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CONTENTS.

IT will be remembered by members of various local societies or chapters of the American Institute of Architects that at the last Convention of the Institute a strong feeling was manifested in favor of changing the relation of the national and the local bodies; a relation which appears to have become in many ways unfavorable to the best interests of both. After considerable discussion, it was thought best that the Convention should express no opinion on the subject until the views of the Chapters had been ascertained, and the matter was referred to the Trustees with instructions to communicate with the Chapters, and invite them to express their feeling on the subject, and to suggest models for a revised constitution of the Institute, in order that a well considered scheme might be submitted for the action of the next convention. Notice of this reference has been sent to the Chapters, and all of them probably have given it some consideration. The Boston Chapter, in a meeting held on Wednesday last, voted to adopt the report of a special committee, which we give in another place, and instructed their Secretary to communicate their action to the other Chapters of the Institute. We trust that this important movement will meet with the fullest consideration, and that the convention of November will be able to take definite action. The formal organization of chapters has been in some respects manifestly unjust to those isolated architects who find it hard to be compelled to belong to two organizations in order to be admitted to one of them, and a certain cumbrousness is imparted to the working of the Institute from the same cause. The more membership in the Institute comes to be regarded as an honor, pure and simple, which requires high character and attainment to get and keep, but demands little money or labor, the more will such membership be sought after, and the more influence will the society exert.

THE St. Louis architects seem to be a public-spirited body of men. It appears that about the first of April the journeymen stone-cutters in that city struck for terms so unreasonable that the bosses, accustomed as they were to the demands of what is usually the most unreasonable of all the unions, rebelled, and applied to the architects, stating their case in a circular letter, and asked their indulgence in cases where work had to be delayed, and for help to resist this "outbreak of socialism." The architects more than responded to their appeal, and thirty-five of them, with twenty-five builders, signed a paper affirming that they believed the boss stone-cutters to be right in the stand they had taken, and that those who had encouraged or aided the strikers in their course should not have their further patronage. It is pleasant to see men so much interested in the circumstances which surround their professional practice that they are willing to interpose in such a matter. Rightly or wrongly, mechanics usually look up to architects with a great deal of respect, and unless the latter forfeit this respect by gross incompetence, they can exercise a considerable influence over their less educated fellows. In this special case the expression of the architects' opinion is far too weak a weapon to have much effect upon the mulish folly of a union, and we should be sorry to see them throw their influence away; but their sympathy with the vexations of the master stone-cutters is, no doubt, a good thing, and will excite sympathy and confidence in return.

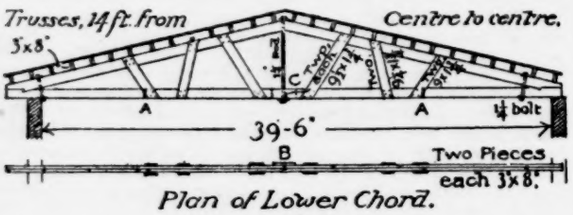
IT is with respectful gratitude that we take up and record the pearls of wisdom which fall from the lips of English magistrates concerning the rights and duties of the members of other professions. In the latest case where we find the judge acting also as witness for the defence, certain civil engineers had brought an action to recover what they asserted to be the ordinary commission, one and one-half per cent, for preparing plans for certain baths, the estimated cost of which was sixteen thousand pounds. The company which proposed to construct the baths did not deny having ordered the plans, and did not even dispute the price; their only ground for contesting the claim was, that the plaintiffs had done so much other work for them that they ought to "throw in" this item. The judge, however, supplemented this rather weak defence by announcing that the claim of one and one-half per cent on the outlay was "ridiculous." The plaintiffs, he said, were entitled to be "paid for their labor," but nothing more. It perhaps did not occur to his Lordship that the unfortunate engineers had spent large sums to acquire the knowledge and training which gave their "labor" its value, and that they were entitled to have from the rewards of their professional work reimbursement with interest for this outlay; that the natural aptitude for such work is as much property, and its exercise as much entitled to be paid for, as the talent of a painter or an opera-singer; that the responsibility of the designer, as well as the value of his services to his employer, increases in proportion to the outlay, and that it is as foolish to say that the work on plans for public buildings should be paid at the same rate per hour as on laborers' cottages, as it would be to maintain that a lawyer should receive no more for drawing a mortgage of a railroad than for a conveyance of a freedman's log-hut; at all events, the jury received no intimation that these considerations were to be regarded, and they awarded seventy pounds as payment, instead of the two hundred and forty claimed. This, we should say, would have paid for the paper and India-ink, and perhaps for the labor of the draughtsmen employed. The office-rent, pay of draughtsmen in the intervals of work, labor, care, supervision, family expenses, responsibility, training and talent of the designers, we suppose they were expected to contribute gratis. We knew of an architect once who worked for a dollar and a half a day, without regard to the character of the building on which he was employed: would it not be well to establish this as a minimum rate of wages, which other architects might under all circumstances be entitled to recover, whatever judges might think of the value of their services?

THE VERDICT IN THE MADISON SQUARE GARDEN ACCIDENT.

THE verdict of the jury on the fatal fall of the building called the Madison Square Garden, in New York, attributes the accident to the faulty construction of the building, censures the owners, the Harlem Railroad Company, for employing an engineer not conversant with construction, instead of an architect, and censures the Department of Buildings for allowing the structure to be erected contrary to law. It is new to have a corporation condemned for employing engineers to design its buildings, on account of their recognized incompetency for such work as compared with architects, but the latter profession will be grateful for the implied compliment. After all, the incompetency of the particular engineer employed in this case was demonstrated by his own evidence, and as the railroad company is unquestionably liable for the ignorance and recklessness of its employees, the verdict will have the effect of directing such suits for damages as may follow against that one of the joint defendants which is best able to pay, and this was perhaps the main point in the minds of the jury. The Department of Buildings is, we presume, above the law, even if a plain infraction of the statute could be proved. Now that the evidence is all in, it may interest those who profess the art of construction to review it, and try to disentangle a reasonable theory of the occurrence from the mass of conflicting opinions which were presented.

The facts are simple: a wall twelve inches thick, thirty-four feet high, and two hundred feet long, with return walls at each

end, but no cross-partitions or girders, and no anchorage except a few irons inserted some fifteen feet from the ground to tie it to an independent framing of timber behind, formed one side of a building covered by a roof of forty feet span, supported by trusses of which we give a diagram, copied from the *Railroad*



Plan of Lower Chord.

Gazette. One evening, under no particular provocation, this wall, with the roof, fell outward, the dislocation commencing at the middle of its length. After the accident, several trusses were found broken: in all of them the tie-beam, which was made in several pieces spliced by spiking, had broken in the direction shown by the irregular line on the diagram, immediately under the king-rod, besides stretching some five-eighths of an inch by the bending of the spikes.

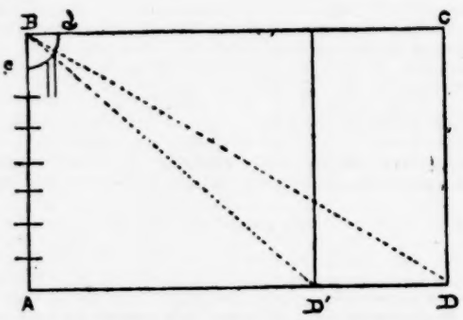
Leaving out the nonsense about the destruction of the strength of the roof by the heat of the room beneath, the injury to the wall or roof by dancing on the floor, the weakening of the wall by driving nails into it to hang pictures, or its crushing by the extra weight so added, which formed the bulk of the testimony, the preponderance of the opinions which are worthy of any respect is in favor of the theory that the built-up tie-beams of the central truss separated under tension, letting the truss fall, the thrust of the rafters pushing out the wall at that point, and inducing a general overturn.

With this view we confess ourselves unable to coincide. That the *tension* alone of so light a roof could tear apart such a tie-beam, even if feebly spiked, we cannot think likely, and if the beam had begun to stretch by the bending of the spikes, why did not the stretching continue? A nail partly drawn out yields more and more easily, and it would be strange if the beam should extend gradually half an inch, and then with a sudden jerk snap itself in two. Even supposing this possible, neither the form nor the position of the rupture is such as a failure of this kind would occasion. The natural place for the parting of this tie-beam would be at A or A′, half-way between the suspension-rod and the bearing, where to a severe tensile strain is added the heavy cross stress caused by its own unsupported weight, increased in this instance by the weight of the principal rafter and its load, which by means of the pieces which form a burlesque of strutting is transferred directly to the tie-beam. The actual form and position of the break points, we think, to a downward pressure exerted upon the beam by the strut nearest the centre, resisted by the force of the king-rod, so that the wood, being unable to yield, was thrust apart by the action of the strut. It is not impossible that the quiescent weight on the rafters may have been sufficient to break off the tie-beam in this way; certainly the mode of strutting was well adapted to secure such a result; but the dimensions of the timbers render it unlikely unless a load of snow should add to the strain, while the effect would be perfectly accounted for by a previous movement of the wall dragging the truss off its bearing, and allowing its end to strike the floor as it fell. The inertia of the falling roof would then add force amply sufficient to drive the tie-beam asunder when its movement was stopped by an obstacle. The partial drawing out of the nails would also in such a crash be likely to occur simultaneously with the parting of the tie-beam, while this double action would be improbable under a protracted strain.

But when, leaving the roof, we regard the wall which supported it, it seems still more certain that this, as the weakest part of the whole construction, must probably have fallen first. Gross as was the ignorance displayed in the design of the roof, it is surpassed by the recklessness with which so serious a piece of construction as that of an almost unsupported wall, two hundred feet long, was disposed of.

If it were not for the complete lack of understanding of the principles involved which was shown by the builders summoned as experts in the inquest, we should hardly think of calling attention to the fact that in so long a wall there is no question of resistance to vertical pressure; that it is nonsense to talk about the weight of a score of pictures, or the vibration caused by the light feet of a few young dancers, being more than a twelve-inch wall of that height could support; the main element to be considered under such circumstances is the *stability* of the mass of masonry itself. It is plain that for a few feet from the return walls the brickwork would stand erect forever, held in place by them, under any pressure short of actual crushing strain; and it is no less evident that as the distance from the angles increased, their influence in retaining the wall would diminish, until at a great distance it became inappreciable, and the masonry could depend only on its own steadiness, that is, on the width of its base in proportion to its height, just as if it stood alone, and the rules for determining its thickness become those for independent walls, or columns standing alone. This principle is well known to architects, although their applications of it often savor somewhat of the "rule of thumb," rather than scientific deduction, and building laws recognize it by demanding that as the unsupported length increases, the wall shall be thickened; the New York law specifying that four inches shall be added for every ten feet above twenty-five feet in length, while the Boston statute contents itself with four extra inches for every twenty-five feet beyond the standard twenty-five.

The French rule, more scientific, is explained by the following diagram: —



The height of the given wall is set off at any scale on the line A B, and its length between the cross walls on A D, and a diagonal is drawn from B, the top of one end of the wall, to D, the bottom of the other end. From B to *e* is taken the thickness which would be required for an independent wall to secure the degree of stability required, this being, for ample steadiness, one-eighth of the height; for a moderate degree, one-tenth; and for the smallest permissible degree, one-twelfth. With this distance as a radius, an arc is described, cutting the diagonal B D in *d*, and a vertical drawn through this intersection includes between it and the vertical A B the required thickness of the wall at the given scale. If the wall is shorter, extending only from A to D′, this process will indicate a less thickness, as the figure shows. Evidently, if the length between the cross-walls is infinite, the thickness will equal that of an independent wall, while a very small length will give a very slight thickness, with all degrees between.

The Madison Square Garden wall, though feebly tied, can hardly be said to have been securely anchored, even in the first story, while the upper story was practically unsupported. We will, however, assume that it was held firm at the second floor, and calculate its dimensions only for the portion above. By the French rule, for the smallest permissible amount of security this wall should have been about nineteen and a half inches thick; by the Boston rule it should have been three feet four inches; the New York law would require six feet ten inches. Three-fifths of the smallest standard was the actual thickness.

Here, we believe, is the true explanation of the accident. No builder would think of leaving a twelve-inch party wall twenty-five feet high over night without support, and the long wall of the Garden was little better: if anything, it is strange that it did not fall sooner. We have no desire to fix the responsibility on persons; that is not our province; but in the interest of good building it is impossible to discuss too carefully the circumstances of such accidents, and we think we shall express the conviction of many of our readers, as well as our own, in saying that whatever may have been the faults of the roof which fell, the wall was still worse, and that while buildings may be roofed as badly, and yet stand, the failure of walls so designed may be looked for with confidence.

DETAILS OF SEWERAGE.[1]

IN laying out a system of sewers for a town, the first point to be settled is the location and level of the outfall. If the town happens to be on the banks of a deep river into which the sewage can be discharged without fear of contamination, as at St. Louis or Cincinnati, several outfalls can be had at convenient points, but if the sewage is to be delivered to the sea, or to be disposed of by irrigation or other artificial treatment, or if it be necessary to lift it by pumping, as is often the case in low-lying districts, then it becomes necessary to collect it as far as possible at one locality, where it can be treated as a whole. The location of the larger mains will generally be determined by the courses of the natural valleys, wherever the slope of the surface is considerable, while the lateral sewers will enter these mains at the intersections of streets, with such ramifications as may be suggested by the contour of the ground.

Modern practice requires all sewers which are too small to allow a man to pass through them for inspection to be built in straight lines broken by angles where change of direction is necessary, and these angles are always provided with either a man-hole for access, or a lamp-hole into which a lantern can be lowered. By this means any collection of sediment or other obstruction in any form can be readily located and removed. Changes of inclination should, for the same reason, be made at these holes; but in sewers of three and one-half feet height and upwards, curved lines are allowed. These curves should be carefully traced and made uniform and accurate. When towns are located on sloping or hilly sites with portions lying at the foot of these slopes, nearly level, as often may occur on river banks, it is important to guard against the sewers of the flat districts being flooded by the discharge of those on the slopes. In such cases the higher levels can be provided for by an intercepting-sewer passing along a contour line decidedly above the flat districts, into which all the sewers from the slopes should discharge, and which can be led to its destination without risk of flooding the lower streets by its contents. In all cases where the sewage of the lower part of a town has to be raised by pumping, this principle of *interception* is very important, in order to avoid pumping such sewage as can be delivered at the desired point by gravity. It is often worth while, if the works be on a large scale, to spend a considerable sum in cutting through hills or bridging valleys with such "high-level" intercepting-sewers, rather than to encumber the lower districts with their contents.

If the town is so densely peopled, or likely to become so, that the surface-water of the streets cannot properly be discharged directly into the water-courses, so that any considerable part of it must be provided for in the sewers, there is a good deal of judgment to be exercised in determining upon the proper quantity to thus provide for. If the sewers are made larger than needed, not only is capital wasted, but their self-cleansing power is impaired thereby. On the other hand, if made too small they become gorged with heavy rains above their carrying capacity, the water rises in the inlets and is backed-up in house-drains to the great inconvenience of the householders. The lower parts of London have been much afflicted in this way during the unusual rain-falls of the past two years.

The great intercepting-sewers recently constructed along the banks of the Thames are proportioned so as to carry off, besides the expected flow of sewage, a rain-fall of one-quarter of an inch in 24 hours from their water-shed. Many of the tributary sewers receive and bring in a good deal more than this, but provision is supposed to be made for the overflow of this surplus into the river. Whether the evil is to be attributed to an inadequate provision for this overflow, or to inadequate capacity in the branch sewers, we are not fully informed; but it is certain that much inconvenience has arisen in the lower part of London which has been newly built upon within a few years. I copy the following from the London *Engineering*, of January 16, 1880. "A comparatively new danger to health in the metropolis occurred during 1878 and 1879. In some districts, owing to the heavy rain-fall, houses were flooded from the sewers during almost every heavy storm. Consequent upon this the cellars, kitchens, and down-stairs sitting-rooms were as often coated with solid matter of the sewage in hundreds of houses, both north and south of the Thames. Although this was in part due to excess of rain, still the chief cause was that the existing sewers were much too small to carry off the refuse from the great number of new houses that are annually added to London. These may be reckoned by miles in length additional for each year. At last the evil became so great that the Metropolitan Board was compelled to take up the matter. New sewers are in course of construction which will for the present alleviate the evil. But these temporary measures, of course, will only act as a palliative, and it requires no great amount of foresight to perceive that ere long the whole sewerage system of the metropolis will have to be reconstructed."

