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SOME progress has been made toward the decision of the question whether the New York elevated railroads will have to pay damages for injury to property in the streets through which they pass, by the decision of the General Term of the Superior Court in the case of Dr. Caro, a resident of West Fifty-third Street, through which the Metropolitan road runs, who found his house darkened and the upper rooms rendered uncomfortable by the smoke and noise, and claimed that the nuisance should be abated. The Special Term decided against him, but the new decision reverses the first. The railroad company does not deny that the plaintiff's property is depreciated in value, but claims that its charter, permitting it to use the streets, protects it from liability for the necessary injury to private convenience. This the Court does not admit, quoting the precedent of the Cohoes Canal Company, which was compelled to pay damages for injury done by some blasting on their line, although their charter allowed them to excavate their canal by such means. We should think the analogy between the cases was not quite perfect, but undoubtedly the whole matter will be appealed. Some incidental matters have a little interest. Dr. Caro applies to the Court, not for damages, but for an injunction to prevent the running of trains, making the assertion, which is not denied by the defendant, that the company is insolvent, and unable to pay any judgments for damages which might be recovered against it, that all its property is mortgaged far beyond its value, and that any execution against it would be idle and fruitless. This may serve as a hint to those who think it would be easy to collect damages for injury to private property by future roads. The other New York company, which runs through Third Avenue, has taken a lease of that avenue from the city, so that any damage to abutting property would have to be paid by the city which gave the lease, and not by the company; a still less hopeful prospect for the injured ones, we should say. Nevertheless, it seems clearly equitable that, if the company's charter is drawn so unfortunately for the rights of property-owners as to relieve the company of responsibility for the injury it does, the city which gave the charter should be firmly holden to make good the injury. There are so many ways in which corporations can slip out of their obligations, that such matters should be carefully looked after by those who will be affected, before a charter is given.

THE Philadelphia elevated railroad, which is now building by the Pennsylvania Railroad Company, seems to run through houses as well as streets, and the corporation have had to condemn and pay for a large amount of real estate, in the same manner as a surface road. As usual in such cases, public attention is strongly drawn to the progress of the work, and the necessary demolitions give rise to many incidents. One woman, who owned a house on the line, had agreed to sell it, but through some informality the deeds could not be passed until the workmen engaged in clearing the route had reached the spot, and the proprietor refusing to give up possession, the house was taken down over her head. She sat, supported by some kindred spirits, in a second-story chamber until the ceiling over her had been removed, the partitions taken away, and the floor partly taken up; but finally abandoned the field, and submitted to use the carriage which the company kept waiting at the door to convey her to another dwelling-place. It is just reported that the city of Berlin has taken definite steps toward the construction of an elevated road through that large and rapidly growing city, and has appointed a commission of architects and engineers to consider the best route and the details of the work. Berlin is built on a sandy plain, little above the water level, so that the conditions will resemble those of several American cities, and undoubtedly there will be many interesting points of comparison between ours and the European methods of treating the subject.

PROFESSOR WM. RIPLEY NICHOLS, of the Massachusetts Institute of Technology, has been recently requested to examine into the sanitary condition of some of the Boston public school-houses, concerning which various unfavorable reports had been circulated, and his report is just published in pamphlet form. Professor Nichols has done good service before in the study of the air of school-rooms, and his investigations may be regarded as thorough, and his account of them trustworthy. As usual in "sewer-gas" excitements, he found little cause for apprehension; some local smells due to the imperfect character of the apparatus employed seem to have been mistaken for a general corruption of the school premises; but he takes occasion to comment upon the ventilation of the rooms. Owing, no doubt, to the gradual increase in attendance, the average condition of the air in the school-rooms is not so good as it was ten years ago, and Mr. Nichols expresses his opinion that some steps should be taken to remedy the evil. It is to be regretted that some means does not exist for determining organic contamination by itself, more calculated to impress the average mind than the present mode of taking the percentage of carbonic acid present as the index of other impurity. This is well enough for those who are accustomed to this mode of measuring, and to whom actual experience will suggest the kind of atmosphere which a given percentage of carbonic acid indicates; but the public are likely to forget the accompanying circumstances of organic contamination, and it is to be feared that unprofessional citizens, reading that air of the worst rooms in the worst schools contained only about two-tenths of one per cent of carbonic acid, a gas which is itself generally supposed to be but feebly noxious, will think that this is but a slender foundation for the demand for money to remodel their ventilating apparatus. Such persons may be profitably reminded that the actual state of contamination which such a percentage indicates is worse than that of most theatres during a performance, and about the same as that of an average railway passenger-car.

THOSE who desire the general use of the metric system of weights and measures should be gratified at the progress which their cause has made during the last year. The latest converts seem to be the physicians, and with them the druggists. A large number of medical societies have expressed their intention of adopting it in their transactions, and many recent books on hygiene and medicine use the metric notation. The British Medical Association has appointed a committee to consider whether the profession in that country shall adopt the same standard, but it is hardly necessary to predict that the report will be adverse. Meanwhile, however, the American doctors, having once obtained a taste of the order and simplicity of the Continental notation, as contrasted with the ridiculous jumble of Avoirdupois, Troy, and Apothecaries' weights; of grains which may be either sixtieths of a drachm or thirtieths of a drachm, "according to the context," of drachms which may be either sixteen or eight to the ounce, of ounces which may be either sixteen or twelve to the pound, will be unlikely to retrace their steps. Medicine is fast becoming an exact science, and it can no more afford to carry about and try to use in its literature the rusty tools handed down from half-a-dozen mediæval nations, than to operate upon its patients with dull and lumbering instruments. The great requisite for popularizing the metric notation is something to make the standard familiar to the young. Much has already been done, but much remains to do.

It is unfortunate that the metre is so unwieldy a unit. A foot is easily measured by the eye, so is an inch, or a centimetre, but a yard is too large a unit for ready estimation except by practice, and the metre is still worse. Whoever will suggest a common object of nearly a metre in one dimension, can render a service to the cause of knowledge. Even so rude a standard as the ordinary city windows, which frequently measure very nearly a metre in width, would be easily carried in the mind. Perhaps city authorities would allow marks of a metre in length to be painted here and there on the curbstones, or lamp-posts might be banded at the requisite intervals: all such things would be of much use.

The records of the Boston Department for the Survey and Inspection of Buildings, which are carefully and systematically kept, reveal some interesting facts. As it happens, the first year of the existence of the Department was also that of the great fire, so that it is not surprising to find the number of permits issued during that year larger than in any since, though the number for 1874, two years after the fire, but a period of much speculation in suburban real estate, nearly equals it, and the list for 1871, the year before the fire, would not be far short. Since 1874 the numbers have very much diminished. As might be expected, the permits for brick buildings in the fire year, 1872, exceeded those of 1876, '77, '78, and '79 combined; but it seems that during the three months of 1871 in which the building law was in operation more structures of this class were authorized than in the whole of most of the years since 1874, and more than one-fourth as many as in 1872 itself, so that the great fire actually from the outset diminished the number, although it increased at first the magnitude of building operations. The Department keeps a record of losses by fire also, from which it appears that the value of property destroyed averages very nearly a thousand dollars per day in the years when no great conflagrations occur to double or triple the total in a single night. It is interesting to observe that although the aggregate loss varies much from one year to another, the number of fires has increased quite steadily since 1872, showing that construction has not greatly improved. There are, however, many signs of a better state of things in this respect.

The Metropolitan Museum of Fine Arts has already done something toward education, through the efforts of a number of the trustees and other gentlemen, who have established a fund for the support of a school of industrial art, and the school is now open at 31 Union Square, New York. Instruction is given in wood-work under the direction of Mr. A. Sandier, and in metal-work by Mr. Charles B. Atwood, both of whom are architects of recognized standing and attainment; and illustrations are drawn from the inexhaustible riches of the Di Cesnola and Avery collections. Thus far, the prospects of the enterprise seem encouraging. Forty-eight pupils are now in attendance, equally divided between the two instructors, and it is intended to add to the conveniencesn the school, and perhaps, another year, to the courses of study. It is found that a large proportion of the students are totally ignorant of drawing, and their instruction must therefore begin at the rudiments, so that the general progress of the class is delayed; but this trouble will cure itself by degrees. Strange to say, not one of the students of metal-work is, or is intended to be, an artisan in iron, brass or bronze; all of them will devote themselves to gold or silver work. Perhaps this is to be explained by the smallness of the demand for artistic products in the common metals, — a demand which is fostered almost exclusively by architects. The profession can do much to increase their influence by a more general interest in the subject. "Art metal work" is an expensive luxury; but a little care will often be able to search out well-designed stock patterns, and a demand for these will do much to encourage artistic feeling in the workmen who make them, and thereby improve the general taste.

A libel suit has been commenced by Mr. John Clifford, lately architect to the new City-Hall at San Francisco, Cal., against another architect, Mr. Wm. H. Drake. The plaintiff alleges that the defendant, with two other architects and a certain stone-cutter, impelled by professional jealousy, published an attack upon his character in a Chicago paper, which was copied into the San Francisco *Chronicle*, and led to his removal from his position. We know nothing whatever of the merits of the case, but it will do no harm to suggest that architects generally are often regarded by the public as being unduly ready to malign each other's work, if not their characters. Whatever value to an artist the honest criticism of his fellows may have, it is well to remember that the public reputation of a professional man is a part of his property, and courts have generally shown themselves disposed to require adequate compensation from those who thoughtlessly or maliciously infringe upon or lessen the value of that property; and if a just *esprit de corps* cannot be depended upon to inspire the members of a profession with a proper regard for each other's rights, it will do no harm to have it understood that worldly prudence must supply its place.

The labor troubles are fast vanishing. Practically, the workmen are selling their labor on a rising market, and although they take means of questionable prudence for influencing prices, they find it easy to make terms. The carpenters in New York have demanded, and have generally been granted, three dollars per day, an advance of fifty cents or more, and stone-masons and painters in other places have had their pay increased. The Lowell stone-masons, a sensible class of men generally, have given two weeks' notice of their intention to require higher wages, and expect to obtain it. It is hardly necessary to point out how much fairer such reasonable notice is to the employers than the sudden and violent demands for more money, purposely made when the master is distressed with contracts, and helpless, which some agitators try to make customary. Even boss mechanics are human, and the decent sympathy for their interests on the part of the men, which would, by suitable previous notice, enable them to complete their unfinished contracts without loss, and make their new ones intelligently, would be sure to be repaid by the greater willingness of the employers to raise the general standard of wages where such action did not mean ruin to themselves. The strange situation at Cohoes still continues, but a large number have yielded, and many individuals have applied for work, which could not be given them for want of the material which should have been furnished by the other departments of the mills, which are still on strike. This dependence of one department of a manufactory upon the others seriously complicates strikes. By means of it a few Fall River spinners were able to tyrannize over a whole town, and the extension of the principle upon which they acted may result in radical changes in manufacturing, probably not to the advantage of the operatives. It is said that the Cohoes work-people are beginning to be distressed. Four pianos have been taken from their houses for non-payment of instalments. This calls to mind the Sheffield situation of two years ago, when the prosperous steel-workers undertook to resist the depression of trade by the same senseless course of enforced idleness and wrong-headedness. There also pianos were first given up; a few months more of hopeless struggle, and the other furniture followed; and it was not long before the question became one of the necessaries of life. In that condition it still remains; their monopoly has passed into other hands, and the Sheffield cutlery workers will hardly see their pianos again in this generation.

We are interested to see how the move among the architects in regard to competitions is to result. The English papers this week seem to be silent on the subject, but we trust the leaven is at work. At least, there is a hopeful sign in the advertisement of a competition for municipal buildings for the city of Glasgow, which appears in the *Building News*, in which the town authorities promise that the designs shall be submitted to an eminent neutral architect for adjudication. In other respects this competition has its peculiarities. The floor plans, it appears, are already fixed, having been designed by the city architect, and competitors will only have to make elevations. Perspectives are not to be received, and all drawings are to be in line, at a scale of ten feet to the inch. The premiums offered are certainly more than usually liberal; the first is seven hundred and fifty guineas, the second five hundred, and the third three hundred. The cost of the structure is limited to a hundred and fifty thousand pounds, and the designs must be in a "dignified classic" style. Another good point is the length of time allowed for preparing drawings, the advertisement being dated March 9, while the last day for receiving designs is June 15. This would give time for even the Transatlantic geniuses, who think classic design is easy, to try their fortune.

THE VENTILATION OF BUILDINGS.[1] — I.

This subject is inseparably connected with heating, for two good reasons, viz.: —

First, In all cold climates the fresh air that is introduced must first be artificially warmed in some way.

Second, Heat as a form of mechanical energy is largely used as a motive force, in connection with gravity, to set in motion the air which we wish to move, whether outward from within our buildings or for the introduction of a fresh supply from outside.

There are various sources of impurity in the air of our buildings, more or less prejudicial to health, many of which can be *kept out* and avoided in great measure, and should therefore never be allowed to contaminate the air within the walls.

Among these sources are the following: —

(*a*) Emanations from cast-off clothing of diseased persons, or soiled undergarments awaiting the laundress, even when worn by persons in ordinary health, for such garments always contain effete matter in a somewhat volatile condition.

Shakspeare in the "Merry Wives of Windsor" makes a point of the coarse sensibilities of Falstaff being disgusted by this — in an age much less sensitive than our own.

(*b*) Excreta of all kinds, whether fluid or solid, but particularly those of diseased persons.

(*c*) Dampness in cellars, mouldy heaps of rubbish, leaky pork-barrels, spilt food, and all kinds of vegetables stored in cellars.

(*d*) Cooking fumes of all kinds, for, however savory some may be, others are not only nauseating, but absolutely injurious.

(*e*) Gases from cooking or heating fires, and the products of combustion of illuminating-gas.

(*f*) All descriptions of filth in the soil, whether recent or old.

(*g*) Leaky drains, and accumulations of putrescent matter in cess-pools or drain-pipes.

All these and similar sources of bad air must first be eliminated by removing the cause, leaving for ventilation only the duty of removal of the volatile excreta from the lungs and skin of the inmates. Perhaps the removal of cooking fumes and the products of the combustion of illuminants can be treated of as ventilation, but these gases should be specially provided for, and never suffered to diffuse themselves, as is generally done, all over the building. The quantity of the contamination caused by illuminating-gas is enormous, and will be referred to hereafter.

After the elimination of all such foul agents as have just been alluded to, we shall find quite enough left to be done within the prescribed limits without being encumbered with these substances, which I shall therefore suppose to have been excluded from the apartments which are to be treated by ventilation.

The importance of pure air is doubtless a familiar subject to you all. The chemical qualities of its constituent parts, and their effect upon the human system, are now tolerably well known to all who have paid any attention whatever to either chemistry or physiology. But the *standard of purity* is a subject about which a variety of opinion exists among different people. Nature has fortunately endowed us with a faculty of conforming to a certain amount of impurity without visible harm, if the system is sound and strong, though more delicate persons suffer from the lesser quantities.

Thus we see, in various races of men, acquired powers of resistance, which enable them to endure conditions which would be very troublesome to others. The extreme in this direction is attained by the Esquimaux. Dr. Kane, in his description of a night passed in one of their huts, buried in an enormous drift of snow, says he "crawled in on his hands and knees through an extraordinary burrow thirty paces long." He "soon found himself gasping the ammoniacal steam of some fourteen vigorous, amply fed, unwashed, unclothed fellow lodgers. He had come, somewhat exhausted by an eighty miles journey through the atmosphere of the ice-floes. The thermometer inside was +90°, and the vault measured fifteen feet by six. Such an amorphous mass of compounded humanity one could see nowhere else: men, women and children with nothing but their native dirt to cover them, twined and dovetailed together like the worms in a fishing basket," etc. But even the endurance of the Esquimaux is slowly yielding to the grim conditions by which they are surrounded. Their numbers are waning. Nature refuses to go beyond the limit reached in Greenland, in fortifying man against such influences. The children who survive to grow up, do so by reason of their strength, by the stern rule of the "survival of the fittest," but their numbers do not replace those who have gone before them. The race is passing away. In leaving the high latitudes and entering more temperate regions, the taste of man shows his appreciation of a fair allowance of pure air, while his physical development improves by the use of it. Yet the force of habit is strong even with us, — so much so that the reasoning powers and scientific data must be resorted to, in order to save enough pure air in our crowded cities to prevent positive harm. You are all aware of the stifling air of a theatre gallery if you enter it late in the evening from a cool north-west wind in the street. Yet if going in earlier, and taking the increase of impurity as it gradually accumulates, by insensible degrees, it is only noticed by its secondary effects upon the system, — dullness, headache or sleepiness. Thus the standard of purity must be a conventional and arbitrary one, fixed by experience, and adapted to the class of occupants by whom the building is to be used. If the conditions of climate do not favor a free circulation through open windows, and particularly when artificial heating becomes necessary for health and comfort, the problem soon becomes a difficult one, and must be solved independently for each particular case, according to its ruling conditions. The element of cost generally enters into the case as one of these conditions; for where money has to be spent to get pure air, the higher the standard required, the more will be the expense of furnishing the supply.

