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ACCOUNTS come from Cincinnati and New York of threatened strikes among workmen for an advance in wages. The New York carpenters will demand the large increase of fifty cents per day after April 1, and the fresco-painters' union has already given notice of an advance in rates from three and a half to four dollars per day. In Cincinnati, the printers' union, the stove moulders, the masons and carpenters, and the furniture makers, have given notice that higher pay will be required. We are glad to see that the building trades generally have had the good sense to warn their employers of the rise, which is ordered for April 1, in time to enable them to make their contracts intelligently. By this fair and reasonable proceeding they put themselves in a position to gain what they wish without difficulty, since the builders, knowing what to expect, and being all affected alike, can advance their own market to suit the altered circumstances without incurring loss. This is a very different thing from the sudden assaults of men upon their employers in the hope of extorting a few cents by the threat of total ruin to their business which have been too common of late years, and it is pleasant to see that American common-sense is beginning to influence some of the more intelligent unions. The foreigners in Cincinnati think the time is favorable for agitation in favor of an eight-hour law, but we have faith enough in American energy to believe that the demand for time to spend in idleness will never become very general here.

THE "Carpenters' and Joiners' Protective and Benevolent Association" of Chicago, following the example of other cities, has issued a circular, under date of February 4, of which we have been favored with a copy. After speaking of the rise in rents and in the prices of the necessities of life with the revival of business, the circular says that the carpenters and joiners of that city have never been justly paid for their work in comparison with members of other trades, and that it seems to the members a duty to themselves and their families to stand up for their rights and ask an equal share in the prosperity of the day; "always," however, "opposing the baneful maxim of strikes." They therefore announce that they have agreed from and after April 1, 1881, not to work for less than three dollars per day, nine hours to constitute a day's work on Saturday, and ten hours on all other days. Nothing, it seems to us, could be more business-like than this document, which gives reasonable notice of an advance in the price of a certain commodity, namely, skilled labor, just as the jobbers of cotton goods in New York would announce to their customers an advance of a cent a yard in brown sheetings. If the market will not sustain the increased price, the dry-goods jobbers have to retreat, and so may the carpenters, but if they are sensible men they will bear the reverse quietly, and try again at a more favorable opportunity. How different such proceedings are from the antics of the ordinary "organizers of labor" need not be said. What would be said, for instance, of an association of dry-goods dealers, who, having the same object in view as the Fall River weavers,

namely, to sell their wares to the best advantage, should, like them, hire a man at a liberal salary to malign their customers, to extol the most insolent and dishonest among their own number, and put obstacles in the way of the transaction of their own business? Or what would Wall Street say if the brokers, after one of their number had been deservedly kicked out of a merchant's counting-room, should close their offices, and like the Cohoes weavers, march in procession about New York, weeping and howling, and carrying banners inscribed "We are slaves"? Yet such performances would be no more foolish than the demonstrations in which the large class of workmen who are too conceited or debased to comprehend either their rights or their duties spend every year millions of the dollars which they need so sorely, and millions more of their employers' money, which they have still less right to waste.

A SINGULAR explosion took place recently in Westchester County, New York, in the retort-house of a local gas company. It appeared that the purifying apparatus was furnished with blow-off pipes for removing sediment from the washing liquid, and a workman, after blowing out a quantity of sediment, left the valve open, so that a large quantity of gas followed it, filling the place until it reached the wash-room, in which a light was burning. No immediate effect seems to have followed until the door was opened by one of the employees, when the gas exploded, blowing the roof of the building high into the air, throwing out the front wall, and hurling three men a distance of nearly forty feet. Fortunately, none of them were seriously hurt, and although the building was completely demolished, the pipes and machinery were uninjured, and nothing was set on fire. The flame of an explosive mixture of illuminating gas and atmospheric air is extremely light, but the violence of the detonation is so great that the men who suffered its full effect without fatal injury or shock must be deemed fortunate. We notice that electric-light wires have again been giving trouble. A telephone instrument has been destroyed by accidental contact of the lines, and there have been some narrow escapes from fatal injury to persons handling them. Considering the carelessness with which these wires are strung around buildings, it will hardly be long before worse mishaps occur.

MR. E. D. HARRIS, architect to the Stewart estate, which owns the Metropolitan Hotel in New York, writes us to say that we "either intentionally or ignorantly" did injustice to the present holder of the property in speaking of the recent fire in the dining-room of the hotel as caused by a "defective flue," and wishes us to retract the statement on his authority, which we very cheerfully do. Our information was derived from the New York daily papers, and was so explicit that although we were quite aware of the remarkable solidity which characterizes most of the buildings erected for the late Mr. Stewart, this instance seemed to have been exceptional. Mr. Harris informs us that after the fire in 1879 a careful examination was made, showing the kitchen flue to have been at fault, and all the flues were then inspected and made secure, while the wooden furrings on the walls were, as an additional precaution, removed and replaced with fire-proof blocks. The thoroughness with which this was done is shown by the result of the second inquiry into the cause of the recent fire, conducted by the architect and a deputy from the Department of Buildings, which showed conclusively that "no defect in the flues or in any other part of the building could be charged with the accident." We wish all architects could be sure that investigations into the origin of such accidents in the buildings erected under their care would result as favorably.