This is an editorial in a journal which is not given to sensational articles, still I doubt if Mr. Bazalgette, the engineer of the Metropolitan Board, would agree to the idea expressed in the last paragraph.

The quantity of surface-water that will naturally run into the sewers during a given time, after a heavy rain, varies largely according to the circumstances. The following considerations all affect the rapidity with which rain-water will drain upon the surface: viz., the character of the surface as to improvement by building and pavement; *e. g.*, a city with few open spaces has most of its surface paved or roofed; under such conditions, some 80% or 90% of the actual rain-fall will get into the sewers within twenty-four hours. But just in proportion as the surface is covered with gardens or grass-plots, the drainage will be delayed. So that in many suburban towns less than 50% will drain off in winter, and less than 20% in some short summer rains when the ground is warm and the evaporation rapid. The character of the slope affects this question also. The sides of hills drain much more rapidly than plains. So that the engineer must take all these questions into account in providing for the surface-water. Local acquaintance is often of great service in determining such questions, where the judgment and experience of a man goes farther than any possible computation in arriving at a proper conclusion. If the steep, sloping side of a hill is bounded at its base by a district nearly level, the water will drain from the slope with great rapidity, and will be likely to overtax the sewers on the plain in sudden bursts of rain, if special pains be not taken to prevent such a result. Where the hill district is not large enough to warrant the construction of an intercepting-sewer to keep its drainage out of the plain, it is sometimes feasible to relieve the sewers at the base of the slope by overflows into natural water-courses by special short conduits. But where the flow from the slope must be carried for any considerable distance by the sewers on the plain, the latter will need to be constructed quite large, to avoid being overtaxed on such occasions. We sometimes have a large quantity of rain in a few hours. Published records of rain-fall in New England show that we often have a fall of over an inch per hour for an hour or more. It is better, if possible, to guard against such emergencies by ample overflows, than to increase the size of the long sewers in a plain, provided the opportunity is found to discharge the water into streams. For the increase of size in such long sewers would be seldom needed, requiring a large outlay of capital for rare occasions, and a sewer less likely to keep itself clear by scour at all other times.

The rules practised in different cities in the same climate and inhabited by a people of similar habits are found to differ quite widely in regard to the quantity of rain-fall provided for within a given time. In Boston, where the population is quite dense, and very few open squares with grass-plots exist, and where in the older part of the town the surface is hilly, the drainage necessarily follows short lines of streets, radiating from the hill-tops and discharging under the old system, by a large number of outfalls, into the surrounding tide-water. In many of these lines of sewers the fall is quite rapid, and the surfaces which feed the sewers are steep and mostly covered with buildings and pavements. Here it has been the practice to provide for one inch of rain-fall per hour getting into the branch sewers, and even with this ample allowance some localities at the foot of the hills (such as Dock Square) have been flooded during violent rain-storms. The new intercepting-sewer, which is now being constructed to receive all these short branches, will be expected to carry only a rain-fall of one-quarter of an inch, or less, per hour, on the surface drained by it. The difference is in part because of the greater steepness of the area feeding the branch sewers causing a rapid drainage, and in part from the relief by overflows by which a large portion of the water may be gotten rid of before it enters the intercepting sewer during violent storms. Moreover, the farther the water flows from its gathering-ground, the more is a short and sudden burst of rain diffused over the length of the system, making less show the farther it runs; just as freshets which occur near the source of a river appear at first in a large rise over a short distance, but, in passing down some hundreds of miles, the rise is much less in height, but perceptible over a longer district than at first.

In proportioning the sizes of sewers for a desired capacity of discharge, and an inclination fixed, as it generally will be, by the local topography, the tabulated results of various authors are found based upon formulæ where the coefficients of friction have been deduced from their experiments. But as the smoothness of the surface and the uniformity and shape of the conduit affect the velocity of flow very considerably, regard must be had to these disturbing elements, either by eliminating their existence or by making due allowance for them in the computations. The fullest and most recent sets of tables that have been published on the discharge of sewers are to be found in the works of Baldwin Latham. But in all cases where sewers of any considerable size are to be provided for, experiments with the precise conditions of the problem, where possible, form a much better reliance than any printed tables. The formulæ published by different authorities differ only in the value of the coefficients and the care with which the circumstances of the case are foreseen and met.

The following are some of the formulæ used by the best authorities: —

Chezy's formula: —

$$\text{(General form, } V = \sqrt{2\,g\,h}\text{).}$$

$$V = B\sqrt{rs}$$

where B is to be determined by experiment.

$r = \frac{a}{p} = h\,m\,D$ (or "hydraulic mean depth") $\begin{cases} a = \text{area.} \\ p = \text{wet perimeter.} \end{cases}$

$s = \frac{h}{l} = \frac{\text{height}}{\text{length}} = \text{sine of slope.}$

By Beardman, $B = 94.2$.
By D'Aubisson, $B = 95.6$ over $V = 2$.
By Eytelwein, $B = 93.4$.

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

Weisbach's formula: — $V = \frac{\sqrt{2gh}}{\sqrt{1 + e + c \times \frac{l}{d}}}$.

c = coefficient for friction, depending on material, and also varying with velocity.

e = coefficient for entrance, depending on form of end of pipe, and therefore inconsiderable in long pipes or conduits.

d = diameter of pipe and l = length of pipe.

DISPOSAL OF EXCRETA, FLUID AND SOLID.

We have touched in a general way upon the importance of the immediate removal of the excreta of our bodies. We have also considered, more in detail, the methods of removal of the volatile excreta of the lungs and skin by ventilation. It remains to consider the removal of the solid and fluid excreta thrown off by the bowels and kidneys. The method in which this may best be done must vary somewhat in different climates, soils and habits of life. What we have to do with chiefly is our own climate and the habits now existing in our own community, wherever the population is gathered in towns or cities. This is one of the most vexatious problems with which the sanitarian has to deal, for the reasons that the same methods which may succeed in one locality are found to fail in another, and because there have been various rival schemes before the public, promoted by parties who sought to get a profit from the operation, and who naturally looked upon the question with more or less bias in favor of their own methods, to the exclusion of all others.

There has been a great effort made, particularly in England, to utilize human excreta by various chemical processes. These all endeavor to separate the solids from the fluids and to leave the water in a condition sufficiently pure to avoid its being a nuisance when discharged into running streams. Up to a certain point all parties agree, viz., that the organic refuse, when separated from the water of sewage, should be devoted to fertilizing the soil, and therefore all aim at the production of a commercial manure, which it may be for the profit of the farmer to buy and apply to his crops. They would thus be acting in unison with that endless cycle of physical change, before alluded to, where all decay in animal life forms the food of plants, these plants again forming the food of animals. The difference of opinion arose as to the method of treatment, but if the prospect of profit by the sale of the product to the farmer were given up, the only motive remaining, that of disposing of these matters for the best advantage of the whole community, would combine the various conflicting opinions, so far as they happen to be adapted to the circumstances of the case to be treated. So far as our present experience goes, this question of possible profit by sale of the product seems to be settled in the negative. It remains then for each community to employ such method as is found to be most consistent with its peculiar circumstances.

The various plans for removal are generally divided into two general classes, the "water-carriage" and the "dry" system.

Our own countrymen have seized upon the water-carriage system with great unanimity, and in many cases perhaps without proper consideration of the conditions which are essential to its success, viz., a copious water-supply, and a system of sewers adapted to the purpose, with an opportunity to discharge the contents of such sewers without becoming a nuisance to themselves or to others. In all towns which have the means to provide a water-supply and to construct sewers, and a proper place to discharge them, consistent with the welfare of others, there is no question but that the system of water-carriage has merits that will put all dry methods quite out of the field. It is with regard to such places as do not possess such means or opportunities that the methods of dry removal deserve attention.

It is universally agreed that any plan is bad which involves the *retention* of excreta in or about a house for more than twenty-four hours at most. Immediate and regular removal is of the first importance. On this account nothing can be much worse than the privy-vault, especially if connected with the house by continuous roofs. The gases evolved by the decomposition of the contents of such vaults or cess-pits pervade the whole house by diffusion, so that no quantity of disinfectant or deodorizer which can be applied to such cases can afford anything more than temporary relief. Unfortunately this system is still very largely in use not only in country villages and isolated houses, but in our old towns and cities as well, especially among the poorer class of dwellings, where the owners have not felt able to make the expenditures necessary for adopting the method of water-carriage.

The methods for emptying vaults, and removing their contents, have been very much improved of late. In place of the offensive wagons, with their furniture covered with filth, which formerly filed out from our city over all the leading thoroughfares every night, we have now compact tanks on wheels, kept perfectly clean outside, and filled by means of pumps and hose which accompany them.

Estimates at the office of the Board of Health rate the number of vaults still in use within this city [Boston, Mass.], at about thirty thousand, of which two-thirds, say twenty thousand, are closed vaults, having no connection with the sewer. There are from five thousand to seven thousand of these cleaned out annually,—indicating that they average about three years without cleaning. Since some are cleaned every year and even oftener, it follows that some are allowed to remain much longer than three years without cleaning. It is now over thirty-one years since the city has had an abundant water-supply, with which the use of water-closets became practicable. This large use of the vaults up to the present day serves as an example of the slow rate of change in customs of this kind, and how much remains to be done to bring our own community up to the standard which we recognize to be the only proper one.

Those communities whose topography and surroundings do not favor the disposal of excreta by water-carriage and sewers must have recourse to some of the dry methods. These can be used to better advantage in small compact communities like prisons, schools, and other public institutions, where supervision can be safely depended upon. In such places these methods have given satisfactory results where carefully developed and administered, and they will doubtless continue to be so used. Several systems of removal without water are described in detail in the Seventh Annual Report of the Massachusetts Board of Health. But as their use in our country is likely to be very limited, I shall content myself with this reference without any further description. Among the best of these methods is that known as the dry-earth system, with the earth-closet in place of the old privy. Dry loam is used to mix with every alvine discharge at once. It has the effect to deodorize fecal matter, and absorb the gases of its decomposition. It is well adapted for private houses of the better class in the country, where the owners cannot afford the cost of the water-closet system with its attendant conditions of water-supply and sewers. But the earth-closet, like all other methods of dry removal, is dependent for its success upon the vigilant care of those who have it in charge. Any remissness on their part is fatal, and the devices which appear so satisfactory when carefully managed, become terrible nuisances inside of a house, if the least neglect is allowed. The difficulty that would arise in furnishing the necessary quantity of dry earth and in removing that which had been saturated, when applied to large communities, has prevented, hitherto, the application of the earth-closet system to any whole towns or cities. The removal of excreta from cities in any way except by water involves a great deal of labor and cost. The quantity voided per thousand of mixed population is estimated at one and one-quarter tons per day. This would amount to upwards of three hundred tons daily for the city of Boston alone. If this were all to be removed by the earth-closet system, an equal amount of earth, say three hundred tons, must be brought in from the country in a dry state every day, and the whole with the excreta, amounting to six hundred tons in all, removed daily from the city's limits. The cost of such a system, properly supervised and inspected, would thus be very onerous, while the difficulties arising in carrying out the detail of distribution and collection in a satisfactory manner would be practically insurmountable. In considering the collection of excreta by water-carriage a wide and important branch of the question is opened, viz., — the drainage of towns.

ROBINSON ON SEWAGE DISPOSAL.[1]

The question of the disposal of sewage has now for some years given much trouble to the engineering world; a great number of conflicting theories have been propounded, and processes have been tried, and a considerable amount of literature has been devoted to advocating the various processes and theories, among which the careful engineer was obliged to pick his way with considerable caution. Now, however, the period of enthusiasm is past; the inventions which seemed to promise valuable results have been thoroughly tried, generally with the result that unexpected difficulties have nearly counterbalanced the advantages gained, and the elimination of impracticable systems, with actual experience of the more rational ones, has progressed so far that it is possible to give in a small compass a *résumé* of all the important modes of waste-disposal which experience has approved, with a reliable statement of the conditions necessary for their successful adoption, and the results to be expected from them. Such a *résumé* Mr. Robinson has undertaken to furnish, and although the expert may perhaps note a few omissions, and possibly some unintentional want of even justice to all the processes, his book is still of much value, as comprehending all that most persons not engineers need wish to learn of the present state of knowledge concerning a matter of great and growing importance; while professional men will find in it, in addition to the brief accounts of the various systems, with which they are already familiar through the works of their several advocates, exact and tabulated statements, giving the results of various trials to the present time, from which they can draw their own conclusions regarding the merits or demerits of each.

The author states his own general conclusion in a few words of the preface. "Where suitable land is available," he says, "I advise irrigation; but where such is not the case, I employ chemical treatment," *i. e.*, precipitation. Judging from the facts which he brings forward in the course of the book, his conclusion is well founded.

Some preliminary remarks on house sanitation form the introduction, all brief, and for the English climate, judicious. The vexed question, whether house soil-pipes should be used for sewer ventilation, meets with a decided negative. "House-drains," says Mr. Robinson, "should be effectually trapped from the main sewer."

The first mode of waste disposal taken up is irrigation, and some new and interesting facts are cited. Contrary to the common notion, it appears that the irrigation of soil with sewage does not enrich the soil itself. It increases the growth of the plants which happen to be there, but the matter which is not at once absorbed by their roots is completely lost in the subsoil. The famous Craigentinny meadows

[1] Sewage Disposal. By Henry Robinson. London and New York: E. & F. N. Spon, 1880. Price $1.50. Received by A. Williams & Co., Boston.

near Edinburgh are cited in support of this. After having been irrigated with sewage for many years, bearing enormous crops all the time, analysis shows that the composition of the soil has not changed in the least. Before irrigation began, it was a sandy ground, containing one and one-half per cent of organic matter, — root-fibres, — and it is the same now. Whatever may be the nature of the assimilative process, the great fertility of sewage-irrigated lands is well proved. Some statistics from the sewage farms of Gennevilliers and Asnières, show the effect upon sandy soils. Comparing the crops on sewaged and non-sewaged territory, it is found that the average yield of rye on the former is 166 hundredweight to the acre, to 52 on the latter; potatoes yield on the irrigated lands 742 bushels, to 453 on the non-irrigated; while in rye-grass, the staple sewage crop, the irrigated fields produced 1,023 hundredweight to the acre, while those not treated average but 108. Mr. Robinson quotes Mr. William Crookes as disparaging the quality of the Gennevilliers vegetables, saying that if the rye-grass were broken the juice would have a decided smell of sewage; but Mr. Crookes appears in another place as president of a precipitation company, so his judgment may have been warped, and similar statements have been repeatedly shown to be groundless.

The various processes still in use for purifying sewage by chemical separation of the organic matter are next considered. The author's opinion, for which he gives good reasons, is on the whole in favor of precipitation by alum, especially if the alum contains iron salts, which much assist its action, and he gives statistics of the results obtained at Coventry by the "A B C" process, in which alum, blood, clay and charcoal are employed, the precipitate forming a manure of some value. Next comes a "caution" to those who think that discharge into the sea is the best disposition for the waste of coast towns, and this ends the list of methods for sewage disposal treated of. The author claims that in a great many, if not the majority of seashore towns, the necessary conditions for safely discharging sewage into the ocean do not exist. One of these conditions is that there shall be at the outfall a continuous motion seaward during the twenty-four hours, instead of an oscillative action to and fro, which will result in the return of the sewage and its deposition along the shore. Sea-water, it is said, delays the oxidation of organic matters, so that foul matters which in river-water would be soon got rid of, are, when poured into the sea, preserved much longer; and it is also asserted that matters suspended in fresh water are deposited, by a kind of chemical action, when even a small quantity of saline solution is added to the water; To this is attributed the formation of the foul mud-banks which almost obstruct the Thames near the outfalls of the London sewers.