The vitalizing or valuable element in the air for the support of animal life is well known to be the 21% of oxygen, which is diluted by about 79% by volume of nitrogen, the latter being practically inert. The injurious effects of foul air are two-fold: first, the diminished supply of the oxygen, which is felt in the loss of quality in the blood, and hence a loss of tone throughout the system; and second, the increase of organic impurities, by which the blood becomes yet further deteriorated, or, if still continued, actually poisoned. These are the same effete substances which nature is constantly excreting through the lungs and skin. It was formerly thought that the active injury, effected by breathing air which had been previously breathed, was due to the CO^2 exhaled, and this gas was made a great bugbear in all the earlier treatises on ventilation. But more recent physiologists consider this ingredient as nearly neutral, to the extent of the quantities ordinarily found even in crowded apartments, and impute the harm to organic effluvia which are so various in their nature, and often so subtle, as to defy ordinary chemical tests. But though these harmful agents cannot be so readily counted and weighed in any specimen of the air, it is generally accepted that they exist about in proportion to the *excess* of CO_2 in air that has been breathed. It is known that a certain small amount of CO_2 exists in the purest air, about four parts in 10,000 in volume; also that air exhaled from the lungs contains about a hundred times as much, — say 4%. Now this change is readily detected and measured by simple chemical tests, with sufficient accuracy to enable us to use it as an index of the deterioration of the quality of the air which it has suffered by once being breathed. Dr. Angus Smith gives this test: That no precipitation of carbonate should be given when a 10½-oz. phial full of air is shaken in ½ oz. of clear lime-water. Assuming that this increase of CO_2 is commensurate with both the loss of oxygen and the amount of organic impurities, this excess of CO_2 over the standard quantity of four in 10,000 is therefore generally used as a test of the essential deterioration.

The standard of purity is stated by Dr. Parkes as six parts in 10,000, or 50% more CO_2 than existing in pure air. That is to say, this quantity cannot be exceeded without appreciable injury to persons of delicate organization, and should therefore be taken as a proper limit to be worked to as far as practicable. It may perhaps be considerably exceeded for a time, *i. e.*, 7 or 8 and even 20 parts in 10,000 will not be fatal, but will create certain discomfort and lassitude. An average pair of lungs is said to exhale $\frac{6}{10}$ of a cubic foot per hour of CO_2, while, according to Pettenkoffer, about 15 cubic feet of air are exhaled during the same time. The time required to vitiate a given volume, V, by one pair of lungs, then, to this degree (.0006), is $T = \frac{.0002\ V}{0.6} = \frac{V}{3000}$ in hours, so 3,000 feet will keep a man comfortable only one hour, say a room 10 feet high and 17.3 feet square, if hermetically sealed. If tight rooms were more easily got, we should suffer oftener; all rooms leak gas, by diffusion. CO_2 has a specific gravity of about 1.5, yet is not inclined to accumulate at the bottom of a room. Even though not chemically combined with air, the gas pervades the whole space. Gases of a different specific gravity never stand long in one another's way; they all have a harlequin habit of jumping through one another with great agility, each gas being, as it were, a vacuum to others, though somewhat obstructing their diffusion. This fact of diffusion was announced by Dalton, but its law was defined by Graham: thus, that each one of two gases of different specific gravity, when separated by a porous diaphragm, diffuses itself through the space occupied by the other gas, at a rate varying inversely with the square root of their relative densities. Thus, taking hydrogen and oxygen.

	Sp. Gr.	$\sqrt{\text{Sp. Gr.}}$	Coefficient of Diffusion.
H	1	1	4
O	16	4	1

The fallacy of some men is obvious, who talk about the CO_2 always settling to the bottom of a room, and needing ducts to take it away from thence.

Pettenkoffer relates that when on a visit to Marienbad, he noticed a spring from which a constant delivery of gas took place, consisting chiefly of CO_2. The spring was surrounded by a small wooden building, and walled in by a tank 23.7 metres long by 11.4 metres wide. The water was two metres deep. On one long and one short side of the tank extended a platform, near the level of the water surface, from which you could look down and see the gas bubbling up. He had no means of measuring this flow of gas, but estimated that it must exceed one millimetre depth on surface, per second, equal to six centimetres per minute, or 3.6 metres per hour.

If this gas were not rapidly diffused, the building would soon be filled to a depth of three metres, and in an hour the air would become unbreathable. A man standing on the platform has his head only 250 to 260 centimetres above the water; but no inconvenience arises from standing there for hours together.

[1] A lecture by Mr. Edward Philbrick, C. E., delivered before the students of the Massachusetts Institute of Technology.

"*Man lebt darin wie in gewöhnlicher Luft.*"

Only beneath the platform are candles extinguished, near the water. Soap-bubbles blown by a man's breath, and allowed to fall towards the water, are checked only by the immediate approach to the water, where they float quietly on the stratum of gas. An approximate analysis of the gas [1] showed it to consist of 70% CO_2; at 5 centimetres above water, 31% CO_2; at 25 centimetres above water, 23% CO_2; at 100 centimetres above water, 2% CO_2; at 145 centimetres above platform, less than ½% CO_2.

So far as we know, the organic vapors which we wish to get rid of are subject to the same law of diffusion. The *vapor of water*, however, is supposed to possess an attraction for organic exhalations, and serves as a vehicle for their diffusion. Hence, and for other reasons, air that is saturated with vapor of water is more commonly complained of as oppressive, and is really more likely to be unwholesome, than dry air, of which I shall have more to say later.

We have considered the case of a man enclosed with, say, 3,000 feet of air, which would in an hour's time reach the proper limit of vitiation. The next question is, how fast to introduce fresh air in this apartment to prevent the increase of such vitiation. As the process is supposed to continue at the same rate, we must evidently supply an entirely new volume every hour, *i. e.*, 3,000 cubic feet, or fifty feet per minute.

Dr. Billings, of the Johns Hopkins Hospital at Baltimore, uses for hospital wards a somewhat larger figure than this, viz., one cubic foot per second per man; a convenient ratio to remember. Of course a still larger quantity is required for certain surgical wards and in cases of contagion; while a smaller quantity must be accepted in many cases where the cost would be unreasonable, or inconvenient draughts would be occasioned by its introduction. From these considerations we see that although the air contains some 21% of oxygen, we can avail ourselves in respiration of only a small part of this without suffering. When the quantity of oxygen is reduced by even $\frac{1}{20}$ of this amount, the air is unfit to breathe, representing essentially the same condition as an increase of 1% of CO_2 with a corresponding increase of watery vapor and organic exhalations.

In order to learn the effect of close air upon the system, within safe limits, Dr. Angus Smith says he constructed a closet, lined with lead, and containing, when a man was in it, 170 cubic feet of air. After remaining in this apartment one hour and forty minutes, the CO_2 had attained to 1%. The first change that his senses noted was that of increased moisture, making the air feel "soft." After one hour he perceived an unpleasant smell of organic matter, like that in a crowded school-room; but made perceptible only when stepping about, and thus accumulating the effect of the successive portions of air coming in contact with his lungs. After one hundred minutes the smell became quite unpleasant, and he came out. Three other persons entered at once, and said it was *very bad;* after one minute he entered again, and found it "extremely bad." The oxygen was reduced to 20%. "Was glad to escape, though not conscious of discomfort. The pleasure on coming out was altogether unexpected; like that experienced on walking home on a fine night after leaving a crowded room." His attention had to be called to the bad odor, however, while in the chamber, in order to perceive it; *i. e.*, it did not arrest attention. It took four hours for his lungs to recover their normal condition, *i. e.*, to work unconsciously, after coming out.

The second time he stayed inside for one hundred and sixty minutes; after the first one hundred and forty minutes, he found a long breath was agreeable; the air felt close. On standing in a chair it seemed worse. The oxygen was then reduced to 19.61%.

He afterwards reduced the oxygen by burning candles in the room, and entered the closet with candles and a spirit-lamp. The candle was soon extinguished; he tried to light it, but the match would not ignite. He still breathed without difficulty; but gradually a feeling of discomfort came on, hard to describe. The breathing increased in rapidity. He afterwards lighted the gas, which burned brilliantly. After the gas had gone out, he went in again, and stood up in a chair, but felt incipient faintness; yet the senses were not so unpleasantly affected by the smell, etc., as in a crowded school-room. His lungs seemed to refuse to expand; but he could not tell why.

After opening the door the oxygen was tested and found 17.45%. He was satisfied from these experiments that badly ventilated rooms that contain less than 20.7% oxygen are very unwholesome. Even if a man lives where a candle will not burn, he does not think it proved that he is not injured.

The closet was tried voluntarily by a young woman, after the oxygen had been reduced to less than 19% by candles, and the CO_2 had reached 2.1%, but no organic matter from human breath. She stood for five minutes very well, then suddenly became white, and could not come out without help.

Again, having supplied CO_2 artificially in the closet to 3.84%, and reduced the oxygen to 20.19%, two men went in, and got headaches instantly. They were not able to stay over seven or eight minutes.

The same lead closet was used as a test of the amount of heat given off by a man in a given time; but as it was not surrounded by a good non-conducting medium, it is probable that considerable heat was wasted through the walls. One man, confined for one hour, was found, on a mean of five tests, to heat the 170 cubic feet of air 5.64° Fahrenheit.

Dr. Smith goes on to say that in the earlier stages of want of ventilation the organic exhalations are most injurious. These bad influences increase with the temperature, but those of CO_2 do not. So that we ventilate in warm weather more for getting rid of the organic matter than the CO_2. The increase of the vitiation to an injurious degree is so insidious, and makes so little impression on the senses, that he considers lack of ventilation worse than the fumes of vitriol: those would alarm the sense of smell, and notify us at once of their presence.

[1] See *Zeitschrft für Biologie*, vol. ix., p. 246.

The relative quantities of oxygen and CO_2 in air, under different conditions and in different places, is given in the following table: —

TABLE "A."

VOLUME OF CO_2 IN THE AIR. [From Dr. R. Angus Smith.]		VOLUME OF OXYGEN IN THE AIR. [From Dr. R. Angus Smith.]		
Places.	Percentages.	Places.		Percentages.
Near Chambeisy,	.0460	London, North,	7 tests	20.857
Lake Geneva,	.0439	" South and S.W.	16 "	20.883
Suburbs Manchester (14 tests),	.0369	" Parks,	7 "	20.95
Pit of theatre,	.2734	" Metropolitan Railway tun'l	10 A. M.	20.60
Stables,	.0833	" "	7.30 P. M.	20.79
Study, at table,	.1177	Manchester, wet day,		20.98
" at ceiling,	.1561	" dry day,		20.91
School-room,	.0970	" dense fog,		20.82
" "	.0886	" suburbs,		20.96
In brewery,	.1214	" sitting-room,		20.89
" near vats,	.1800	Theatre pit,	11.30 P. M.	20.74
In a mill, with 400 people,	.2830 to .3000	Theatre gallery,	10.30 P. M.	20.63
Streets of Manchester, fair,	.0403	Scotch Mts., mean	24 places	20.98
" " fogs,	.0679	" lower, "	12 places	20.94
" " near privy,	.0774	Scotland, mean of	30 places	20.96
" " in suburbs,	.0291	Sea-shore on Heath,		20.999
" " in close blds.,	.1604	Manchester, front y'd,		20.943
		" near privy,		20.700

The higher the apartment is made, and the more cubic space per head, the easier it becomes to regulate the change of air without sensible draughts. It is found that if currents are established near the floor at the rate of over two feet per second, a perceptible and disagreeable effect is produced, particularly if the dew-point is low. The inlet ducts must therefore be so adjusted as to position and size as to have this limit observed as nearly as may be in practice.

A great deal of annoyance has been met with by the neglect of this precaution.

Supposing the inlet and outlet ducts to have been provided of sufficient size to change the air at the desired rate, we have still to see that the fresh-air inlets are so disposed that the air will be properly *mixed* with the air already in the room, and not pass directly to the outlets, as is too often the case. Such a result would of course leave the air in the room without the needed renewal, and it would fall below the desired standard in quality. Even after arranging all the apparatus with the greatest care, it will be found to work very irregularly under differing conditions as to wind and weather. Strong winds on the exterior of a building always exert a powerful influence upon the movements of air in the interior, both by their action through the ventilation ducts, and through all the smaller orifices about doors and windows, and the pores of the walls themselves. Their sum total is often capable of admitting a large quantity of air in windy weather, or when large differences of temperature exist between outside and inside. These cracks do a great deal of work under such circumstances, when least wanted; but in sultry weather, when ventilation is often most needed, they are quite inactive, and cannot be relied upon. Their action is therefore not to be regarded as an assistance, but rather as a disturbing element in carrying out any system of ventilation, often requiring a good deal of special attention to counteract or modify their action, and sometimes making all the difference between success and failure.

Diffusion through differences of temperature causes a good deal of change of air in buildings — called thermo-diffusion.

When air or other gas is divided by a porous diaphragm, and warmed on one side to a temperature above that on the other side, diffusion takes place from the cold side to the warm, though the pressures are equal. Pettenkoffer of Munich (as quoted by Hartley) relates this interesting experiment. He had a room in his house with a tight German stove, of fire-brick. The capacity of the room was 265 cubic feet. The doors and windows being all closed, the temperature outside being 32°, and inside 66°, difference 34° Fahrenheit, he found the air was changed completely every hour. After putting a fire in the stove, the change of air arose to 3,320 cubic feet per hour. After pasting paper over all the cracks around doors and windows, the change was at the rate of 1,060 cubic feet per hour, through the walls. When the temperatures were 71° and 64°, difference 7°, the rate of change was reduced to 780 cubic feet per hour.

Mürker and Schulze state (Hartley) that with a difference of 40° of temperature air goes through one square yard of wall of different materials thus: —

	Cubic ft. per hour.		Cubic ft. per hour.
Sandstone	4.7	Tufaceous limestone	10.1
Quarried limestone	6.5	Mud	15.4
Brick	7.9		

This is a very important fact in regard to dwelling-houses, where the number of persons is often small in proportion to the area of outside wall, but paint on walls may modify this largely.

Let us now consider the influence of the common methods of illumination upon the character of the air.

TABLE FROM LUNGE IN DR. LINCOLN.

Kind of Light.	Used per hour. Litres.	Candle power.	CO_2 per hour. Litres.
Petroleum	0.045	10.	56.8
Oil lamp	0.025	4.	31.2
Candle		1.	11.3
Gas (flat burner)	127.	10.	86.
One man			17. = 0.6 cubic ft.

For equal light we get (*Roth and Lex, Dr. Lincoln*): —

	CO_2 in litres per hour.
Street-gas	155.
Refined oil	87.
Petroleum	75.

Street-gas evolves 681 volumes CO_2 for every 1,000 feet of gas. (*Lunge in Dr. Lincoln.*) Hartley says, two of CO_2 to one of burning gas.

