made to my earlier connection with the subject, it would be only just to me, and it may be useful to publish my results also. My report is as follows: —

Appended to this report[1] are the following drawings, viz.: —

1. Apparatus used in Experiments I to VII.
2. Manner of extending soil-pipe at top.
3. Anti-siphoning, 4″ x 2″ Y-branch.
4. Manner of discharging contents of water-closet bowl.
5. Common S-trap, of glass.
6. Bower's trap.
7. Garland's trap.
8. Brandeis's "Paragon" trap.
9. Nicholson's mercury seal-trap.
10. Apparatus used in Experiment VIII.

Figure 1 illustrates the apparatus used in the Experiments I to VII. *A* is a common *bath-tub*, of about 80 gallons capacity when completely filled, with a 1½-inch lead waste, entering the main soil-pipe through a 4 by 2 inch Y-branch. The outlet of the bath-tub was closed by means of a conical-shaped 2-inch valve, operated by chain and lever. The 2-inch outlet was not obstructed, as is usual, by a strainer.

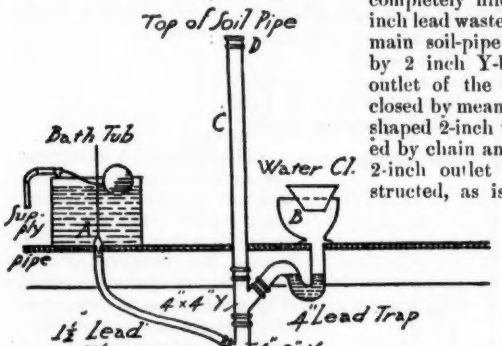


Fig. I.

B is a *common "pan" closet*, with bowl attached, and with a 4-inch lead trap, having about 1 inch of seal, and entering the soil-pipe through a 4 by 4 inch Y-branch.

C is the *main soil-pipe*, of cast-iron, 4 inches in diameter. Into the socket at top, *D*, of soil-pipe, a flap-valve was placed in certain experiments, closing the top of soil-pipe quite tightly. In other experiments a tin pipe, of dimensions as shown in Figure 2, was inserted at top of soil-pipe, in order to increase its length.

E is a 4 by 2 inch Y-branch, which receives a 1¼-inch horizontal lead waste, with a cup, *F*, at its end, into which the different traps to be tested were inserted and tightly joined by putty. This waste

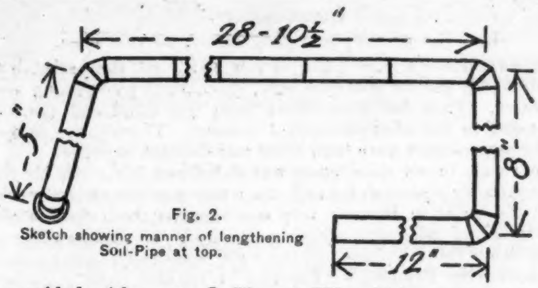


Fig. 2.
Sketch showing manner of lengthening Soil-Pipe at top.

was provided with vents, I, II, and III, which were alternately opened and closed in some of the experiments described.

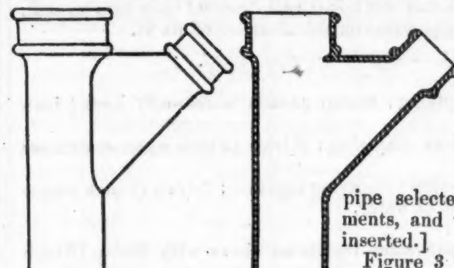


Fig. 3.
Y-Branch.

G is a 4 x 3 inch Y-branch, from which a fresh-air pipe branches, which was closed tightly during all the experiments. [This was a part of the original soil-pipe selected for the experiments, and was not purposely inserted.]

Figure 3 shows the "Anti-siphonage Y-branch," manufactured by the J. L. Mott Iron Works, New York, which was used in certain experiments in place of the common 4 by 2 inch Y-branch at *E*.

The bath-tub was emptied, when quite full, in one minute and twenty seconds.

Fig. 4.

Figure 4 shows the manner in which the water-closet bowl was filled and emptied, discharging at each time about 2½ gallons of water. The pan was drawn quite back, and a funnel inserted, kept filled with water, as it was found that a discharge from the bath-tub would draw all the water out of the pan, and would also unseal the 4-inch lead trap in certain experiments *with a closed soil-pipe*. The discharge was effected by lifting the funnel and allowing all the water to rush out of the bowl. In a number of the experiments, in order to make the test more severe, a large stable-bucket of water was poured into the bowl of the closet, while discharging, as fast as the outlet would receive it without overflowing the bowl.

Figure 5 shows one of the *common S-traps*, which for the purpose of experimenting were made of thick glass pipe, the interior diameter of the pipe being 1¼″ with different depths (*H*)

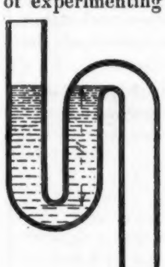


Fig. 5.
Glass S-Trap.

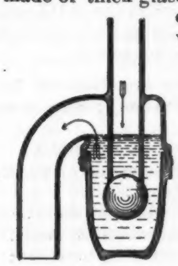


Fig. 6.
Bower's Trap.

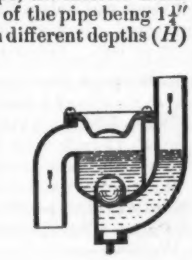


Fig. 7.
Garland's Trap.

of water-seal, namely: 3″, 3½″, 4½″, 5″.

The glass pipe was somewhat contracted at the upper and lower bends, owing to inaccuracy of manufacture.

Figure 6 shows *Bower's trap*.

Figure 7 shows *Garland's trap*.

Figure 8 shows *Brandeis's "Paragon" trap*, which seems to be in principle substantially the same as Adee's trap, without having the enlarged air and water chamber of the latter.

Figure 9 shows the *Nicholson "Mercury Seal" trap*, which being entirely of glass, was necessarily shaped somewhat differently from the trap as sold.

The *Cudell trap* arrived too late for trial, but it seems to be substantially the same as the Garland trap.

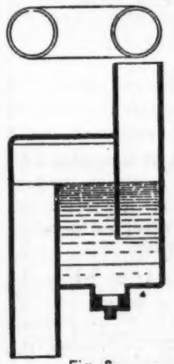


Fig. 8.
Brandeis's "Paragon" Trap.

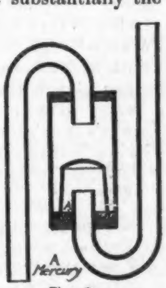


Fig. 9.
Nicholson's Mercury Seal-Trap.

[1] Made under direction of Col. Geo. E. Waring, Jr., Newport, R. I., for the National Board of Health.

EXPERIMENTS.

I. — *Top of soil-pipe tightly closed, no vent open.*

The experiments were made as follows: First, the bath-tub was entirely filled, and its contents, only, discharged by opening the 2-inch valve. Then the water-closet bowl was filled and the water discharged in the above-described manner. Thirdly, the bath-tub and the water-closet were both filled and emptied together.

The result in all three cases was as follows, viz.: *All the traps were completely siphoned, i. e.*, all the water was drawn from the S-traps; the water in Bower's trap was lowered about $\frac{7}{16}$ of an inch below mouth of inlet-pipe, allowing the top of the India-rubber ball to drop below this inlet-pipe; all the water was drawn from Garland's trap, also from Brandeis's "Paragon" trap, and from Nicholson's "Mercury Seal" trap. In the latter trap the mercury remained untouched, and the porcelain cup dropped into place, thus forming a seal. In Garland's trap the metal ball dropped back into its seat, thus forming a seal dependent on the accuracy of its fit.

II. — *Top of soil-pipe closed.*

a. Vent No. I open:
1. Bath alone emptying: S-trap (3-inch water-seal) loses $\frac{1}{2}$ inch of water.
2. Water-closet alone emptying: S-trap (3-inch water-seal) loses $\frac{5}{8}$ inch of water,
3. Bath and water-closet emptying together: S-trap (3-inch water-seal) loses 1 inch of water.

b. Vent No. II open:
Tests 1, 2, and 3 give same results as above with S-trap (3-inch seal).

c. Vent No. III open:
Results same as above with S-trap.
The mechanical traps were not tested in these experiments.

III. — *No vents open; valve on top of soil-pipe more or less open.*

a. Bath emptying alone:
If valve on top of soil-pipe was open —
$\frac{1}{8}$ of an inch all round, S-trap lost 1 inch of water.
$\frac{1}{4}$ of an inch all round, S-trap lost $\frac{1}{2}$ inch of water.
$\frac{3}{8}$ of an inch all round, S-trap lost $\frac{1}{4}$ inch of water.
$\frac{1}{2}$ of an inch all round, S-trap lost $\frac{3}{16}$ inch of water.
If valve was entirely open, S-trap lost $\frac{1}{8}$ inch of water.
If valve on top of soil-pipe was entirely open, Bower's and Garland's traps lost no water, no motion of balls was perceptible. Other mechanical traps were not tested.

b. Bath and water-closet discharging together:
If valve on top of soil-pipe was open —
$\frac{1}{8}$ of an inch all round, S-trap lost $1\frac{1}{2}$ inch of water.
$\frac{1}{4}$ of an inch all round, S-trap lost $1\frac{1}{16}$ inch of water.
$\frac{3}{8}$ of an inch all round, S-trap lost $\frac{3}{8}$ inch of water.
$\frac{1}{2}$ of an inch all round, S-trap lost $\frac{5}{16}$ inch of water.
If valve was entirely open, S-trap lost $\frac{1}{8}$ inch of water.
If valve on top of soil-pipe was entirely open, Bower's and Garland's traps lost no water. Other traps not tested.

IV. — *Soil-pipe open at top; vents I, II, and III opened successively.*

If either the bath-tub alone, or bath-tub and water-closet were discharged together, the S-trap (with 3-inch water-seal) *lost no water at all;* there was only a slight vibration of the water surface with either vent open. Bower's and Garland's traps showed no motion of the water or ball. Other traps not tested.

V. — *Soil-pipe lengthened by an additional 54 feet, with four bends (See Fig. 2.) laid horizontally; open at end; no vent open.*

a. Bath alone emptying:
S-trap (3-inch seal) loses $\frac{3}{8}$ inch of water.
"Paragon" shows strong vibration of water.

b. Water-closet alone emptying:
S-trap (3-inch seal) loses $\frac{1}{4}$ inch of water.
"Paragon" trap shows vibration of water,

c. Water-closet and bath emptying together:
S-trap (3-inch seal) loses $\frac{1}{2}$ inch of water.
"Paragon" trap loses $\frac{1}{4}$ inch of water.
Other traps not tested.

VI. — *Soil-pipe lengthened as above (see Fig. 2); open at end; vent No. I open.* [No difference in result obtained by opening other vents.]

a. Bath emptying alone:
S-trap (3-inch seal) not affected.
Bower's trap not affected.
Garland's trap not affected.
"Paragon" trap shows slight vibration of water.

b. Bath and water-closet emptying together:
S-trap (3-inch seal); water-seal not affected; slight agitation of water surface.
Bower's trap shows slight vibration of ball, but loses no water.
Garland's trap shows very slight vibration of the water surface.
"Paragon" trap shows slight vibration of water surface.

VII. — *Inserted Mott's anti-siphoning Y-branch.* (*Fig.* 3.)

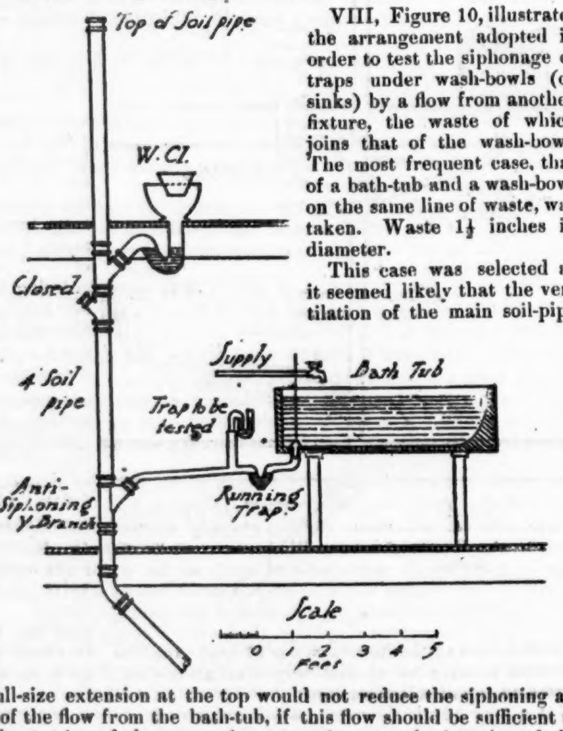
a. Soil-pipe closed (not extended); no vent open:
1. Bath emptying alone:
The water from all S-traps was completely siphoned; Garland's trap and Brandeis's "Paragon" completely siphoned.
In Bower's trap water level fell $\frac{1}{2}$ inch below bottom of inlet-pipe; the India-rubber ball dropped, unsealing mouth of inlet-pipe.

b. Soil-pipe open (not extended); no vent open:
1. Bath running alone:
S-trap loses $\frac{5}{16}$ inch of water.
"Paragon" trap shows vibration of water.
Bower's trap shows no motion of water.
Garland's trap, no motion of water perceptible.
2. Water-closet running alone:
S-trap loses $\frac{1}{4}$ inch of water.
Other traps not tested.
3. Water-closet and bath-tub emptying together:
S-trap loses $\frac{1}{2}$ inch of water.
"Paragon" trap loses $\frac{1}{8}$ inch of water.
Bower's trap shows only slight vibration of ball.
Garland's trap was not affected.

c. Soil-pipe open (not extended); one vent open (either I, II, or III):
1. Bath emptying:
S-trap (3-inch seal) loses a few drops of water.
2. Water-closet running:
S-trap loses a few drops of water.
3. Water-closet emptying together with bath-tub:
S-trap loses $\frac{1}{16}$ inch of water.
Bower's and Garland's traps show no effect in any case. Other traps not tested.

d. Soil-pipe closed; vent III open:
1. Bath alone emptying:
S-trap loses $\frac{3}{8}$ inch of water.
Bower's trap not affected.
Garland's trap not affected.
2. Water-closet emptying:
S-trap loses $\frac{1}{4}$ inch of water.
Other traps not tested.
3. Water-closet and bath running together:
S-trap loses $\frac{5}{8}$ inch of water.
Bower's trap shows slight movement of ball, but loses no water.
Garland's trap is not affected.

e. Soil-pipe extended by additional 54 feet; open at end; no vent open:
1. Bath alone emptying:
S-trap (3-inch seal) loses $\frac{1}{2}$ inch of water.
Bower's trap shows hardly any vibration.
Garland's trap shows hardly any vibration.
"Paragon" trap lost $\frac{1}{4}$ inch of water.
2. Water-closet alone emptying:
S-trap loses $\frac{3}{8}$ inch of water.
Bower's trap shows hardly any vibration.
Garland's trap shows hardly any vibration.
"Paragon" trap loses $\frac{1}{4}$ inch of water.
3. Water-closet and bath emptying together:
S-trap loses $\frac{5}{8}$ inch of water.
Bower's trap loses a few drops of water.
Garland's trap loses a few drops of water.
"Paragon" trap loses $\frac{3}{4}$ inch of water.