MATHEMATICAL DRAWING INSTRUMENTS.[1]

A SIMPLE glance at the table of contents of this work is sufficient to indicate that it was written by one who has been engaged in teaching mechanical drawing to classes of boys. The average boy when he first approaches the drawing-table is a very awkward and clumsy creature, and by frequent association with boys in the class-room the author has evidently convinced himself that it is impossible to be too minute in describing the construction and use of the tools with which they are to work. Even admitting this, we are somewhat astonished to find that one hundred and fifty-two pages are required to describe these few tools; and after reading the work carefully, we think it would have accomplished its proposed object better if it had been reduced one-half. In reading the notes and queries in some of the popular scientific serials, we are often struck with the singular questions asked, implying in many cases almost a want of common sense on the part of the questioner, and perhaps our author set himself the task of answering all such questions beforehand in the matter of drawing-instruments. To make perfectly clear what we wish to say, we should pronounce it a suitable book for a primary school, so far as minuteness of explanation goes, but not to be unreservedly recommended even for that class. When a boy has grown old enough to go to the drawing-table, — and we have such faith in drawing as a means of instruction that we should be glad to see this exercise commenced at a quite early age, — he would learn more in a few hours of practice than he can possibly learn from this book.

The weakest point of the book is its geometry. Here the reader is sometimes tempted to question the writer's acquaintance with the subject, or even his familiarity with common geometrical terms. For instance, the word *chord* does not appear, and one would be led to infer that the side of a regular polygon was the aliquot part of the circumference of the circumscribed circle. Thus, on page 74, we read: "The beginner will soon find, too, that the radius of a circle will go just six times round its circumference. Mathematically, the ratio of one to the other is not exactly one-sixth, but the difference is so slight that for all practical purposes it is non-existent." Again, on page 110: "It will be remembered that the radius of a circle goes six times round its circumference," etc. It is true that the chord or side of the hexagon differs from the sixth part of the circumference by less than five per cent, but is this the way to present it to a novice? The worst case, however, occurs in the test of triangles, or "set-squares." The geometrical construction here given introduces so many sources of error that we should be inclined to test the geometrical construction by the instrument, instead of testing the instrument by the geometrical construction. In general, the remarks, suggestions, and cautions have a true foundation, and for primary classes they are admirable; but those are precisely the classes which cannot appreciate their full significance, and which need a practical instructor. It may suit the wants of a very limited class of uneducated mechanics' apprentices — the class which is constantly asking, "How can I learn drawing without a master?" Unfortunately it does not teach even this class how to make a drawing, but only tells them something about their tools.

[1] Mathematical Drawing Instruments, and How to Use Them. By F. Edward Hulme, F. L. S., F. S. A., Art-Master of Marlborough College. New York: Bicknell & Comstock. 1880.

A BUILDING SAFE-GUIDE.[2]

"THIS treatise, which is based on practice, is accompanied with the necessary plates [two, containing seventeen cuts in all] and tables. . . . .

"All the statements and figures contained therein are warranted to be correct, as a great many mechanics and others are ready to rise and swear to them: therefore do I set at defiance all adversaries who may be disposed at any time to make serious objections to this work."

In this style the author addresses his readers in his preface, and warns the critic to approach his task with becoming caution, so that if he feel disposed to make "serious objection" to any statement found in this book he will do well to qualify his criticism by saying in the language of Artemus Ward, "This is a joak." Moreover, if the critic would escape the ban of "society at large," he must guard himself against seeming hostile to the book, for the author elsewhere says: "Therefore do I claim that the enemies of this work are strongly opposed to the interests of society at large."

Others of the architect-author's utterances are, to say the least, novel, as for instance the statement made as an argument against having competitions for private buildings, in this language: "No architect can build cheaper than another, if both of them know their profession well, and intend to deal fairly, consequently there cannot be much material difference between designs of this class."

The author has divided his work into three unequal parts, the first of which is most depressing as it deals with the many possibilities of defrauding the owner that arise in building operations, particular stress being laid on the opportunity to make unlawful gain by collusion between the architect and builder, when the architect accepts inferior work and material, and shares the builder's profit. This would be a very uncomfortable idea to entertain could not one take refuge in the comforting thought that as yet no one has seen fit to throw a light on the illegal gains which the physician shares with the druggist, when he wittingly prescribes for his patient, as helpless in his hands as is the ordinary client in the hands of the architect, a needless quantity of adulterated drugs.

The second part is more cheering, for here we find vaunted the merits of a "new system" of conducting business which is to preclude every chance of fraud. To be sure, it is a little disappointing to find that this new system does not vary materially from the practice of architects in good standing in the East, and it is hard to see how it can be new to the same class of practitioners in the West. Of the sixteen clauses of the synopsis of the new system, there are some whose value we do not appreciate: for instance, why it should be necessary for all competing mechanics to sign the drawings and specifications; or what is to be gained by attaching the contract price, after that has been determined, to the specifications. As the apparent purpose of the work is to inculcate suspicion, it is not surprising to find that under the new system the owner, not the architect, is to receive and open all bids from mechanics.

The third part which occupies about three-quarters of the work is given to a treatise on materials and workmanship, which may or may not be useful, according as the reader's previous knowledge of the things treated is sound or unsound. Much of the information is trite, some of it is misleading, and some of it is absolutely wrong and harmful. But the author evidently considers that its saving grace lies in the fact that "it exposes and explains also in detail all the frauds which may be perpetrated in each trade, and shows all possible ways and means to detect them." But even in the special field the author has undertaken to exploit, we find the work but imperfectly done, for we find it said that cast-iron soil-pipes — which, by the way, are said to vary between four inches and fifteen inches in diameter — of the same diameter "are of the same strength or thickness of metal" so that frauds can be effected only by using smaller sizes than are called for. Evidently, then, the writer knows nothing of sand-holes, cracks, and pipes thinner on one side than the other.

We regret to see amongst other errors of judgemnt, that the writer recommends the Kyan method of preserving timber by the use of corrosive sublimate, and amongst errors of fact the statement that "the connections of water-closets are made with the best glazier's putty." It is disagreeable to be forced to put one's self under the ban of society, but as we are persuaded that the author has been as ill-advised in publishing his Building Safe-Guide, as he has been unhappy in his choice of a title, we are bound to say so, and we find that we cannot palliate our offence in his eyes by closing with the words of the great American humorist.

[2] Marcotte's Building Safe-Guide. By Charles Marcotte, Architect, St. Louis, Mo.: Slawson & Pierrot, Printers. 1880. Price $1.00.

THE CHOICE OF A BUILDING-SITE.

A CELLAR is a desirable thing — handy to have in the house — if properly made; but a poor cellar, one badly ventilated and drained,

is worse than no cellar. Better be without it altogether than not have it as it should be; better stand the house on piers, and let the winds of Heaven have free circulation under it, than make of it a plague-spot, which it will be if the cellar is sunk in wet and spongy land, or if filled in winter with decaying vegetables. In many parts of Europe the cellar is used as a stable, and I have there frequently passed a night at a time, though not without trepidation, over a cellar so occupied, while the attic was given over to hens. It is gratifying to think that we are not likely to come to this in our own country; but we are still far from thoughtful about our cellars. No man should think of building on soft and spongy land, nor in a locality where the soil is inclined to hold water; and it is even more objectionable to select a site on made land, for the filling-in is too often composed of refuse matter, collected wherever it could be found, and in which there is more or less of decaying animal and vegetable waste. Of late years we have been waking up to the fact that these laws are sound and should be rigidly enforced. But they are not new: in fact, they are almost as old as the hills. Of this I have been reminded by recently reading a review of the works of Mānasāra, the Vitruvius of India, in the London *Building News*.

The time when Mānasāra lived is not known: suffice that his notes for the guidance of architects and builders ante-date the writings of some of the learned sages who compiled the sacred books of India. That he understood the laws of sanitation, is clearly shown in many of his instructions. At the outset he tells his readers what should be the qualities of the soil on which to build, if one would have a healthy house, and how to test the soil to ascertain its qualities. "Habitable ground," says the sage, "may be known from its color, smell, taste, form and touch. The best sort of ground should abound with milky trees, full of fruit and flowers;" but a spot that is slimy, damp, subject to unwholesome effluvia, near a burying-ground, or any other repository of decayed matter, should be avoided on every account. One of the tests, to ascertain if a site selected is a suitable one to build upon, is, to dig a hole, and after having made the excavation, fill it up with the earth that has been thrown out. If after filling the hole there should be a surplus of earth, it is a sign that the ground is good. If the earth barely fills the hole, the ground is but indifferent; but if the earth so thrown out is not enough to fill the hole, have nothing to do with the location, for it is positively bad. These last instructions, cited by the *Building News*, are from the *Matsya purana*, which dates from the same early period.

A good dry site, on firm upland, is not only the most suitable on sanitary grounds, but also for many other reasons. A house always appears to better advantage, if, when we approach it, we have to look up to it. To press a house down to near the level of the ground is to injure the effect it would otherwise produce, and it also shuts it off from light and air.

Whether we give much thought and attention to other parts of our dwellings, we should see that the cellar is not only well drained, but also that it is ventilated, and has its bottom covered with concrete. Different soils require different treatments: a sandy soil must be handled in one way, and a tenacious clay in another; but whatever the soil, we must always come back to the one point, — that a cellar must be light, airy and dry, to make it safe for one to dwell over it.

Bedrooms in the cellar, or, as we sometimes call it, the basement, are unhealthy, and too often are really dangerous, even in houses that are built on a sandy soil, and with the basement well out of ground. In our climate, and particularly in New England, there is much humidity in the atmosphere, and the changes in the temperature are often great and sudden. At such times the condensation is rapid, and in a cellar everything soon becomes surcharged with moisture; the air becomes fixed, or, at best, sluggish, and the opening of the windows does not correct the evil; on the contrary, the difference in temperature invites the moisture-laden air to enter and deposit its load, and thus, while the cellar was apparently dry and free from moisture during the winter, when it was shut up, the summer sees drops hanging from the ceiling and running down the walls. If the occupants of basements, those who work in them by day, and sleep in them at night, could or would, with watchful care, open the windows during the dryest part of the day, and close them promptly at the least indication of a change of temperature, the evil might in part be overcome. But in so doing we should rob them of air, — suffocate them by enclosing them, as it were, in a wet blanket, — and so we leave them to attacks of rheumatism, or, worse still, some fatal form of lung-disease. There is very little poetry in a cellar, and I do not think any one can call to mind any rhapsody on the subject. Even Mantilini felt the depressing influence of the cellar, in which, in his latter days, he turned the mangle. No one who ever lived in a cellar was jocose. A garret might do. Poets have lived in a garret, and have successfully courted the Muse under the rafters that gave them shelter; but a cellar — nothing in this day can be said in its favor. Champlin.

THE ILLUSTRATIONS.

MANTEL-PIECE AND FURNITURE. MESSRS. LINDSLEY & CUTTER, ARCHITECTS, NEW YORK, N. Y.

The chimney-piece is of dark marble, and the dado and clock of ebonized cherry and maple; the lambrequin is embroidered in subdued tones of color. The dado is divided into three panels; the middle one is filled with one of Alma Tadema's etchings, The Roman Emperor; the end panels are filled in with polished brass sconces on etched brass plate and embossed gold leather. The clock-face is of polished brass, hands silver, figures black; the lower door is filled in with leaded glass, colored and transparent, so that the large polished brass pendulum may be seen. On the clock under the shelf is the inscription, "Time and tide wait for no man." The chandelier is made of polished brass; the globe is made of leaded glass, colored and transparent, lead gilt. Inside the globe are two small burners; the argand burner at base slides up and down, to be used as a reading-lamp. The picture-frame is made of ebonized cherry, with a Japanese figure painted on fine gauze. The furniture is all covered with embroidered material. The dimensions of the bric-à-brac case are about eight feet six inches high by five feet six inches long and two feet six inches wide. It is made of ebonized cherry, moulded, carved and painted, mounted with polished brass. The curtains are hand-worked in crewels in several colors.

DESIGN FOR A CITY HOUSE. MR. W. A. BATES, ARCHITECT, NEW YORK, N. Y.

UNITED STATES POST-OFFICE AND COURT-HOUSE, KANSAS CITY, MO. MR. J. G. HILL, SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT, WASHINGTON, D. C.

COUNTRY HOUSE. MR. A. M. WEST, ARCHITECT, WATERBURY, CONN.

BALMAIN'S LUMINOUS PAINT.[1]

Every one knows that a ray of white light consists of minute waves, or ripples, analogous to those of water, and of various lengths. The mean length of these waves, measured from the crest of one to the crest of the next, may be taken as the fifty-thousandth of an inch. They all travel in straight lines, and all with the same velocity, a velocity which is called the velocity of light. In passing through a prism, these lines of waves are refracted, or bent at different angles, and when afterwards allowed to fall on a screen, they are reflected back to our eyes, and a portion of them, acting on the optic nerve, produce the sensation of color. These rays are, therefore, called the visible rays. Here on the screen you see the spectrum of the white electric light.

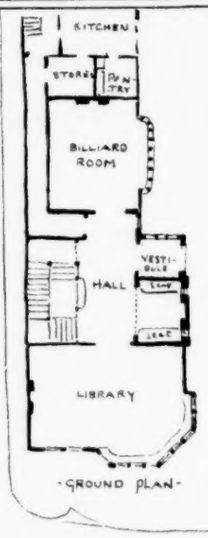
The eye is, however, a very imperfect optical instrument, and is only sensitive to waves between certain limits of length. The real spectrum on the screen is much larger than the visible one. There is a portion beyond the red, which is called the ultra-red portion. The waves of this portion are too long to affect the eye, but are powerful in producing the phenomena of heat. The rays are, therefore, sometimes called the invisible or obscure heat-rays. There is also a portion beyond the violet, produced by waves too short to affect the eye, but active in producing chemical and other effects. These rays are called the ultra-violet, actinic, or chemical rays.