Thus we see that an ordinary flat burner, consuming 127 litres or about four cubic feet per hour of street-gas, consumes as much oxygen and delivers as much CO_2 as *five* men, while an argand burner, very commonly used on our parlor tables, is equivalent to at least eight men. It may be said that the burning of gas does not evolve the organic impurities that human lungs do. But unfortunately street-gas has its own impurities, which though not organic are possibly quite as noxious, viz., sulphur, which in burning in free air produces SO_2, which is often betrayed by the tarnishing of silver-plated surfaces exposed in the room where much gas is burned. At any rate, the depletion of oxygen is a positive loss, however pure the gas may be.

If due consideration were given to these facts in planning the gas-lights, we should soon find that the easiest way to deal with the products of the gas-burners would be to provide special ducts to take them out of the rooms, whenever they are used in any considerable numbers, as they generally are in theatres, halls, etc., as well as in strongly illuminated parlors. Fortunately the amount of heat evolved by the burning of gas is generally sufficient to serve as a motor to expel the noxious products from the room, if we only provide suitable ducts for this purpose. The pure air will readily take the place of what is thus gotten rid of, if we give it a chance; for gravity assists, that is, the bad gases are so heated that their buoyancy helps them out of our way, while the considerable quantity of vapor of water which is evolved by the combustion of the hydrogen serves as a vehicle to take up and carry along the SO_2 and other impurities which the burning gas gives out.[1]

PORTLAND CEMENT.[2] — II.

HAVING considered what I have called the problematical tests of cement, namely, its weight, fineness, and specific gravity, and shown the results which may be expected by this preliminary examination, there remain to consider the absolute test of tensile strength, and the manner in which it is carried out. The object of the test for tensile strength is to obtain the best possible results under certain conditions. The conditions are generally those already given in the extract from the regulations of the Metropolitan Board of Works.

It is evident that to obtain the best result much must depend on the manipulation of the cement, the manner in which it is gauged, the amount of water which is used for the purpose, the care with which it is placed into and removed from the moulds, the length of time which is allowed to elapse after gauging before it is placed in the water, the form of the mould used, and many other minutiæ of manipulation which can only be acquired by actual experience and practice. The amount of water which is required to reduce a cement to a proper consistency, or, technically, to properly gauge it, varies from fifteen to twenty per cent. A quick-setting cement generally requires a larger percentage of water than a slow-setting one, but the exact amount required can only be determined by actual experiments with the sample under examination. The amount of water required also depends upon the skill of the manipulator, as an experienced gauger will bring the mass to a proper consistency with less water than another of less experience or skill, and, as the amount of water used materially affects the result obtained, the importance of using a minimum cannot be over-estimated. Many of the discrepancies which arise when testing cement are undoubtedly due to this cause. With the object of overcoming this difficulty I have devised a small machine for gauging cement, and I find that by its use less water is required, and that the operation of gauging is done much quicker, both points which materially affect to its advantage the result obtained.

The custom seems to have become general that the briquettes should be placed in water twenty-four hours after gauging; this time, though it is perhaps convenient to gauge up on one day and place the briquette in water on the next, — and gives a slow-setting cement every chance, — still, it certainly does not act beneficially on a fairly quick-setting cement, and it is generally advisable to place the briquette in water as soon as it is possible to remove it from the mould without fear of damage, and the twenty-four hours may be taken as the limit of time; as, though a cement which has not by then set sufficiently to bear removal from the moulds may be a fairly good cement, it is too slow in setting to be of much practical value. Again, with regard to the area of breaking section of the briquette, it is usual to specify that the cement shall carry so much on the square inch, and yet the briquette generally in use has a breaking section of 1.5 inches square, giving an area of 2.25 inches. How this custom has arisen, I am unable to say, but it would undoubtedly greatly assist in clearing up many of the discrepancies now to be met with if one uniform section and form of briquette were adopted, and inasmuch as the strength on the square inch is specified, it would seem natural that the briquettes should have that area of breaking section. It will be readily understood that the form of the briquette has much to do with the result obtained, and it is essential that the strain put on the briquette should be tensile only, all crushing forces being detrimental and often resulting in the fracture occurring elsewhere than at the smallest part, and hence giving a false result. Also that the briquette should be capable of easy removal from the mould in which it is gauged — avoiding all necessity of knocking the mould in order to remove it, as such is liable to injure the set of the cement. After experiments with many different forms of briquettes, I have adopted the form shown on diagram No. 2, as the one which best meets most requirements, and which certainly gives the best results of any I have yet tried.

There is another matter which seems to have been overlooked, or at all events not estimated at its full value, by experimentors with cement, namely, the increase in strength between a briquette broken at the expiration of seven days and at the expiration of twenty-eight days. Many cements will stand the ordinary test at seven days, and yet be utterly worthless at twenty-eight days; others will give a good result at seven days, and improve but little afterward; while a cement that gives a comparatively low result at the expiration of seven days may have considerably increased in value. The result of the subjoined experiments shows that this is a most important matter in estimating the ultimate strength of a cement.

No. 2

By an examination of Table IV., it will be seen that No. 1 was a cement that actually satisfied all requirements at the expiration of seven days, and yet at twenty-eight days was actually worthless, being much blown and consequently having no strength whatever; and it would undoubtedly have pulled to pieces any work in which it was used. Nos. 2 and 6 were both strong, quick-setting cements, and showed good results at the expiration of seven days; in fact, they seem in that short time to have attained almost their ultimate strength, as their increase during the next three weeks was but two and five per cent. The other samples show results varying from 20 to 40 per cent increase in tensile strength between the seven and twenty-eight days, and it will be

TABLE No. IV.

No.	Tensile strength, section 1″ square. 7 days.	28 days.	3 months.	Increase or decrease per cent at 28 days.	Increase or decrease per cent at 3 months.
	lbs.	lbs.	lbs.		
1	380	210	—	— 44.73	
2	701	718	728	+ 2.42	+ 3.85
3	510	647	716	+ 26.86	+ 40.39
4	605	772	826	+ 27.60	+ 36.52
5	476	662	—	+ 39.07	
6	693	728	—	+ 5.05	
7	589	764	901	+ 29.88	+ 52.97
8	666	810	—	+ 21.62	

[1] The quantity of *heat* evolved by the combustion of a cubic foot of ordinary illuminating gas is estimated at 700 heat units: an ordinary four-feet burner would then evolve $4 \times 700 = 2800$ H. U. per hour, or 46.6 per minute. The specific heat of air is 0.238, nearly. A cubic foot of air at 60° weighs $\frac{536}{7000} = .0766$ lbs. So that to ascertain how many cubic feet of air, at 60°, would be heated 1° by burning a four-foot burner one minute, we have $\frac{46.6}{.0766 \times 0.238} = 25.562$, or 2,556 cubic feet, 10°, nearly. When we consider that air increases in volume $\frac{1}{490}$ for every 1° of temperature, we see here plenty of motive power to carry off the heated air, and a disturbing element for heat of room if not carried off.

[2] A paper by Mr. Henry Faija, Associate M. Inst. C. E., read before the Royal nstitute of British Architects, February 23, 1880.

seen that at longer dates the quick-setting cements are by no means the strongest.

The importance of fine grinding is again exemplified by examples Nos. 6 and 8. No. 6 is the cement as received from the works: 33 per cent of it would not pass through the No. 50 sieve. No. 8 is the same cement, but ground so fine that it would all pass the same meshed sieve. While, in the cement as delivered, the increase in strength between the seven and twenty-eight days was but five per cent — when ground it amounted to 21 per cent.

By examining Table V., the great loss in strength by using too much water for gauging the cement, and the consequent advantage of using the minimum quantity by which the mass can be rendered plastic, are apparent.[1]

In this paper I have treated solely of what may be considered good cements, and have given the result of the tests made with them under different conditions. The failure of a cement by expansion or contraction during the process of setting has not been brought under consideration, but it is needless to say that a cement which does either would be a dangerous cement to use, the only exception being that a good cement will sometimes blow if used too soon after it has left the mill and before it has had time to cool; but such a cement would, after being properly warehoused, be perfectly reliable.

TABLE No. V.

	Percentage of water used.	Tensile strength at 7 days.
		lbs.
No. 1	15.2	520
" 2	15.8	445
" 3	17.8	346

The deductions which I have endeavored to prove from experiments are: —

1. That the weight per striked bushel, unless taken in conjunction with the fineness to which the cement is ground, is absolutely valueless as a guide to the quality of a cement, and that therefore the two should always be taken in combination, and that it is also advisable when possible to take the specific gravity.
2. That the finer a cement is ground, the less it will weigh per striked bushel, but that it will at the same time be stronger.
3. That the core or coarse particles in a cement act deleteriously, and can be compared only to so much sand.
4. That to be able to form a true opinion of the value of cement, briquettes should, when practicable, be tested at twenty-eight days, as well as at seven, and that the greater the increase per cent is between those dates, the stronger and harder is the cement likely to become.

The details of the weight and fineness, and other matters deduced from the foregoing tests, I have embodied somewhat in the form of a specification which I think meets most requirements, but the purposes for which a cement is to be used must of necessity govern many clauses. Thus: —

SPECIFICATION.

Sample. — From each delivery of cement on to the works a sample of about one bushel will be taken indiscriminately from at least twelve sacks or casks, as the case may be, and will be subjected to the following tests, with the whole of which it will have to comply. The sample thus taken will be considered to indicate the quality of the entire delivery.

Fineness. — The cement to be so finely ground that it will all pass without leaving any residue when sifted through a copper-wire sieve having 625 holes to the square inch, and when sifted through a similar sieve having 2,500 holes to the square inch, the residue, or that which is unable to pass through, shall not be more than 15 per cent of the bulk before sifting.

Weight. — The weight per striked bushel to be not more than 116 pounds nor less than 108 pounds, but the weight must in all cases depend upon the fineness: thus, according to requirements, a cement which, when sifted through a sieve having 2,500 holes to the square inch, leaves a residue of from 12 to 15 per cent, must weigh not less than 112 pounds per striked bushel; should the residue be from 8 to 12 per cent, the minimum weight to be 110 pounds; and should there be less than 8 per cent residue, the minimum weight to be 108 pounds per striked bushel. The bushel measure to be placed on a level floor where there is no vibration, and in every case filled from a zinc or other smooth-surfaced shoot, placed at an angle of 55 degrees, the lower end of the shoot to be five inches above the top edge of the measure. The cement to be allowed to run continuously along the shoot until the cement in the measure is well piled up, when it is to be struck level with a straight-edge. In no case is the measure to be in any way touched or shaken until it has been struck.

Specific Gravity. — The specific gravity to be not less than 2.95, nor more than 3.1.

Tensile Strength. — Twenty briquettes to be gauged from each sample, ten to be broken at the expiration of seven days from the date of gauging, and ten at the expiration of twenty-eight days from the date of gauging. Those broken at seven days to carry an average weight of 400 pounds per square inch of section without fracture, and those broken at twenty-eight days to show an increase in strength of 25 per cent over those broken at seven days. The following particulars are to be observed in gauging the cement to form the briquettes: —

[1] The results of the tensile strength given, throughout the paper, are in each case the average of either five or ten briquettes, and the percentage of water used is in every case taken by weight.

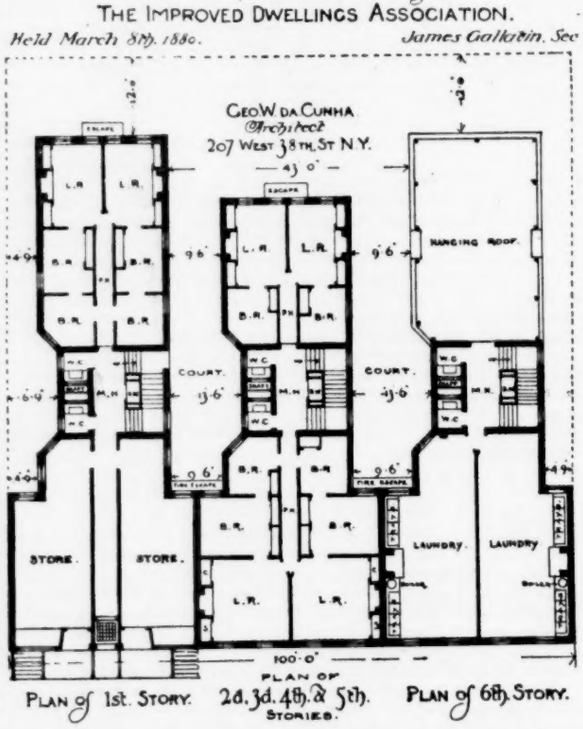
The contractor to use any form or section of mould he chooses in which to make the briquettes, provided always that the breaking sectional area of the briquettes be not less than one square inch. The moulds in which the briquettes are made to be placed on glass or other non-porous beds. The amount of water used for gauging the cement not to be more than 19 per cent of the whole. The briquettes to be removed from the moulds and placed in water within twelve hours from the time of gauging, and allowed to remain therein until they are due for breaking (which will in every case be reckoned from the time of gauging, and not of placing in water), and to be broken immediately on being taken out of the water.

Expansion or Contraction. — Pats about three or four inches square and about half an inch in thickness (gauged with the same percentage of water as is used in forming the briquettes), placed on pieces of glass, to be immersed in water within four hours from gauging, and to show neither cracks on the edges nor on the surface, nor deviation in form when examined at the expiration of seven days.

THE ILLUSTRATIONS.

MODEL TENEMENT-HOUSE. MR. J. W. DA CUNHA, ARCHITECT, NEW YORK CITY.

The Trustees of the Improved Dwelling Association are to build six houses on Seventy-first and Seventy-second Streets, in accordance with the annexed plans.



The houses are to be five and six stories in height, with a half-story to be used for laundry purposes. Two cross walls divide each house into three compartments, insuring security against fire. The apartments are so arranged that they can be rented in suites of two, three, four, and six rooms. Each two families have an entrance from their apartments into a main hall, over which they have sole control. The apartments will have every convenience, wardrobes, dumb-waiters, water-closets, gas and water. Every room has at least one window opening to the air and light. All water-closets have inpendent ventilating shafts. These shafts have no openings into court, halls, or rooms, and are so constructed that they induce a downward and upward current without artificial means.

DESIGN FOR A COUNTRY HOUSE. MR. A. WALLACE BROWN, ARCHITECT, NEWARK, N. J.