VIII, Figure 10, illustrates the arrangement adopted in order to test the siphonage of traps under wash-bowls (or sinks) by a flow from another fixture, the waste of which joins that of the wash-bowl. The most frequent case, that of a bath-tub and a wash-bowl on the same line of waste, was taken. Waste $1\frac{1}{2}$ inches in diameter.

This case was selected as it seemed likely that the ventilation of the main soil-pipe by full-size extension at the top would not reduce the siphoning action of the flow from the bath-tub, if this flow should be sufficient to fill the section of the waste-pipe to a point past the junction of the wash-bowl waste.

The experiments demonstrated the truth of this supposition.

There was no perceptible difference in the siphonage of any of the traps tested, whether the top of soil-pipe was open or closed.

With an *open, ventilated soil-pipe*, arranged as above, a flow of about 80 gallons of water from the bath-tub had the following effect on different traps:

a. S-trap with 3 inches water-seal had all its water carried out, except that portion below the lower bend of trap; in other words, its seal was just broken.

b. S-trap with 3½ inches water-seal showed the same results.

c. S-trap with 4½ inches water-seal had about two inches of water-seal left after emptying the bath-tub. The suction was sufficient just to hold up 4½ inches of water. No air-bubbles were sucked through the lower bend of trap. In other words, one-half of the water was withdrawn.

d. "Paragon" trap had 2 inches of water taken out; the seal was therefore broken.

e. Bower's trap had only a few drops of water carried out by suction; the ball rotated heavily and allowed air to pass, thus breaking the vacuum, which occurred at regular intervals. There was, in addition to the ball-seal, sufficient water left to form a seal.

f. Garland's trap had ⅞ inches of water taken out. The ball was agitated violently by the suction, allowing air to pass from the inlet next to bowl. There was, however, sufficient water left to form a seal in addition to the ball-seal.

g. Nicholson's trap was not tested, the earlier experiments having shown that the suction could not be great enough to break the mercury-seal, even if all water should be carried out.

All these experiments were made with the funnel-shaped outlet of the bath-tub.

This was replaced by the common outlet of a tub, with strainer and plug (about 1½ inches diameter), and all the experiments repeated.

The results of this second set of experiments did not differ from those first obtained.

DEDUCTIONS.

The experiments described above were made under my direction, and under the immediate supervision of my assistant, William Paul Gerhard, C. E. Their accuracy is beyond question.

Their results do not sustain the theory upon which are based the recommendations of many sanitary engineers, and the requirements and suggestions on the subject of several Boards of Health.

It is possible that that theory has been based on experiments with small glass pipes flushed by volumes of water relatively much greater than the soil-pipe of a house is ever called upon to carry. There is no doubt that if my trials had been made with a sufficient discharge of water to fill the soil-pipe nearly or quite full, their result would have been the same as that of trials with small pipes; but this cannot occur in practice.

As we used a bath-tub containing about 80 gallons, with a 2-inch outlet unobstructed by a strainer, the tub being emptied in *one minute and twenty seconds*, and a water-closet discharging its full contents, and often a large bucket of water in addition, in one body at the same time, we secured a volume of flow past the branch on which the traps were tried greater than can occur in ordinary practice.

The following deductions seem to be justified:

1. The flow of drainage through a 4-inch vertical soil-pipe not ventilated at the top produces a very strong suction on branch pipes, the mouths of which it passes.

2. The opening of the 4-inch soil-pipe at the top practically prevents such suction even when the upper part of the pipe is 70 feet in length and circuitous in its course.

3. If each bath-tub, wash-basin, sink, etc., wastes by an independent outlet to a branch of a 4-inch soil-pipe open at the top, the siphoning of even ordinary S-traps having more than one inch of seal is not to be apprehended.

4. If one vessel discharges into a branch leading from another vessel, the discharge of the latter may produce a suction on the S-trap of the former sufficient nearly or quite to break its seal, unless of unusual depth.

5. Where the conditions are as described in paragraph 4, the suction is not sufficient to cause the ball of Bower's trap to drop away from its bearing, nor is it sufficient entirely to remove the water from traps which, like Garland's and Cudell's, are closed by a valve bearing vertically downward upon its seat.

6. Brandeis's "Paragon" trap showed no material superiority over the S-trap. The water, under strong suction, was entirely removed from Nicholson's trap, but its mercury was not, and evidently could not be, disturbed.

7. Mott's "Anti-siphoning" Y-branch of the soil-pipe possesses no material advantage over the ordinary Y-branch.

The general conclusion which naturally follows these deductions would be that the separate ventilation of traps, where the main soil-pipe is 4 inches in diameter and open at the top, is unnecessary, especially as it is generally simpler and much less expensive to carry each waste independently to a branch of the soil-pipe.

I venture the personal opinion that, even disregarding the question of cost, and the increased use of lead pipe, the complication of the work implied by special trap ventilation should be controlling arguments against its adoption.

I publish these deductions as they were originally written. They should be considered only in connection with the different results obtained in Mr. Philbrick's experiments, and the two should have each its proper weight in influencing any decision on the general subject.

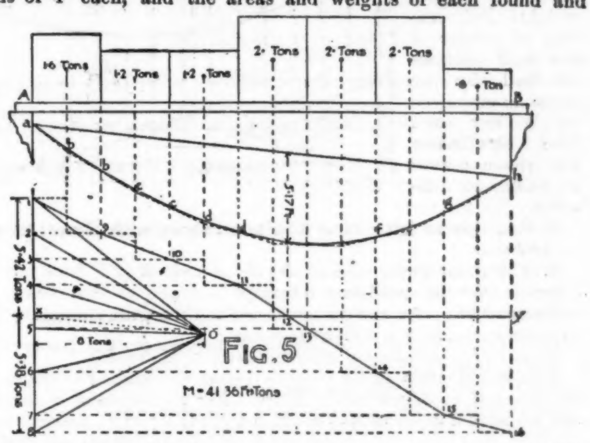
I will at a future day communicate the impression on my own mind produced by these two reports taken together, and by the reports of other experiments in the same direction.

GEORGE E. WARING, JR.

GIRDERS. — II.

Case V. Loading uniform over short sections, but which are of different intensities. (Fig. 5.)

IN this case the comparative intensities of the loading are represented by the altitudes of the corresponding rectangles. Commencing at left end, we have a load extending over 4′, of .4 ton per foot; then for 8′, of .3 ton per foot; for 12′, of .5 per foot; and for 4′, .2 ton. These load sections are then divided into short sections of 4′ each, and the areas and weights of each found and



marked on them. The loads are then laid off in order on the load line, the equilibrium polygon and broken shear line obtained as in the last case.

The equilibrium curve is then found by producing the end verticals of the load sections to intersect the equilibrium polygon and then tracing the curve tangent to the polygon at the intersections. It will here be an irregular curve, but can be readily drawn by means of suitable curved rulers.

The true shear line is obtained by connecting by right lines the intersections of the end verticals and the broken shear line, which produces the broken line 1–9–11–13–14–15–16, the required shear line. Changes of direction occur at the points 9, 11 and 15, which correspond to the changes in the intensities of the loading.

1. The reaction at left end = 5.42 tons = maximum shear; at right end = 5.38 tons.

2. As the true shear line crosses the shear axis at 12, which is 14.9′ from left support, the maximum intercept will also be found at this point, and measures 5.17′. As the pole distance = 8 tons, the maximum bending moment $M = 5.17 \times 8 = 41.36$ foot tons.

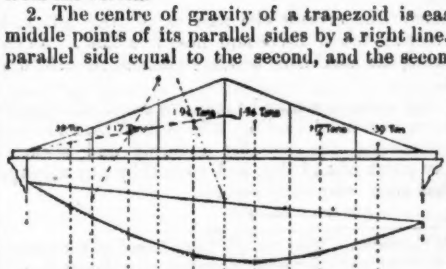
Case VI. Load continuous and of varying intensity. (Fig. 6.)

The intensity is assumed to vary uniformly from zero at each end to .5 ton per foot at the centre. The loading is here represented by a triangle, which is divided by verticals into six sections of equal length. The area of each section will evidently equal the product of the half sum of its parallel sides into its length, and represents its weight.

The centres of gravity of the sections will not be at their geometrical centres, but will be found as follows:

1. The centre of gravity of a triangle will lie on the line drawn through either vertex and bisecting the opposite side, at ⅔ its length from the vertex.

2. The centre of gravity of a trapezoid is easily found: join the middle points of its parallel sides by a right line. Produce the first parallel side equal to the second, and the second equal to the first, but in the opposite direction; then join the ends of the produced lines by a right line, and the intersection of this and the line bisecting the parallel sides will be the required centre of gravity of the trapezoid. After obtaining the weights and centres of gravity of the load sections, the equilibrium curve is obtained as before; but the intersections of the broken shear line and the end verticals must be joined by the curved line which will be the true shear line. With a continuous loading of varying inten-

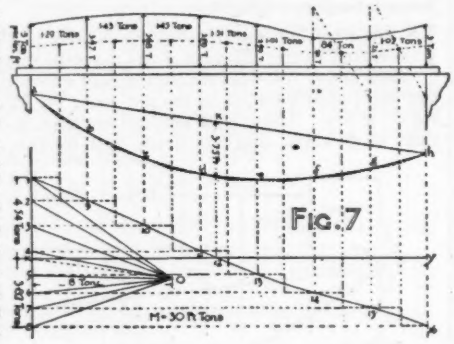


sity this shear line will always be a curve; will be concave towards the shear axis, if the intensity of the loading increases towards the centre of the girder; convex, if the reverse be true.

1. Reactions at ends are equal = 3.5 tons = maximum shear.

2. Maximum intercept is at centre, measures 4.12′; as the pole distance = 8 tons, the maximum bending moment $M = 4.12 \times 8 = 32.96$ foot-tons.

Case VII. Load continuous and of varying intensity. (Fig. 7.) The intensity of the loading is here assumed to vary as the length of the ordinates between girder and the curve above it. The loading is divided in sections of 4′ each, end verticals measured, the areas, weights and centres of gravity of the load sections obtained by the methods employed in the last case. The equilibrium and shear curves then offer no difficulty.

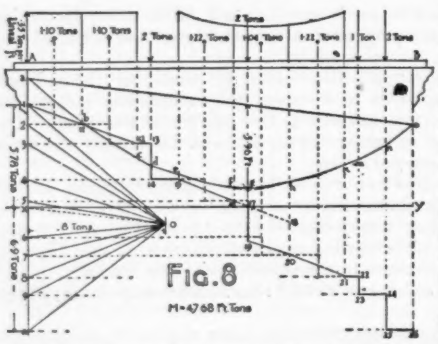


1. Reaction at left end = 4.54 tons = maximum shear; at right = 3.82 tons.

2. The shear curve crosses the shear axis at 12.9′ from left end, consequently the maximum intercept is found at that point, and measures 3.75′. As the pole distance = 8 tons, the maximum bending moment = $3.75 \times 8 = 30$ foot-tons.

Case VIII. Loading of mixed character. (Fig. 8.)

As a combination of all possible forms, the loading is assumed to be arranged as shown in the figure. For a distance of 8′ from left end we have a uniform load of .35 ton per foot; at 9′, a concentrated load of 2 tons; from 11′ to 23′, a load of an intensity varying as the ordinates to the curve; also, concentrated loads at 16′, of 2 tons; at 24′, 1 ton; and at 26′, 2 tons. Portions of the girder are not loaded at all. The continuous loading is divided into sections, of which the areas, weights and centres of gravity are then found. The equilibrium polygon and broken shear line are then obtained as in *Case V.* The equilibrium curve will only be traced under the continuous loading, the remainder being formed by the polygon first found, so that we have a mixed equilibrium curve and polygon, and the intercepts must be measured accordingly.



For the first 8′ from the left end the true shear line will be the inclined straight line 1-11-12; then from 8′ to 11′, the broken line 12-13-14-15. If the load of two tons at 16′ were removed, the point 20 would fall at 18, the distance 20-18 being = 2 tons; trace the curve 15-16-18; make 17-19 = 2 tons and trace the curve 19-20-21. The true shear line will therefore be the mixed line 1-11-12-13-14-15-16-17-19-20-21-22-23-24-25-26.

1. Reaction at left end = 5.78 tons; at right = 6.9 tons = maximum shearing strain.

2. As the true shear line crosses the axis at 16′ from left end, the maximum intercept is found there and measures 5.96′. As the pole distance is 8 tons, the maximum bending moment $M = 5.96 \times 8 = 47.68$ foot-tons.

Since the preceding examples may be made to cover all possible modes of arrangement of a fixed loading, it is evident that the general problem of obtaining the bending moment and shearing strain, acting at any point of a girder, and caused by any arrangement of the load, has been completely solved.