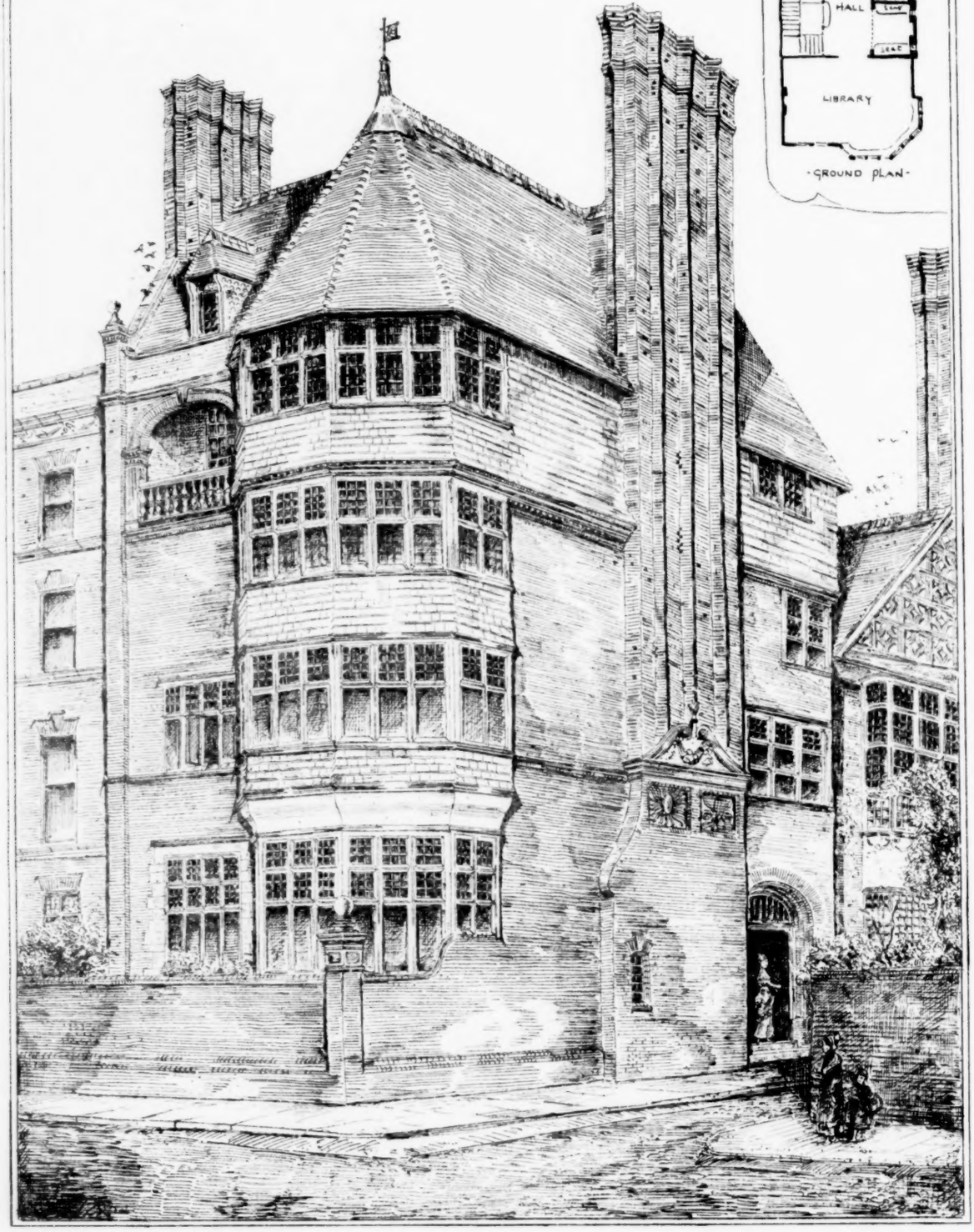
Many years ago, Sir John Herschel observed the peculiar blue opalescence which a solution of quinine presents when held in certain lights. Brewster made further observations of the same kind; but it was not until 1852 that Professor Stokes, of Cambridge, published the memorable research on the subject, which would alone have been sufficient to render his name immortal in the history of science. Stokes suggested the name, fluorescence, for the phenomenon, and showed that it was due to a power, which some bodies possess, of absorbing light-waves, and emitting them again as longer waves. Quinine is peculiarly sensitive to violet and ultra-violet rays. If I pass a solution of quinine through the spectrum, beginning at the red end, you will see that the fluorescence does not appear until we reach the blue portion, but continues to be visible far beyond the violet. In the ultra-violet portion, we have a distinct conversion of invisible actinic into visible light rays. Here is a solution of the new Magdala red, made from naphthaline. It appears black in all parts of the spectrum, except the region of the yellow, in which it shows a magnificent red fluorescence. This experiment proves that fluorescence is not always caused by the conversion of invisible into visible waves. We now throw a beam of electric light, filtered to some extent from heat-rays by passing through ammonio-sulphate of copper, on two jars of water, and throw into one a solution of quinine, and into the other an alkaline solution of the curious compound called fluorescine. You perceive in the one case a blue and in the other an intense emerald-green fluorescence, and it is really difficult to believe that in each case the solution remains transparent. In fluorescence, then, we have generally, if not always, an increase of wave length, due to the molecular action of certain substances. The waves are never shortened, and are sometimes described as suffering "degradation." The luminosity ceases as soon as the incident light is withdrawn, or, to speak more cautiously, it lasts only for a minute period of time afterwards. In the case of quinine, the work of converting invisible into visible rays seems to take about the 5,000th part of a second.

We come now to a closely allied, if not identical, phenomenon. Many substances are known which, having been exposed to light, continue to emit light for measurable periods of time after the luminous source is removed. This phenomenon is called phosphorescence, and it is with this that we are chiefly concerned to-night. The term phosphorescence has been applied to light emitted under various conditions. Thus we have the light emitted during the slow oxidation of phosphorus; the light of living animals, such as the glow-worm and

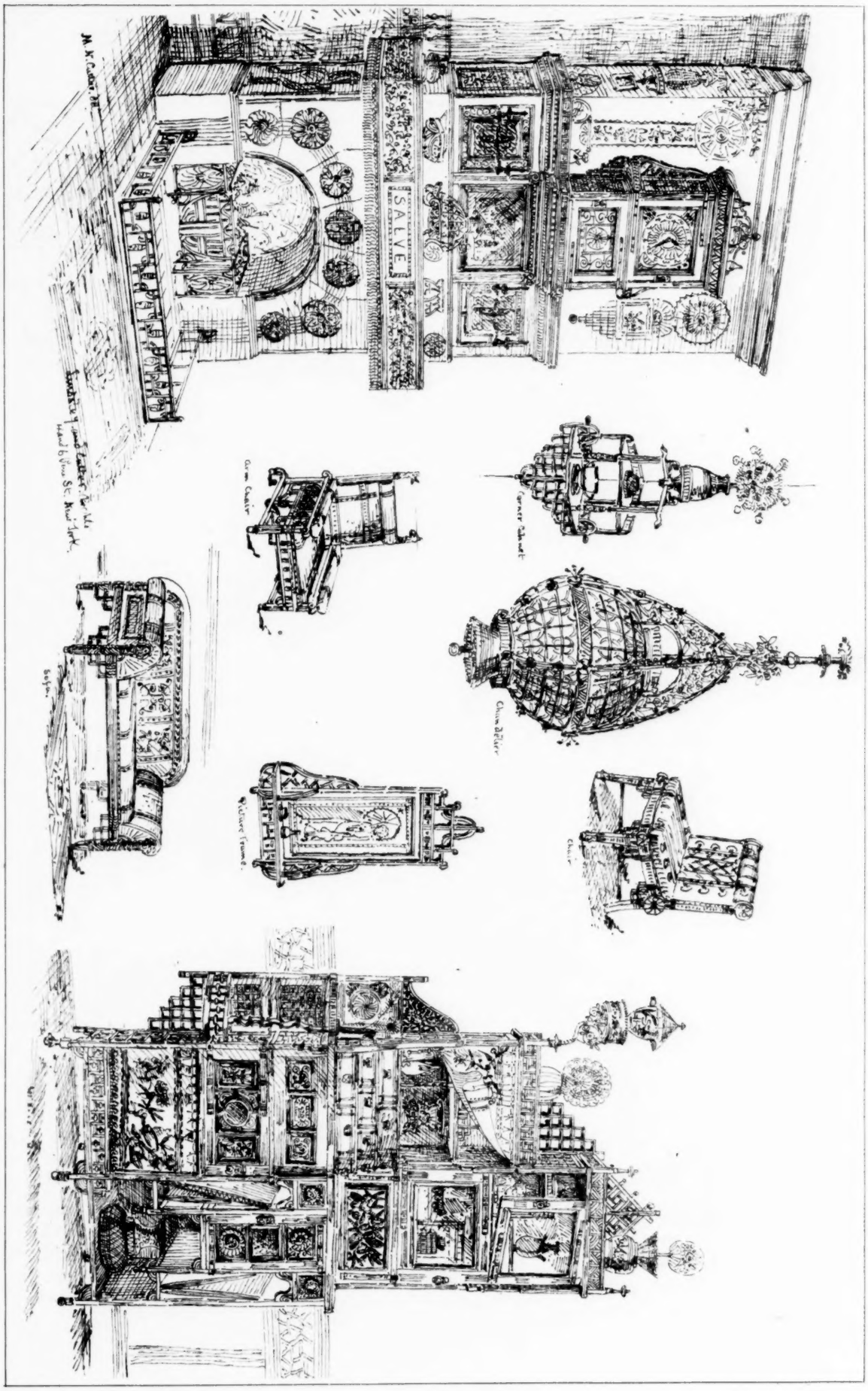
[1] A Paper read before the Society of Arts, London, by Mr. C. W. Heaton, F. C. S.

A City House.
W. A. Bates. Archt. 45 W. 35 St.
New York.





PROPOSED HOUSE AT WATERBURY CT. A.M. WEST ARCH'T.


SALVE

Design for Post-Office and Court-House, Kansas City, Missouri.

the noctiluca; the light attendant upon incipient putrefaction, animal and vegetable; the light produced by the heating of phosphorus, and many other bodies; by percussion, as when sugar is struck with a hammer or rubbed, and the beautiful phenomena developed in high vacua in that strange condition of matter with which Mr. Crookes's remarkable discoveries have lately made us familiar; and, lastly, we have the light which follows insolation. All these are grouped together under the general term phosphorescence, but it is with the last one that we have at present to deal.

The history of discovery in regard to this kind of phosphorescence is a somewhat lengthy one. Obscure hints of the phosphorescent power of gems are contained in some of the works of the ancients, but nothing definite was discovered until about the year 1602, when a shoemaker of Bologna, named Vincenzo Casciorolo, picked up a heavy stone, and, being an enthusiastic alchemist, took it home and treated it in his furnace, in the hope of obtaining gold from it. Instead of getting gold, he obtained a mass which shone in the dark, and which became celebrated as the Bologna stone, or Bologna phosphorus. The stone was the now well-known heavy spar, and acted on by carbon it yielded barium sulphide, a compound of considerable phosphorescent power. In 1663, Boyle published some observations on the phosphorescence of the diamond, and, in 1675, Baudoin obtained another phosphorus by the action of heat on calcium nitrate. Some important additions to our knowledge were made by Beccaria, in 1744, and then came the discovery by Canton, in 1761, of the phosphorus or pyrophorus which bears his name. It is made by calcining oyster-shells with sulphur, and consists of course essentially of calcium sulphide, which is the most remarkable of phosphorescent substances. Thanks to the kindness of my friend, Professor Tuson, I am able to show you a sealed tube containing a specimen of this substance prepared by Canton himself, with the date 1764 engraved on the glass. It still retains its power, a remarkable proof that the luminosity is not due to any chemical action.

In 1775, Wilson published some valuable discoveries. He extended the list of phosphori, showed that light of various colors could be obtained from them, and made some interesting observations on the effects of heat and cold, to which I shall refer again. I have here a sheet of cardboard painted with various phosphorescent compounds, and a butterfly painted on glass in the same matter. On exposing them to light, you will observe the different shades of color, varying from red to blue, which are developed.

Passing by, in this imperfect sketch, several important names, we come to the greatest name of all, Edmond Becquerel, who for more than thirty years has enriched science by his discoveries. It is impossible for me to give even an abstract of these discoveries. He invented an instrument called the phosphoroscope, by which he was able to detect the phosphorescent power in bodies which remain luminous for very short periods of time. He showed that the power was a very common one in natural, as well as in artificially-prepared substances, and that it was possessed by organic as well as inorganic compounds, and particularly by all fluorescent substances. He analyzed the light emitted in each case by the spectrum, and determined its duration within certain limits of accuracy. These limits are singularly wide, extending from less than the 5,000th part of a second, to hours or even days. Of all phosphorescent bodies, the sulphides of calcium, barium, and strontium, are the most remarkable in regard to the duration of their light; and Becquerel has studied the modes of preparing these compounds with the greatest care, and has revealed many strange and even startling facts in regard to them. They can be prepared by the action of carbon on the sulphates, by the action of sulphur on the oxides and carbonates, and by the action of alkaline sulphides, and even of antimony sulphide, on the last-named compounds. The phosphori prepared by these various processes differ widely in regard to the color and duration of the light which they emit; and it is even possible to obtain shades varying from orange-red and indigo-blue, from calcium only. But this is not all. The calcium-sulphide obtained from calcite is different from that from arragonite, though these minerals have the same chemical composition; and the differences remain even after each mineral has been dissolved in acid, reprecipitated by sodium carbonate, and then ignited with sulphur. This affords a strange, and for the present, inexplicable example of molecular persistency. Becquerel holds that fluorescence and phosphorescence are one and the same phenomenon, the apparent differences being due solely to the different periods during which the absorbed light is emitted. The point is one which merits attentive study.

We now come to the immediate subject of my paper. The late Mr. Balmain, formerly of University College, and an excellent chemist, had for years made a special study of phosphorescent substances. He enjoyed the friendship of the Becquerels, father and son, and aided possibly by them, he succeeded in producing a constant and very powerful phosphorescent substance. Here is some of the substance. You see how strong a light it emits after exposure to the magnesium light. It occurred to him to patent the use of this and other phosphorescent materials, mixed with water or oil, as paints capable of being applied in the ordinary way to any surface. This patent for luminous paint is now in the hands of Messrs. Ihlee & Horne, of Aldermanbury, and, thanks to those gentlemen, I am able to show you a great many specimens of articles thus painted, and so to enable you to judge for yourselves of its proposed applications. I have, in the first place, a number of sheets of cardboard so painted, some of them framed and glazed, which you see emit, after insolation, an amount of light which is really remarkable. With these sheets, we can try a few preliminary experiments, which will assist in illustrating the nature of the phenomena with which we are dealing. Let us, in the first place, test the sensitiveness of the paint. Exposing a sheet of painted card, previously kept in darkness, to Leyden jar sparks from an induction coil, you see that each spark impresses its image on the card, and makes it luminous. It is easy in this way to write luminous words on an otherwise dark card. You know how very short a time each spark lasts, and can, therefore, judge of the short time required for the illumination. The same fact is more roughly shown by striking a lucifer match in front of a dark pane. The momentary flash of the tip is, you see, enough to produce a very visible effect on the paint.

We may now try the very obvious experiment of applying light of various colors to the painted surface. Here is a card partially covered with sheets of blue, green, yellow, and red glass. Burning a piece of magnesium in front of it, you see that no effect at all is produced by the red and yellow light, a considerable effect by the green, and most of all by the violet light. The same effect may be produced in another and less ambiguous manner. We will throw the spectrum on a white screen, which consists of five horizontal layers. The upper one is white paper; the next, sensitive photographic paper; the next, paper saturated with quinine; the next, luminous paint, which at present is dark; and the lowest, luminous paint previously insolated. The spectrum covers all these layers. A long exposure is required to give a very satisfactory result, but we are then able to make out that there is great general similarity between the rays which affect the silver, the quinine, and the luminous paint. The affected portions are nearly, but not quite, coincident. If the experiment is carried on for a long time with a very intense spectrum, another effect which we could not have anticipated is observed in the lowest layer, which has previously been made luminous. The violet and ultra-violet rays increase the luminosity, as we might have expected, but the yellow and red rays not only do not add to the luminosity, but actually take away the light previously present. Another experiment will show this effect more quickly. Here is a sheet, at present luminous; I cover half of it with opaque cardboard, and the other half with yellow glass, and then burn a piece of magnesium in front of it. See the result. The rays which passed through the yellow glass have taken nearly all the light out of that half of the card, while the light on the other remains unimpaired.

For an explanation of this curious phenomenon, we must go back 105 years, to Wilson, who first observed it, though in a different manner. We must remember that red and yellow rays are also heat-rays; and Wilson showed that heat would stimulate the light for a time, only to cause it more rapidly to disappear. On a faintly luminous pane I place a can of hot water. Removing it after a minute, we find that the light in that place is much brighter than before. Cold diminishes the light, which, however, returns when the original temperature is restored. This I can easily show, by applying a block of ice for a minute to the luminous surface. Thus we see the importance, in all experiments on the duration of phosphorescent light, of paying close attention to temperature.