DINING-ROOM INTERIOR. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

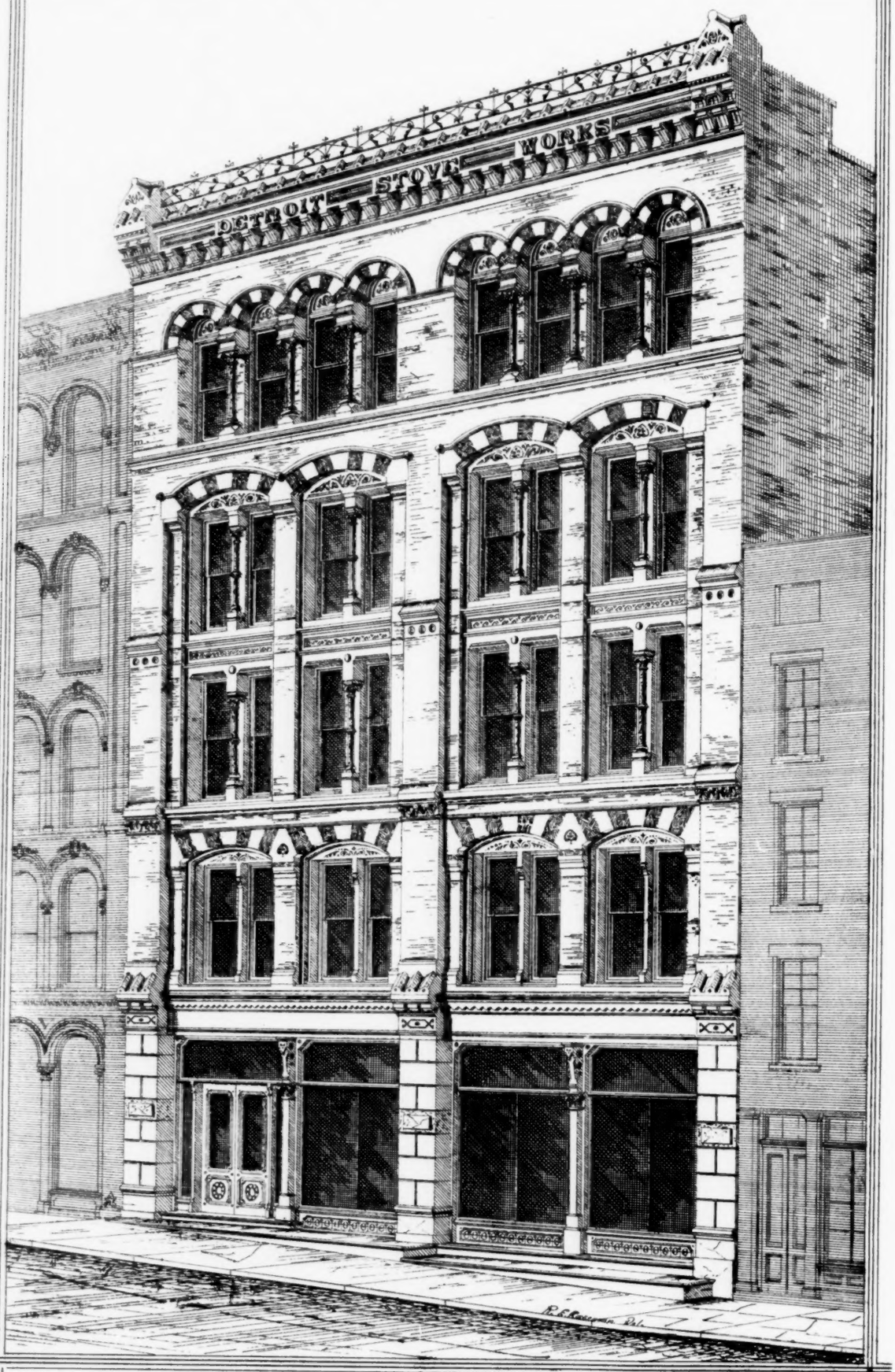
The fire-place in this dining-room was shown in our issue for last week.

THE UNITED STATES COURT-HOUSE AND POST-OFFICE, TOPEKA, KANSAS. MR. J. G. HILL, SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT.

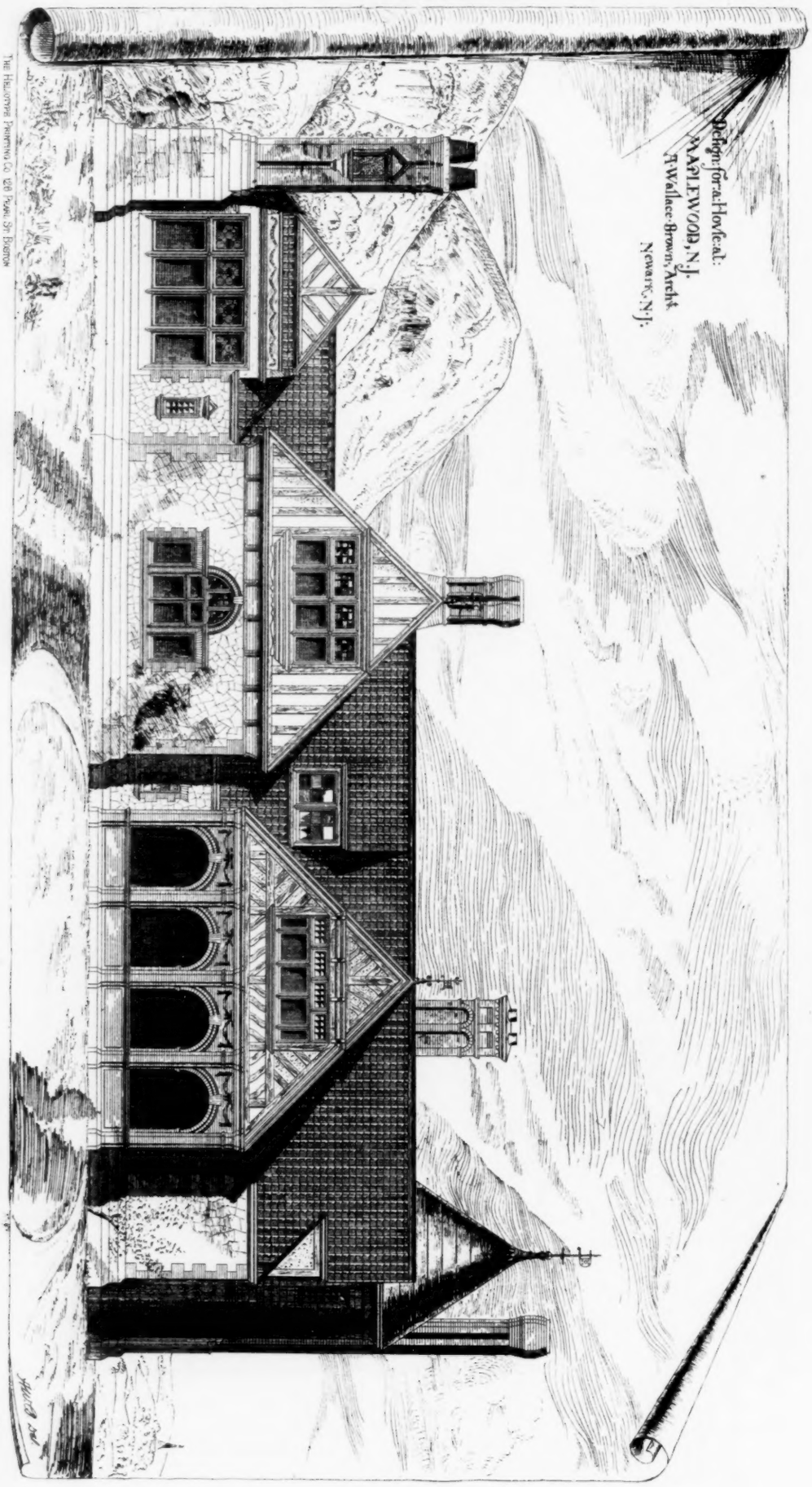
STORE ON WOODWARD AVENUE, DETROIT, MICH. MR. JULIUS HESS, ARCHITECT, DETROIT, MICH.

This building was completed at a cost of $20,000. It is intended

STORE ON WOODWARD AVE FOR DETROIT STOVE CO. — JULIUS HESS - ARCHITECT.



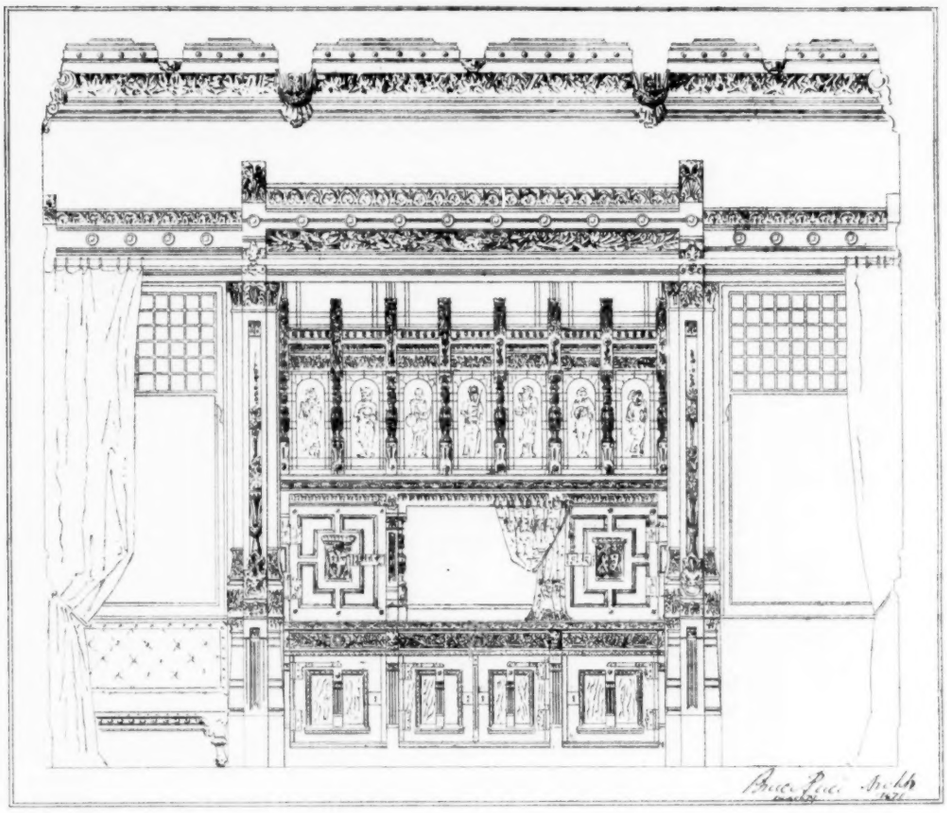
THE HELIOTYPE PRINTING CO. 126 PEARL ST. BOSTON

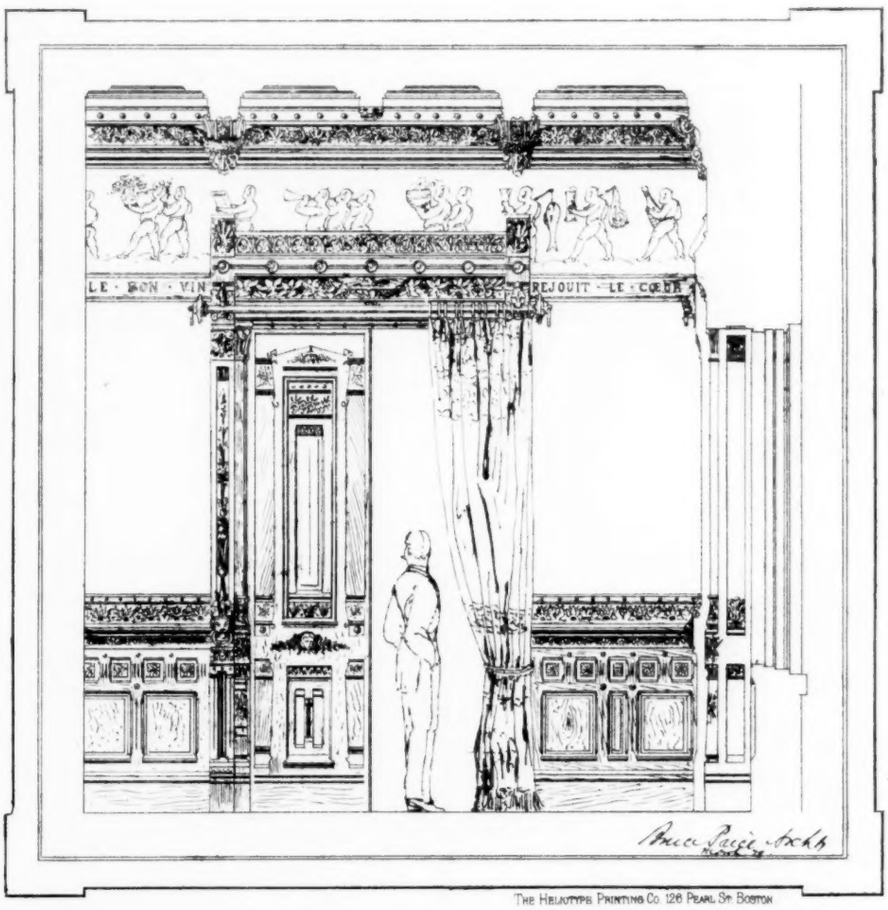


U.S. COURT-HOUSE, POST-OFFICE, &c. TOPEKA, KANSAS.

JAS. G. HILL, SUPERVISING ARCHITECT, TREASURY DEPARTMENT.

THE HELIOTYPE PRINTING CO. 128 FRANKLIN ST. BOSTON.





THE HELIOTYPE PRINTING CO. 128 PEARL ST. BOSTON

A DINING ROOM INTERIOR

for show-rooms and offices for the Detroit Stove Company. The materials used are red brick with Ohio sandstone finish. Shafts of columns, blue polished granite. The offices are finished in butternut and walnut. The building has a frontage of 50 feet on Woodward Avenue, and a depth of 102 feet extending to an alley at the rear.

THE PERMEABILITY OF BUILDING-MATERIALS.[2]

As a general rule, then, the exhaust openings should be near the floor for buildings heated as is customary at the present day. As an exception to this rule may be mentioned the case of bed-rooms, in which the fresh-air supply is obtained in winter through the open window, and no warm air is introduced. In this case, the air may enter at a temperature at or near the freezing point. The purest air will then be at the bottom. The breath and exhalations from the skin will rise to the ceiling, and an exhaust register there placed will be serviceable. It is well, however, even in such rooms, to have an exhaust opening below, as well as above, for use where it is found desirable to warm the pure air before its introduction, as in cases of sickness or during the day-time when window ventilation would prove inconvenient.

The exhaust openings would also be in place at the top of the room, were the system adopted of supplying air partially warmed, say, at 10° or 15° C. (50° or 60° F.), to rooms heated to a higher temperature by hot pipes or flues behind or beneath the walls and floors. The pure air would then constantly fall below the respired air, and the movement of the strata would be the reverse of that now obtained. Such a system of heating would be the most agreeable and salubrious possible; but heretofore its costliness has stood in the way of its general introduction. The cost being equal, that system which approaches es most nearly the desideratum mentioned must be accounted best.

Under pressure, however slight, such as that of the hot air of a furnace flue of little height, air will escape at a thousand minute openings in a room having a number of doors and windows, however carefully the wood-work be fitted, even if no exhaust flue be provided. The aggregate of all these small openings will furnish an outlet if an ample *supply* be provided under pressure, and where the walls are porous the pores themselves will form an outlet. On the other hand, these same minute openings will, *under slight pressure* inwards, such as is occasioned by burning a fire in an ordinary open fire-place where no fresh-air supply flues are provided, admit the outer air in quantities larger than is generally supposed. Mr. L. W. Leeds in his excellent book on ventilation well says: "In the good old days of open wood fires, when, as in our childhood, the real chimney-corner was the family sitting-room, so to speak, or at least for the children, then, with all the listing of doors, calking of windows, and filling up of key-holes, there was certain to be an abundance of fresh air that would force its way into the room in spite of all efforts to keep it out. But with the introduction of anthracite coal and air-tight stoves, and still worse, steam-pipes, placed in the room for heating by direct radiation, the stopping of all draughts, that were before so annoying, became a matter of easy accomplishment. The results thereof have been perfectly frightful: persons have thus unconsciously been smothered to death by the thousands and tens of thousands."

In order to test the influence of a slight pressure in forcing air through the pores and accidental fissures of an ordinary living room, the writer made the following experiment: A room about five meters square and 3.50 meters high, containing five windows on three sides, two doors and a fire-place, with walls and ceilings plastered and floors of soft pine, was taken for experiment, in a city corner house, now being built by the writer. A flue ten meters long, from a basement furnace, furnished the room with hot air. The windows and doors were first made as tight as possible with rubber mouldings. The fire-place was then closed by drawing the damper and pasting paper over the cracks. The brick back and jambs were oiled to render them impervious. All the wood-work was thoroughly oiled and shellacked. A good fire was lighted in the furnace, and the register opened into the room, all doors and windows being closed and locked, and the key-holes stopped up. The hot air entered almost as rapidly with the doors closed as when they stood open, and it continued to enter at the rate of 2.5 cubic meters per minute without diminution as long as the experiment was continued. The thermometer stood at 2° C. outside. The entering hot air ranged from 40° to 55° C. The day was March 3, 1880. Other experiments gave the same results. The pressure of the hot air from the register was sufficient only to raise a single piece of cardboard from the register. A portion of the air must have passed through the pores of the materials, and the rest through cracks and fissures which escaped detection. On the 5th of March, a coat of oil paint was applied to the walls and ceilings. This diminished the escape of air only about five per cent. On the 19th of March, four coats of oil paint had been put on the walls and ceilings, and three coats on the floor, to render them absolutely impervious to air.