(*To be continued.*)

PERRANZABULOE'S CHURCH. — Most people have heard of the church at Perranzabuloe, which for centuries was "drowned with the sea sande," and most people will have read with surprise the statements in this month's *Antiquary* that it is in danger of total destruction from tourists. The church was discovered in 1835, and was at once visited by numerous controversialists who endeavored to prove from the remains the existence in England of a Protestant church nine hundred years before the restoration, and by the bands of strangers who took away pieces of the building as relics. Religious disputants no longer make their way thither (or, if they do, they refrain from publishing their theories), but the danger from tourists seems to continue unchecked. Cornwall is out of the range of Sir John Lubbock's bill, but is there not an antiquarian society in Cornwall which might look after such monuments of the past? — *Pall Mall Gazette.*

THE ILLUSTRATIONS.

WROUGHT-IRON GRILLE OF THE MILLS BUILDING, NEW YORK, N. Y. MR. GEORGE B. POST, ARCHITECT, NEW YORK, N. Y.

THIS wrought-iron grille is at the main entrance of the Mills Building on Broad Street, and was executed by J. B. & J. M. Cornell of New York. The width is 25′ 6″, and the height 15′ 5½″. The sizes of iron vary from ⅛″ x ¾″ to 1″ x 4″. Seven men were occupied a little more than three months in its manufacture. The weight is 11,055 pounds, and it is raised and lowered by two hydraulic rams. When raised the arch of the gate meets the arch of the stone-work of the entrance.

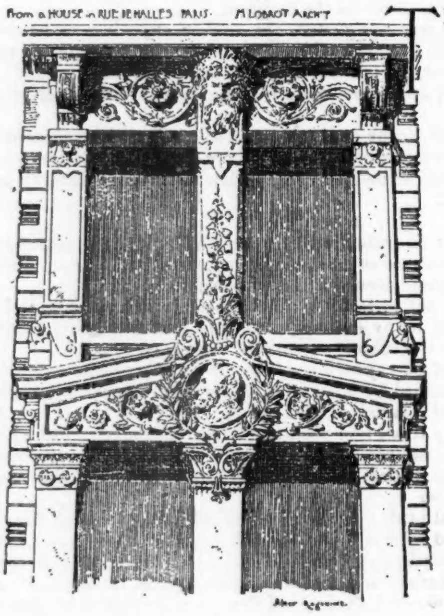
BLOCK OF HOUSES, CHICAGO, ILL. MESSRS. BURNHAM & ROOT, ARCHITECTS, CHICAGO, ILL.

SKETCH FOR PART OF A COUNTRY HOUSE. MR. H. P. KIRBY, ARCHITECT, PITTSBURGH, PA.

HOUSE FOR G. F. ELY, ESQ., CLEVELAND, O. MR. W. A. BATES, ARCHITECT, NEW YORK, N. Y.

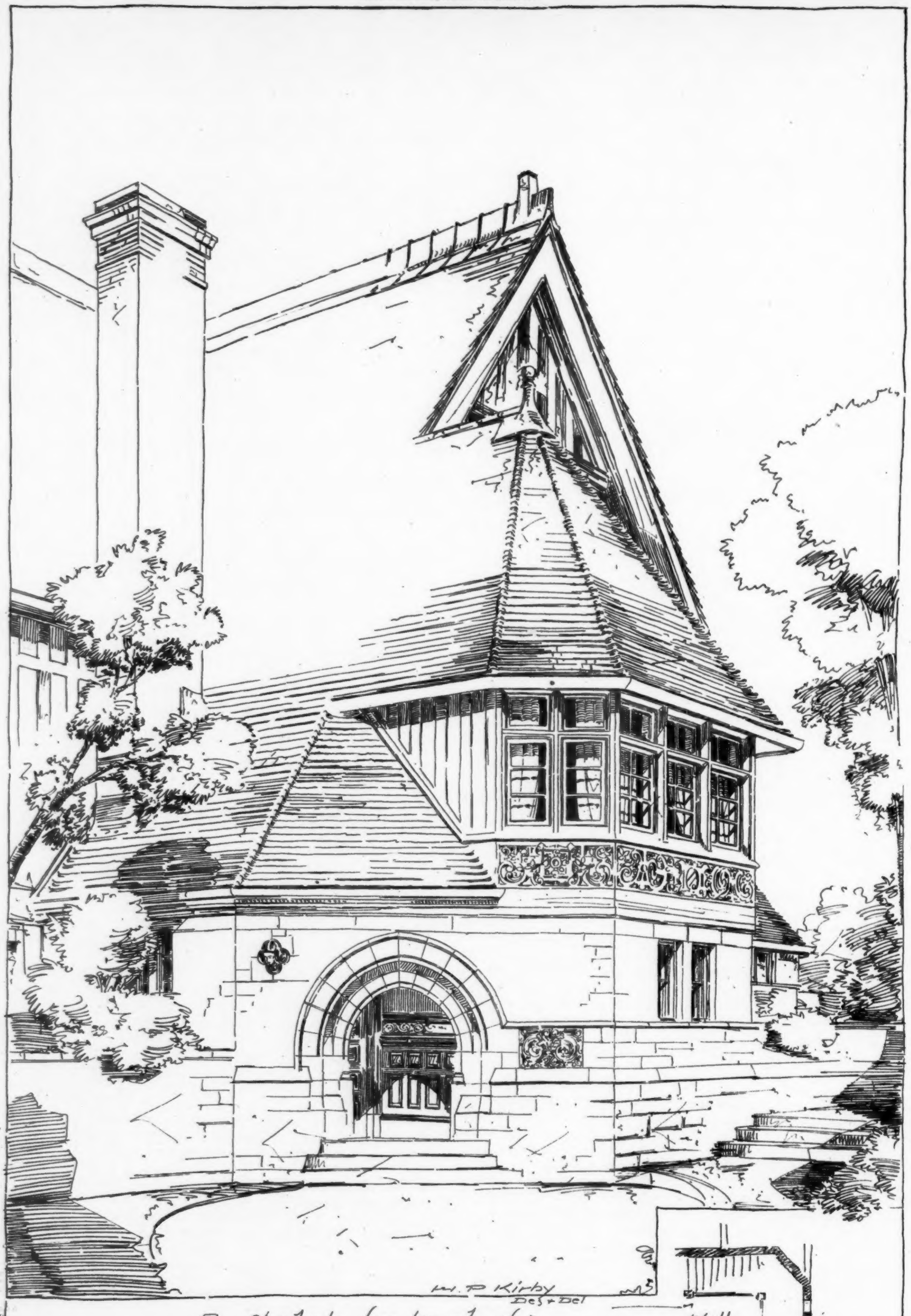
RECENT BUILDING IN BALTIMORE.

From a HOUSE in RUE DE HALLES PARIS · A LOBROT ARCH'T



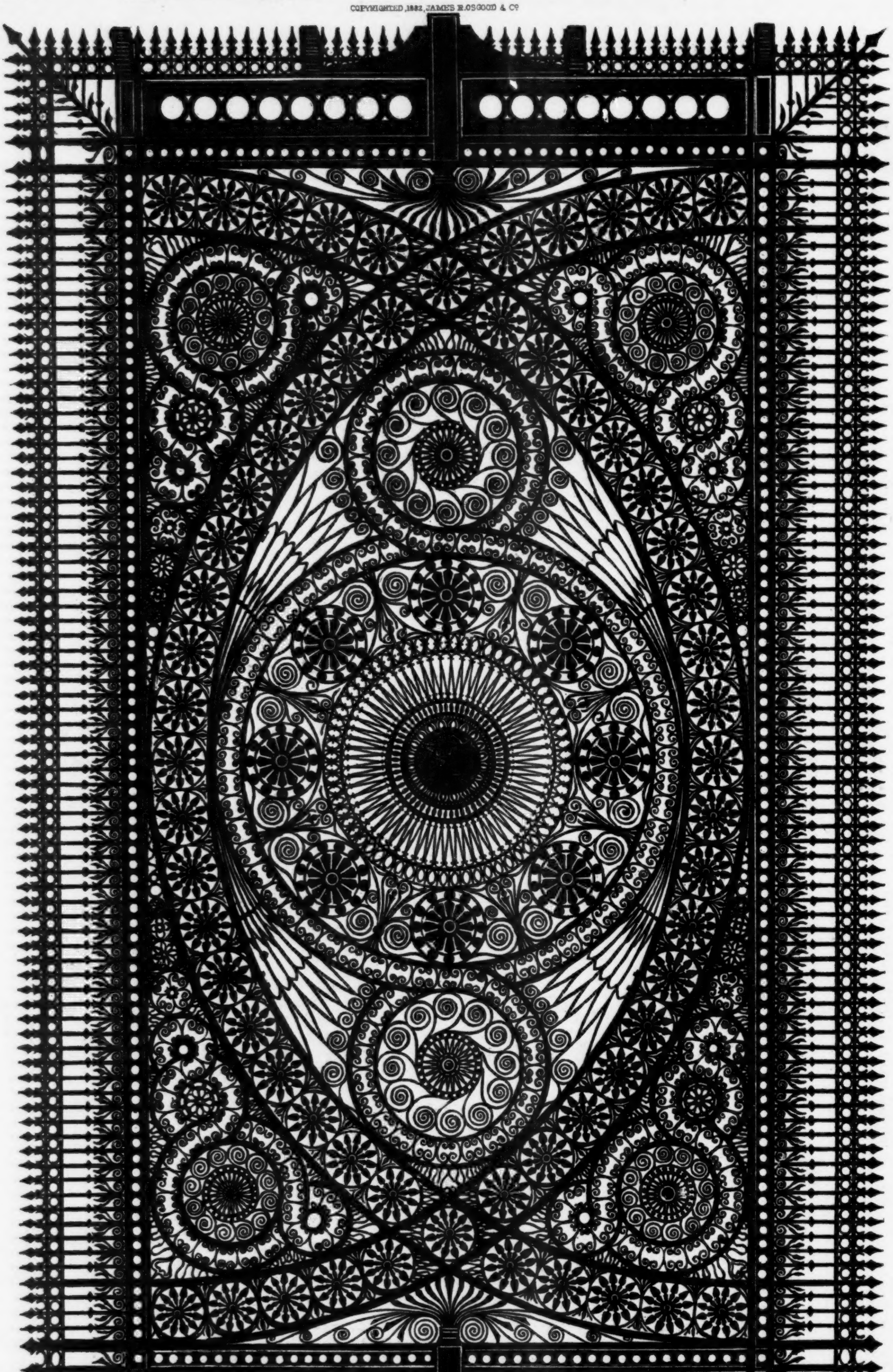
THE past year has been noted for the large number of important structures erected in this city. The largest, most pretentious, and most expensive building, now nearing completion, is the central office of the Baltimore & Ohio Railroad Company. It covers a site 100′ x 100′ in the business centre of the city, and is seven stories high, including a two-story mansard roof. The first story is of fine hammered granite, the others of red brick and dark bluestone. Panels of terra-cotta are used below the windows, in the brick dormers, and in the main piers. The color of the entire mass is dark, while the second tier of dormers, the angles of the roof, and the elaborate cornice at its top, are colored in two shades of very light brown; the lighter exactly the tint of the yellow terra-cotta cresting, crowning the black slate roof. The main entrance is marked by a projecting granite pier on either side; each having a sculptured car-wheel on its face, and carrying two polished granite columns, the whole surmounted by a vast flat-topped superstructure of bluestone, having a segmental arch below, and seemingly about to crush the slender shafts beneath. The entire construction extends through two high stories. Under this, in the face of the wall, is a high and narrow round-headed opening, with the upper portion filled by a double arch, forming a transom. Below this is the doorway proper, hardly occupying one-fourth the width of the entire construction. The windows are square and round-arched in alternate stories, the fifth having mullion shafts of polished granite. The carving, of which there is considerable, is distributed over the entire building, as large rosettes, and as capitals to brick window-piers, which are generally continued as string-courses, though in the third story the line of stone caps is continued on the walls by a band of flat terra-cotta tiles. The effect of the building is massive, until dispelled by the fanciful coloring of the roof work. The execution of the work of the exterior is apparently faultless. The architect is Mr. E. F. Baldwin. An immense telegraph pole, nearly two feet in diameter, has been planted opposite the main angle of the building, and painted a spotless white, with what effect can be imagined.