We may now inquire how far this luminous paint is suited for actual use, and what kind of applications can be found for it. We have seen that it is very sensitive to artificial light. To ordinary daylight it is at least equally sensitive, and I have seen it tried, with a success which seemed to me wonderful, in a thick yellow London fog. A very short exposure produces the maximum of illumination, though, of course, the amount of this illumination depends on the quantity and quality of the light. The duration of the light is likewise dependent, to some extent, on conditions. When the paint has been exposed to the intense light of the sun, or of burning magnesium, a good deal of the brilliancy disappears quickly, but after that the fading is very slow; and it may be said that a more or less useful light will remain through the length of an ordinary winter's night. In an extreme case, I was just able to see the dial of a watch by the light emitted from a card which had been in total darkness for twenty-six hours. In this case the card had been exposed to daylight of moderate intensity for two hours.

The next point to be considered is the durability of the paint. The oil seems to protect it wonderfully, even from the acid air and rain of London. I have seen a wooden bowl, which was painted by Mr. Balmain more than a year ago, and has for several months been exposed to the open air in London, in very bad weather. It still preserves its power. Equally effectual is the oil as a protection from water. Here you see the painted model of a life-buoy immersed in water. Its luminosity is very evident. In several respects, therefore, namely, as regards intensity of light, lasting power, and durability under fair condition, these painted surfaces seem likely to be useful as carriers of daylight into dark places and through dark hours.

Let us now turn to the suggested applications of the paint. They may be divided roughly into the ornamental and the useful, and I need only mention a few out of the many that occur to the mind. In the former class, we may include these painted india-rubber balls, which are very pretty, and suggest nocturnal lawn tennis. Statuary, grotto-work, and ornamental tiles, also give striking and beautiful effects. Here is a large bust of the Prince Consort which has been painted and illuminated. You see how fine an effect it produces. Clock-faces, so prepared, show the time all night, and watch-boxes enable us to do as much for our watches. The ends of lucifer match-

boxes have been painted with the same material. Here are a number of them. There would obviously be no difficulty in finding one of these boxes in the dark.

To pass to more important applications, the roofs of railway carriages have already been treated experimentally with the paint, with results that appear satisfactory. The light would, of course, only be employed for daylight trains which run through tunnels. Then, again, it is proposed to paint the names of streets, the direction a post-offices, sign-posts, and advertisements, in the same way. Here are some framed notices, "Lodgings," "To Let," and such like, which would easily be seen through, at any rate, a great portion of the night. Still more important is the use of this luminous paint in gunpowder-magazines, spirit-stores, and for purposes of exploration in coal-mines during seasons of danger; besides many such uses that may be thought of.

But of all the proposed uses of the luminous paint, none seem to me so important, or so certain of practical success, as the marine applications. Several of these have already been realized in a satisfactory manner. For signal and mooring buoys, for example, its utility is obvious. It is of the utmost importance that the buoys employed for marking channels should be seen easily, the safe entrance to a harbor or river frequently depending upon the successful passage through a line of buoys. The entrances to Poole Harbor, and to the mouths of the Thames and Medway, are marked in this way, and great difficulty and danger are often experienced on dark nights in making out the buoys. Now, there can be no doubt that a buoy thickly painted with luminous paint would remain visible through the whole, or nearly the whole, of a night. A few evenings ago, I assisted at the trial of a small mooring-buoy at Erith. It was not placed in the water till nine at night, having, of course, been for some hours before in darkness. We found that it was easily visible at distances of over a hundred yards, although the night was not a clear one, and the light to which the buoy had been exposed had not been very good. Yatchsmen, returning to moorings late at night, would find such buoys a great advantage, and many collisions might in this way be avoided. Equally important is the application of the paint to life-buoys. Life-buoys are, or should always be, kept on deck in convenient situations. A life-buoy thrown to a man overboard will often save his life, particularly if the man can swim. But what is the use of throwing out a common life-buoy on a dark night? It is impossible for the man to see it, and it is equally invisible to those on board. Here is a life-buoy painted with the luminous paint. It has been on the roof of this house all day, and has, consequently, been now for several hours in darkness. Yet you see it emits a light that could easily be seen at a very considerable distance. Any decently good swimmer could easily reach it, while the ship's boats would know at once the point to which they must row.

Finally, there seems no doubt of the usefulness of the paint in diving and other submarine operations. We have ready a diver in full dress, painted all over with the luminous paint. He is being illuminated in the next room. Now he enters, and you see what a brilliant and ghost-like appearance he presents. At present one of the greatest difficulties in submarine operations arises from the intense darkness. With this new arrangement every diver will be his own lantern, and will carry down with him a stock of daylight that will assist his labors materially. This dress was actually so used at Southampton a day or two ago. Mr. Phillip Hedger, the Superintendent of the Southampton Dock Company, has sent a letter to Messrs. Ihlee & Horne, in which he says that the diver descended, on a somewhat murky day, into twenty-seven feet of not very clear water, and found that he was able to distinguish the bolt-heads and mussels on a ship's bottom with ease. Mr. Hedger seems to entertain no doubt of the success of the new application.

Let me, in conclusion, draw your attention to the splendid inscription, "Balmain's Luminous Paint," which stretches in letters of fire the whole length of the hall. It has been in darkness for two hours, and yet illustrates very simply the way in which the paint may be made useful for advertising purposes.

I may now conclude this brief and very imperfect sketch. I heartily wish the exposition had fallen into better hands, and particularly that our chairman, whose well-known researches on actinic light have added so much to our knowledge, would have taken the matter in hand himself. However, I have done my best, and can only hope that you have acquired some new ideas on the subject, and will in future watch with interest for further useful applications of the luminous paint.

THE BOSTON SOCIETY OF ARCHITECTS.

A special meeting of the Society was held at the President's office, on Wednesday last, to consider and act upon the report of the special committee which was appointed at the March meeting to consider the communication of the Board of Trustees, suggesting a dissolution of the connection between the Institute and the local Chapters.

The report of the Committee as amended at this meeting is as follows: —

The Special Committee have examined the Constitution and By-Laws of the Institute, with a view of ascertaining what changes would best meet the suggestions of the convention held in New York in November, and the opinions of this Society as expressed at the meetings in March and April, and, in accordance with the instructions given them at the April meeting, herewith present a new draft of the Constitution of the Institute to be considered by this Society, and, if approved, to be forwarded to the other Chapters of the Institute for their consideration, with a view to definite action at the Philadelphia Convention in November next.

The changes proposed consist in the omission of all reference to Chapters, thus making the Institute an independent national organization; in the omission of the Librarian from the list of officers; and in omitting "Regular Meetings, Lectures upon topics of general interest, a School for the education of architects, Exhibitions of architectural drawings, a Library, and a Collection of Designs and Models," from the enumeration of the means to be employed by the Institute in the furtherance of its ends. The holding of an annual convention, and the establishment of a permanent council, or board of trustees, to be elected at each convention, are thus made to appear in name, as they are in fact, the chief instrumentalities through which the Institute seeks to accomplish its ends.

The Constitution as thus modified would read as follows: —

CONSTITUTION.

ARTICLE I.

The name of this Society shall be The American Institute of Architects.

ARTICLE II.

The objects of this Institute are to unite in fellowship the Architects of this continent, and to combine their efforts so as to promote the artistic, scientific and practical efficiency of the profession.

ARTICLE III.

The means of accomplishing this end shall be the establishment of a permanent body of officers, the holding of an annual convention for the discussion of subjects of professional importance, and any other means calculated to promote the objects of the Institute.

ARTICLE IV.

1. The Institute shall consist of Fellows and Honorary Members.
2. The condition of membership as Fellows shall be, the honorable practice of the profession, in accordance with the Constitution and By-Laws of the Institute.
3. No member shall accept direct or indirect compensation for services rendered in the practice of his profession, other than the fees received from his client.

ARTICLE V.

The officers of the Institute shall be a President, Vice-President, Treasurer, Secretary and Corresponding Secretary.

ARTICLE VI.

The government of the affairs of the Institute, and the election of members and officers, shall be in accordance with such By-Laws, not inconsistent with this Constitution, as shall be enacted by the Institute.

ARTICLE VII.

This Constitution shall be altered or amended only upon a two-third vote of the members present at an annual convention of the Institute, such alteration and amendment to be ratified by two-thirds of all the members of the Institute.

The By-Laws would have to be modified by making corresponding changes. The only other alterations we would suggest in them would be changing the name of the Board of Trustees, calling them the Council, since the holding of property would not be in contemplation as one of their prominent functions.

The effect of these changes would be to leave every local society to manage its own affairs and spend its own money, while the Institute, as an independent national organization, would attend to those general interests of the profession which no local association could assume to direct or control. Its chief business would be the conduct of its annual meetings, as is the case with the various associations for the advancement of science, and its chief expenses would be those attendant upon these meetings. These would be met partly by the annual fees of membership, and partly, as in the case of the scientific societies, by local contributions at the time of the convention and the fees of the temporary members.

At the same time, the officers of the Institute, holding over from one convention to another, would maintain its existence and be on the watch for occasions to further its purposes, under such conditions as the By-Laws or the instructions of the conventions might impose.

It may be anticipated that both the Institute and the local societies, freed from the embarrassments of an organic connection, would enjoy an increased activity and usefulness each in its own field, an enlarged membership and a diminished scale of fees or assessments.

MR. HYATT'S LATER EXPERIMENTS ON CONCRETE FLOORS.

With reference to the American experiments alluded to in my former communication, the sections were made at New York, in the fall of 1878, and the final tests of breaking were made when the samples were about eight months old. The cementing materials used were best English Portland cement in some of the sections, and American "plaster of Paris" in others. The bricks were cheap American red bricks, worth five dollars (one pound) a thousand; size of bricks, 4 in. by 8 in. by 2¼ in. Of these materials, *cement* and bricks, a brick beam 2 ft. by 11 ft. 11 in. by 13 in. depth at centre, and 11½ in. at the ends, was made with a gridiron tie composed of nine blades or bars, each 1½ in. by ¼ in. The beam had a clear span of 11 ft. 1½ in.; the load was applied at the centre, upon a bearing-block 1 ft. square; the deflection, regular and constant, from ¼ in. at 5 tons,

to 1⅜ in. at 16 tons, when the beam gave way by the crushing of the bricks.

Seven small floor-sections, each 5 ft. 11 in. by 2 ft. 2 in., were made of bricks laid on their edges, the thickness of flooring being consequently 4 in., except an increase of 1 in. at the centre, made by a layer of the cement in the case of four out of the seven samples. The clear span of these sections was 5 ft. 2 in. in each case. The gridiron of tie-metals was composed of ten "knowing blades" each 2 in. by ⅛ in., very tiny fellows, but very "magical." One of the sections, 4 in. thick, bricks joined by Portland cement, at 2 tons deflected ⅛ in., at 4 tons ¼ in., at 7 tons $\frac{7}{16}$ in., and gave way. The other two sections of 4 in. thickness, bricks cemented with plaster of Paris, gave results as follows: One of the two at 3 tons deflected ¼ in., at 5 tons ½ in., at 8 tons $\frac{9}{16}$ in., and gave way. The other at 1 ton deflected $\frac{1}{16}$ in., at 5 tons deflected ½ in., and gave way. Two sections, bricks cemented with plaster of Paris 5 in. thick at centre, 4½ in. at the ends, each with 1 ton deflected ⅛ in., 3 tons ¼ in., 5 tons $\frac{5}{16}$ in., 6 tons $\frac{7}{16}$ in., and one gave way; the other at 8 tons deflected ⅝ in., and gave way. The remaining sections, two in number, bricks united with Portland cement, each one 5 in. at centre, 4½ in. at ends, behaved as follows: one of the two at 2 tons deflected ⅛ in., 4 tons ¼ in., 6 tons ½ in., and showed signs of distress at joints on the under side; at 7 tons deflected ⅝ in., at 8 tons ¾ in., at 9 tons 1 in., and gave way. The other one, with 2 tons, deflected $\frac{1}{16}$ in., 2 tons $\frac{3}{32}$ in., 4 tons ⅛ in., 5 tons $\frac{3}{16}$ in., 6 tons ¼ in., (the weight being now removed, the floor returned to its original level); at 7 tons $\frac{5}{16}$ in., 8 tons ⅜ in. (the section now showed signs of distress on the underside at the joints, but no indication of cracking at the top), at 9 tons deflected $\frac{7}{16}$ in., at 10 tons ½ in., and gave way. In each of the seven sections a fair 6 in. of flooring remained uninjured on each side of the destroyed central portion of the floor, the part actually broken down being a width of 14 in. only, out of the 26 in. composing the width of the section. Possibly these facts may surprise others, as much as they did me at the time. THADDEUS HYATT.

STEAM AS AN EXTINGUISHER.

COMMENTING on Mr. Joseph Bird's account of the manner of extinguishing fires with steam at Downer's Kerosene Works in Boston, which we lately published (*American Architect* for April 17), Mr. J. B. Moore of New Orleans writes to the *Fireman's Journal* as follows: "I have neither time nor desire to enter into a full disquisition on the subject for the information of either Joseph Bird or the many other theorists who write on the subject so learnedly, but will, with your permission, give them a few of the points which we have demonstrated to our entire satisfaction both practically and experimentally. These are as follows: First: The putting out of fire is best accomplished by excluding the oxygen of the atmosphere. Second: By absorption of heat. Third: Water serves the first of the above-named purposes well. Fourth: Water, if not heated, is further an important factor, in that its heat-absorbing property comes into play more readily than any other attainable agent. Fifth, Steam is the least potent of all the proposed agents for the extinguishment of fire — utterly inutile, in fact, until it condenses, and then far inferior to cold water. How then, say you, is it that Joseph Bird and other well-meaning men have testified so freely as to the effectiveness of steam? My answer is that they have simply observed an effect, and jumped at conclusions as to the cause. The fire was extinguished by the exclusion of oxygen; a result, not of the injection of steam into the room, but of closing it so as to be air-tight or nearly so. We had fallen into this same error here at one time, but are thoroughly cured of it now. In the case of the Mississippi steamer, James Howard, her battery of ten boilers was turned loose into the hold, giving a product of steam that all of the steam fire-engines of New York could not have equalled. The fire was subsequently extinguished by scuttling the boat. Two or three other experiences of this sort settled the matter beyond all peradventure in this latitude. The tug-owners in this harbor are intelligent men of large experience in this matter, and the tugs of necessity possessed of very large steam-generating facilities, yet these very men have recently provided themselves with two carbonic-acid-gas machines of very large capacity for use in ship fires. These are additional to one that has been in operation in this harbor for nearly five years, earning in that time $147,000 in the way of salvage money for her owners and crew as a reward for having saved twelve cotton-laden ships whose cargoes were on fire in the hold."

CEMENT TEGELS.

NEW YORK, May 4, 1880.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — Allow me to correct the statement in your issue of April 24, in which you say, "A new industry, new at least in that country, has attained considerable proportions in England," the "Dutch cement tegels." This, to my knowledge, is not new, for the Dutch tiles in fireplaces were commonly used forty and fifty years ago in England, and I know very many occasions where my father, a builder in England, was employed to remove these Dutch tiles to make room for the more modern improvements, and now those modern improvements are doubtless being removed to make room for the now modern improvements, to wit, the Dutch tiles.

The great strides both England and this country have been making in the manufacture of tiles of every description, will doubtless far exceed our less ambitious competitors, the Hollanders. Move on, is the word, and both countries understand it.

Respectfully yours, GEO. HAYES.

STEAM-METERS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — Can you inform me if there is such a thing as a steam-meter in use, and how the steam-heating companies of New York measure their heat; by space of heating surface, or by the month, if not by meters? Can you give me the address of a steam-heating company in successful operation? Yours truly,

WESTERN, A. & C. E.