The escape of air was diminished only about ten per cent.

On the 25th of March, all the window-sashes were carefully examined, and all visible cracks at the joints, at the pulleys, cord-fastenings, etc., carefully calked and puttied, and the entire room examined, and putty used freely wherever even a suspicion of a crack could be found. The result of all this was a diminution, at the utmost of but twenty per cent in the escape of the air, or, in other words, in the entrance of air through the register. Each experiment was continued during more than an hour. The air entered as freely at the end as at the beginning of the hour, when a volume of air, more than equal to the entire capacity of the room, had entered it through the register, with no visible outlet.

Nevertheless, numerous microscopic outlets must have remained, especially around the window-sashes, through which the air escaped in this large quantity under the slight pressure applied. In order to render the room completely air-tight, therefore, it would be necessary to surround the windows, doors, mantel, and base-board entirely with a thick coating of some absolutely impermeable substance like tar or putty, or to paste over them large sheets of oil-cloth or paper. The room would then, and then only, be hermetically sealed, and the hot air from the furnace would cease to enter as soon as it reached its limit of compressibility under the pressure applied.

[2] This paper, by the writer of the "Open Fire-place" articles, will be published with them in their separate form.

THE LADY'S BRIDGE, TOLEDO, SPAIN.

A LEGEND.

"The archbishop has determined to rebuild the bridge."

"The news is too good to be true."

"It is true, for I am the messenger to the architect to whom the work is to be committed."

"Toledo will pray forever for Don Pedro Tenorio if he carries out this design."

Such was a fragment of conversation in the streets of Toledo, in the year 1390. The ancient bridge, broken down by the floods of 1203, and afterwards rebuilt, was now to be restored with great magnificence. The architect was one whose fame had extended far and wide, but this promised to be the crowning achievement of his art.

"Spare not," said the archbishop, "but let the bridge be worthy of the town, of its artist, and of its founder. Let it typify my munificence, thy genius, and the strength and beauty of the city."

"It shall be worthy of all three," proudly responded the artist.

Troops of workmen were now engaged, piles were driven, immense stones, selected with great care, were brought to the river banks, and wrought into shape. The architect spent much of his time in watching the gradual realization in concrete form of his design. At first he was blithe and cheerful, animating the men with his own spirit, and full of devices for smoothing away all the many difficulties that arise to impede such undertakings; but after a while his manner changed, and in proportion as the bridge advanced to completion, he became sad and moody. One day he sat and gazed for hours at the bridge, wrapped in sorrowful thought, taking no heed of the bystanders, like one in an evil dream. A soft hand was placed on his shoulder, a low, shy voice gave utterance to his name.

"Luis!"

"Juanita!"

It was the girl to whom he was betrothed, and whose fate was to be linked to his own on the completion of the bridge.

"Why are you so sad, Luis? What is the meaning of the sorrow that seems to darken all your life? Am I the cause? Do you no longer love me?"

"I love you dearer than life."

She gave a little sigh of pleasure and relief.

"I was afraid some stately dame had stolen your heart away from poor Juanita."

"Impossible. I have no heart. It is in your keeping."

"That's a pretty compliment, but it is not true; for if I had your heart I could read in it the secret cause which has converted my gay lover into a melancholy, moody man."

"I will tell you the cause, Juanita, and my confidence will show you how much I love you, for it places my life and my honor in your hands. Both, alas! will soon be blasted."

"Oh, say not so, Luis. I know you are incapable of crime, and every thing else can be remedied."

"Find me then a remedy for this. In the plans for the construction of the bridge I have made a fatal oversight. The mistake is known only to myself, and I only became conscious of it after all possibility of correcting it was gone. The bridge now is incased in a network of scaffolding, shoring, and supports of every kind; but the moment these are cleared away the centre of the structure will fall into the river, and that which was to have been the monument of my skill will be a hideous ruin, a fit symbol of my folly and disgrace."

Juanita was stunned by this unexpected revelation. The vague fear inspired by her lover's changed demeanor had determined her question, but she had not dreamed of a ruin so near and so complete. In a moment she saw fade from view all the happiness of the future that had been living in her day-dreams, and giving a roseate hue to the widening horizons of womanhood. The glowing colors of life changed before her eyes into the blackness of death and despair. Then, with the woman's instinct that seeks to comfort others, regardless of her own anguish, she sought to console him.

"How cruel I have been to reproach your sadness! How little did I think it had so terrible a cause! But tell me, Luis, can you devise no remedy?"

"None."

"Nothing but taking down the bridge, and rebuilding it?"

"Nothing less will avail."

"Well, let us trust in God. Perhaps He will point out some way of escape. For me, I will go and pray to Our Lady for her help and guidance. I feel sure, Luis, that this evil will be averted."

There was no foundation for her hope, and yet it comforted him.

. . . . . .

It was the night before the day fixed for the final inspection of the bridge. To-morrow the archbishop will pronounce his solemn blessing on the work; to-morrow the scaffolding and trusses will be removed; to-morrow the bridge will stand forth, in all its glory, a proud ambition to the many beauties of the city; to-morrow —— The night was stormy: wind and rain had swollen the river into a torrent; and Luis, as he tossed restlessly upon his bed, almost prayed that its force might sweep away the entire structure. It would be a less disgrace than that which awaited him on the morrow. He arose, and stood at the window of his room. He looked out into the night. His eyes naturally sought the direction of the bridge, but there was nothing to be seen but blackness. Stay, what was that wandering flame? His heart seemed to stand still, as a dim white figure, bearing in its hand a burning torch, passed over the bridge. A light was thrown over one of the parapets. As the figure glided about the doomed bridge, its progress was marked by the springing up of lurid flames. Then the white and mystic figure vanished from sight, and — the bridge was in flames.

The timber-work burnt fiercely; the wind fanned the flames into fury, and the rain, instead of quenching, seemed to stimulate its power. Then, as the fire began to flood the sky with its lurid light, the city awoke. The great alarm-bell was rung, and hundreds of anxious citizens thronged the river's bank, anxious to help and save. It was in vain. Amongst the latest arrivals were the architect and the archbishop.

"This is a sad end of your work, my son," said the ecclesiastic, "but be not cast down. The bridge shall be rebuilt; and if, in the course of the erection of this one, you have found any thing that could be improved, the new one shall be even more magnificent than we had purposed this to be."

As the architect was gratefully acknowledging the archbishop's generosity, he saw Juanita with her father approaching.

"You are saved," she whispered.

"You are my preserver," he returned.

. . . . . .

The destroyed bridge was replaced by one of greater beauty, and there was no fatal flaw in the second design made by Luis. As for the beautiful incendiary, she became the wife of the architect. Before the marriage, she sought the palace of the archbishop, and, under the seal of confession, revealed the secret of her action. The good prelate, moved by the courage and devotion with which love had inspired her, not only forgave her crime, but caused her image to be carved upon the stone above the keystone of the arch, as an emblem of loyal love. There it stands to this day upon the Lady's Bridge. — *The British Architect.*

QUEEN ANNE.

When the third William, of pious memory, condescended to deliver this country from Popery and wooden shoes, he brought in his train other notions besides Protestantism and prunella. He was the means, for example, of introducing into English domestic architecture a Dutch element of detail, if not of outline, traces whereof still survive in our ancient village homesteads, and may especially be observed in the courtyards of hostelries in coaching towns. This Dutch graft harmonized admirably with the good old Elizabethan stock, to which, as an offshoot of the Renaissance, it bore the strongest affinity; and by degrees it fructified into what is now recognized to be a distinct style of domestic architecture, a style which, rightly or wrongly, bears the name of Dutch William's successor. Time brings its own revenges, and among them none is more characteristic of the periodicity of taste than the resuscitation of the Queen Anne style immediately after a revival of Gothic, which at one time promised to be both general and permanent. Gilbert Scott, however, no longer wields the wand of an enchanter, and the style which he strove so artistically to popularize lacks what the theologians term the grace of congruity. The contrast of modern costume and modern furniture, with mediæval ornamentation, savors too strikingly of anachronism; indeed, the very pictures themselves seem out of place in a chamber gorgeous with polychrome and panelling. On the other hand, the Queen Anne style dovetails exactly with our existing canons of taste. Chippendale furniture is a century later, yet it fits well with the home-like classicism of a Dutch interior. Old blue, bric-à-brac, dark oak Caroline cabinets and chests, huge antique picture-frames, all are equally in keeping, while the sumptuary ideas of the more ornate sex could easily gravitate in the direction of those massive robes wherein Sarah Jennings swore and Queen Anne ruled. As a matter of plain fact, the mode now in vogue would have suited even Helena Forment herself, not to mention those fair names known as "The Elephant" and "The Bumble Bee," who added something of grace, though not much of dignity, to the court of King George. The style, in short, adapts itself easily to the requirements of a rather luxurious and distinctly fastidious epoch, and at the present moment combines the rival attractions of novelty and antiquity. It offers as much in regard of absolute beauty as the elder Pugin could when he preached to an age saturated with Palladianism the gospel of Gothicism; while its pedigree, if not quite so long as that of mediævalism, is at least respectable, being two hundred years old.

To form an exact judgment on the merits and blemishes of this style, it is necessary to view with a critical eye its best models. There are some excellent examples in the new quarter of the town now building to the west of Sloane Street; in and about the Melbury road, Kensington; on the Embankment at Chelsea; and at Hampstead. The most ambitious, and perhaps not the least successful, effort to reproduce the style is, however, that of Mr. Norman Shaw, R.A., at Chiswick, where he has erected a township of villas which display the Queen Anne type of building under its every phase. Regarding these residences as so much tentative work of an artist who has identified his reputation with the style, it may fairly be argued that they challenge criticism, and this relatively even more than absolutely. A new mode of house-building is offered for the inspection of those especially who are interested in architectural progress, and here the two-fold question arises: Is it beautiful, and is it also sufficiently utilitarian? The answer to the former of these queries must in the main depend upon temperament and taste. To some people an inflexible regularity of outline is an essential; to others the elasticity of the Gothic style, which is fully shared by that of Queen Anne, loses its charms if not associated with mullions, tracery, gargoyles, and other mediæval accessories. There is, however, apart from prejudice, a certain positive beauty in the picturesque; and Mr. Norman Shaw may fairly lay claim to having constructed a picture in his well-grouped houses with their high-pitched roofs, their warm tints, and "fifteenth-century" bay-windows. South Kensington would indeed be up in arms, were such gems of design characterized as ugly, but of course the further question of utility is a different matter altogether. A home may be exceedingly lovely to look at, yet almost, if not quite uninhabitable. Æsthetic windows may admit draughts, and æsthetic traps sewer-gas. The arrangement of the interior from the basement to the attic may be the quintessence of inconvenience, while the chimneys may convey your smoke in any direction except upwards. If, however, the Queen Anne houses sin in any one of these respects, the fault is rather that of the architect or builder than of the style. In this cold Cimmerian climate of ours, warmth and light are the prime essentials of comfort. Of these, warmth depends upon a variety of considerations over and above architecture, while art, however, must be held responsible for the quantity of light vouchsafed. It is indisputably the most attractive feature of the Queen Anne style, that it never grudges daylight, bestowing as much as the construction will allow, and anon illumining the home from top to bottom with sunshine by means of a cupola or lantern, which crowns the sky-line, to the incalculable advantage of the appearance of the exterior. It is mainly on account of its munificence of the good gifts of Phœbus that this style has found such great favor with the artistic fraternity, to whom sunlight is bread, if not opulence; and if, as appears probable, the public, over and above the *dilettanti*, resort to the form and manner of dwelling affected by our ancestors in the days of Marlborough, utility will bring about that result far more than abstract æstheticism." Most of us have a predisposition in favor of honest red brick, and tiles of the same hue, together with high-stacked chimneys and big windows, in shape rather more attractive to the eye than a mere plain parallelogram; but if we probe the true cause why we relish these special details, we shall find that it is not because they are old English, nor because they are picturesque, still less because they chime in with some formula of artcant, but emphatically because they are suggestive of comfort. — *London Globe.*

THE PRESSURE OF WIND.

A paper was read by Mr. A. Buchan, at the last meeting of the Scottish Meteorological Society, on the "Storm of December 28, 1879," the day when the Tay Bridge fell. In two respects, he said, that was the most remarkable British storm he had ever examined. These were (1) the extraordinary fluctuations of the barometer that occurred during the time the storm lasted, and (2) the rapidity with which the cyclone advanced along the surface of the earth. The path of the storm was from Barra, in the west, across Ross-shire towards Orkney and Shetland. The average rate of the progress of the storm in the United States was about 26 miles an hour. In Great Britain and in Western Europe generally, 20 miles an hour was the ordinary rate of progress; it was often less, though sometimes it rose to 40 miles. The storm in question, from four to five P. M., travelled 30 miles; from five to six, 45 miles; from six to seven, 53 miles; from seven to eight, 70 miles; and from eight to nine, between 60 and 70 miles. It thus appeared that between seven and nine o'clock the storm advanced 140 miles. This had no connection with the velocity of the wind; it was merely the progressive movement of the storm. Along with the storm there came a rise of temperature from 49 to 55 degrees, which was the mean temperature of a night in June. This was another point which made the storm stand out as a most remarkable one. As to the velocity of the wind, Mr. Buchan mentioned that at Bidston observatory, near Liverpool, in a storm twelve years ago, a new pressure anemometer, which registered up to 70 lbs. to the square inch, was driven up to its full pressure and damaged. Here, then, was a case of wind with a force of 70 lbs. to the square inch at least, and it must have been above that. About four years ago there occurred a gust of wind at Sydney, Australia, which lasted two minutes, and during that time had a velocity of 150

miles an hour. Taking ten or twelve minutes, its rate was 112 miles an hour. As to the storm of December 28 last, the following facts had been communicated by Mr. Scott, of the Meteorological Office, London: At Glasgow, between 6.20 and 7.20 P. M., the maximum velocity of the wind was 71 miles an hour; at Aberdeen, the maximum registered was 63 miles, between 8.50 and 9.50 P. M. At Aberdeen, from 7.15 to 7.20, the velocity was 76 miles per hour. At Seaham, near Sunderland, the hourly velocity was 40 miles at the time when the wind had its greatest strength. At 6.50, during a squall, the rate must have been 150 miles an hour. Mr. Buchan remarked that there could not be said to be any pressure anemometer in action in Scotland, that being the only instrument which could record with accuracy gusts of wind, and he hoped they might soon have a number of such instruments in various parts of the country. At Dundee, according to the local observer, the greatest violence of the gale was experienced at a quarter past seven o'clock. There were two things connected with the storm which struck him, — one was a crackling, rumbling noise in the upper air, which seemed to descend to the earth; and the other the great force which the wind exercised on standing objects, such as trees, chimneys, etc. That crackling noise, said Mr. Buchan, was observed in the great Edinburgh hurricane of twelve years ago. He had a note from Mr. Harvie Brown, of Dunipace House, Stirlingshire, who said that, about 7.20 P. M., about 1,800 cwt. of lead, weighing 8 lbs. to the square foot, was torn from the roof of his house like a sheet of paper. A part of that, weighing 3½ cwt., was carried 32 feet clear of the house, and the remainder was wrapped like an Ulster coat with a hood round one of the chimneys. He (Mr. Buchan) had endeavored to lay down the barometric gradients observed in this storm, but he did not find any of these so high as the steepest gradients which occurred during the Edinburgh hurricane. On that occasion there were thirty-three instances of solid masonry being blown down or damaged; but, so far as he learned, there was no such damage done in Dundee or anywhere in Scotland by the storm of December 28th to equal that.