The new Chamber of Commerce, now receiving the finishing touches, is 85′ x 186′, and 90′ high. It is of red brick and fine white granite, the whole surmounted by an immense galvanized-iron cornice, painted to imitate granite. Three floors contain about sixty offices, while the fourth comprises the hall for the use of the Corn and Flour Exchange. This hall is 76′ 6″ x 147′, and 40′ high. The building is covered by a low roof, not visible, except from a distance. The ridge, with an eye to utility rather than beauty, is crowned by a fence of iron pipe, containing insulators for 360 telegraph wires. These are grouped into cables and carried to the hall below. The openings of the lower stories are all square-headed, with flush granite lintels, forming horizontal bands. On the second floor this is broken by projecting red terra-cotta work of *Gothic* design. The windows of the large hall have round-arched heads. The openings

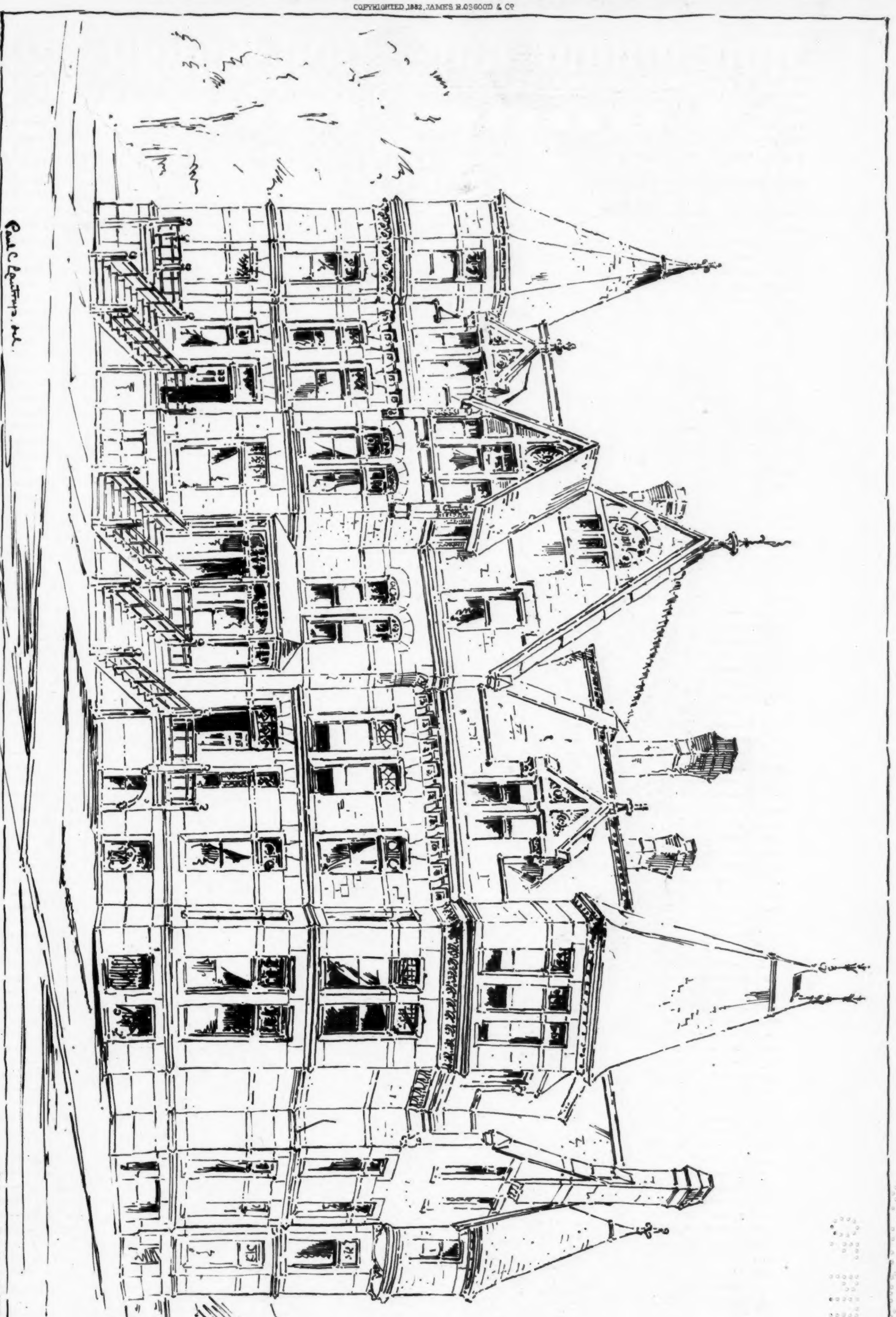


A Sketch for part of a Country House.

Heliotype Printing Co. 211 Tremont St. Boston.

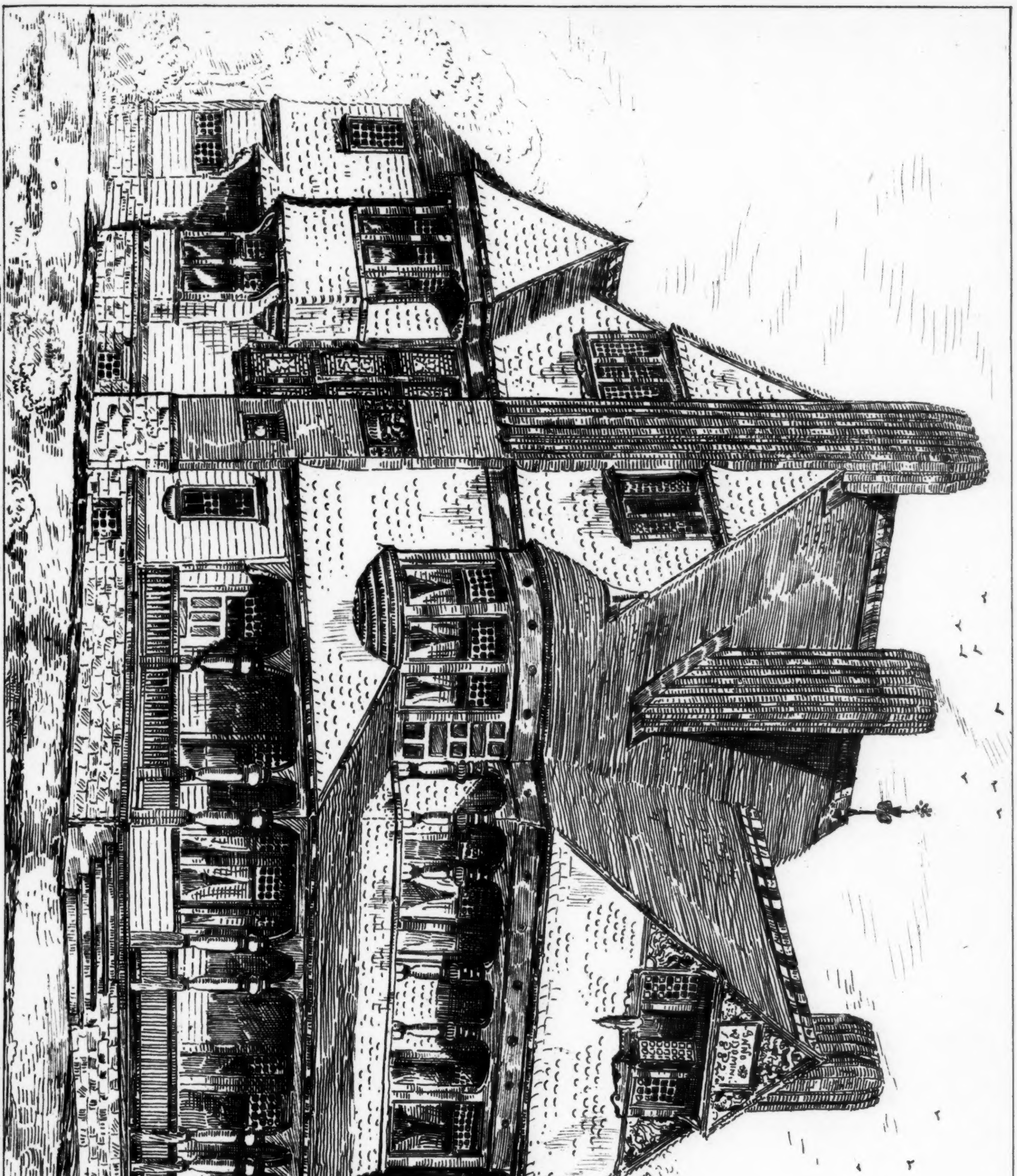


IRON GRILLE, MILLS BUILDING, NEW YORK, N.Y.
GEO. B. POST, ARCHITECT.



Block of Houses, Chicago, Ill.
Burnham & Root Architects.

Heliotype Printing Co. 211 Tremont St. Boston.



House for Mr. C. F. Ely Cleveland O.

Wm. A. Bates Architect 149 Broadway New York

Heliotype Printing Co. 211 Tremont St. Boston.

are exactly over each other everywhere, and the tiresome monotony of horizontal and vertical lines is only broken by a peculiar construction over the main doorway, built up with solid piers and polished columns, and covered by an arch over which the line of the third-floor cornice is awkwardly bent, to resume the even tenor of its way on the other side. The architect is Mr. J. R. Niernsée.

The Pratt Free Library Building, having a white marble façade of 87 feet on Mulberry Street, is half completed. It has round-arch openings, Gothic carving and numerous polished columns, and will cost $225,000, and have shelving for 200,000 volumes. Mr. C. L. Carson, architect.

The new Post-Office has the foundations well advanced, and the setting of basement granite is progressing.

The new Merchants' Club-House will be opened on September 11. Its front on German Street, with four stories of red brick, and bluestone sills and band courses, is almost devoid of architectural design. The kitchen department is in the upper floor, separated from the others by fire-proofing.

Mr. W. T. Walters is building an annex to his picture gallery, connected with it by a bridge, and entirely fire-proof. His collection is not surpassed by any of equal size in the United States.

The Trustees of the Johns Hopkins University have purchased ground in the rear of what have been considered the temporary buildings, on Howard Street, giving an unbroken site for an entire block, to Eutaw Street. They are adding to the chemical laboratory, and have begun the erection of a biological building. This would seem to indicate the abandonment of the magnificent site reserved for the University by its founder, just beyond the northeastern boundary, and a permanent location in the city. Such a course was resisted by a number of the trustees, as utterly opposed to the spirit, if not indeed to the letter, of Mr. Hopkins's will, but, apparently in the minority, they have been over ruled.

A large building for the City Insane Asylum is nearly completed at Bayview, in the eastern suburbs. Mr. F. E. Davis, architect.

The new Western Bank is almost ready for occupancy, and will be the most thoroughly constructed of any in the city. Its materials are pressed brick with elaborate ornamentation in Cheat River blue and Scotch red stone. It is one high story, with Directors' room, etc., in an annex of two lower stories. A notable exception to the usual wretched carving here can be found in two small pediments just executed in the new Trader's Bank, on German Street. It is Renaissance in detail, and exquisitely cut. We trust it may lead to better work in the future.

Quite a number of warehouses have been built during the past year. Two of the most prominent now unfinished are one for Mr. A. Gottschalk, of iron, brick and Hummellstown brownstone, Mr. G. A. Frederick, architect; and two for Mr. Gaither, Mr. J. C. Gott, architect. The latter are six stories high, and remarkable for the use of a horizontal, decorated band of brickwork at the line of every alternate floor, the construction being otherwise entirely of iron, except narrow piers opposite the side and division walls. Mr. T. C. Kennedy has just completed a Congregational church on Eutaw Place. It is an octagon on plan, with open roof-trusses meeting over the centre of the auditorium. The materials are hammered gray gneiss and red Scotch stone. The roof is of black slate, surmounted by a small ventilating turret covered with lead: the finials, hips, etc., being of the same material in its natural color. Mr. Carson has two Methodist churches, one of which, the "Strawbridge," is completed, and is one of the most picturesque designs in the city, both for grouping and color. It is of gray gneiss and red sandstone; spire and roof covered with black slate. The "Epworth" is of red brick in red mortar, and relieved with red stone and terra-cotta; the openings are round-arched and the tower has a tall pyramidal roof of black slate. The First Presbyterian Church, designed by N. G. Starkweather in 1855, is undergoing some changes in the plumbing and ventilation of its chapel. It has probably the highest and most elaborate spire in the United States, measuring 32 feet square and 298 feet high, constructed entirely of New Brunswick sandstone, richly carved. The internal arrangements of the church were, however, so faulty that neither a flue nor a water-closet was to be found, the chapel being heated by stoves having their funnels thrust through the windows!

Quite a number of dwellings are building in the northern part of the city. That of Mr. Ross Winans, by McKim, Meade & White of New York, is probably the most costly and elaborate residence ever erected here. The exterior is of brick and Longmeadow stone; the stairway-tower is elaborately carved and covered by a conical roof. The whole mass is plain, almost to severity, and has a simple, double-pitched, high, slated roof. The house is surrounded by a garden below the street grade, and enclosed by a wall. Against the east side of this wall is a fountain, the water issuing from the mouths of dolphins and falling into a carved stone basin, semi-circular on plan. The interior of this house will be elaborately fitted up in natural woods, the hall and staircase being of oak. Messrs. Wyatt & Sperry are just completing a block of twenty-three houses, for Rev. R. A. McKim of New York, on Calvert Street, opposite the block built last season by J. A. & W. T. Wilson, for Mrs. C. L. McKim. This square is now the handsomest, architecturally, of any in the city. The new houses are brick, with red sandstone largely used. One square beyond, Mr. C. E. Cassell has just erected a dwelling, of rough marble, for Mr. Solomon Corner; while directly opposite, Messrs. J. A. & W. T. Wilson are erecting a residence for Mr. Charles Rous, of sand-brick and Goldsboro' brownstone. This house is unique in the fact that the partitions will be of hollow blocks of Hydraulic Lime of Teil concrete and entirely fire-proof. A new parsonage for the Brown Memorial Church has lately been finished, from the designs of Mr. E. G. Lind. It is of rough marble, like the church, and the doorway is ornamented by a shield, which, owing probably to the ignorance of the stone-cutter, is decorated with a bar sinister! Mr. Lind, who is the President of the Baltimore Chapter A. I. A., and the designer of many important buildings here, has permanently removed to Atlanta, Ga. Owing to the fact that no building laws are in force here, the construction of the numerous speculative "rows" of houses, put up chiefly in the western part of the city, is past belief. Most of them are divided from each other by 4″ brick walls (?), have joists 2″ x 8″ spaced two feet apart, and the rest in proportion. Heaven help the occupants; for the plumbing is of the same character, most of them having a leaching cesspool for the common use of each pair, generally located twenty feet from the rear wall, and with unventilated soil-pipes terminating in the house. Diphtheria has lately prevailed to an alarming extent among them. The city has no system of sewerage, and a committee lately appointed has presented a comprehensive report advocating the "separate" system so successful at Memphis and elsewhere. No action has yet been taken in the adoption of the report, however. Showing the public ignorance on the subject, one of the city papers recently quoted several towns having "improved sewerage," remarking that "diphtheria and typhoid fever prevailed to a vast extent in each, and closed by saying "The Baltimore surface drainage and sink system is better after all!"

There is a growing tendency to fire-proof construction, nearly all the important buildings lately erected being so constructed. So far there is not an example of carved brickwork in the city. As we have probably the finest material in the world for this purpose, it is hoped that before long it may be availed of.

THE DRAUGHT OF CHIMNEYS.