MR. WILLIAM F. POOLE, Librarian of the Chicago Public Library, read before the American Library Association last week an interesting paper on the construction of library buildings, which he thinks to be now, as a rule, very imperfectly adapted to their intended use. In brief, he condemns the alcove and gallery system of planning entirely, asserting that the books in the upper tiers of lofty buildings are injured by the excessively hot, dry air which accumulates there, and is found to affect the leather bindings very seriously, while the health of the attendants suffers from the fatigue of ascending and descending from one gallery to another. As he very justly says, also, the interior space between the rows of alcoves, which is

generally used as a reading-room, is totally unsuited for such a purpose, being always disturbed by the promenading of visitors and the business of the library. He would reverse all this, placing the books in rows of comparatively low cases, occupying the whole floor of the rooms, except the space necessary for aisles, and reserving a number of small reading-rooms. He exhibited a plan of a building to be constructed in this way, which would easily contain three million volumes within a structure covering but forty thousand square feet of ground, the books being classified in the various rooms, which would be separated from each other by brick walls, and entered only from corridors outside the main structure. This would alone constitute an effectual safeguard against total loss by fire, and Mr. Poole's plan is valuable for this, if nothing else.

THE Boston Museum of Fine Arts, following the example of the French Government, resolved to purchase a certain number of the most meritorious works which should be contributed to the exhibition of contemporary art recently held in its galleries, as an encouragement to the artists; this being thought more judicious than the offering of prizes. The announcement is now made that two works have been bought in accordance with this determination, and it is rather a surprise to find that both of them are sculptures, one being a bust by Miss Olive D. Warner, and the other a bronze bas-relief portrait of Bastien Le Page, by Augustus Saint-Gaudens. This mode of conferring distinction can hardly be too highly commended. To the artist the satisfaction of having his work actually selected for placing beside those of the best of all ages is worth far more than the passing honor of a medal or money premium, and in very many cases the price received for the picture or statue is an important sum to a young and comparatively unknown man. Every painter knows that his masterpiece, the work on which he has lavished his best and tenderest thought, is the hardest of all his pictures to sell, and the knowledge that he may find a possible purchaser in a body which can appreciate the best that he can do, and is able to pay a fair price for it, will keep many an artist in heart to make, year after year, his utmost effort, and thereby gain a strength which can be had in no other way, while without such hope he would sink before long into the nauseating sentimentalism, or the unending and soulless repetition of a single happy thought which have been the curse of American art, because hitherto little else has been salable; and the Museum will find no less profit in the opportunity thus afforded to collect the best contemporary works on the most favorable terms.

It is a little singular, that from the moment the ordinary citizen becomes interested, pecuniarily or otherwise, in any particular scheme, his assertions of fact, as well as his opinions, on matters relating even in the most remote manner to the enterprise which occupies his mind become untrustworthy. The struggle for popular favor among the interoceanic canal companies offers so many and such glaring examples of this recklessness—to call it by a mild name—that it is worth considering whether the authors of the untenable statements which are made on behalf of the various companies could not be held personally responsible for the losses which might be caused to those who were induced by them to invest money injudiciously. One of the latest cases of conflicting *ex parte* evidence which we meet is contained in a letter written by Captain Phelps, who is interested in the Nicaragua Canal, in answer to one written by General Beauregard to support the Tehuantepec ship-railway enterprise. The point which seems to us most noticeable is the discrepancy between the estimates of the distance which will be saved by the various routes in the voyage between our Atlantic and Pacific ports. General Beauregard, following Captain Eads, asserts that the sailing distance between New Orleans and San Francisco by way of Tehuantepec would be less by twenty-two hundred miles than that by way of Panama, while Captain Phelps estimates the saving at a little over fourteen hundred miles. Certainly, skilled engineers should be able to make public statements of geographical facts without such inconsistencies as this, and Captain Eads should not delay answering this, as well as other assertions made by Captain Phelps, which we forbear to quote, in the hope that they will be disproved.

WE must confess our inability to comprehend justly the meaning or application of the so-called Monroe Doctrine, as laid down by Congressional wisdom in relation to the interoceanic canal.

The report of the Foreign Affairs Committee of the House of Representatives in relation to this enterprise, after some discursive remarks about "frightening all Europe," the "never-ceasing vigilance of the State Department," the "greatly superior power of our Government," and other inspiring themes, affirms "that the construction of any public works connecting the waters of the Atlantic and Pacific by any European government or power . . . could not be sanctioned by the United States." Why the investment of a hundred and fifty million dollars by a foreign government in cutting a passage across the Isthmus of Panama, for the almost exclusive benefit of the United States, should excite the fury of a nation which looked complacently on while the "sister republic" of Mexico was seized by France, and formed into an empire with an Austrian sovereign at its head, is a question which we regard with respectful curiosity, but do not attempt to solve. Fortunately, there is no danger that the sincerity of these sentiments will be tested, for however it may be with private individuals, it is in the highest degree improbable that any government would put public money into a scheme which presents so little encouragement to prudent capitalists of any kind.