Mr. St. John Vincent Day, C. E., spoke upon the great importance to engineers and bridge-builders of having accurate records of the velocity of the wind. Having seen remarks in the newspapers that the Forth Bridge had been passed by the railway authorities and the Board of Trade, he had made inquiries respecting the calculations on which it had been based, and he had found, on the authority of the Astronomer Royal, that only 10 lbs. per square foot had been allowed for wind pressure. Engineers had considered the matter, and he believed they had reported that with regard to wind pressures they had found nothing upon which they could place any dependence, except the old tables of Smeaton, which put down the pressure of the wind at from 7 lbs. to 12 lbs. and 13 lbs. to the square foot. Numerous wind pressures, Mr. Day showed, had been recorded since then by Professor Rankine, Professor Piazzi Smith, and Dr. Robinson, Armagh, the last-mentioned of whom had stated that the gusts of one particular storm, which was half a mile in breadth, blew at the rate of 125 miles an hour for six minutes continuously. What would become of the Forth Bridge in such a gale as that? But of course the bridge as at present devised was not going on. He had that from the Board of Trade. The report of the engineers had been set aside, and the strains as yet were still unsettled. As to the pressure on the Tay Bridge on the night when it fell, the wind would, of course, blow with much greater force down the conical valley of the Tay than it would in the open; and, according to Dr. Robinson, nearly one-third would have to be added to its velocity near the bridge, owing to the contraction there of the Firth. Dr. Robinson had also said he had no doubt that the vertical effect of the wind resisted by the water below and by the pressure of the head above would tend to lift up the whole bridge off the piers. On February 20, 1877, a storm was recorded at Holyhead, the gusts of which blew at the rate of 200 miles per hour; and on November 16 of the same year there was a storm which blew at 180 miles an hour. — *The Architect.*

EXTINGUISHING FIRES WITH STEAM.

Mr. Joseph Bird, a gentleman who is very much interested in all that concerns the extinguishment of fires, writes to the *Fireman's Journal* as follows: —

"It is very singular that this improvement has not been made in steam fire-engines. That a building on fire, but which has not burned 'out' to the air, can be, if not too large, instantly extinguished, and with one-tenth of the loss, especially if filled with merchandise, than it can be by water, is true beyond a doubt. Many of our great warehouses are so large that no one or perhaps two steamers could fill them, and thus they would not be saved in this manner, unless brick or iron walls are thrown across the buildings, as is the custom in Liverpool and London. I propose to describe the way the engines would be worked when this steam arrangement was made, and the steamers altered so as to throw steam as well as water. On arriving at a building on fire, the men would instantly perceive whether water or steam should be used; if water, the arrangement for work would go on as at present. If the fire was confined within the building, the steam-pipe would be got ready, while one man, with the proper sized auger, bored a hole for the steam-pipe into some door or window near the fire. That is all. Water or steam. Now one, then the other; and the property of the city vastly better protected by it, and at a very slight expense. Steam has often been tried at different times; and as it has been under difficulties, it has often failed. These failures were sure to have the widest circulation, while success has often been kept out of sight. All buildings in which steam is used should be prepared so as to extinguish their own fires, which would save a great amount of property to the owners, and often to others. Persons owning such buildings, and wishing to prepare them, may learn how simple the manner is by calling to see the kerosene-works of the Downer Company at South Boston. Of course such works, under the most careful direction, often take fire. If a fire occurs there, in a minute the doors are shut, and steam turned into the building from the outside. In from one to three minutes that portion of the buildings is crowded with steam, and the fire is out, when at its leisure the steam is allowed to escape, and the men go to their work again. One of the neighboring business men took quite an interest in this new way of getting rid of the dangerous element, and as the steam smothered out one fire after another, he became so excited as almost to wish that the fire would for once come off the conqueror. Hearing one day an unusual noise in that direction, he looked up and saw one of the buildings wholly enveloped in flames. 'There!' said he, 'now they will catch it!' and off he went, pell-mell, to get around to the front and witness the destruction. On his way he had to run a few rods out of sight of the fire. His last look showed no diminution of the flames; but when after a run of ten rods he came into full view, the steam had been turned on, and to his unbounded astonishment, not the slightest sign of fire could be seen! It would be very easy to bring about this much-needed change, as, when application was made for using steam-power in a proper place, it could be granted on condition that the parties should introduce steam-pipes for extinguishing fires. These would soon prove so efficient for that purpose, that all persons owning buildings using steam would find it for their interest to also introduce such pipes. There need be no fear that there will be too many ways to get rid of fires. It is because we have had but one string to our bow, and that sometimes lost for fifteen or twenty minutes, that we have so many fires, at last culminating in the conflagration of November."

THE PROPOSED BACK-BAY PARK, BOSTON.

To the Editor of the American Architect:

Dear Sir, — In a former note I showed the unsoundness of the premises pardonably taken for granted in the comments of one of your contributors upon the plan for this work. Will you please let me, for the reasons then given, also question those of the objection since raised to it by your correspondent W.

In presenting the plan to the Commissioners, three objections were anticipated, as to the grounds of which they were advised that my opinions should not be taken as authoritative, and three gentlemen, each eminent in his department of natural science, were consequently invited to examine the plan and give judgment upon the points thus placed in doubt. As the opinions obtained were given verbally and informally, they cannot be quoted; but for the present purpose it may be sufficient to say that one of the questions submitted was as to whether the conditions proposed would be particularly favorable to the breeding of mosquitoes, and that the answer was satisfactory to the Commissioners. Mosquitoes are believed to be less likely to breed under the intended circumstances than in the present Public Garden, and no good reason is known for supposing that any that may be bred will be of the "particularly malignant type" imagined by your correspondent.

Yours respectfully,

Frederick Law Olmsted.

THE NEW ALBANY CAPITOL.

To the Editor of the American Architect:

Dear Sir, — The cause of the cracking in the sandstone abutments in the grand corridor of the new Albany Capitol perhaps lies in the modification of style in the edifice. The description of the Assembly Hall in *Scribner's Monthly* for December, 1879, clearly explains the change in construction. The original design contemplated but light work in this hall as bearing upon the corridor-piers below; while the change made the piers under the granite columns take an additional load of half a million of pounds — more or less — in excess of the original design. It seems an incongruous attempt to put substantial Gothic stone vaulting of large span — upon which very likely the roof, and dormer rooms besides, have a support, — upon a structure below, not planned for such construction. Either the first designers put too much material in the lower stories and foundations, or the later designers have put too much on top of the original. The subject may be easily illustrated by diagrams from Messrs. McAlphine, Fuller, and Eidlitz, for the attention of the architect and builder.

V.

PUBLICATIONS RECEIVED.

Illustrations of the History of Art. Part V. The History of Painting from the time of the Egyptians to the close of the Eighteenth Century. Boston: L. Prang & Co., 1879. Price $2.50.

Mathematical Drawing Instruments and How to Use Them. By F. Edward Hulme, F. L. S., F. S. A., Art-Master of Marlborough College, Author of "Principles of Ornamental Art," "Familiar Wild Flowers," "Suggestions in Floral Design," etc. Approved by the Science and Art Department. New York: Bicknell & Comstock, 1880. Price $1.50.

NOTES AND CLIPPINGS.

An Elevated Electric Railway for Berlin. — The council of magistrates of the city of Berlin had under consideration, a short time ago, a proposal, submitted by Messrs. Siemens and Halske, for the construction of an electric railway across a portion of the capital. There will be two lines of rails, one for the up and the other for the down journey. The lines will be carried on iron pillars 14 feet 9 inches high, and nearly 33 feet apart. These pillars will be placed along the edge of the footpath, so as to cause the least possible interference with the ordinary traffic. The carriages will be narrow and short, containing ten sitting places and four standing places. The electro-dynamic machine, which will propel the carriages, will be placed under the floor of the carriage between the wheels, and a steam engine of 60 horse-power, which will be employed in the production of the electricity, will be placed at the terminus. The stoppages will be very few, and the rate of speed will be, it is expected, about 20 miles an hour. The chief object of the undertaking is to convey persons quickly across the city, and especially to facilitate access to the city line of railway. The chief objection raised is that the carriages will pass along at the level of the first floor of the houses in the streets which it will traverse, and it is feared this will lead to a depreciation of property. The magistrates have appointed a special commission of engineers and architects to examine into and report upon the proposal.

The Ashtabula Bridge Disaster. — The recent accident to the Tay Bridge has led engineers to reconsider the causes that may have occasioned some of the hitherto unexplained disasters to bridges. Amongst others General Budlong A. Morton, of New Haven, writes as follows about the fall of the Ashtabula bridge in 1876: —

"At the time this bridge was built, the science of bridge-building was in its infancy. It has scarcely reached a youthful stage at the present time. We had made but little progress in the study and knowledge of the elemental forces. Wind, a factor which was but little understood at that time, and whose variable forces are but slightly understood by a few at the present, was not considered to the extent of providing against its power. When we take into consideration the shape of the valley of the Ashtabula Creek from the bridge to the lake, together with the velocity of the wind at the time, we find, by the concentration of two currents of wind at the point of contact with the bridge, that the force applied laterally to the bridge exceeded 42,000 pounds. That, combined with the upper current of wind from the northwest, striking the train at an angle of 45 degrees, at a velocity of 60 miles an hour plus the speed of the train, 15 miles, equal to 75 miles per hour, or a resistance of 23 tons to the square foot, would seem to clear away the mystery as to the cause of the accident. There was a pressure upon that bridge at that time that no human foresight could have foretold."

A New Metallic Compound. — A new metallic compound, applicable to many artistic and industrial purposes, has been recently announced in England. The substance belongs to the class known as the thiates, or sulphur sulphides. Nearly a year ago Mr. J. Berger Spence discovered that sulphides of metals combined with molten sulphur formed a liquid. This liquid, on cooling, became a solid homogeneous mass, possessing great tenacity, and having a peculiarly dark gray, almost black color. It has a comparatively low melting point, viz., 200° Fahr., or rather more than 100° above the temperature of boiling water. It would thus require only a small amount of fuel to reduce or to melt it. The new compound also expands on cooling, — a property not shared by the majority of other metals or metallic compounds. For such purposes as joining gas or water pipes this expansion is of great importance. It is also claimed that the new compound resists favorably atmospheric or climatic influences, as compared with bronze or marble, and its resistance to acids is much superior to that of other metals or metallic compounds. These qualities, if sustained by further experience, would certainly render the new compound very useful in many ways.

Artesian Well in Boston. — At present an artesian well is being bored in Boston under the direction of Mr. J. A. Whipple, in order to determine whether or not there is under the city an adequate, available supply of pure water. The experience of the men engaged has been as follows: They first bored through six feet of hard filling; then met with a stratum of some soft black substance in a semi-fluid state, about forty to forty-five feet in thickness. Below this they found from ninety-three to ninety-seven feet of stiff blue clay, overlying a stratum of coarse gravel, in which they found a small stream of excellent pure water. After this they again encountered a twenty-foot vein of the stiff blue clay mentioned before, having passed through which they struck a solid bed of hard slate rock or shale, which necessitated the use of the rock-drill, which they are using up to the present time. At the depth of three hundred feet they struck a second small stream of good water in the slate rock. They have now reached a depth of about three hundred and seventy-five feet. The tubing they put down measures eight and one-half inches, outside diameter, and is one-fourth of an inch thick. The weight now operating on the rock is about 3,000 pounds, the drill itself weighing about 1,600 pounds.

The Destructive Forces of Nature. — During the years between 1871 and 1876, the average loss to life and property in France, inflicted by the phenomena of nature, was distributed as follows: —

By ice and frost	153	million francs.
" hail	83	" "
" fire	39	" "
" storms and floods	38	" "
" cattle-disease	32	" "

Another Chance for Architects. — Prince Demidoff is to build a new palace at Pratolino, near Florence, and all the leading architects of the world are asked to compete in designs for it. He has sold his art collection because he had become weary of it, and wishes to form a new one.

Mr. Lorillard's Mexican Expedition. — The New York *World* says: M. Désiré Charnay, who is to conduct the Lorillard expedition to Mexico, is already familiar with the field he is about to enter. As long ago as 1857 he visited both Mexico and Central America on a mission from the French Government to explore the ruins first described by Mr. John L. Stephens. On that occasion he took many photographs of the temples, monuments and tombs of Mitla, Palenque, Chichen-Itza and many other interesting points, and on his return with them to France he published an atlas of them, together with a companion volume entitled "Cités et Ruines Américaines." All monuments and objects of interest to antiquarians and historians which may be discovered during the expedition, and which can be safely and conveniently removed, are intended, with the consent of the Mexican authorities, to become the property of the French Government, and are to constitute a separate museum. Casts and photographs will be taken of all the monuments, bas-reliefs, inscriptions and objects of interest obtained or visited, and these will become the property of Mr. Lorillard. A Mexican statute now in force forbids the transportation out of the country of such objects as those embraced in the scope of this interesting expedition. Señor Zamacona has stated that it is possible that the rigor of this law may be abated in favor of the Lorillard expedition. Of this we, bearing in mind the way in which Dr. Le Plongeon was treated in his attempt to remove the great statue of Chaacmol, have grave doubts.

Central American Appreciation of Art. — Some years ago the Empress Eugénie presented a colossal bronze statue of Columbus to the town or settlement of Aspinwall, at the Isthmus of Panama. The place is now called Colon, as it is supposed that the discoverer visited the coast on his second voyage. The negroes, ship-chandlers, and agents, who constitute the inhabitants, care little for works of art, and, according to a traveller who lately visited the place, they hesitated about accepting the gift because they objected to pay the freight, till the captain of the steamer who had brought it, vexed and perplexed, flung the statue or group (Columbus is represented as sheltering the young State of Colombia, in the shape of a feather-crested Indian maiden, under his arm) into the mire of a swamp on the shore. There it lay ignominiously year after year, till it was at last fished out by the manager of the railway company, who wished it to be part of the pageantry of the inauguration of the line. They set the statue on the ground, upright, but set it up hastily and clumsily, without basement or pedestal, on the bare ground, where it remains to this day, hardly protected by a rough wooden paling which lets in dogs and pigs, and harbors them like a happy family at the great man's feet; a very "pearl" of European art thrown away, in defiance of the old wise saw, on these unappreciative Transatlantic "swine." — *The Architect.*

The Palenque Tablet. — In "The Palenque Tablet," by Charles Rau, published by the Smithsonian, the author says of this famous bas-relief of Yucatan, described by Waldeck, Stephens, Morelet, and Charnay: "Considering that signs, or parts of signs, for months, and more particularly such as denote days, occur in conjunction with numbers expressed by bars and dots on the Tablet of the Cross, I venture to suggest that its inscription constitutes a chronological record of some kind. The central group of figures probably illustrates one of the events narrated, or indicated, by the surrounding glyphs." This cautious statement by Dr. Rau appears to have been based upon inferences drawn from manuscripts of Mexican and other tribes, handed down from the time of the Spanish conquest.

How Bric-a-Brac Shops are Supplied. — The *American Art Review* mentions that a man was lately caught in the garden of the Tuileries trying to break a statue. He stated that he was a dealer in *débris;* that it was his occupation to break statues, statuettes, bas-reliefs, and to sell them for export. He affirmed that the English are the best customers for wares of this sort. An advertisement in the London *Times* having offered for sale "the materials of the cloister of the Carmelites of Pont l'Abbé, built in 1383," the municipality of that place has contributed 1,500 and the French Government 2,000 francs, in order to gain possession of the property and keep it in France.

A Burglar-proof Key. — A machinist in Nevada has invented an effective improvement on the common door-key, which renders it impossible for a burglar to use the key in opening the lock by taking hold of it with nippers from the outside. The end of the key is made to revolve independently of the key itself, and a thief may turn it round forever without moving the key.

Raw and Manufactured Iron. — From seventy-five cents' worth of iron ore may be developed, it is said, $5.50 worth of bar-iron, $10 worth of horse-shoes, $180 worth of table knives, $6,800 worth of fine needles, $29,480 worth of shirt-buttons, $200,000 worth of watch-springs, $400,000 worth of hair-springs, or $2,500,000 worth of pallet arbors (used in watches).

An Old American Theatre. — It is said that the oldest theatre in America is the Savannah Theatre, which was built in 1803. It is a massive building of brick and stone, and has never been remodelled or changed in any way. The architect was an Englishman, who was brought to America by the Blake brothers, two wealthy South Carolina rice-planters, who at that time resided in Savannah.