THE attention of the Mathematical and Physical Section of the British Association was, on the 30th of August, called by their president, Lord Rayleigh, to the very humble practical inquiry[1] as to the effect of wind on the draught of chimneys. It would be difficult more aptly to illustrate the true connection between the pursuit of pure science, and the most every-day annoyances of domestic life (with a view to the removal of the latter), than is afforded by this announcement. As a prime feature in the architecture of dwelling-houses the chimney demands a chapter to itself. And it is well that the basis of this chapter should be mathematical. With regard to draught, we have more than once had occasion to remark that it is a function of the height of the chimney-tubes. We do not, of course, apply the remark without modification to the details of ill-constructed chimneys. Many chimneys smoke from positive ill-construction, having a narrow part, an ugly bend, or a downward portion, in their conduit, which the normal draught is not strong enough to overcome. Others smoke because they form the shortest channel by which air can enter the house to supply the draught of the loftier chimneys. Where there are two chimneys in one room, and the doors and windows are closed, lighting a fire in one chimney will ordinarily cause down-draught in the other, as the readiest mode of maintaining the atmospheric equilibrium. In most cases, however, the addition of a yard or so to the height of the chimney-stack, supposing that to be already above the highest part of the interior of the house which it ventilates, will prove more useful than the addition of any of those curiously contorted and wholly non-pneumatic contrivances, the endless variety of which tortures the eye of the mechanically-minded man as he whirls along the suburban railways.

Apart from the questions of normal draught, and of internal regularity of construction, is the effect of wind on the draught of chimneys. This varies very much with the locality of the house. It may be said to be primarily a question of site. Neither is it a question always to be settled, *à priori*, by the architect. The action of wind, although, of course, always determined by physical laws, is so subtle, and so delicately affected by slight causes, that there are cases in which it is all but impossible to foretell it. What is more com-

[1] A formula and table for chimney draught.

mon than to have a chimney that answers perfectly well except when the wind is in one particular point of the compass? And why does it then smoke? To be able to reply to this question is to be able to cure the defect; but how often is the difficulty regarded as insuperable? It may be useful to cite an instance of the deflection of wind in a manner that it is difficult to explain, and that could certainly never have been anticipated. On the lovely plain of Sorrento, sloping towards the Bay of Naples, in the midst of its own gardens and orange groves, stands a stately palace, which, in the days when the name of Nelson was a terror on the seas, was a favorite haunt of the Queen of Naples, and was not unfamiliar to our great sea-captain. There are no rocks, lofty buildings, or overhanging trees in the immediate vicinity, and nothing that is apparently likely to interfere with the free movement of the wind, from whatever quarter it may blow. The aspect of the front of the palace is northerly, looking over the Bay towards Naples, and the hills behind it. On a few occasions — some three or four times, perhaps, in the year — a strong east wind sweeps across the peninsula, and is clearly indicated as to its course by the straight and level stream of smoke that it drives from the cone of Vesuvius across the bay. But on these occasions, the current is so deflected by the northern shores of the bay, fully twenty miles distant, as to drive on the front of the palace: that is to say, in a direction pointing nearly due north, with such force that it becomes necessary to close the *persiani*, or outer window-shutters, in order to preserve the great drawing-room windows from being blown bodily in. Full familiarity with the spot does not afford any very satisfactory explanation of the phenomena, of which, however, we can speak from repeated personal observation.

This, perhaps, may be regarded as an extreme case. Nevertheless, it is typical of not a few instances in which currents may be detected after a house is built, the existence and effect of which the architect cannot be blamed for not having foreseen, but the influence of which on the draught of his chimneys will be, for so many days in the year, at once irresistible and intolerable. There is now absolutely nothing for it, in such a case, but to put out the fires. We do not say that a cowl may not be of use, but, on the other hand, we cannot speak from any experience of the action of a cowl under such conditions.

Here, then, comes in the scientific part of the question as attacked by Lord Rayleigh. What is the effect of a cross current of wind on the draught of a chimney? As the direction of the wind is more and more downward, his lordship replies the up-draught of the chimney diminishes, but does not turn backwards, that is to say, become down-draught, until the inclination amounts to about 30°. This is an important point at which to arrive. It is, however, obviously necessary to ascertain the precise features of the cases where the experiments were made, before formulating any absolute rule on the subject. The height of the top of the chimney, both above the sea-level and above the basement of the house, is one fact needful to determine. The force of the wind is another. Thus, a wind of the velocity of ten or twenty miles an hour blowing downwards at a measured angle would produce a very different effect on the draught of a chimney 40 feet high from that which it would have on the draught of a chimney 100 feet high.

Again, the maximum up-draught, we are told, is not with a direction of wind vertically upward, but with one making an angle of about 30° with the vertical. This is a result which it is without our experience either to confirm or to question. But it is clear that the cases must be extremely rare, if ever they occur, in which the top of a chimney would be exposed to a wind blowing upwards at a more acute angle than 30°. The determination of the same angle as the limit of downward and of upward efficiency is as elegant as it is unexpected.

A yet more practical part of the subject is the remark of Lord Rayleigh, that "a chimney with a T-piece at the top never produced an unfavorable effect on the up-draught, and only in one case failed to produce a favorable one." Professor de Chaumont thought vertical ends would increase resistance to the up-draught. So do ninety-nine people out of a hundred. We have no hesitation in saying that Lord Rayleigh is right, and that general opinion is wrong, provided, that is to say, that the protection of the chimney-top be rightly designed. And we say this absolutely and unhesitatingly, because our judgment is based on the two independent and concurrent sources of evidence afforded by observation and by direct experiment. In Southern Italy chimneys, no doubt, are comparatively few, but they exist in many buildings, and no Italian architect would dream of leaving a vertical flue or pipe open at the top to receive the tremendous downpour of rain which occasionally occurs in Italy with almost tropical violence. The aperture of the chimney is always roofed over, the smoke escaping by side apertures. The practice of the master-builders of the world is thus in accordance with the theory of the English scientific noble in this respect.

Experience, we have said, confirms the remark. And here, if we seem for a moment to depart from an admirable rule,—that of not mentioning in a scientific paper anything that may look like an advertisement,—we must explain that such appearance is deceptive. We have to refer to an admirable invention which was made and sold some forty years ago under the name of Day's Patent Wind-Guard. As to the validity of the patent it is not needful now to inquire, as in any case it must have long since expired. But what we lament is, that, so far as we can discover, this admirable invention has been entirely forgotten. In recent inquiries which we have instituted in order to obtain one of these wind-guards for our own use, we have been unable to discover that they are now made, although figured in some old trade-books. It may, therefore, be of much use to give such particulars as will guide any one in constructing an appliance of the kind.

Let us take, for example, the case of a chimney, two bricks and a half, or 22½ inches square, with a flue of 9 inches square. A frame is to be constructed which would lie upon this hollow square, and allow bricks to be built on it to the height requisite to hold it steady. From this frame the guard itself rises as an octagonal shaft. Four pieces of sheet-iron, or of slate, each 9 inches wide and 18 inches high, are fixed on the lower frame, 16 inches apart, so as to form four sides of an octagon, and the other four sides are formed of four similar plates, set at angles of 45° with the former, but so much within them as to allow 1½ inches to 2 inches clearance between the edges. These inner plates will just touch the outer angle of the 9-inch flue. A top, of iron or of stone, holds the upright plates together, and both top-plate and base-plate may be finished with a simple moulding. Sheet-iron is perhaps the best material, but it is obvious that the contrivance may be made also in slate.

As to the perfect security which this guard effects from wind, we can speak not only from the testimony of those who have used the plan, but from careful experiment. With models of the wind-guard made on the scale of 1 inch to a foot, set on small tubes of proportionate size, representing chimneys, which were fed with smoke from the combustion of paper, we have experimented by means of powerful jets of wind driven in various lines of force; vertically downwards on the top of the guard, horizontally at right angles to either side or angle, or in any other direction. In no case have we found it possible to produce down-draught in the chimney by the force of wind. On the contrary, the greater the force the better the draught of the chimney.

The *rationale* of this action may be illustrated by that of a much later invention, now in common use on our railways, — the steam injector. Let those of our readers who desire to master the subject, and have no more ready mode of doing so, refer to the diagram and description of this appliance which is given by Sir F. J. Bramwell, on p. 335 of a work recently published by Messrs. Longmans, under the title "Railways and Locomotives." It will there be seen that "steam, escaping at high velocity through a circular orifice, induces a current in a body of water in connection with that orifice, and carries it forward, at the less velocity corresponding to the increased weights of the combined stream of water and steam, but still at a high velocity." This stream passes into an expanding channel, where its velocity is further reduced, and so into the boiler, which is thus fed with water.

In the case of the wind-guard, the wind striking on the outer plate causes a current of proportional velocity between the edges of the outer and inner plates, and thus creates an induced current, which comes in aid of the draught of the chimney. The difficulty to be overcome is far less than in the case of the two fluids of unequal specific gravity; but the effect is so much the more powerful. We are familiar with the contrivance mentioned by Professor de Chaumont, which has been used for the protection of lamps from the dash and spray of sea, as we believe, with admirable results. But it is a much more complicated, and therefore more costly, contrivance than the very simple one which we have endeavored to rescue from oblivion. And we think that it is purely protective in its action, while the construction that we describe is not only protective but absolutely aids the up-draught; and, moreover, the cone is more likely to become choked with soot. The brush of the sweep can easily ascend into the interior of the wind-guard, in case of any soot lodging there.

We have little doubt that any enterprising manufacturer who will discover one of these old wind-guards (they were made and sold somewhere in Pimlico, in 1842), make some to pattern, and introduce them to the trade, will at the same time do a good stroke of business, and confer a very great benefit, both on the architect who has to build in exposed and gusty situations, and on many a householder who now knows too well, and that to his cost, when the wind is in the east, or in that quarter, wherever it may be, that is hostile to the good behavior of one or more of his chimneys.

We are not acquainted with any mathematical formulas intended for the guidance of the architect as to the height or draught of chimneys. It may, therefore, be of some service to provide a simple table for the use of the architect and of the builder, stating, in the first instance, the principles on which it is calculated.

The only cause of that upward movement which we call the draught of a chimney is the difference between the weight of the column of air and vapor in the shaft, and that of a column of equal height of the exterior atmosphere. This difference of weight must be enough to overcome the friction within the chimney-shaft and any resistance to free discharge at the top. It is obvious that the ascending volume consists of matter which, at equal temperatures, is heavier than atmospheric air, as it contains soot, or finely comminuted carbon, carbonic acid, sulphur, and other matters naturally heavier than air. Calling attention to the existence of these two sources of retardation, viz.: friction and the loading of the column, it will be safe to neglect them in tabulation, as it is very difficult to determine the absolute heat of the ascending column, and a few degrees more or less will amount to quite as much as the elements thus neglected. With this explanation the formula that regulates draught may be thus stated:—

$$D = (a.t.—a.t'.)\ h.$$

where D = the draught, *a.t.* the weight of a cubic foot of atmospheric air at the external temperature, and *a.t'.* the weight of a cubic foot of atmospheric air at the mean temperature within the shaft, and h the height of the chimney. It is obvious from a glance at this formula of how much importance the addition of a very few feet to the height of a chimney must be.

To increase the draught we must increase either h, the height of the chimney, or t', the temperature of its contents. This explains at once the efficacy of the best appliances for increasing draught,—such as the bi-valvular registers, in this country, and the iron blind that is drawn down within the chimney aperture in the wood-burning fire-places of France and of Belgium. The larger the aperture below,—the greater the quantity of cool air that enters the chimney,—the lower is t', and the less the draught. The more the air that enters below is compelled to pass through in close proximity with the burning fuel, the higher does t' become, and the more powerful the draught. This is the simple key to the whole theory and practice of draught produced by heat. Of course, in different conditions of the barometric column equal amounts of heat will have somewhat different effects. Hence we can see in a moment why our fires should "draw" so much better in clear cold weather than when the air is warm, or loaded with damp. The weight of a cubic foot of air at 32° Fahrenheit is 0.080728 lb. avoirdupois.

If the top of a chimney-flue were closed by a flap, or hinged valve (the weight of which we take as counterbalanced), the effect of the draught, or rather of the downward pressure of the external atmosphere which causes the upward draught, would be to lift the valve in proportion to the force of the current. If at the same time a strong wind be blowing over the top of the chimney (in the direction of the hinged end of the flap) its effect would be to force down and close the valve. The stronger current of the two will obtain the mastery to the degree of its excess of pressure. This is also the effect, it will be seen, of cross-current where there is no valve, but where the two currents more or less interfere with the movement of one another in the way shown by the action of the valve.

It is possible wholly to eliminate the ill effects of this cross-current, and even to utilize it in aid of draught, by any contrivance that causes the external blast to produce an induced current from within the chimney; and this, it is easy to see, is the effect of the wind-guard.

In calculating the following table we purposely use round and approximate figures, as quite sufficiently accurate for practical purposes, and as more readily intelligible to many readers than more complicated mathematical expressions. We have also used the pressures proportionate to velocity as allowed by Smeaton. Now, assuming, for convenience of calculation, an increase of temperature of 108° Fahrenheit (that is, from 62° to 170°), as imparted by a fire to the ascending column of air that passes over it up the chimney, we shall have an upward pressure of a fraction over 0.04 lb. for every foot of ascent in the shaft. This is represented in the following table of comparative heights of chimney, pressures, and velocities of current, calculated for that rise of temperature.

It will be proper in making use of this table to refer to the table (III.) given in a former article, showing the increase of velocity of the wind with the height obtained above the ground. Thus in rising from 15 feet to 50 feet there is, as shown on that table, an increase in the local velocity of the same wind from 60 to 70.8 miles per hour. In raising a chimney from 15 feet to 50 feet we should obtain an increase of draught-pressure of from 0.6 lb. to 2.0 lbs. per foot, as against an increase of wind-pressure, in a great storm, of from 20 lbs. to 27 lbs. per foot. The gain is more than threefold,—the loss less than 33 per cent. We mention this not as a difficulty, but to show that proper consideration must be given to the whole subject.