[No very practicable steam meter has yet been introduced, to our knowledge; certainly none is in general use. Some of the steam-heating companies have tried measuring the condensed-water returned from the radiators, which would roughly represent the steam consumed for heating. There are no steam-heating companies yet in full operation in New York, so we cannot say how they will measure the steam supplied. The company at Springfield, Mass., charges fifty cents for the season, for each square foot of radiator surface, which is a very good way, for some rooms will be comfortable with one-tenth of the radiating surface which others require, and the house-owner can have one foot or a hundred put into his rooms, to ensure the degree of warmth required in each, and pay accordingly. There are steam-heating companies in successful operation at present in Springfield, Mass., Auburn, N. Y., Lockport, N. Y., and Detroit, Mich. How they are to be addressed we do not know. Perhaps some of them will inform us. — EDS. AMERICAN ARCHITECT.]

A SCULPTOR'S RIGHT TO HIS MODEL.

IN the *American Architect* No. 208 we published a letter from Mr. Bartlett, a Boston sculptor, in which were asked certain questions which appertained to the matter of artistic copyright, which is at present receiving so much attention abroad. How far our comments at the time are supported by the opinions of others is shown by the following letters, which Mr. Bartlett has received from an English sculptor in good standing, and from M. Dubois.

152 BUCKINGHAM PALACE ROAD,
LONDON, S. W., April 13, 1880.

The English law gives absolute ownership of all rights in his work to the sculptor for life-time and for thirty years after his death "to his heirs, administrators and assigns." This holds good even with portrait busts, of which not even photographs may be published without the consent of the author. Any infringement of a sculptor's copyright is liable to be punished by law. All the law requires of the sculptor to maintain this right is that he shall sign and date his work when it leaves his hands. The law regarding painting is not so satisfactory. Yours in haste, GEORGE SIMONDS.

M. Paul Dubois, Director of the Government School of Fine Arts in Paris, says, "No one has the right to reproduce or use the original studies of a sculptor or painter, for a bust, statue or painting, without his consent, since in so doing the person is punishable by law."

In this connection we may mention that a Parisian court has lately instructed a sculptor, Marietti by name, that he cannot compel payment for a portrait-bust of a sitter whose likeness he has failed to catch. The court, however, evidently believing that authorized labor is deserving of some compensation, granted the unsuccessful sculptor a certain time in which to attempt to so alter the bust that the likeness could not be disputed by the sitter or his friends.

NOTES AND CLIPPINGS.

THE "MEMORANDUM LOCKERT." — M. Louis Lockert, the director and proprietor of *Le Technologiste*, has discovered that the reason that the readers of scientific publications are comparatively few in numbers is because the would-be readers have not enough time at their command to read what is written, even if they knew where to find the sort of reading they would hold profitable, or had the means to spend in obtaining it. It has occurred to M. Lockert that this is a difficulty which can be solved, and his solution takes the form of the *Memorandum Lockert*, a semi-weekly publication, which is to contain a running and classified index of all articles on subjects of interest which appear in the French and foreign scientific journals and periodicals. Something of the same sort was undertaken last year in England, but the attempt was a failure, and M. Lockert's would probably share the same fate, were it not that he gives a practical value to his new publication, which its English prototype lacked. It is done in this way: any subscriber whose curiosity or interest may have been excited by the title of any article given in the *Memorandum*, can obtain a brief summary of it by enclosing one franc's worth of postage-stamps to the publisher. Furthermore, by paying twenty-five francs he will receive the *Technologiste*, in which such brief summaries will be published, and his privilege as subscriber will give him the right to select for publication in that weekly journal thirty such summaries of articles whose titles in the *Memorandum* have attracted his attention. Again, any subscriber to the *Memorandum* who may desire it will receive a full translation of any paper he may select, without the fear that it shall be afterwards published in the *Technologiste*. In this way he would be enabled to acquire a special and private knowledge on the subject which interests him. In many ways the scheme, it spite of its obvious difficulties of administration, seems an excellent one. We will only say that we hope that succeeding issues will not, like the sample copy we have received, be printed in script letters autographically reproduced from stone.

A New Phase in the Question of Ancient Lights. — There is now approaching completion, at the northwest corner of Fifth Avenue and Fifty-seventh Street, New York, a costly house, the property of Mr. Edward Kemp. The building extends eighty-five feet on Fifty-seventh Street, and there is a space of fifteen feet between it and the house on the adjoining lot. This house is occupied by Mr. Frederick Mead. In the wall facing the avenue there are six windows, which, until the erection of the Kemp house, overlooked the vacant lot and commanded a view of the avenue. Mr. Kemp objected to these windows, and desired to have them walled up. Mr. Mead suggested instead that the sashes should be filled with opaque glass. Mr. Kemp determined to close up the windows, and about a month ago he had iron shutters placed over the windows, and held in position by iron tubing braced against his house. Mr. Mead discovered that the shutters rested on his window-sills, and he put men at work to cut away the sills. This done, the shutters fell to the ground. On Wednesday aggressive measures were resumed by Mr. Kemp. An iron trellis has been built against Mr. Mead's wall. To the trellis are attached, directly opposite the offensive windows, iron plates five feet square, which completely shut out all light. It is estimated that the structure will cost not less than $1,000. Ivy and climbing vines are to be trained over it so that its hideousness will be concealed from view.

Testing the Atmosphere of Philadelphia School-Rooms. — An examination is now being made by Medical Inspector Taylor, of the Board of Health, of the various school buildings in Philadelphia, with a view to ascertaining their general hygienic condition. The dimensions of every room and the average number of pupils in each is taken, for the purpose of ascertaining the amount of air required and consumed, and its character. The air for this purpose is obtained by taking into the room a six-ounce bottle filled entirely with water, and by pouring the contents out the bottle becomes filled with the air; then it is secured by a soft rubber cork, which renders the bottle perfectly air-tight. These bottles of air are labelled, and, when opportunity offers, the contents are analyzed and a minute record kept of the result. Dr. Taylor proposes to make a report of the schools examined after the present term closes in June, and proceed with the examination after the re-opening of the schools in September, the examinations being made only during school hours.

A New Orleans Association of Artists. — The artists of New Orleans have lately formed what is designed to be a permanent organization, known as the Southern Art Union, its object being to advance æsthetic tastes, promote art education, and enable all Southern artists to have a permanent gallery of exhibition in that city.

Masts and Mast Trees. — In the mast trade, the fir, from its height, its straightness, and its lightness, in one variety or other, is rigidly adhered to. Roughly speaking, they may be classed under five heads, viz.: 1, Quebec yellow pine; 2, Quebec red pine; 3, United States pitch pine; 4, Oregon pine; 5, Kaurie pine. The yellow pine has been fairly used and tried; but being soft, easily broken, prone to decay at the level of the deck, and, what is of the greatest consideration, very costly, it is now but sparingly used. The red pine, although a fine grown tree, is rarely sufficiently straight for the purpose of masts, and in consequence is but little used. The pitch pine may to-day be termed the true "mast-tree." It has all the requisite qualities for this purpose, but its weight is a great drawback, and it is not considered a very durable wood. These objections are more than compensated for by its cheapness, and the clean, sound character of the wood; and hence, in almost every ship-yard in England it is more largely used than any other pine. The Oregon or Douglas pine ranks, from its great size, as the first of the mast trees. These masts are sent to us in a hewed form, faultless on every point. This wood, from the cost of transit, cannot be brought into competition with other shipments; but where size is a consideration, it carries all before it, as masts of one hundred and ten feet in length, and thirty-two inches diameter, are by no means exceptional. The curious on this point will be pleased to inspect the celebrated flag-pole in the royal gardens of Kew, which is an example, one hundred and fifty-nine feet in length, and of proportionate thickness. The Kaurie pine ranks with the Oregon pine in being a monarch of the forest. This is otherwise known as the Australian pine, or Norfolk Island pine. Its quality for masts is everything that can be desired, and although its cost is very great, owing to the excessive sea carriage, it is by no means a rarity in this country. Some years ago, the governor of New Zealand sent a gigantic mast to the English Admiralty, and a friend of ours, who was a passenger home with this tree, says it was lashed to the masts and bowsprit, and projected over the head and stern of the ship thirty feet. It was found to be highly suitable for masts and spars, and a commission of experts frum the dock-yards was afterward sent out to examine and report upon the Australian forests. A tree of this class was felled on a farm near the Maharangi River, intended for the 1851 exhibition in London; but the time allowed for transport being too short, the project was abandoned, and the tree was left upon the ground. The length of the bole up to the branches of the bushy head was one hundred feet, and its diameter, at the butt was ten feet. Laslett mentions a still larger tree, which measured eighty feet to the branches and twenty-four feet in diameter. About fifteen years ago a parcel of sixty logs arrived in Liverpool on consignment to Mr. Edward Chaloner; we were told they averaged ninety feet in length, and squared up to three feet, and that they were perfectly clear and sound. It would appear with the mast trade, as with many other industries, there is a constant thirst for change; the latest fashion is the construction of the lower masts and the principal spars of wrought-iron, a system that places, for once in the career of English shipbuilding, the growth of our masts in our own hands. The objection taken is that they are heavy, and in case of disaster they cannot be felled and thrown overboard; but this appears to have little consideration, for the manufacture of tubular iron masts is becoming very general, and to-day there are few of our first-class ships but what are so fitted in their rigging. — *The Timber Trades Journal.*

The Diseases of Stone-Workers. — The majority of trades are attended by peculiar ailments, which have been described in familiar language by Dr. Rabagliati, of Bradford, in a series of articles published in Messrs. Cassell's Great Industries of Great Britain. Workers in stone, it appears, suffer more than is generally supposed. Labor is generally out of doors, and the muscles are exerted equally, but in spite of these advantages, the duration of life among stone-hewers is said to average not more than from thirty-three to forty years. Quarrymen, in addition to constant liability to colds, inflammation of the lungs, and rheumatism, from working in wet and damp, often meet with severe sprains and ruptures. The injury, according to Dr. Rabagliati, almost always occurs to the fibrous ligaments which pass between the contiguous ends of bones, such as the knee-joint. The sprains occasionally end in permanent incapacity for heavy work. Quarrymen are not, however, the greatest sufferers. It was found in France that among the workers in the flint used for pottery, consumption became epidemic, and the average duration of life sank to nineteen years. Affections of the chest are the cause of sixty-one or sixty-two per cent of the illness among stone-hewers. Dr. Rabagliati considers that acquaintance with the structure of their bodies by quarrymen and others engaged in heavy work would be the best means of preventing the injuries to which they are liable. A knowledge of the structure and composition of a joint would suggest the proper directions for applying weights, and the extent of the mass which it is prudent to deal with. It would also be very often of the greatest utility if workmen, or rather foremen and superintendents, knew something of the manner of treating accidents. The severity of sprains and fractures is generally increased by clumsiness in first dealing with the sufferer. — *The Architect.*

Completion of the Trojan Excavations. — The St. Petersburg *Golos* has received a letter from the famous archæologist, Schliemann, dated Athens, March 14, and prints this extract: "I have just returned from Asia Minor, where I have at last finished that digging out of Troy which I began in 1870. During ten years I have struggled with great difficulties, among which, perhaps, the most troublesome has been the large amount of débris under which the ancient city was buried. It has been necessary to dig down and dig up the ground for more than sixteen yards below the surface. But I am fully recompensed for all my trouble. I found the remains of seven different ancient cities; the last of them was the Ilion of Homer. That city was built by the Æolians, banished from Greece by the Dorians in the eleventh century before our era. In one of the buried cities I found many statues of Minerva, with the owl's head; whence her name of Glaucopis. In another city were found many images of the divinities. But the most interesting and important of all discoveries is, of course, the city of King Priam. Every article found in the ruins of that city bears unmistakable signs of having been destroyed by fire in time of war. There were discovered many remains of human bodies in full armor. I dug out and cleared away the débris from the entire wall that surrounded the city, and also from all the principal buildings. Now I am finishing a large volume in English, describing, with full details, all my discoveries, and containing two hundred illustrations of the most important of the discoveries. My Trojan collection is now in London, but at the end of this year I shall take it to my villa in Athens, which is fire-proof, built only of marble and iron. I have received large offers for my collection from the United States, England, France, and Germany, but I cannot part with it for any money in the world."

Napoleon's Tomb and the Washington Monument. — The New York *Evening Post* says that a stone from the tomb of Napoleon the First, at St. Helena, intended for the Washington Monument, is to be presented to the Washington Monument Society, with the appropriate documents. It was only recently found, after it had been lost sight of for nineteen years. When our naval vessels were ordered home from foreign waters at the opening of the civil war in 1861, the man-of-war Mystic, in sailing from the East Indies, stopped at St. Helena, and some one proposed bringing home a stone for the Washington Monument from Napoleon's tomb; this was done. The stone was landed at the Brooklyn Navy Yard, and then forgotten. Recently Admiral Powell made inquiries, and it was found stowed away at the Washington Navy Yard, and is reported by Commodore Febiger to be in good condition.

The Sanitary Condition of Memphis. — About fifteen miles of new sewer have been laid to date, and house connections are being made as rapidly as the force of plumbers can work. Although unfavorable weather has prevented the completion of the entire system, all the business portion of the city and the thickly-settled portion west of the bayou are substantially finished. The work in comparatively clean soil and the less thickly-built region east of the bayou will be continued until June 1. Lists recently made, it is claimed, demonstrate the success of the new system of sewerage. With this important work practically accomplished, and with the general sanitary improvement effected by the labors of the past winter, the municipal authorities and local Board of Health are sanguine of the continuance during the summer of the present healthy condition of Memphis. The published mortality tables for the past month show Memphis to rank seventh in point of healthiness among forty-six cities of over thirty thousand population.

The Last of one Labor Union. — The Packingmen's Protective and Benevolent Union, the organization which began the mammoth strike at the Chicago stock-yards last winter, and which at one time comprised nearly ten thousand members, has virtually disbanded, only twenty-seven members appearing at a called meeting, and not one of them being willing to serve as an officer of the organization. As a consequence, no election was held, and the meeting broke up.

The Venus of Pergamos. — A beautiful head of Venus, discovered with the friezes of Pergamos, now in Berlin, lacks a nose. Casts of the head have been made and the nose is to be restored. The head is said to equal in beauty that of the Venus of Milo.

BUILDING INTELLIGENCE.

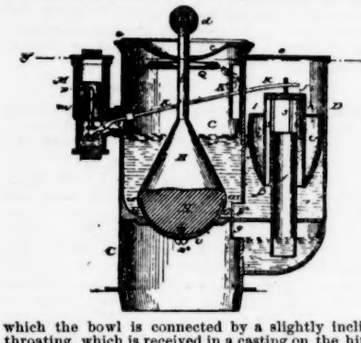
[Reported for The American Architect and Building News].

[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.]

225,362. WATER-CLOSET. — Moses F. Gale, Brooklyn, N. Y. The cut only shows the plunger-chamber in the middle, the overflow chamber on the right, and the supply-valve on the left. On the side towards us is placed the crockery receiving bowl which empties its contents into the soil-pipe below the plunger-chamber by passing first through this chamber, to



which the bowl is connected by a slightly inclined throating, which is received in a casting on the hither side of C. The plunger-chamber is divided into two parts by the horizontal diaphram, G, which is also continued across the overflow chamber D. In the centre of D is a hole through which the contents of the bowl are discharged into the portion of the soil-pipe immediately above the usual S-trap whenever the plunger, H, is raised by the pull-up handle. The plunger, H, which has a conical upper part so as to offer as little resistance as possible when the handle is raised, fits tightly into the valve-seat in G; a perfectly tight joint, one accommodating itself to any inequalities which may be formed by the lodgment of fecal matter on the edges of the valve seat, is formed by leaving between the hemispherical body of the bottom of the plunger and the stiffish rubber covering, *u*, an air-space, which is effected by making the rubber of a different curvature from the bottom of the plunger. At the top of this chamber C, is a small circular perforated pipe, which washes out the inside of the chamber each time that fresh water is admitted to the bowl. The overflow is effected through the chamber D. The upright pipe F passes through the diaphragm G, and its lower end passes below the surface of the water constantly retained in the lower part of the chamber by the wall of the soil-pipe; water flowing out only when it has risen to the level of the opening *g*. The plunger-chamber C and the chamber D are in communication with one another by the two openings E, through which the valve-rod K passes, and F, and it is by means of this opening that water in the bowl and in the two chambers is kept at the same level. Fitting over and around that portion of the overflow pipe which rises above the diaphragm is another pipe *h*, whose lower part is enlarged by the circular air-chamber *i*, the office of which is to float upwards as water enters the bowl and chambers, and by so doing, through the agency of the lever-arm, K, attached to its top, to shut off the water-supply, as would be done by an ordinary ball-valve float. A packing, *g*, is fitted at the top of *h*, so that while the plunger is raised and the valve *h* lowered the top of *f* may be tightly sealed. It will be seen by inspection that the overflow *f* is always doubly sealed, both at top and bottom. Another feature of this closet, not shown in the cut, is the way in which the bowl is secured to the soil-pipe.