A Legal Decision. — A builder cannot recover from the owner of the property for damages to a building in process of construction, where the contract was for a gross sum, and there had been no delivery or acceptance of the part by the owner. Such a contract is not separable. Such is the decision of the Michigan Supreme Court in a recent case of Filden *vs.* Besley. It follows from this that the insurable interest in such a building would ordinarily be confined to the builder, unless acceptance or advances of some kind had made the owner liable to loss. —*The Insurance Monitor.*

BUILDING INTELLIGENCE.

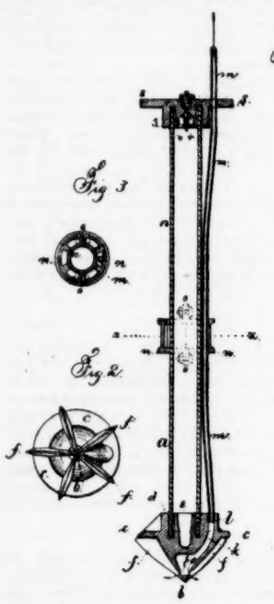
[Reported for The American Architect and Building News].

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

BUILDING PATENTS.

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

225,061. TUBULAR PILE.—Job Johnson, Brooklyn, N. Y. The pile is a metal tube, *a*, at the bottom of which is a shoe having a conical point, *b*, a horizontal disk, *c*, two short vertical cylinders, *d* and *e*, upon the upper surface, and inclined cutting blades *f*, *f*. The lower end of the tubular pile *a* is entered into the annular space between the short cylinders *d*, *e*, and is securely leaded therein, the object being to render the tubular pile perfectly water-tight at the lower end, and to prevent the parts working loose as the pile is revolved in sinking it. The cutting-blades, *f*, extend at their upper end beyond the edge of the disk, *c*, so that in passing through shale, gravel, or hard substances, the hole that is made by rotating the pile will be larger than the disk, and give opportunity for the same to descend freely, and also for the water and



refuse meterial to rise. In some instances the water-supply has been through the column, the delivery being central between the scrapers. In this instance a core of hard material is left that may close the delivery-orifice. In other instances the water-supply has been by a pipe that passes through the disk at the lower end of the pile. In this instance the action of the water has not been central, and the pile is liable to be displaced. Both these difficulties are avoided by providing a central water-chamber, *i*, above the conical points of the scrapers, opening into the spaces between all the scrapers, and from this chamber the pipe, *k*, or water-way, passes up in the shoe to the socket, *l*, into which is screwed the lower end of the water-supply pipe, *m*. Thus the water is central in its washing action; the pile is kept central as it is forced down, and the scrapers drill into any hard substance, and make an opening sufficient for the passage of the disk, *c*. After the pile has been sunk the tube *m* can be unscrwed and used with the next pile. In sinking the pile it is necessary to rotate it. A sectional clamping-drum is therefore used that is made of two or more parts, *n*, *n*, bolted together. There are two inward ribs that extend from the cylindrical part of the pulley to the tubular pile, so as to firmly hold the pile when the pulley is bolted together, and at the same time there are spaces between the ribs, through which the water-pipe, *m*, can pass. The pulley and pile may be rotated by a belt driven by suitable power, or a common pipe-wrench may be used. The cap, *s*, of the pile is made with two short cylinders, 3, and 4, between which the upper end of the tubular pile is received and securely fastened by lead, so as to be air-tight, and through this cap is a hole with a valve-seat. The valve, *r*, fits this seat, and it may open either inward or outward.

226,149. WRENCH.—James H. Alexander, Mystic River, Conn.

226,173. SASH-LOCK AND LIFTER. Thomas A. Ireland, Cincinnati, Ohio.

226,180. METALLIC PACKAGE FOR PAINTS, ETC.—John W. Masury, New York, N. Y.

226,185. TUBULAR WELL.—John A. Newell and Ary Lucasse, Kalamazoo, Mich.

226,188. APPARATUS FOR DRYING BRICKS.—Wilhelm Pieper and Jonathan Creager, Cincinnati, Ohio.

226,190. BOLT-CUTTER.—Henry K. Porter, Boston, Mass.

226,215. COMBINED VENTILATOR AND CHIMNEY.—Albert T. Wheeler, Springville, N. Y.

226,224. VALVE FOR WATER-CLOSETS.—John Demarest, New York, N. Y.

226,237. IRON PILE.—Isaac W. Marlay, Metuchen, N. J.

226,243. KNOB-ATTACHMENT.—Emery Parker, New Britain, Conn.

226,244. KNOB-ROSE ATTACHMENT.—Emery Parker, New Britain, Conn.

226,246. LATHE CHUCK.—Charles H. Reid, Danbury, Conn.

226,256. MACHINE FOR MOULDING AND COMPRESSING ARTIFICIAL BLOCKS OR BRICKS.—Alfred Walker, Sing-Sing, N. Y.

226,282. FIRE-PROOF FLOOR.—John Copcutt, Yonkers, N. Y.

226,306. HINGE.—John J. Gordon, Flint, Mich.

226,312. SASH FASTENER.—Martin Hameline, Joplin, Mo.

226,318. WINDOW SHUTTER.—David Huston, Boston, Mass.

226,320. SHUTTER-WORKER.—John B. Jewell, Carrollton, Mo.

226,330. PASSENGER ELEVATOR.—Horace M. Lee, Boston, Mass.

226,339. MONKEY-WRENCH.—John Moffet, New York, N. Y.

226,353. TRANSOM LIFTER. Frank A. Reiher, Chicago, Ill.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—The following building permits have been issued since the last report:—

Jas. H. & J. T. Phister 13, two-st'y brick buildings, Eastern Ave., between Cannon and Fort Sts.

Hamill, Brown & Co., three-story brick building, 37′ x 85′, cor. Fawn St. and Falls Ave.

Henry Slickerman, three-story brick building 28′ x 99′, Washington Road, between Stockholm and Wooster Sts.

Amanda J. Price, three-st'y brick building. 14 James St., between Central Ave. and Somerset St.

J. Freeman Rasin, three-st'y brick dwell., 24′ x 70′, cor. Calvert and Chase Sts.

Jos. M. Cone, 6 three-story brick dwells., 18′ x 60′, Franklin St. between Pine and Pearl Sts.

Jos. M. Cone, 12 three!story brick buildings, 16′ x 58′, Hill Ave., between Bloom and Prisstman Sts.

CHURCH.—Mr. Frank E. Davis is preparing drawings for a new M. E. Church, 48′ x 85′, to be built on the corner of Montgomery and Sharp Sts., of brick with stone finish; cost, $18,000.

PARSONAGE.—Messrs. Dixon & Carson are preparing drawings and specifications for a new parsonage for the First Presbyterian Church, cor. Park and Madison Sts.; also for extension of church. The parsonage is to be of brick with stone finish, 23′ x 85′, three stories high; the new building and extensions are to cost $35,000.

STOCK EXCHANGE.—Steps have been taken for building a new Stock Exchange, the option of a site is held, and preliminaries have been arranged. The site in view is in the immediate neighborhood of South and Baltimore Sts.

Boston.

BUILDING PERMITS.—Since our last report the building permits granted are as follows:—

Brick.—11 *Oliver St.*, 1 store, for B. M. Jones, 24′ x 110′.

Lewis St., for Boston Sugar Refinery, 1 kiln house, 45′ x 75′, and 1 boiler house, 40′ x 65′; S. F. Whitehouse, builder.

Emerson St., *No.* 14, for H. Souther, 2 dewlls., 17′ x 37′; L. Locke, builder.

St. James Ave., for H. B. Williams, 6 houses, 24′ x 65′; Standish & Woodbery, builders; Wm. R. Emerson, architect.

375-79 *Marlboro St.*, for G. Wheatland, Jr., 3 dwells., 23′ x 42′; Vinal Dodge, builder.

341 *Commonwealth Ave.*, for N. W. Rice, 1 dwell., 27′ x 71′; A. H. Caton, builder; Kerby & Lewis, architects.

232 *Commonwealth Ave.*, for A. A. Wheelock, 1 dwell., 20′ x 58′; G. A. Avery, architect.

Mechanic St., Ward 5, for J. Gahm, 1 tenement house, 36′ x 58′, three stories, and table, 20′ x 30′; F. H. Tarbox, builder, L. Weissbein, architect.

133 *Marlboro St.*, for C. W. Freeland, 1 dwell., 30′ x 65′; J. & H. M. Harmon, builders.

Wood.—*Melville Ave.*, Ward 24, for J. W. Field, 1 stable, 30′ x 40′; McNeil Bros., builders.

10 *Victoria St.*, 5 dwells., 22′ x 32′; D. H. McKay, owner and builder.

Ware St., Ward 24, for F. King, 1 dwell., 27′ x 30′; E. McKechnie, builder; J. A. Fox, architect.

Wyoming St., for N. E. Temple, 1 dwell., 31′ x 32′; T. Russell, builder.

Mechanic St., Ward 5, for J. Gahm, 1 carriage house, 30′ x 43′; F. H. Tarbox, builder; L. Weissbein, architect.

Pleasant St., Ward 24, for M. A. Sawyer, 1 dwell., 35′ x 44′; McNeil Bros. builders.

HOUSES.—Messrs Kirby & Lewis are the architects of two new houses for Mr. A. H. Caton, and one for Mr. N. W. Rice, 337, 339, and 341 Commonwealth Avenue. No. 327 is built by J. W. Tobey, the others by Mr. Caton. All are of brick and red sandstone. Foundations now building.

On Marlborough St. are soon to be built two houses; one for Mr. F. H. Skinner, to be built by A. H. Caton, and the other for A. E. Harding, by S. W. Merrill. Messrs. Kirby & Lewis are architects for both.

Brooklyn.

ALTERATIONS.—*Ninth St.*, *No.* 359, mansard roof, also three-st'y brick extension, 15′ x 58.6′; cost, $6,495; owner, Jose Gomez, on the premises; architects, W. Field & Son; builder, M. Ryan.

Broadway, *No.* 52, two-st'y brick extension, 20′ x 24′, cost, $2,000; owner, D. Fedden, on the premises; carpenter, Wm. Kohlmeier.

Lafayette Ave., *No.* 114, one-st'y brick extension, 18′ and 14′ x 38′; cost, $40,000; owner, Michael Snow, on the premises: architect, M. J. Morrill; builders, J. B. Rutan and Wright & Brook.

BUILDING PERMITS.—*Ash St.*, one three-st'y frame storehouse, 20′ x 70′; owner and builder, Church & Co., 36 Ash Street; architect, A. Sterns; mason, J. P. Woodruff.

Buffalo Ave., *cor. Butler St.*, one two-st'y frame store and dwelling, 27.9″ x 50′; owner, Henry Pich; builders, James Hickey and John Duhy.

Myrtle Ave., one three-st'w brown-stone store and flats, 25′ x 56′; cost, $7,000; owner, James Carey, cor. Clermont and Lafayette Avenues; architect, R. Dixon; builders, Long & Barnes.

Baltic St., one two-st'y brick stable, 23′ x 45′; cost, $1,800; owner, Mrs. McLaughlin, Warren Street; architects, M. Freeman & Son; builders, John R. Scott and Coyne & Feeney.

Nassau St., *cor. Liberty St.*, one six-st'y brownstone Publishing House, 77′ x 100′ x 75′ x 100; owner. A. S. Barnes, Clinton Avenue; architect, C. C. Buck; builder, G. H. Stone.

Park Ave., six three-st'y frame tenements, 20′ x 45′; owner, E. W. Brunsen, Bristol, L. I.; architect, Isaac D. Reynolds; builders, John Lambert and Thomas Donnelly.

Monroe St., *No.* 305, one two-st'y front brown-stone dwelling, 16.8′ x 42′; cost, $4,200; owner, David Weild, 307 Monroe Street.

Pacific St., *N.*, one three-st'y brick dwelling, 25′ x 65′ x 29.4′ x 65′; cost $16,000; owner, George L. Weed; architect, John Mumford; builders, James Ashfield & Son.

State St., one four-st'y brick tenement, 30′ x 43′; owner, Thomas Colson, 281 Atlantic Avenue; architect, Charles Werner.

Butler St., one one-st'y frame building, 86′9″ x 23′; cost, $2,000; owner, William Bradley, 548 Sackett Street; builders, William H Hazard & Son.

Park Ave., *cor. Graham St.*, one one-st'y brick storehouse, 69′ x 62′; cost, $3,000; owners, Tucker, Carter & Co.; architect, A. V. B. Bush; builders, John Mahony and B. Banks.

Pacific St., two three-st'y brown-stone dwellings, 20′ x 55′; owner, James F. Whitney, 1234 Pacific Street; architect, Geo. P. Chappell; builders, Cornelius King and Powderly & Murphy.

St. John Pl., seven three-st'y brown-stone dwellings, 20′ x 45′; cost each, $6,500; owner, Isabella Gordon; architect, R. Dixon; builder, John Gordon.

Chicago.

BUILDING PERMITS.—*Paulina*, near Blue Island ave., 2 two-st'y office and dwell., for M. Lowenthal; cost, $4,000.

Kinzie and Wells sts., two and one-half-st'y depot, and one story express building, 150′ x 200′, for the Northwestern Railway Company; cost, $100,000.

Third Ave., *No.* 183, two st'y dwell., for R. Weber; cost, $4,000.

West Chicago Ave., *No.* 425, three-st'y dwell., for H. Schruerdfeyer; cost, $3,500.

Archer Ave., and Keeley st., two-st'y dwell., for A. Frink; cost $6,000.

Cincinnati.

BUILDING PERMITS.—The following building permits, amongst others, have been issued during the month of March:—

Thirty-four permits for repairs, total cost, $13,850.
G. Differns, two-st'y brick; cost, $5,000.
Cotteral & Son, three-st'y brick; cost, $5,000.
H. Muller, three-st'y brick; cost, 3,500.
Fred Luecke, two-st'y brick; cost, $2,500.
Jas. H. Rowe, two-st'y frame; cost, $2,000.
H. Hosbrock, two-st'y brick; cost, $6,000.
S. Richards, three-st'y brick; cost, $8,000.
B. Wessel, three-sto'y brick; cost, $4,500.
G. G. McGarvey, five-st'y brick; cost, 2,200.
E. A. Bickell, four-st'y brick; cost, $5,000.
J. H. Schawe, four-st'y brick; cost, $3,000.
John Robinson, addition; cost, $2,000.
Conrad Kuhl, three-story brick; cost, $4,000.
F. Reichert, two-st'y brick; cost, $3,000.
Ohio Salt Co., four-st'y brick; cost, $6,000.
J. Krohmer, three-st'ry brick; cost, $4,000.
James Griffith & Son, three-story brick; cost, $6,000.
Thomas Emery's Sons, five-st'y brick; cost, $10,000.
Thomas Emery's Sons, five-st'y brick; cost, $8,000.
Thomas Emery's Sons, 14 two-st'y brick; cost, $150,00.
W. McCannon, 4 four-st'y brick; cost, $11,000.
Total permits for the month, 63.
Total cost for the month, $181,600.
Total permits to date, 149.
Total cost to date, $372,075.00.

New York.

BUILDING PERMITS.—*One Hundred and Twenty-seventh St.*, for Mrs. Annie Fettrich, Wm. B. Tuthill, architect, 316′ x 52′ and 115′ x 52′, 4 brown-stone dwells.; cost, $40,000.

Madison Ave., cor. One Hundred and Twenty-seventh St., for Isaac E. Wright, J. H. Valentine, architect, 1 brown-stone house, 19′ x 50′, J. C. Wright, builder; cost, $12,000.

Madison Ave., for Isaac E. Wright, J. H. Valentine, architect, 3 brown-stone houses, 19′ x 50′, I. E. Wright, builder; cost, $30,000.

One Hundred and Thirty-sixth St., between Alexander and Willis Avenues, for Thos. J. O'Kane, Jno. Roger, architect, J. O'Kane, builder, 4 brick dwells., 17′6″ x 40′; cost, $20,000.