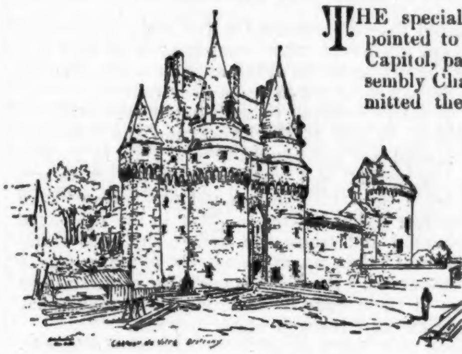
Table for Calculation of Chimney-Draught.

Height of Chimney in feet.	Pressure due to 116° Fah. in lbs. per foot.	Velocity of draught in miles per hour.
30	1.2	16
40	1.6	18
50	2.0	20
60	2.4	22
78	2.8	24
80	3.2	26

It is, of course, apparent that if we have an ordinary fireplace, with a chimney 50 feet high, and with that proportion of fuel and of draught which gives a current of twenty miles an hour to the ascending column of smoke, the aperture at the top of the chimney would be closed by a cross-current blowing at the rate of seventy miles an hour almost as efficiently as by a valve weighted to 27 lbs. per foot. The fire, in fact, would have to be extinguished. But the pressure of 27 lbs. per foot, or 0.19 lb. per inch, is very trifling in comparison to the pressure of steam in a boiler; and as the action of the injector by induced current is an ascertained fact, it is plain that it is within the province of the engineer to make the hurricane, blow it ever so wildly, produce an induced current through a chimney, so that the draught shall in no way be reversed by storms. As to that there can be no doubt, although this may be the first time that the statement has been definitely made. We have given what our own experience has led us to believe to be a simple and effective means of producing this induced current. If any of our readers can recommend a better plan we shall be happy to make it known.

We had put on paper some remarks on one or two other matters discussed at the British Association, which appeared to us of striking industrial importance; but the novelty of a scientific investigation of a subject which most men are accustomed to regard with a hopeless shrug of the shoulder, as well as the importance of a thorough appreciation of a matter which comes so directly home to every householder and to every house-builder, is such that we have thought it well to devote to this question of draught all the space at present available. We think it cannot be too strongly insisted on that when, first, the subject of up-draught, and secondly, that of wind-protection,—or rather, wind-induced draught,—are seen to be thoroughly within the control of science, it will be felt to be unpardonable to be condemned to the great nuisance of a smoky chimney.—*The Builder.*

THE ALBANY CAPITOL.



THE special commission appointed to examine the new Capitol, particularly the Assembly Chamber, have submitted the result of their investigations to Governor Cornell, and recommend that the vaulted stone ceiling in that chamber be taken down and replaced by a wooden construction. This change cannot be effected except by order of the Legislature. Following is the report in full:

To the Hon. Alonzo B. Cornell, Governor of the State of New York:

Sir: The undersigned Commissioners, appointed by you to "survey and examine the different parts of the new Capitol, as to the safety and durability of the work, more especially as concerning the Assembly Chamber and the ceiling thereof," have the honor to report as follows:

Immediately upon the organization of the commission we proceeded to get as correct an idea of the present condition of the Capitol as could be acquired from, first, an examination of the building, and the explanation of Major J. W. Eaton, the local Superintendent, who has been in charge of the work almost from its commencement, and a careful study of such drawings as were in his possession; second, from reports of sundry surveys and levels taken at various times by Mr. R. H. Bingham, City Surveyor; third, from the explanations of Mr. Leopold Eidlitz, who represented the architects in charge of the work.

As the result of these investigations we find that the materials and workmanship of the building in general are exceptionally good, and we discover no defects worthy of special consideration other than those appearing in the Assembly Chamber and the portions of the building immediately above and below it. We have consequently confined our subsequent labors to a very careful and, we believe, thorough examination of these defects; to an analysis of their causes, and to a consideration of their bearing upon the ultimate stability of the structure. To this end we caused a new set of levels to be taken, from which it appears that, although no very unusual amount of settlement has occurred, the settlement has not been uniform.

The footing courses directly under the large granite columns which carry the vaulted roof of the Assembly Chamber were uncovered for inspection, and we find that the piers resting on them have settled more than the adjacent walls, and that there is a difference in settlement between the piers themselves.

Scaffolds were swung under the vaulting of the Assembly Chamber so that it could be minutely examined. We find that one of the main diagonal or groin ribs is seriously cracked, and also the portions of the vaulting surface that rest directly upon it; that the end walls over the main transverse arches are somewhat out of place, and that the main side vaults are in bad condition.

We have had the entire vaulting, with its supports and backing, measured, and their weights carefully computed, as a check to the accuracy of the quantities furnished to us by the architect, and we find that his calculations are substantially correct.

We have had the main granite shafts in the Assembly Chamber plumbed, and find that one of them is slightly out of plumb, leaning in the direction of the plane containing the line of the resultant of the thrusts of the groined vaulting and the arches sustaining it.

We have tested the stone of which the ribs of the vaulted ceiling are constructed, and find that it is not uniform in quality or strength.

We have examined the plans of the foundations of the building which were prepared by Mr. J. W. McAlpine, civil engineer, to carry the superstructure designed by Mr. Thomas Fuller, the architect, under whose direction the masonry of this part of the building was carried up to about the level of the second floor. We conferred also with Mr. McAlpine in person, and examined his printed report on the foundations, in order to gain a full knowledge of the subject. We find that the foundations under the four main columns of the Assembly Chamber are, under the most favorable view of the distribution of the pressures, loaded to the extreme limit of safety. We discover that after Mr. Fuller was superseded by Messrs. Eidlitz, Richardson and Olmstead, the plan of the Assembly Chamber was altered to such a degree that the weights on the foundations under the four great piers are very much greater than those foundations were designed to carry, and in consequence an unequal settlement has occurred. This, however, in itself is not, in our opinion, sufficient to imperil the safety of the structure. The evidence is strong, though not conclusive, that the settlement has ceased.

We have critically examined the plans of Mr. Leopold Eidlitz, architect, for the construction of the Assembly Chamber and the work connected with it, and have given due consideration to his very full and clear explanations of his computations and methods of construction.

We have constructed lines of pressure for the main arches and vaulting ribs, and have made such other computations as were necessary for analyzing the strains on the different parts and comparing the results with the devices arranged to resist the strain.

The side vaults as above referred to as being in bad condition have a decided tendency to rise at the crown, and the stones of which they are composed are crimping and cracking in various places. The main longitudinal and transverse arches are in safe condition. The thrust of the various arches and ribs is transferred to half-arches, resembling flying buttresses, lying in the prolonged planes of the longitudinal and transverse arches, and thus transferred the thrust is itself taken up, at points above the crowns of the main arches, by iron rods. Provision is made for maintaining a uniform temperature of these rods by inclosing them in masonry boxes, and by heating the attic through which they run.

If we could be sure that this unequal settlement of the foundations has permanently ceased, and that they were capable of safely bearing an increased load, and that the present mixed construction of flying arches and iron rods would always hold the arch springers with absolute rigidity, we should recommend that the ceiling of the Assembly Chamber be recentered, that all broken or defective stones be replaced, and the main side vaults brought into stability by rebuilding or readjustment of loads. We are, however, by no means convinced that, with changes in the amount of water in the clay on which the foundations rest, new settlements may not occur, especially at those places where the footing courses are most heavily loaded. Mr McAlpine, who made a very thorough study of the soil underlying the building, fears that such may be the result. In our opinion it was an error of judgment to erect that most delicate of all architectural devices, a stone-groined ceiling, and particularly one of unusual span and weight, on foundations not absolutely secured against uneven settlement, in a position in which it was obviously impossible to balance all the thrusts except by some extraordinary means. The present construction is very ingenious, and its details have been studied with a minute care which reflects great credit upon its author. But the necessity which he has felt of introducing artificial heat in the attic to insure the safety of the Assembly Chamber, the largest room in this great monumental structure, should alone have been sufficient reason for abandoning the idea of securing the stability of a system of vaults by the devices adopted. In our judgment the continued stability of the vaulted ceiling is a matter of doubt. It might remain without serious failure, but as we cannot count upon its doing so for any definite period. e en if all possible repairs are made, we are compelled, with great reluctance, to recommend that the architect be instructed to remove all the stone vaulting (excepting, perhaps, the four small corner vaults), retaining the arches and walls above them that run parallel to the sides of the room, and to supply the place of the groined ceiling with a construction of wood. Such a course of proceeding would remove a very considerable weight from the most heavily loaded parts of the foundation. It would also do away with a large part of the existing unbalanced outward thrust above the columns, so that alterations in the tension of the iron rods above the arches would cease to be an element of danger.

The cracks in the "red corridor" under the Assembly Chamber are no evidence of danger to the building. They are caused by an unequal settlement which apparently affects only the corridor itself. The method of repair suggested to us by the architect will be, in our judgment, effective and permanent.

The cracks in the transverse walls of the former room of the Court of Appeals and in the entrance corridor under it, are of no great consequence unless the settlement of the foundations should continue.

All of which is respectfully submitted.

W. P. TROWBRIDGE.
CHARLES BABCOCK.
GEORGE B. POST.

ALBANY, September 26, 1882.

COLOGNE CATHEDRAL.—Another step toward the entire and final completion of the Cologne Cathedral has just been taken. The iron scaffolding for use in putting on the roof is in place, and the men are about to begin the work of laying down the leaden plates.

MONTHLY CHRONICLE.

SEPTEMBER 1. Flood in the Concho River valley, the river rising fifty feet. One hundred and twenty lives lost, and many cattle.

Burning of the City-Hall at Iowa City, Io.

September 2. Explosion of a powder-mill at Tucson, Arizona. One life lost. Damage to surrounding property, $100,000.

Fall of a school-house during construction. Two men killed.

Fall of a floor overloaded with brick during repairs to Hayden's building, Rochester, N. Y. Six men injured.

September 4. Fall of a brick wall at Lancaster, Pa., during repairs. Two men injured.

September 5 Excursion train wrecked near Hugstettin, Germany. One hundred lives lost.

A quantity of jute wet in extinguishing a small fire at Boyce's bagging mill, Muncie, Ind., swells and throws down the walls of the building, causing a total wreck.

September 6 Burning of the Philharmonic Theatre, London, in the morning.

Burning of the Ocean House, Swampscott, Mass. The guests escape unhurt.

September 7. Earthquake at Panama.

September 11. The Beriot Theatre, at Louvain, Belgium, is burned. No lives lost.

Panic at St. Thomas's Church, Cincinnati, during the children's mass, caused by a false alarm of fire. Five persons seriously crushed and trampled on.

September 12. Court-House at Clarion, Pa., is burned. The county records are saved.

September 13 Death of Frank Shanley, C. E., engineer of the Hoosac Tunnel.

September 14. Fall of a buttress of St. Patrick's Cathedral, Dublin, Ireland, causing the death of four women.

Sinking of the lake steamer "*Asia*" on Lake Huron. About one hundred lives lost.

Wind-storm does much damage at Winsted, Conn. No lives lost.

September 18. Explosion of the Aldine Coal Company's powder magazine near Wilkes Barre, Pa. No lives lost.

September 19. Buildings blown down at Rochester, N. Y.

September 22. The exhibition building at Sydney, New South Wales, is burned, together with its contents.

September 23–25. Equinoctial storm, the rainfall amounting to about fifteen inches in New Jersey, where the storm was heaviest.

September 25. Explosion at the Dodson Mine, Plymouth, Pa. Three lives lost.

Fall of a gallery in the exhibition building at Pittsburgh, Pa. Seven persons injured.

September 27. Earthquake shocks felt in Illinois and Missouri towns, about four o'clock A. M.

A wind-storm demolishes the Evangelical Church at Newton, Kans, during service. No one seriously hurt.

September 28. Fall of a house at 923 Wallace Street, Philadelphia. None of the inmates seriously hurt.

September 29. Burning of the Mississippi River steamer *R. E. Lee*, near Vicksburg. Twenty-one lives lost.

CALCULATING GIRDERS.

NEW YORK, October 5, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Professor Ricker's able article on Girders suggests the (now) old question: which is better in calculating strains, the graphical or arithmetical method? In my own experience of a number of years and covering many examples, large and small, I have found the graphical method most suitable for roof trusses, and large or complicated trusses having many members; but for simple cast or wrought iron girders, beams, boxed girders, etc., I have found the arithmetical calculations quicker and simpler. By remembering three simple rules I have been enabled, when pressed in business, to make these calculations on my way to or from business, often on the edges of newspapers, whereas the graphical method would have involved drawing materials and instruments, scale, accurate drawings, etc., besides requiring the memorizing of quite as many rules. These rules are:—

1. If the weights on a girder (*ck.*) are uniformly or symmetrically distributed, each support carries (or reacts) one-half of the total weights. If the weights are unevenly distributed, each support carries, or the reaction of each support is equal to, the *sum* of the products of *each* weight into its distance from the *other* support, divided by the whole length of span.

2. The greatest bending moment of a uniformly or symmetrically distributed weight is at the centre. To find the point of greatest bending moment with uneven weights, find the reaction of either support; then begin at that support and pass over weight after weight, until an amount of weights has been passed *equal* to the reaction, and this is the desired point.

3. The bending moment of a uniform load at the centre is equal to the product of the whole load into one-eighth of the length of span. To find the bending moment of an uneven load imagine the girder cut at the point of greatest bending moment, then the bending moment will be equal to the product of the reaction (on either side) into its distance from the point, less the sum of the products of *all* the weights on the *same* side, into their respective distances from the point of greatest bending moment. To check the whole calculation, try the reactions and weights of the discarded side and the same result will be obtained.