227,130. SEWER-TRAP. — Wm. L. Randolph, Brooklyn, N. Y.

227,146. CURTAIN-FIXTURE. — William Campbell, Brooklyn, N. Y.

227,171. FIRE-PLACE HEATER. — Robert Logan and John Logan, McKeesport, Penn.

227,200. CURTAIN-FIXTURE. — Geo. Baldwin, South Manchester, Conn.

227,203. LIME-KILN. — Andrew Barron, Janesville, Wis.

227,208. LEADER-PIPE. — Emil Bittenbring, Hartford, Conn.

227,210. VISE. — James M. Black, Chicago, Ill.

227,266. SHUTTER-FASTENER. — Matthew F. Kirk, Chelsea, Mass.

227,268. COATING IRON SURFACES. — Joseph Kintz, West Meriden, Conn.

227,269. CURTAIN-CORD TIGHTENER. — William Klemm, Pittsburg, Penn.

227,275. CARPENTER'S WORK-BENCH. — Geo. Lettenmyer, Little Georgetown, W. Va.

227,312. LADDER. — John L. Sippy, Venice, Ill.

227,318. WEATHER-STRIP. — David F. Stambaugh, and Henry W. Crail, Effingham, Ill.

227,324. FIRE-ESCAPE. — Richard H. Tucker, New York, N. Y.

227,327. LOCK. — Rudolph Vollschwitz, Elizabeth, N. J.

9,183. (*Re-issue*). COMBINED SQUARE AND BEVEL. — Orvil R. Chaplin, Boston, Mass.

9,184. (*Re-issue*). CURTAIN-FIXTURE. — Hermann Herlt, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

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

Chas. Kurtz, three-st'y brick dwell., No. 7 Gough St., between Pratt and Granby.

G. W. Hopper, 13 two-st'y brick dwells. on Washington St., between Hoffman and John Sts.

G. W. Hopper, 5 two-st'y brick dwells. on Hoffmann, St., between Washington and Chapel.

G. W. Hopper, 7 two-st'y brick dwells. on Chapel St., between Hoffman and John.

Trustees of Biblical Institute, three-st'y stone building, cor. Fulton and Edmonson Aves.

M. M. C. Croine, three-st'y brick building, Edmonson Ave., near Mount St., 17'5" x 90'.

St. Stanislaus Society, two-st'y brick and stone church, 46'6" x 100', on Ann St., between Alice Ann and Lancaster Sts.

Academy of Visitation, addition and improvement to building cor. Park and Centre Sts.

C. L. Laffill, 5 three-st'y brick buildings on Mosher St., near Calhoun St.

Christian Schutz, three-st'y brick building, Ensor St., between Monument and Forrest St.

House of Good Shepherd, three-st'y brick building, cor. Mount and Lombard Sts., 30' x 140'.

Johns Hopkins University, five-st'y brick and stone warehouse, 75' x 180', on Sharp St., between Lombard and German Sts.

CHAMBER OF COMMERCE BUILDING. — Mr. Niernsée, has been appointed architect for the new building for the Chamber of Commerce, to be occupied by the Corn and Flour Exchange. Competition drawings were submitted last fall by two prominent architects of Baltimore, and one from Chicago, but no selection of design was made till last week. The site of the new building is on the corner of Holliday and Second Sts.

CHURCH.—The congregation of Emanuel M. E. church contemplate building a new church on the corner of Myrtle Ave. and Mosher Sts. It will be 55' x 75', and cost $15,000 or $20,000, and will be built somewhat after the style of the First English Lutheran Church, with lecture-room and class-rooms below.

HOUSES.—Mr. J. Boyden Lee is about to build a residence, N. W. cor. Charles and John Sts., 22' x 68'. J. A. & W. T. Wilson, architects, are preparing the drawings.

STABLE.— Dr. Wm. H. Hoopes is having drawings prepared for a stable, 26' x 40', on West Baltimore St., to be of his patented artificial stone; J. A. & W. T. Wilson, architects.

SUBURBAN HOUSE. — Mr L. B. Purnell, of the firm of Hurst, Purnell & Co., is building a cottage on Calverton Road, near the city limits. It will be 60' x 100', 2 stories and attic, and tower 65 feet high, and will cost $20,000. Mr. Jackson C. Gott is the architect.

Boston.

BUILDING PERMITS.—*Brick, cor. Washington and Ash Sts.*, for Mrs. C. G. Crocker, 1 tenement, 21' x 124', four stories; W. S. Cogswell, builder

386 *Commercial St.*, 1 tenement, 54' x 104', four stories, for J. C. and E. A. Loud; C. S. Stone & Co., builders.

50 *Lincoln St.*, for N. Whiting, 1 store, 34' x 73', five stories; G. H. Young, architect.

Cor. Bedford and Chauncy Sts., for W. H. Wellington, 1 store, 64' x 90', six stories; T. E. Stuart, builder; S. J. F. Thayer, architect.

331 *Beacon St.*, for R. Dabney, 1 dwell., 25' x 60'; D. Davis & Son, builder.

East Fourth St., for Blind Asylum, 1 school-house. 25' x 50', four stories; Lock & Nolan, builders.

Brook Place, No. 20, 1 dwell., 22' x 36'; M. C. Mann & McLaughlin, owners and builders.

Congress St., No. 19, for People's Ice Co., 1 ice house, 32' x 150'; C. B. Leavitt, builder.

Forest Garden, No. 23, for W. Austin, 1 theatre, 30' x 55'.

HOUSES.—Plans are now making for a double house off Dale St., Highlands, for Dr. Green; cost, $4,000; Mr. J. H. Besarick, architect.

Corner Boylston and Dartmouth Sts. are building two houses from the designs of E. A. P. Newcomb, architect, for Messrs. Smith and S. A. Carleton; J. McNeil, builder.

Brooklyn.

BUILDING PERMITS. — *Oak St.*, 1 one-st'y frame stable 30' x 100', with wing 30' x 120'; cost $2,000; owners, Knickerbocker Ice Co., 432 Canal St., New York.

Quincy St., 6 three-st'y brick dwellings, 16'8" x 40'; cost, each, about $3,500; owner, Darius C. Davison, 639 Greene ave.

Columbia St., 1 two-st'y brick stable, 28' x 25' x 40'; cost, $2,700; owner, J. W. Mason, 140 Hicks street; architect, D. B. Provoos; builders, J. Allen and J. Hood.

Gold St. cor. John St., 1 one and two-st'y brick shed, 75' x 87' x 83'; owners, C. T. Reynolds & Co., 106 and 108 Fulton St, New York; builders, Robert Hoile and John McDicken.

Macomb St., 1 three-st'y brick store and tenement, 20' x 40'; cost, about $3,000; owner, Daniel Orr, 32 Macomb st.; architect, Chas. Werner; builder, John McLoughlin.

Lefferts Place, 6 three-st'y brown stone dwell'gs, 16' 8' x 45'; owner, A. Treadwell, cor. Lefferts pl. and Franklin av.; architect, R. Dixon; builder, John Frost.

Gates Av., 2 four-st'y brown stone stores and tenem'ts, 21' x 56'; owner, S. L. Swimm, 389 Putnam av.; mason, Wm. Uris.

Lewis Av., 1 two-st'y frame dwell'g, 22' x 40'; cost, about $3,500; owner, S. R. Hooker, 9 Stuyvesant av.; architect, Fred. Weber; builders, George Cutler and George Schiel.

Park Pl., 3 three-st'y brown stone dwell'gs, 20' x 45'; cost, about $7,000 each; owner, Mary Magilligan; builder, John Magilligan.

Bergen St., Nos. 374 and 376, 2 four-st'y brown stone flats, 20' x 45' 2"; owner, Geo. W. Brown, 728 Fulton street; architect, C. B. Sheldon; builders, Levi Brown and C. E. Cozzens.

Greene Av., 2 two-st'y brown stone dwell'gs, 20' x 42'; owner, F. C. Vrooman, 444 Gates av.

Jay St., cor. Willoughby st., 1 five-st'y brick restaurant and lodging-house, 30' x 75' 6"; owner, Good Samaritan; architect, J. Mumford; builder, not selected.

Chicago.

BUILDING PERMITS.—Thomas Mackin, repairs of store, cor. of Kinzie and State streets; cost $15,000.

R. T. Crane, one-st'y pipe factory; Stewart Ave., near Judd; cost, $40,000.

Chicago, Rock Island and Pacific Railroad Company, additional story on building on Van Buren St.; cost, $12,000.

Munger, Wheeler & Co., elevator, 101' x 200', cor. Canal and Fulton Sts.; cost, 200,000.

Board of Education, three-st'y school house, cor. Eugene and Hammond Sts.; cost $30,000.

New York.

ALTERATIONS. — *Allen St.*, No. 202, full story to be made of atic, new store front, and internal alterations; cost, $2,000; owner, L. Rothschild; architect, Julius Boekell.

Sixth Av., cor. 19th st., damage by fire to be repaired; cost, $5,000; owner, John J. Astor; architect, Thomas Stent; mason, Mark Eidlitz; carpenter, John Downey.

Kingsbridge Road, a one-story brick extension, 100' x 70'; cost, $3,000; owner, Isaac G. Johnson; architect, S. Francis Quick; builders, J. & G. Stewart.

Forty-fourth St., No. 204 *East*, interior alterations; cost, $2,000; owner, S. J. Donvan; builder, J. V. Donvan.

Fourteenth St., Nos. 106 *and* 108, *East*, one story brick extension on rear 50' x 29', first story iron columns and lintels; cost, $4,000; owner, John H. Huber; architect, Jobst Hoffman.

Twenty-Third St. No. 234 *East*, three-story extension on rear, 10' 6" x 23'; cost, $3,000; owner, John Bisco; architect, John Luder; mason, Jas. Whyte.

Perry St., No. 3, three stories to be added to brick extension; cost, $2,000; owner, estate of E. Bloomer; mason, James H. Parker; carpenter, David Wilkie.

Bond St., Nos. 46 *and* 48, one-story brick extension, 52' x 60'; cost, $3,500; owners, National R. R. Publication Co.; builder, John W. Crawford.

Seventy-fourth St., No. 18 *East*, four-story extension on rear, 17' x 14' 6"; cost, $12,000; owner, L. H. Niles; architects, D. & J. Jardine; builders, A. G. Bogert & Bros.

Fourteenth St., No. 4 *West*, one-story brick extension on rear, 20' x 33', and a new store front; cost, $6,000; owner, W. Jennings Demorest; architect, W. Jones; builders, Jones & Co.

Forty-Third St., five-story brick extension on east side, 100' x 56'; cost, $20,000; owners, E. S. Higgins & Co.; builders, A. A. Andrews & Son.

Lexington Av., No. 735, two-st'y brick extension on rear, 9' 6' x 12'; cost, $2,000; owner, Wm. Lauer; builder, Thos. Sanderson.

Twenty-Fourth St. No. 125 *East*, interior alterations; cost, $2,600; owner, Jacob G. Bebus; architect, Joseph M. Dunn; builders, N. & H. Andruss.

Broadway, No. 72, front and rear walls to be rebuilt, also interior alterations; cost, $15,000; owner, Peter Marie; architect, D. Lienau; builder, John Banta.

Fifth Av., cor. 16th st., two-st'y brick extension, 45' x 36', also interior alterations; cost, $4,000; owner, Martinelli; builder, Joseph Smith.

Thirty-first St., No. 136 *East*, three-st'y brick extension on rear, 21' 8' x 22', new store front in basement story; cost, $3,500; owner and b'ldr, M. Brown.

CAFE.—The "White Elephant," on Broadway, between Thirty-first and Thirtieth Sts., is to be enlarged by the addition of a café.

FULTON MARKET. — Fulton Market has been condemned by the Inspector of Buildings as in an unsafe condition and dangerous to the limbs and lives of its occupants and of the persons who pass through. A bill has been introduced before the Legislature, providing for the rebuilding of the market by the Commissioner of Public Works, under the supervision of the Commissioners of the Sinking Fund. The bill was drafted by the Mayor and Controller of the City, and has been sent to Albany with a very strong memorial. It is expected that immediate action will be taken.

HOUSES.—*Fifty-fifth St.*, near Fifth Avenue, for Chas. F. Barney, Messrs. McKim, Mead and White; L. W. Crow, builder; two residences; one 33' x 95' 5"; one 17' x 68'; cost, $40,000 and $20,000, respectively; granite fronts.

MODEL BRICKYARD. — Messrs. Wilson Bros. & Co., have sent to Switzerland full plans for a model brickyard, embracing all the latest American improvements.

OPERA HOUSE.—The Board of Directors of the new Metropolitan Opera House have purchased from W. H. Vanderbilt the block between Madison and Vanderbilt Aves., extending from Forty-third to Forty-fourth St., for $300,000. The plot measures 189' x 210'.

STORES.—On *Twenty-seventh St.*, cor. of Broadway, a store is to be built from designs of Mr. James Stroud. It will be 26' x 80', of Philadelphia brick with Nova Scotia stone finish, five stories high; cost, $35,000; W. C. Hanfield is the owner.

No. 11 *West Nineteenth St.*, for Robert Goelet; George Mullian, architect; Marc Eidlitz, builder; 20' x 77'. Iron front store; cost $15,000.

Philadelphia.

ALTERATIONS. — *Nos.* 707 *and* 709 *Wharton St.*, addition of two stories to pottery; owners and builders, J. E. Jeffords & Co.

Cor. Dock and Front Sts., addition to building, 30' x 60'.

No. 214 *North Twenty-Second St.*, addition of three stories to building, 18′ x 26′; contractor, W. L. Atkinson.

FACTORIES. — *Fifth St., cor. Lehigh Ave.*, two-story brick factory, 16′ x 32′; owner and builder, Jacob Marsch.

Sixteenth St., near McKean, one-story factory, 16′ 26′; owner and builder, K. Holloway.

Division St., cor. Thompson St., 1 two-story factory, 60′ x 120′; contractors, Rea & Riley.

No. 416 *Cherry St.*, 1 three-story shop, 18′ x 70′; builders, Messrs. Shegog & Quigley.

Church St., west of Hamilton and Wood Sts., one-story foundry, 50′ x 100′; owners and builders, Lindsay & Herndon.

Twenty-Third St., cor. Turner St., 1 machine shop and foundry, 40′ x 240′; contractors, Whiteside & Sons.

No. 1234 *Columbia Ave.*, 1 two-story bake-house, 19′ x 30′; owner and builder, G. W. Mosebach.

HOUSES. — *Cadwalada St.*, 1 three-story dwelling, 16′ x 39′; contractor, George Kessler.

Boston St., West Twenty-fourth and Twenty-Fifth Sts., 15 three-story dwellings, 14′ x 33′; J. L. Cane, owner.

Mill St., near Lime Kiln Pike, 1 two-story dwelling, 19′ x 36′; builders, McLaughlin & McNamara.

Cresson St., near Adams St., 1 three-story dwelling, 17′ x 35′; builders, same as above.

No. 807 *Buttonwood St.*, 1 three-story building, 17′ x 30′; contractor, James Girton.