West Thirty-sixth St., a brick five-st'y tenement, 25′ x 65′, John Totten, owner, C. F. Ridder, Jr., architect; cost, $10,000.

West Fifty-third St., a similar building, four stories high, 25′ x 50′, John Maher, owner, Andrew Ewald, builder; cost, $7,000.

West Thirty-seventh St., *No.* 312, a similar building, 26′ x 50′, Jacob Wenner, owner, G. Holzeit, architect; cost, $8,000.

One Hundred and Twenty-third St., a four-st'y brown-stone front tenement, 25′ x 65′, Jacob Weeks, owner, John Brandt, architect; cost, $10,500.

Third Ave., cor. Sixty-fourth Street, for Wm. A.

Winter, three stores, wood and glass, 25′ x 30′; cost, $3,000.

Seventy-ninth St., for J. Klenow, Wm. Fairchild, architect, one brick store, 27 x 30; cost, $1,500.

Alterations. — *Thirty-seventh St., W., No.* 12, a fourth st'y to be added; cost, $4,000; owner, Howard Lapsley; architects, Gambrill & Ficken.

Thirty-fourth St., W., No. 108, a fifth st'y to be added, and a three-st'y brick extension, 15.3′ x 10′, to be built; cost, $4,000; owner, Dr. F. N. Otis; architects, Gambrill & Ficken.

Fifth Aave. cor. One hundred and twenty-fifth St., church damaged by fire to be repaired; cost, $30,500; owners, Church of the Holy Trinity; architect, Henry Dudley; masons, Lyons & Bunn; carpenter, Edward Smith.

Eleventh Ave., cor. Thirty-ninth St., store front to be changed and internal alterations; cost, $2,000; owner, G. Wiley; architect, C. F. Ridder, Jr.

Ninth St., E., Nos. 319 *and* 319½, four-st'y brick extension, 16′ x 37′, and internal alterations; cost, $10,000; owner, Robert Stuyvesant; architect, S. D. Hatch; builder, John Molloy.

Grand St., No. 398, store front and interior alterations; cost, $2,500; owner, Mrs. Laura Wilks; architect, S. D. Hatch; builder, I. H. Decker.

Factory. — On the corner of Twenty-eighth Street and First Avenue, a factory, 50′ x 45′, five stories high, is to be built for W. S. Loeb, for occupation by Messrs. Hater Bros., at a cost of about $19,000. Messrs. H. J. Schwarzmann & Co., are the architects, and Marc Eidletz the contractor.

House. — An extension to the house of Dr. H. B. Millar, 45′ x 15′, at No. 4 East Forty-first Street, is to be built from designs of Mr. Wm. B. Bigelow; the interior decorations will be very elaborate.

Opera-House. — The Metropolitan Opera-House Co., has been duly organized, and is now considering the purchase of a lot of land 200 feet square, the cost of which and the building to be erected thereon is expected to be $600,000.

Store. — Mr. S. A. Warner has prepared plans for a store on Greene Street, 50′ x 100′, and is now receiving estimates.

Store. — A four-st'y store of brick with stone finish, 26′ x 113′, is to be built at No. 106 Greene Street, for Mr. D. L. Bennett, Mr. H. Fernbach is the architect.

Tattersalls. — Mr. Wm. K. Vanderbilt has purchased the property on the corner of Fiftieth Street and Seventh Avenue, for $200,000, and has leased it to the New York Tattersall Co., who will build a suitable building.

Warehouse. — A large warehouse and factory is to be built on the corner of Beech and Greenwich Streets, from the designs of Messrs. Laban & Son, of Jersey City.

Philadelphia.

Asylum.—The corner-stone of the Philadelphia Home for Incurables, Forty-eight Street and Woodland Avenue, was laid April 14.

Brewery.—*Thompson St., No.* 32, 1 four-st'y brewery, 72′ x 146′; contractor, J. B. Doyle.

Depot. — *Front St.*, cor. Pine, freight depot, 49′ x 444′; owners, Penn. R.R. Co.; contractors, W. F. North.

Factories. — *Washington Ave.*, cor. Twentieth, 1 three-st'y factory, 45′ x 73′; owners, "The American Sewing Machine Co.; contractors, A. & T. Doane.

Fourth St., cor. Montgomery, four-st'y factory, 40′ x 24′; owners, J. B. Stetson & Co.; contractors, Stephen Morris & Son.

Pine St., No. 1920, four-st'y factory, 48′ x 43′; contractor, John O'Donnel.

Fifth St., nor. Butler, one-st'y factory, 40′ x 70′; owner and builder, David Manny.

North Thirteenth St., No. 125, five-st'y factory, 20′ x 104′; Jas. Howard & Co., builders.

Tenth St., cor. Reed, one-st'y wagon factory, 16′ x 155′; contractor, C. Bachle.

Foundry. — Plans are being drawn by Wilson Bros. & Co., architects of this city, for a foundry 65′ x 100′; machine-shop, 115′ x 50′; rolling mill, 355′ x 175′; for Colorado Iron & Coal Co., at Pueblo, Colorado.

Houses. — *Nassau St.*, cor. Twenty-fourth, 10 two-st'y houses, 14′ x 33′; J. L. Cane, owner and builder.

Lehigh Ave., West of Eleventh, 4 three-st'y dwell., 18′ x 62′; owner and builder, A. J. McClary.

Girard Ave., Nos. 411-415, 3 three-st'y dwellings and stores, 17′ x 47′; Thos. McCarty, contractor.

Powelton Ave., cor. Thirty-sixth, three-st'y dwell., 40′ x 64′, E. & A. L. Pennock, contractor.

Merine St., North of Diamond, 31 two-st'y dwell., 14′ x 56′; owner and builder, H. R. Shock.

Wellington St., North of Columbia Ave., 8 three-st'y dwell., 14′ x 46′; owner and builder, J. S. Albright.

Store. — Messrs. Merchant & Co. are building on Arch Street a four-story iron-front building, 25 by 85 feet, which will be an addition to their present store.

Christian St., cor Twenty-third, three-st'y store and dwell., 18′ x 50′; John Cunningham, contractor.

Chestnut St., No. 1618, three-st'y store, 20′ x 70′; Thos. Little, contractor.

Main St., North of Walnut Lane, three-st'y store, 18′ x 68′; owner and builder, D. S. McNab.

South Sixth St., Nos. 18 *and* 20, 2 five-st'y stores, 20′5″ x 173′; owner, T. Megarge.

Market St., No. 718, 1 four-st'y building, 24′ x 286′; contractor, J. B. Doyle.

Warehouse.—*North Second St.*, W. 825, 1 three-story warehouse, 20′ x 80′; builder, W. C. McPherson.

St. Louis.

Building Permits. — Thirty-two permits have been issued since our last report, six of which are for frame structures of slight importance. Of the rest, those worth $2,500 and over are as follows: —

Owners.	Use.	Stories.	Rooms.	Cost.
St. Louis Wire Mill Co.	Mill.	1	1	$3,500
W. L. Lockwood,	Dwelling.	2	7	5,800
Eau Claire Lumber Co.	Stable.	2	2	3,000
H. S. Turner,	Store & Offices.	2	8	3,700
Mrs. Emile Lack,	Dwelling.	3	3	3,500
H. Trusdmann,	Dwelling.	3	8	6,000
Brower & Bro.,	Box Factory.		2	3,800

General Notes.

Brattleboro, Vt. — The Methodists have begun their new church on Elliott Street.

Cedar Rapids, Io. — Mr. F. M. Ellis, of Marshalltown, Iowa, is the architect of the opera-house, 61′ by 140′, which is to be built for Judge Green & Son; cost, $45,000.

Mr. Ellis is also to build three stores, 60′ by 100′, for Barton & Patch; cost, $12,000.

Chippewa Falls, Wis. — The contract for building a theatre has been let. The auditorium will be 65 by 70 feet; stage, 20 by 70, and the curtain opening 30 feet wide.

Dayton, O. — The Baptist Union is considering plans for a new church, to be built at the corner of Clay and Van Buren Streets.

Des Moines, Io. — The Capitol Commissioners have decided that the interior or the building cannot be completed for the Nineteenth General Assembly.

Detroit, Mich. — Mr. M. S. Smith is the architect for the new store of Messrs. Newcomb, Endicott & Co., on Woodward Avenue.

Fall River, Mass. — Work has begun on St. Joseph's Church. It will measure 72′ x 130′.

Flint, Mich. — A site for the proposed opera-house has been decided upon, and sufficient means pledged to insure its erection.

Hampton, Io. — Mr. F. M. Ellis, architect, of Marshalltown, Io., is building for George Beed & Co., a hotel-block 120′ by 132′, and three stories high. It is to contain seven stores, one bank, and sixty rooms; cost, $40,000.

Hartwell, O. — The corner-stone of the new Episcopal Church was laid April 8.

Harrisburg, Pa. — Mr. F. E. Davis, of Baltimore, Md., is preparing drawings for a new chapel and Sunday-school, for the German Reform Church. It is to be built of brick and stone, and will cost between $12,000 and $15,000; dimensions are 45′ x 97′.

Joliet, Ill. — The Board of Trade talk of building a large grain elevator.

La Crosse, Wis. — Mr. C. F. Struck, architect, is preparing plans for an ice-house for C. & J. Michel. Cost, $10,000.

Lisbon, Io. — A church for the United Brethren, with a seating capacity of 600, is to be built by Mr. F. M. Ellis, of Marshalltown, at a cost of $8,000.

Louisville, Ky. — Joe Demmzio to alter a three-story brick store on Jefferson Street, between Third and Fourth; cost, $5,000.

Lynn, Mass. — The corner-stone of the new Young Men's Christian Association building, was laid on Thursday, April 8.

Mansfield, O. — Plans for the new opera-house, architects Messrs. Gibbs & Cobb, are now ready for the decision of the Board of Directors.

Marshalltown, Io. — Mr. O. L. Binford is building house from the designs of Mr. F. M. Ellis, at a cost of $10,000.

Miamisburg, O. — The corner-stone of a Catholic Church will be laid here the first Sunday in May.

Minneapolis, Minn. — Brackett's Block, owned by G. A. Brackett, which was burned April 7, is to be rebuilt at once.

Newport, R. I. — Mr. Edward Mayer has broken ground for a large cottage on Washington Street.

Northfield, Minn. — The improvements to be made in rebuilding Carleton College this year will cost $22,000.

Olneyville, R. I. — Mr. George C. Cady is the architect of the school-house which is to be built at the corner of Amherst and Vaughn Streets; cost, $7,000.

Preston Hollow, N. Y. — Mr. Warren P. Purrington, Jr., is to build a costly house on Main Street.

Pittsburgh, Pa. — The Property Committee of the Pittsburgh Exhibition have approved plans for the new Power Hall, which is to be built at the west end of the main Exposition Building. The building will be 100 by 168 feet. The architects will receive bids for its construction on the 15th of April; also for a boiler-house, 40 by 80 feet, and an annex to Floral Hall, 30 by 126 feet.

Poughkeepsie, N. Y. — Mr. James Parish is about to build a frame house on the Hudson Kiver; cost, $8,000; A. Cannon, Jr., architect.

Mr. George McLean is building a frame house on Washington Street, costing about $3,000, A. Cannon, Jr., architect.

The Vassar Brother's Laboratory is nearly finished at Vassar College, of brick, with terra-cotta. Silliman & Farnsworth, of New York city are the architects, A. Cannon, Jr., of Poughkeepsie, contractor.

Vassar Brothers are building a Home for Aged Men on the corner of Vassar and Main Streets; size about 50 by 90; four stories, of brick, with granite finish; cost about $25,000; J. Wood, architect, of New York City; A. Cannon, Jr., of Poughkeepsie, N. Y., contractor.

Mr. C. F. Rose is the architect for St. Mary's School Buildings, on Hamilton Street; size, 30 x 42, four stories brick, and blue-stone finish, and costing about $4,000.

Mr. Rose has also just completed the plans for a new city-hall, to contain court-room and all city offices; three stories, brick, and blue-stone finish; 36′ by 50′, fronting on Union Street; cost about $6,000.

Relay House, Md. — The corner-stone of what will be known as the Arlington Presbyterian Church, was laid April 8.

Richmond, Ind. — An effort is making to build a fire-proof museum for Earlham College.

Southampton, N. Y. — Mr. Henry W. Clements is now building houses for W. H. Schieffelin, J. R. Schieffelin, and L. P. Siebert.

Tracy, Minn. — The town has voted $4,000 bonds for a new school-house.

Viroqua, Wis. — Mr. C. F. Struck, architect of La Crosse, Wis., has just finished plans for the new court-house jail, and sheriff's house, for Vernon County. Cost of all the buildings, $20,000. The court house and jail will be built of stone, the other building of brick. Greenslade & Bailey, of Milwaukee, have the iron contract.

Waterloo, Io. — The Baptist Church, which is under the care of Mr. F. M. Ellis, of Marshalltown, will cost $12,000.

West Brookfield, Mass. — Messrs. G. & C. Merriman, of Springfield, Mass., are building a Public Library as a gift to this town. The basement is of granite, the upper stories of pressed brick and cut Ohio-stone. Size of building is 58′ x 44′. J. R. Richards, of Boston, architect; James & Marra, Springfield, Mass., contractors for the stone work.

Xenia, O. — A new school-house will be built at once.

Zanesville, O. — The Commisioners will build a new County Infirmary building this summer, to cost $50,000.

Industrial.

Appleton, Wis. — Bradley, Smith & Co., of Chicago, are to put up a large pulp and paper mill.

Mr. Fleming and Mr. Gilmore are preparing to put up a flax-mill.

Biddeford, Me. — The Pepperell Company is about to build a new mill 125 feet square and three stories high.

Brunswick, Me. — A brick factory, for the Dennison Manufacturing Company, is soon to be built from the designs of Messrs. Kirby & Lewis, architects, of Boston. The building will measure 44′ x 160′, and will be three stories high.

New England Village, Mass. — It is reported that the Washington Mills Emery Manufacturing Company, are about to build a new mill, 30′ by 80′, three stories high.

Piqua, O. — The foundation for Cron's new furniture factory is now being laid.

Providence, R. I. — The Brown & Sharp Manufacturing Company is building from the designs of Messrs. Stone & Carpenter, a foundry, 144 feet square.

Public Buildings.

Altoona, Pa. — The House Committee on Public Buildings and Grounds has agreed to recommend the erection of a public building at a cost of not exceeding $60,000.

Charlestown, W. Va. — The Senate has passed a bill appropriating $75,000 for a public building in this city.

Cleveland, O. — She Senate Committee has decided to recommend the passage of the House bill, appropriating $150,000 to repair and extend the Government public buildings in this city.

Hannibal, Mo. — The House Committee on Public Buildings and Grounds has agreed to report favorably the bil for the erection of a public building in this city, at a cost not exceeding $75,000.

Marquette, Mich. — An appropriation of $100,000 for a public building has been recommended by the House Committee on Public Buildings and Grounds.

Memphis, Tenn. — The contractors for the public buildings have been notified that unless they take immediate steps to complete the work, the Government will revoke the contracts and take possession of the buildings.

Paducah, Ky. — The Senate Committee on Public Buildings has decided to recommend the passage of the House bills, appropriating $106,000 for the erection of a government building here.

Sacramento, Cal. — The House Committee on Public Buildings and Grounds recommends the appropriation of $100,000 for a public building in this city.

Syracuse, N. Y. — An appropriation of $100,000 has been recommended by the House Committee on Public Buildings and Grounds, for a public building here.

Bids and Contracts.

Holyoke, Mass. — The contract for finish for the Chemical Paper Co.'s Mill is awarded to the Sutherland Falls Marble Co., of Vermont.

Rockaway, L. I. — Work on the hotel for the Rockaway Beach Improvement Co., is progressing rapidly. The contract for the mason-work calls for the laying of about a million of brick, and has been awarded to Messrs. Robinson & Wallace, of New York.

West SpringField, Mass. — The contract for marble finish for the Southworth Paper Company's new mills has been awarded to the Sutherland Falls Marble Company, of Sutherland Falls, Vt.