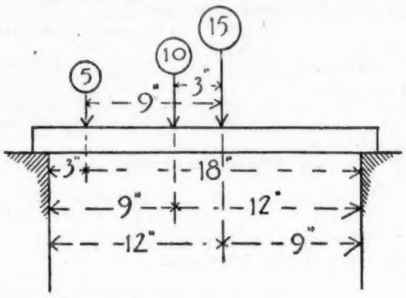
Example.—Three weights of respectively 5 lbs., 10 lbs., and 15 lbs. are placed on a 21″ girder, 3″, 9″ and 12″, from the left-hand support. Find the point and amount of greatest bending moment.

$$\text{Reaction } A \text{ will be (in lbs.)} = \frac{5\times18}{21} + \frac{10\times12}{21} + \frac{15\times9}{21} = 16\tfrac{3}{7}.$$

$$\text{Reaction } B \text{ will be (in lbs.)} = \frac{5\times3}{21} + \frac{10\times9}{21} + \frac{15\times12}{21} = 13\tfrac{4}{7}.$$

Check, $A + B$ must equal whole load, and we have in effect: —

$$A + B = 16\tfrac{3}{7} + 13\tfrac{4}{7} = 30 \text{ or} = \text{loads } 5 + 10 + 15 = 30.$$



A = 16 3/7 lbs. B = 13 4/7 lbs.

To find point of greatest bending moment: begin at A, pass over weight 5, plus weight 10, and we still need $1\frac{3}{7}$ lbs. to make amount of reaction A ($16\frac{3}{7}$); therefore greatest bending moment is at 15. *Check*, begin at B, and we arrive at 15 only, before passing amount of reaction B ($13\frac{4}{7}$).

To find amount of bending moment, suppose the girder to be cut at 15, and take left side, then we have bending moment: —

$$M = 16\tfrac{3}{7} \times 12 - (5 \times 9 + 10 \times 3 + 15 \times 0) = 122\tfrac{1}{7}'' \text{ lbs.}$$

Check, take the right-hand side, and we have bending moment: —

$$M = 13\tfrac{4}{7} \times 9 - (15 \times 0) = 122\tfrac{1}{7}'' \text{ lbs.}$$

Again Prof. Ricker expresses his length in feet. I think when he comes to calculate the moments of inertia and resistance of his girders, he will find it more desirable to use inches, and therefore preferable to express his moments in tons-inches or pounds-inches.

I also notice that Prof. Ricker uses the same letter W to express a uniform load or a centre load. This, to me, always confuses formulas and makes it necessary in every case to look up the meaning of each letter. I have adopted a very simple system of lettering, enabling me to *read* my formulas at a glance. For tons or feet I always use *capital* letters; for pounds or inches I always use *small* letters. Again, U means a uniform load in tons; W a load (in tons) at the centre; W_1, W_2, W_3, etc., loads (in tons) at the points 1, 2, 3, etc.; u means a uniform load in pounds; w, a load at centre in lbs; w_1, w_2, w_3, etc., loads (in pounds) at the points 1, 2, 3, etc.; L means length of span in feet; l, length of span in inches; M_1, M_2, M_3, etc., the distances (in feet) from left support; N_1, N_2, etc., do. from the right: m_1 and n_1, etc., being the same in inches; Δ represents deflection in feet; δ the same in inches; C, constant for compression in tons; c, do. in pounds; T, a constant for tension in tons; t, do. in pounds; K, a constant for rupture by breaking in tons; k, do. in pounds, etc. I have given much of my time and study to the subject of strains, and these practical results may interest some of your readers. Respectfully yours,

LOUIS D. BERG, Architect.

NOTES AND CLIPPINGS.

THE CINCINNATI CHAPTER, A. I. A. — At a meeting of the Cincinnati Chapter, A. I. A., held on the 5th inst., the following officers were elected to serve during the ensuing year: President, A. C. Nash; Vice-President, James W. McLaughlin; Secretary and Treasurer, Charles Crapsey. Col. George Ward Nichols was elected an Honorary member, and Mr. L. F. Plimpton as practising member. Committees were appointed and additional action taken looking toward the proper entertainment of the Sixteenth Convention of the Institute, to be held in this city on the 25th and 26th inst.

BRICKS AND BRICK-LAYING IN CINCINNATI. — A recent investigation of the brick interests of this city developes the fact that during a period of one year there are used in this city about 61 millions of brick. Of this amount about 45 millions are made inside the city limits, and the balance came from the surrounding country. To make this 45 millions there are 42 gangs of men employed in 37 yards (a few of the yards employing two gangs), and each gang consists of five men, and they make 5,000 bricks per day of ten hours, often working, however, sixteen to seventeen hours per day. Thus each man makes 1,000 bricks per day. They do not work more than 200 days in the year, counting overtime and all, because of the cold and wet weather. As nearly as can be ascertained, the cost of making is about $5.30 per thousand, at the present prices. The price of brick at present is $8.00 delivered at reasonable distances. Pressed brick are not made here. Those mostly used (and there are a good many) come from Zanesville, O., and cost delivered in the city $26.00 per thousand, and about $22.00 per thousand for laying. A good bricklayer on a fancy front can lay only 300 to 400 pressed brick in a day. Of common work a good hand will lay 1,200 brick (1,500 wall count) a day. The day's wages is $4.50 for all hands. The cost per thousand for ordinary work is $10.00 to $12.00 per thousand, wall count.

THE LATEST EXCAVATIONS AT POMPEII. — Our Naples correspondent writes: "The last house excavated at Pompeii in Isola V, Regione VIII, is of an anomalous kind. It is situated at the south side of the isola. Its construction is quite unusual as it possesses no proper atrium. On entering the doorway you find on your right a small stove in the corner of the passage, and on the left is the kitchen proper with a room for slaves. Then to the right is a row of columns, forming a rectangular space, in the midst of which is the triclinium with the reclining bed formed of masonry, and in the centre a cylindrical table covered with slabs of marble geometrically arranged. The wall paintings of this open space are not of great value: there are heads of Medusa, hippogriffs, and fantastic birds. Returning into the passage there is on the left next to the kitchen an exedra, with walls ornamented with yellow and white squares, divided by columns, decorations, and festoons all in fresco. At the entrance of this room are two strange figures; on the left an infant surprised at the sight of a large rat issuing from a trap, and on the right the same infant trying to catch the rat. On the left wall is a medallion with a small figure, two cupids and two flying geniuses, one with a pastoral staff in the left hand and a bunch of grapes in the right, the other with a staff in the right hand and the left supporting a basket on the shoulder. The opposite wall is in a bad condition, so that nothing can be distinguished but the faint traces of a similar medallion. This room was covered, and above it and the kitchen was a second story, to which access was had by a staircase at the end of the ground-floor passage and by a similar passage above. Behind the exedra (always to the left of the passage) comes an enclosed garden. A window into this garden gave light to the staircase. At the extreme end to the right is another small room, with a window opening into the triclinium. This room had another above it, and the sole connection between this upper room with the others on the left was by means of the passage on the second floor. Many vases, shells in bronze, several gold rings with engraved stones, and amphoræ were found in this house, and six skeletons. A walled-up door on the left wall of the exedra makes it probable that the house was once a portion of some other larger dwelling, and that it, like so many others, had been sold separately and undergone various changes. — *From the London Daily News.*

THE SAND IN THE COLORADO RIVER. — Are there any circumstances in connection with the Rio Colorado River, it might be asked, which serve to explain the powerful nature of its action on the rocks? The answer to this question is of the most interesting kind, since it serves to illustrate a new circumstance in river action, and one which renders it highly powerful in its effects on the earth's surface. The Colorado is undoubtedly a fierce torrent. Within the cañons it has a fall or slope of between seven and eight feet per mile, which is twenty times as great as that of the Ohio and Mississippi. But running water alone will hardly accomplish a work of such magnitude as the Colorado has evidently been able to effect. Hence, when the geologist surveys the Colorado more closely he notes that its work and power are largely due to the quantity of sand and like débris it carries down, and which, borne along with its currents, serve like a natural saw or file to wear and eat out the rocks over which it runs. The immense power of sand borne by running water, as an agent in eroding rocks, is thus clearly demonstrated; but the sand must be present in proper quantity, that its work may be thoroughly accomplished. There must neither be too much nor too little sand in the river, if its work is to be thoroughly performed. Too much sand will block up its currents and impede its work, will lie in its bed, and thus protect the rocks instead of contributing to their wear. Too little sand will be swept onward and leave no impression on the river-course. Hence, it is when the river, as is the case with the Colorado, possesses just that modicum of sand which it can keep moving with dire effect to the rocks, that the wear and tear proceed most quickly, and that the work of water is seen at its best. Curiously enough, a tributary of the Colorado illustrates the case of a river which cannot erode its course because of the great amount of sand which it carries. This is the river Platte, which has a fall equal to that of the Colorado, but which is *overloaded* with sand. Hence its action on its course is feeble as compared with that of the Colorado, and its work can never, as things are, compare with that of its neighbor-stream, which has silently but effectually hewn out the land into the great gorges, which are among the most wonderful of Nature's gigantic works. — *Chambers's Journal.*

GASLIGHTED HARBOR BUOYS. — Mr. J. Bellamy, of Byng Street, Millwall, has just completed the third large gaslight harbor buoy for the Trinity House authorities. These buoys are made spherical, 9 feet in diameter, containing inside a cylindrical vessel about 5 feet in diameter, the two being rivetted together and gas-tight joints being made. The shell consists of eight sections and a top and bottom plate made of 3-8 inch steel plates and double rivetted in the seams, steel of about 26 tons tensile strain being employed. On top of the spherical buoy is a low square frame, constructed of angle-irons and bars, which carries the gas-lantern. Both the internal cylinder and the space between cylinder and sphere contains gas at high pressure, and these buoys are constructed to burn for 100 days without requiring to be refilled. The object of having a double casing is that in case of an accident to the outer shell, the inner cylinder shall still contain sufficient gas to keep the lamp alight until the buoy can be removed; the two chambers communicate by a valve opening inwards to the cylinder, and in case of damage to the sphere this valve is forced to its seat by the pressure inside. The buoys are tested with an air pressure up to 100 pounds per square inch, all joints being painted over with soap and water. They are an excellent job in both design and workmanship. — *Engineering.*

THE PLYMOUTH MONUMENT. — The great granite statue of "Education" was safely placed upon the buttress of the "Forefathers Monument" October 7th. The statue occupies the southwest buttress, immediately in the rear of the statue of Morality. This completes the female statues. The two remaining statues — Law and Freedom — will be represented by male figures. Steps have been taken by members of the American Law Association to raise money to furnish the statue of Law.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

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

BUILDING PATENTS.

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

265,231. MEANS FOR OPERATING DOORS OF ELEVATOR-SHAFTS. — Frederick H. Abeel, Englewood, N. J.

265,236. WRENCH. — Thaddeus W. Boyle, Augusta, Ga.

265,238. ENDLESS PACKAGE-ELEVATOR. — George W. Brown, New York, N. Y.

265,239. AUTOMATIC AIR-COCK FOR STEAM-HEAT RADIATORS. — Gilman W. Brown, West Newbury, Mass.

265,253. PAINT-BURNER. — John A. Felt, Kent, Ohio.

265,256. SYSTEM OF PRODUCING AND CONTROLLING CURRENTS OF AIR FOR COOLING, WARMING, VENTILATING, ETC., — John Gamgee, London, England.

265,263. FIRE-ESCAPE LADDER. — Timothy Howe, Foxborough, Mass.

265,275. TRANSOM-ADJUSTOR. — James T. Olinger, Stelvideo, Ohio.

265,277. TILE FOR WELLS AND CISTERNS. — George W. Overall, Memphis, Tenn.

265,279. STEAM RADIATOR. — John B. Pierce and Joseph Bond, Buffalo, N. Y.

265,287. CENTERING TRY-SQUARE. — Walter H. Sleeper, Athol, Mass.

265,301. SKELETON STRUCTURE.—Edward C. Bates, Boston, Mass.

265,306. WATER, GAS, SEWER, OR DRAIN PIPE. — John P. Culver, Tucson, Ariz.

265,308. SHUTTER-WORKER. — Léon O. Dion, Natick, Mass.

265,310. FLOOD-VALVE FOR DRAINS. — Frederick M. Dyer, Camden Town, County of Middlesex, England.

265,319-320. IMPLEMENTS FOR CLEANING WATER-CLOSET BOWLS. — Louis O. Howell, Philadelphia, Pa.

265,322. ARCHED GIRDER. — Peter H. Jackson, San Francisco, Cal.

265,327. VENTILATOR. — Peter H. Jackson, San Francisco, Cal.

265,350. SQUARE AND BEVEL INSTRUMENT. — Charles D. Walters, Harrisburg, Pa.

265,372. TRAP FOR WASTE-PIPES. — Nicholas Barry, Jr., Muscatine Ia.

265,383. CARPENTER'S SQUARE. — Willie H. Callihan, Galveston, Texas.

265,384. HOISTING-MACHINE. — Tyre J. Chaffin, Crystal Springs, Ga.

265,386. CHIMNEY. — Otis B. Colcord, Greenville, Ill.

265,389. PAINT. — Jacob B. Cornell, Jacob B. Zook, and Byron N. Cornell, Goshen, Ind.

265,445. WRENCH. —Peter Rotermund, Eureka, Cal.

265,448. SAFETY ATTACHMENT FOR ELEVATORS.— William E. Sawyer, New York, N. Y.

265,474. LOCKING-LATCH. — George Voll, Cincinnati, Ohio.

265,481. WASH-STAND. — Nathan O. Bond, Fairfax Court-House, Va.

265,501-515. COMPOSITION FOR TREATING SULPHATES OF LIME FOR THE MANUFACTURE OF ARTIFICIAL MARBLE. — Raphael Josia, Florence, Italy.

265,531. FIRE-ESCAPE LADDER. — Thomas Miller, Jersey City, N. J.

265,551. FIRE-ESCAPE BALCONY. — John B. Wickersham, Philadelphia, Pa.

SUMMARY OF THE WEEK.

Baltimore.

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

Rudolph Nordman, three-st'y brick building in rear of No. 49 Block St.

Frederick Berger, 9 three-st'y brick buildings, Chester St., commencing s w cor. Hampstead St.

4 two-st'y brick buildings, Hampstead St., s w cor. of Chester St.

T. A. Joynes, three-st'y brick building, Franklin St. w Arlington Ave.

H. A. Hayden, two-st'y brick building, Arlington Ave., s of Edmondson Ave.

Peter McMahon, two-st'y brick stable, in rear of s w William St., bet. West and Ostend St.