Dudley St., between Ninth and Tenth Sts., 1 two-story dwelling, 16′ x 30; contractor, Henry Wisner.

Fifth St., 1 three-story dwelling, 18′ x 60′; contractor, Henry Hartzell.

Mt. Holly St., near Reed St., 2 two-story dwellings, 14′ x 28′; contractor, Thomas McCouch.

Mellville St., near Neff St;, 1 two-story dwelling, 18′ x 30′; Chas. Fay, contractor.

Thirty-Fourth St., cor. Baring St., 1 three-story brick dwelling, 18′ x 20′; Wm. Orr, contractor.

No. 1916 *South Fifth St.*, 1 two-story dwelling, 16′ x 40′; owner and builder, S. B. Snell.

Airy St., near Robinson St., 1 three-story dwelling, 21′ x 32′; contractor, John McAlarnen.

Franklin St., near Columbia Ave., 1 three-story dwelling; Whiteside & Sons, contractor.

East St., near Cresson St., 1 two-story store and dwelling, 17′ x 32′; contractors, Harmer & Gillet.

Leverington St., west of Ridge Ave., 4 two-story dwellings, 17′ x 44′; owner and builder, Jacob Shinkel.

Ruscomb St. and Germantown Road, 2 three-story dwellings, 16′ x 42′; owner and builder, Robert J. Siddall.

HOTEL. — *Chestnut St.*, near Nineteenth St., 1 six-story hotel building, 25′ x 160′; architect, Addison Hutton; builders, Yamell & Cooper.

STORES. — *Main St.*, west of Seymour St., 1 two-story store, etc., 17′ x 52′; owner and builder, Charles Schimpff.

Second St., north of Diamond St., 1 three-story store, 18′ x 45′; contractor, L. A. Buckle.

OFFICE BUILDING. — *Thirtieth St.*, cor. Chestnut St., 1 office building, two stories; contractor, John Godfrey.

WAREHOUSE. — *Twenty-Eighth St.*, near Brown St., one-story warehouse, 20′ x 50′; owner and builder, William Charlton.

STABLE. — *Jefferson St.*, near Seventh St., 1 three-story stable and dwelling, 14′ x 22′; owner and builder, George Mertz.

RAILROAD DEPOTS. — Messrs. Wilson Bros. & Co. are preparing plans for alteration of the large freight depot of the P. R. R. Co., at 15 and 16 Market St., this city. The work on the new elevated railroad of the P. R. R. Co. is progressing rapidly.

St. Louis.

BUILDING PERMITS. — Thirty-five 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 or over are as follows:

Owners Name.	Use.	Stories.	Rooms.	Cost.
Frazier Lubricating Co.,	F'ct'y,	2	2	$5,000
F. Stenniger,	Dwell.	2	12	4,500
Leider Krantz Co.,	Hall	2	2	30,000
M. Meckling,	Dwell.	2	10	3,800
Green & Clark,	Dwell.	2	10	7,000
Page and Grandsser,	F'ct'y.	3	3	6,000
—— Peterson,	Dwell.	3	12	6,300

STRIKES. — The stone cutters have been on a strike since April 1, 1880. It is understood that besides demanding increased pay they insist that the bosses shall employ none but stone-cutters to set stone, that they shall make a uniform rate of $3.00 a day for bad and good workmen alike, and that the bosses shall repair to the headquarters of the strikers, and there sign a paper of humiliation, confessing their sins and agreeing to the above and other conditions.

Several attempts at a strike have been made by carpenters and bricklayers, and also by laborers, but without general cooperation. The effect of the rise in price and the labor disturbances has been to check much proposed building, and the season will be comparatively dull.

General Notes.

ADDISON, N. Y. — Mr. E. B. Gregory, architect, of Elmira, N. Y., is building six stores, in one block, but different style of front to each; pressed brick fronts, with Ohio sandstone and limestone finish; also a post-office building for the following named gentlemen: post-office building, cost $5,000; one store, W. A. Smith, 25′ x 125′, cost $6,500; two stores, C. W. Gillet and A. Winton, 25′ x 85′, cost $8,000; one store C. W. Gillet, 25′ x 85′, cost $5,000; two stores, Payton & True, 25′ x 85′, cost $8,000.

ALLENTOWN, PA. — Mr. Elias Bittner is about to build a four-st'y block, fronting on Hamilton St., and running back 125 feet.

ANDOVER, MASS. — An English cottage is being built for the Andover Theological Seminary, to be occupied by Prof. W. J. Tucker; Merrill & Eaton, architects, Lowell, Mass.; Abbott & Jenkins, contractors, Andover, Mass; cost, $12,000.

ARMERDALE, MD. — The corner-stone of Father Jollin's church will be laid next Sunday.

BLUFFTON, IND. — Mr. E. J. Hodgeson, of Indianapolis, is the architect of the house for Mr. J. S. Ball; cost, $4,500; also of a house for Mr. C. Warner; cost, $3,000.

BREWSTER, MASS. — The town has voted $10,000 for a town hall.

BRIGANTINE BEACH, N. J. — Congressman Harmer is building a cottage.

BROCKTON, MASS. — The Southworth House, on Main St., is to be removed, and a three-st'y brick block, 75′ x 225′, is to be built. It is to be built and owned by an association of seven gentlemen.

CHARLEMONT, MASS. — The Methodists have the foundations laid for a new two-story parsonage.

CLEVELAND, O. — Mr. Ralph Worthington says that a new block is to be built in place of the one burned May 6.

Ground has been broken for the new Case Avenue Church.

CONNERSVILLE, IND. — A new house is to be built for J. G. Florea, from designs by E. J. Hodgeson, architect, of Indianapolis; cost, $8,000. Mr. Hodgeson is also the architect of the jail, which is to cost $7,000.

CORNING, N. Y. — Mr. E. B. Gregory, architect, of Elmira, N. Y., is building a dwelling house for G. R. Brown, cost $3,500, and is repairing St. Mary's R. C. Church, at a cost of $5,800.

CORYDON, IA. — Mr. C. A. Dietrich is the architect of the school-house now building here; cost, $10,000.

DAYTON, O. — A petition is in circulation, and will be sent to Congress, signed by four thousand of the veterans, asking for an appropriation of $30,000 to replace the Memorial Hall at the Soldiers' Home, which was lately burned. Contractors say that it can be rebuilt in sixty days.

EASTHAMPTON, MASS. — The library building committee have awarded the contract for the new building to Bartlett Bros., of Whately, for $16,000.

ELMIRA, N. Y. — Mr. E. B. Gregory, architect, is building a dwelling house for Seth X. Metzger, in Swiss villa style, cost $5,500; a stable for N. P. and J. S. Fassett, cost $5,500, and a stable for N. S. Winsor, cost $2,500.

HAYDENSVILLE, MASS. — The Hayden Co. intends to build three double tenements this season.

INDIANAPOLIS, IND. — Mr. C. A. Wallingford is the architect of the house for D. Randsell; cost, $6,000.

Mr. E. J. Hodgeson is the architect of the house for C. E. Coffin; cost, $4,000.

IONIA, MICH. — The recently burned district is to be built up at once by the heirs of the Moseman estate.

JERMYN, PA. — The Catholic Society is building St. Patrick's Orphan Asylum. A frame building, 40′ x 50′; Fred J. Amsden, of Scranton, architect.

JOBSTOWN, N. J. — The corner-stone of a new Catholic church was laid May 6.

LAFAYETTE, IND. — Mr. C. A. Wallingford, architect, of Indianapolis, is to build a house for J. J. Perrin.

LONDON, ONT. — Messrs. Tracy & Durrand are to be the architects of the Masonic Temple, which is to be built at the corner of Richmond and King streets, at a cost of $70,000.

LOUISVILLE, KY. — Hale & Bro. are to build two two-and-a-half-story brick dwellings on Breckenridge St., between Fifth and Sixth; cost, $3,500 each.

F. Burnett is to build a two-and-a-half-story brick dwelling on Jefferson St., between Hancock and Jackson; cost, $1,200.

Thomas Meikle is to build an addition to a three-story brick warehouse on Monroe St., between Eleventh and Twelfth; cost, $3,000.

LOWELL, MASS. — The city is advertising for plans for a two-story school-house, to cost $7,000.

MARTINSVILLE, IND. — An $8,000 house is building for M. E. Park, from the designs of E. J. Hodgeson, architect, of Indianapolis.

MIDDLETOWN, CONN. — The new building for the Farmers and Mechanics' bank, to be built this summer will cost $80,000.

MILTON, MASS. — Mr. George Chickering's house is being altered from designs of Mr. E. A. P. Newcomb, architect, of Boston. A stable is also building; Burt Bros., builders.

NEWTON, PA. — There is being built here, at Hill Side Farm, a building for the Insane of Scranton Poor District; size 45′ x 50′, two stories and basement, and of brick. Plans by Mr. Fred J. Amsden.

NEWTONVILLE, MASS. — Mr. E. A. P. Newcomb, of Boston, is the architect for rebuilding Mr. Wm. Holling's house in the Queen Anne style.

NORWICH, CONN. — The First Society will soon begin building a new church.

PITTSTON, PA. — Mr. A. McI. De Witt is about to build a frame house, costing about $8,000, from plans by Mr. J. H. W. Hawkins, of Wilkesbarre, Pa.

SCITUATE, MASS. — The corner-stone of the new Unitarian church, which is to be 41′ x 70′, was laid on Monday last.

SCRANTON, PA. — Mrs. Marvine is building a brick block on Lackawanna Ave. and Washington St., 108′ x 85′, three stories high, to be occupied by Hunt Bros. & Co., for a handsome store; cost, $10,000; Fred J. Amsden, of this city, architect.

Mr. James Jordan is building a block on Lackawanna Ave., of pressed brick, three stories, 37½′ x 80′; cost, 10,000; Fred J. Amsden, architect.

TEWKESBURY, MASS. — Drawings are nearly completed for an English cottage and stable for Mr. William E. Whitehead, to cost about $12,000; Otis A. Merrill, architect, Lowell, Mass.

TIOGA, PA. — Mr. E. B. Gregory, architect, Elmira, N. Y., is building St. Johns R. C. Church; cost, $6,500.

WALTHAM, MASS. — The town will build a new school-house, costing $20,000.

WILKESBARRE, PA. — A Jewish Synagogue is about to be built on Washington St., size 38′ x 75′, of pressed brick and stone finish; cost about $10,000. Mr. J. H. W. Hawkins, of this city, architect.

Mr. A. T. McClintock is building a brick residence on Franklin St., costing about $15,000.

Mr. R. J. Flick is building a brick block of five houses, on South St., costing about $20,000. Mr. Hawkins, architect.

Mr. Benjamin Reynolds is remodeling a house on River St., costing $6,000, from plans by J. H. W. Hawkins.

Mr. Espey is building a three-st'y brick block.

WOONSOCKET, R. I. — James Helme has begun a new block, 40′ x 60′, at the corner of Prospect and School Sts.

Industrial.

AUBURN, ME. — L. B. Kinsley & Co. will add about thirty feet to their factory and put a French roof on the whole.

CHICAGO, ILL. — Messrs. Jones & Laughlin will build one of the largest nail factories in the West, fronting 268 feet on Canal, and 150 on West Lake.

CHICOPEE FALLS, MASS. — J. Stevens & Co., have commenced a building nearly as large as their main shop.

COLERAIN, MASS. — W. Cary Jr. is putting up a three-story building for the manufacture of cider vinegar.

GUILFORD, CONN. — H. K. Thurber of New York, will build a new canning factory, 150′ x 36′.

IPSWICH, MASS. — A large addition, 280 feet long, 85 feet wide, and four stories high, will be immediately made to the Ipswich hosiery mills.

LONG BEACH (LONG ISLAND), N. Y. — The Atlantic and Virginia Fertilizer Company will rebuild their works.

LOWELL, MASS. — Otis A. Merrill, architect, is furnishing the drawings for the new mill of the Middlesex Company, of this city. When completed it will be 428′ long, 55′ wide, and two wings 55′ x 80′ each; the main mill to be five stories high, the wings two stories each.

PATERSON, N. J. — J. C. Todd & Co. are building a four-story addition to their flax mill.

RICHMOND, MICH. — A flax-mill is shortly to be built here.

SOUTH LAWN, ILL. — A large plow factory, involving the expenditure of $150,000, is building at South Lawn, near Chicago, to be ready for work by August 1, by the Hopkins Reaper Company.

TRENTON, N. J. — A large woollen mill is being built by Samuel K. Wilson.

WEST WARREN MASS. — The Warren Cotton Company has commenced its new mill, which is to be a two-st'y structure, and will cover about a half acre of ground.

Bids and Contracts.

ALBANY, N. Y. — The contract for the sawed slate bedplates for the iron rafters of the new government building has been awarded to the North Peach Bottom Slate Company, of Philadelphia.

ALLENTOWN, PA. — The Southerland Falls Marble Co., has been awarded the contract for marble for front of Vermont, of Elias Bittner's block.

BOSTON, MASS. — The Directors for Public Institutions have awarded to Weston & Shepard, $15,133, the contract for building a laundry building for the House of Correction at South Boston. The other bids were as follows: Donahue Brothers, $17,000; Augustus Lothrop, $16,600; B. F. Dewing, $16,172; J. W. Coburn & Co., $15,993; James Fagan, $15,477; McGorragie & Co., $15,475.

Awards of contracts for building material of the third story of the Post-office and Sub-Treasury Building extension, in this city, have been made as follows: Hard-burned brick, to Bay State Brick Company, at $9 per 1,000; cement, to T. W. Hoxie & Co., at $1.24 per barrel; lime, to D. Roby & Co., at 88 cents per barrel, and sand to P. O'Riorden, at $1.97 per square yard.

The contract for furnishing tiles of Italian marble for the New English High and Latin School building has been awarded to Bowker & Torrey, for $,9834.

CAMDEN, N. J. — Messrs. Cofrodl & Sayler, of Philapelphia, have the contract for building the new Union depot.

NEW YORK, N. Y. — The contract for the new building for the Bank of the Republic and First National Bank has been awarded to Mr. R. L. Darragh, at a sum in the neighborhood of $375,000.

NORTH ADAMS, MASS. — The Michigan School Furniture Company have contracted for seating the new Baptist church for about $1,400.

PITTSBURGH, PA. — The contracts for building the new Power Hall, Pittsburgh, which will be 100′ x 167′, and the annex to Floral Hall, 30′ x 126′, were awarded to William Anshutz.

SPRINGFIELD, ILL. — The contract for building an addition to the Illinois Watch Factory, 30′ x 100′, three-stories high, has been awarded to John T. Rhodes & Bro., for $10,000; J. C. Cochrane, Chicago, architect.

Public Buildings.

THE House Committee on Public Buildings and Grounds has already agreed upon bills authorizing new public buildings in thirty-seven cities. In Northern cities sixteen buildings are authorized, the aggregate cost of which is limited to $3,500,000. In Southern cities and towns twenty-one buildings are to be provided, at a total cost of $2,200,000.

DANVILLE, VA. — The site for a new custom-house has been fixed on.

FORT WAYNE, IND. — Mr. Colerick has introduced a bill directing the Secretary of the Treasury to purchase a site and erect a building for a Post-Office, Court House, Revenue and other offices, at a cost net to exceed $50,000.

FRANKFORT, KY. — The House Committee on Public Buildings and Grounds, has agreed to report an appropriation of $100,000 for a Court-House and Post-Office building.

LEAVENWORTH, KAN. — The House Committee on Public Buildings and Grounds has agreed to report a bill making appropriation for a Public Building not to exceed $100,000.

MARQUETTE, MICH. — The House Committee on Public Buildings and Grounds, has reported a bill to build a U. S. Court House and Post-Office.

PITTSBURGH, PA. — Mr. Shallenberger has secured the passage of the bill for the erection of a Public Building here.

It is said that plans are already preparing for the new Custom House.