J. J. Pentz, 4 two-st'y brick buildings, w s Wall St., n of Ostend St.

Henry Stockbridge, two-st'y brick carriage-house, in rear of E. S. Calhoun St., cor Raborg St.

Buck & Jackson, 10 three-st'y brick buildings, Linden Ave., bet. Preston St. and Camel Alley.

Henry Smith, 12 three-st'y brick buildings, Fairmount Ave., bet. Chester St. and Castle Alley.

George Hipkins, two-st'y brick stable, in rear of No. 113 West St., bet. Elizabeth Lane and James Alley.

Daniel Ahern, three-st'y brick warehouse, in rear of No. 118 Chester St., bet. Bank St. and Eastern Ave.

Blind Asylum, two-st'y brick building, Saratoga St., bet. Pine and Arch Sts.

John Ziegenheim, two-st'y brick building, and two-st'y brick stable in rear, n w cor. Hudson and Potomac Sts.

Henry Von Heine, three-st'y brick building, and two-st'y brick stable in rear, s s Columbia Ave, w of Parker St.

G. W. Staffer, two-st'y brick building, n w cor. St. Peter's St., and Dawson Alley.

United Brethern in Christ, 2 two-st'y brick buildings, n s St. Peter's St., and two-st'y brick building, w s Dawson Alley, in rear.

Dr. Owens, three-st'y brick building, in rear of No. 103 Fayette St.

Boston.

BUILDING PERMITS. — *Brick.* — *West Seventh St., Nos.* 124 *and* 126, *and Tudor St., Nos.* 115 *to* 119, Ward 15, for Robert Bishop, two-st'y storage building, 48' x 84' x 105' x 109'.

N St., No. 112, Ward 14, for Henry B. Stratton, three-st'y dwell., 21' x 50'; Henry B. Stratton, builder.

Hampshire St., No. 61, rear of, Ward 19, for Thos. Jackson, two-st'y manufactory, 26' x 35'; Jas. Jackson, builder.

Clarendon St., near St. James Ave., Ward 11, for Frank E. Winslow, skating rink, 100' x 200'.

Portland St., Nos. 57 *and* 59, Ward 7, for Ellen J. Dooley, five-st'y mansard store and dwell., 17' 9" x 21' 3" x 47' 9"; Lanning & Drisco, builders.

Wood. — *Olney St.*, cor. Bowdoin St., rear of, Ward 24, for Patrick and Michael Norton, green-house, 15' x 150'.

Garden St., near Linden St., Ward 25, for Royal Winter, 2 two-st'y dwells., 22' 6" x 45'; Herbert M. Perry, builder.

Medford St., Nos. 47 *to* 61, rear of, Ward 3, for Hallowell Granite Co., stone drilling, 26' x 43'; J. B. Wilson, builder.

Princeton St., No. 341, rear of, for Coleman O. Melia, two-st'y dwell., 17' x 27'; James H. Coffin, builder.

Terrace Ave., rear of, near Sheridan Ave., Ward 23, for Andrew Cassidy, stable, 17' x 20'; Andrew Cassidy, builder.

Ashley Ave., near Breed St., Ward 1, for D. Arcy & Atwood, stable, 30' x 30'; G. H. Griffin, builder.

Elm St., near Saratoga St., "Orient Heights," for J. F. Slattery, stable, 18' x 22'; J. F. Slattery, builder.

Florence St., near Ashland St., Ward 23, for Geo. Jepson, two-st'y dwell., 20' x 25' 6" x 30'; E. A. Carter, builder.

Tremont St., Nos. 17 *and* 19, Ward 3, for Charles Robinson, Jr., 2 three-st'y dwells., 21' 6" x 32', ell, 11' 6" x 32'; Geo. M. Starbird, builder.

Condon St., Nos. 6 *and* 8, Ward 2, for Wm. Waters, Jr., 2 two-st'y mansard dwells., 18' 6" x 38'.

Norfolk St., near Corbet St. and N. Y. & N. E. R. R. Ward 24, for Samuel N. Ufford, two-st'y dwell., 19' 6" x 33' 6" x 28'; Duncan McKenzie, builder.

Brooklyn.

BUILDING PERMITS. — *Sixth St.*, s s, 100' w Third Ave., two-st'y frame factory; cost, $4,700; owners, D. Allen's Sons, 166 Front St., New York; architect and builder, D. E. Harris.

Meserole St., No. 241, n s, 325' e Morrill St., three-st'y frame tenement; cost, $3,000; owner, Val Becker, 660 Willoughby Ave.; architect, Th. Engelhardt; builders, Geo. Lehrian, and Jenkins & Gillies.

Jefferson St., No. 126, s s, 240' e Evergreen Ave., 2 two-st'y frame dwells.; cost, each, $2,500; owner and builder, Chas. Treshman, Bushwick Ave., cor. Bremen St.; architect, Th. Engelhardt.

President St., No. 810, s s, 275' 4" e Seventh Ave., four-st'y brick dwell.; cost, $8,500; owner, Sarah W. Burckett, 812 President Street; architect and builder, C. F. Burckett.

Bridge St., n e cor. Plymouth St., four-st'y brick factory; cost, $16,000; owner, P. Cassidy, 1119 Madison Ave., New York; architect, M. J. Morrill; builder, Geo. Phillips.

Heyward St., w s 50' e Harrison Ave., one-st'y brick shed and bake oven; cost, $3,000; owner, John H. Shults, on premises; architect, E. F. Gaylor; builders, W. & T. Lamb, Jr., and G. & A. Langer.

York St., n s, 60' e Washington St., 45' x 90', six-st'y brick factory; cost, $25,000; owners, Ketchen & McDougal, 4 Liberty Pl., New York; architect, Mercein Thomas; builders, J. Ashfield & Son, and Morris & Selover.

Halsey St., n s, 100' w Howard Ave., 12 two-st'y frame dwells.; cost, each, $2,000; owner and architect, G. R. Waldron, 1906 Atlantic Ave.; builder, E. Sutterlin.

Manhattan Ave., Nos. 69 *and* 71, w s, being north of Van Cott Ave., 2 three-st'y frame stores and dwells.; cost, each, about, $2,500; owners and builders, E. & A. Walsh, 268 Oakland Ave.; architect, F. Weber.

Cincinnati.

BUILDING PERMITS.—Fred Buerning, three-st'y brick building, Wade St., near Dalton Ave.; cost, $3,000.

F. Mooreman, six-st'y brick factory, Front St., near Carr St.; cost, $10,000.

Harancourt Brewing Co., two-st'y brick building, Harrison Ave., near Railroad; cost, $5,000.

John J. Albehl, two-st'y brick building, n w cor. Market St. and Bellevue Ave.; cost, $6,300.

Chas. Farnum, two-st'y frame dwell., Blue Rock St., near Lakeman St.; cost, $2,000.

Wm. Wageman, two-st'y brick dwell., Church St., near Gilbert Ave.; cost, $8,000.

Hide and Oak Leather Co., three-st'y frame building, Providence St., near Findly St.; cost, $4,000.

Seven permits for repairs, cost, $4,600.

Total permits to date, 589.

Total cost to date, $1,716,200.

Chicago.

APARTMENT BUILDING. — Levi W. Yaggy has commenced another apartment-house, corner of Dearborn Ave. and Erie St., from plans by L. G. Halberg. It will be six stories, and will cost $125,000.

HOUSES. — The same architect has in hand plans for residence for J. A. Bell, on Drexel Boulevard, to cost $10,000, and for G. H. Brooks, a residence of Columbia stone, on Division St.

C. P. Kimball is building a house on Ontario St., near Cass St., three stories and basement, pressed brick with white sandstone finish, from designs by W. W. Boyington.

Marvin Hughitt is about to build a house for his daughter, on Indiana Ave., two-st'y and mansard, 25' x 72', of pressed brick. Plans by W. W. Boyington.

BUILDING PERMITS. — C. H. Williams, two-st'y brick flats, 44' x 46', 345 and 347 South Oakley St.; cost, $6,000.

J. Roeder, two-st'y and basement brick flats, 21' x 56', 390 Webster Ave.; cost, $4,500.

C. Adborg, three-st'y and basement brick flats, 22' x 48', 218 Townsend St.; cost, $6,000.

W. Wilson, two-st'y and basement brick dwell., 23' x 50', 469 West Harrison St.; cost, $4,000.

M. Peters, four-st'y and basement brick factory, 25' x 100', 229 Fulton St.; cost, $10,000.

C. E. Ward, three-st'y brick dwell., 20' x 60', 204 West Lake St.; cost, $8,000.

R. Mosenbacher, two-st'y and attic brick dwell., 20' x 41', 544 North Market St.; cost, $2,500.

W. C. Craig, two-st'y and cellar brick dwell., 42' x 44', Halsted St., near Fullerton Ave.; cost, $8,000.

C. H. McCormick, two-st'y and attic brick dwell., 42' x 44', Belden & Sheffield Aves.; cost, $8,000.

George Schmidt, two-st'y and basement brick dwell., 52' x 66', cor. Goethe and State Sts.; cost, $4,500.

New York.

ALTERATION. — H. Edwards-Ficken is making extensive interior alterations, and decorating the house of Rev. Roderick Tenny, cor. Madison Ave. and Thirty-third St.

COTTON EXCHANGE. — The Building Committee of the Cotton Exchange have selected the site for the new Exchange, and will commence building as soon as they can get possession of the land.

THEATRE. — It is reported that a new theatre is to be built on Twenty-first St., near Fifth Ave., by Mr. Ed. S. Stokes, who has lately purchased property in that location.

BUILDING MATERIALS continue to be held at fairly uniform prices. Dealers being kept busy in supplying orders.

BUILDING PERMITS. — *Franklin St., Nos.* 144, 146, 148, *and* 150, 2 seven-st'y brick and stone storehouses; cost, total, $50,000; owners, George P. Slade et al., 110 Leonard St.; J. M. Slade, architect; Wm. G. Slade, builder.

Jones St., No. 17, three-st'y brick stable; cost, $5,-500; Williard C. Hunter, owner, 20 Jones St.; C. E. Hadden, architect; mason, John Demorest; carpenter, not selected.

Eighteenth St., Nos. 12 *and* 14 w, nine-st'y brick and stone apartment house; cost, $120,000; owners, Building Association, No. 12 West Eighteenth St., No. 4 Stone St.; architect, A. Hatfield; builder, Hugh Getty.

Twenty-fifth St., Nos. 8, 10, 12, *and* 14, w, eight-st'y hotel; cost, $200,000; owner, M. L. Livingstone, 10 East Forty-eighth St.; architect, J. B. Snook; builders, R. L. Darragh & Co.; iron work, Lindsey, Graff & Megquier.

Forty-third St., Nos. 42 *and* 44 w, one-st'y brick car-house; cost, $4,000; owners, Sixth Ave. Railroad Co., Sixth Ave., and Forty-third St.; builder, N. L. Crow.

Forty-sixth St., Nos. 619 *and* 621 w, 2 five-st'y brick tenements; cost, each, $13,000; owner, Peter Golden, 324 East Fortieth St.; architects, Cleverden & Putzel.

Fifty-seventh St., n s, 100' e Ninth Ave., seven-st'y and attic brick and stone apartment house; cost, $180,000; owners and builders, Terence Farley & Son, 165 East Sixty-first St.; architects, Thom & Wilson.

Fifth Ave., s w cor. Fifty-fourth St., 2 four-st'y brick and stone dwells.; cost, $175,000 and $150,000; owner, Wm. H. Vanderbilt, 640 Fifth Ave.; architect, J. B. Snook; builders, Robert L. Darragh & Co.; brownstone work, Jas. S. Sinclair & Co.; iron work, A. J. Campbell.

First Ave., e s, from Seventy-ninth to Eightieth Sts., 8 four-st'y brownstone stores and tenements; cost, each, $13,000, owner, Michael Duffy, 256 East One Hundred and Second St.; architect, A. Spence.

Seventy-ninth St., n s, Eightieth St., s s, 75' e First Ave., 2 four-st'y brownstone tenements; cost, each, $12,500; owner and architect, same as last.

Ninety-second St., s s, 225' w Third Ave., five-st'y brownstone front flat; cost, $18,000; owner and mason, Morris R. Williams, 602 East Fifteenth St.; architects, Thom & Wilson.

Ninety-second St., s s, 255' w Third Ave., five-st'y brownstone front flat; cost, $30,000; owner and architects, same as last.

Ninth Ave., n w cor. Seventy-first St., 7 four-st'y brownstone dwells.; cost, each, about $15,000; owners, John Noble and Elbert Post, 1238 Third Ave.; architect, F. T. Camp.

Eleventh Ave., s w cor. Sixty-ninth St., five-st'y brick tenement; cost, $18,000; owner, Conrad Michaels, s e cor. Ninth Ave., and Sixty-seventh St.; architects, Thom & Wilson.

Third Ave., e s, 99' 11" n One Hundred and Twenty-sixth St., five-st'y brick store and tenement; cost, $20,000; owner, Richard Connor, 313 East One Hundred and Twenty-sixth St.; architect, G. Robinson, Jr.

Seventh Ave., n w cor. One Hundred and Twenty-Seventh St., five-st'y brownstone store and tenement; cost, $30,000; owner, Samuel H. Bailey, 186 East One Hundred and Fourth St.; architect, F. T. Camp.

One Hundred and Twenty-sixth St., s s, 233' w Third Ave., five-st'y brick tenement; cost, $15,000; owner and architect, same as last.

Philadelphia.

HOUSE. — Leiper St., (Frankford), residence for Wm. Rowland, Esq., three-st'y, 50' x 70'; cost, $10,000; Harzlehurst & Huckel, architects.

MATERIAL MARKET has been without fluctuations of any note for some weeks past, remaining at about present quotations.

CHURCHES. — The Baptists are about to build a chapel on Powelton Ave., near Thirty-seventh St.; size, 40' x 60'; Benj. Linfoot, architect.

"Wissahikon M. E. Church" to be built of light natural stone with Hummelstown brownstone trimmings; size, 52' x 65'; Haselhurst & Huckel, architects.