THE use of petroleum as fuel for the generation of steam has been successfully tried in New York, and new experiments are likely to follow. The proprietor of a manufacturing establishment some time ago fitted up an apparatus very similar to those employed for the same purpose in Russia, by which the petroleum is allowed to drip slowly into a metallic box, where it encounters a jet of steam which drives it in a flaming spray through the furnace; and the result so far surpassed his anticipations that he took measures for an extensive use of the liquid fuel. The officers of the Pennsylvania Railroad heard of this successful experiment, and made an examination of the apparatus, which proved so satisfactory that orders were at once given for converting a locomotive to the new system. As soon as this is done, thorough and scientific trials will be made, to determine the relative economy in use of liquid and solid fuels. At present it is thought that the petroleum will prove the cheaper. The crude product can be employed, or even the refuse of the refineries, so that the first cost will be very low, and the saving of labor in handling of coal, stirring, feeding and care of fires, and disposal of ashes, will be very great. No doubt, also, much of the waste attendant upon the burning of coal in locomotives, through the dispersion into the air of smoke and particles of coal by the forcible draught which it is necessary to maintain, will be avoided in the use of the new fuel, and it is to be hoped, for the sake of the passengers who suffer so much from the clouds of unconsumed carbon which are blown into their faces from locomotive smoke-stacks, that the employment of petroleum may furnish a practicable means of remedying this annoyance.

THE *Société Centrale des Architectes* of Paris has undertaken the publication of a monthly *Bulletin*, containing various facts and observations relating to professional matters. The number for December last includes an essay on the evil effects caused by cold weather in the various parts of a building, which the editor of *La Semaine* commends warmly, quoting from it at some length. The severity of the last two winters in Paris has given unusual opportunity for the study of such phenomena, and the results are peculiarly interesting to us, who endure similar weather every season. The effect of hard frost upon stone, brick and tiles was carefully observed, and sandstone, if dry when put into the wall, was found uninjured, provided the upper surface of all projections had sufficient inclination to throw off water. Without this precaution, or if the stone was not freed from the "quarry sap," by seasoning, the projecting portions were almost sure to be attacked. Of bricks and roofing tiles the hard-burnt and well-laid specimens stood well, while the softer and more porous kinds suffered greatly. Glazed tiles were observed to lose their vitrified coating by exfoliation. The finishing coats of ordinary plastering, when laid on a frozen first coat, fell off as soon as a thaw came, the film of ice which formed between the two coats preventing adherence. Plaster or stucco made with lime and cement fell into powder unless they had completely set. Concrete recently formed was softened on the surface, and the decomposed portion had to be removed and replaced with new material. Mortars, even the best, if lately used, lost their quality by the effect of freezing. A fact was noticed which we do not recollect having seen mentioned before, that slate is rendered brittle by cold, and when extremes of frost and thaw succeed each other, it becomes very fragile.

SUGGESTIONS FOR A BETTER METHOD OF BUILDING TENEMENT-HOUSES IN NEW YORK.¹—II.

IV. *Drainage and Other Sanitary Appointments:* If the house is built on a wet soil the cellar and yards should be under-drained with vitrified earthen pipes in number and of the size rendered requisite by the expected amount of moisture. The main should discharge into the waste pipe that connects with the street sewer.

If neighborhood exigencies permit, there should be a drain running clear round the structure just below and beyond the footing stones but not touching them, otherwise the drain joints are likely to be opened by the settlement of the walls.

The cellar should be hydraulic-cemented and the outside of foundation-wall, up to water-table or sill-course, coated with the same, or with a thick smearing of pitch.

Cesspools should be provided for the overflow of the hydrants, and discharged into the main pipe.

On the score of economy, the preferable place for the water-closets would be in the cellar, and at first glance it would seem the most privacy would be secured there. But as regards direct light and ventilation, the distribution shown on the plans would be greatly preferable, and so would the moral requirements of the case, for indecency seeks the cover of darkness, and uncleanness affiliates with foul odors. Privacy, too, is in reality gained in much greater degree by the isolation of each water-closet than by buddling them together in the comparatively dark cellar, far out of sight and hearing of parents and exposed to the incursions of all the unruly children of the house and neighborhood, against whom locks and keys in the dark would be but a poor protection, while they would be effectual in the light and under the constant supervision of the two or three resident housewives interested in keeping each clean. Where the sick and infirm are concerned, the superiority of the up-stairs water-closet is obvious.

The prevention of the deposit of bulky foreign substances in water-closets, as well as undue accretions of animal sediment and slop grease, is a difficult matter, even in the houses of the wealthy, owing to the thoughtlessness of children and servants; and it is very much more so in this class of house; for, among ignorant people, the superstition largely prevails that the casting of anything into a dark hole disposes of it once for all. The provision, as shown on plans, of ash-chutes (which should be ventilated to the roof) would largely tend to diminish a great and very common danger, ashes and cinders being frequently thrown in the pans of the water-closets, to fill the trap the first time the cup is raised. The lifts, too, though primarily intended to carry up heavy material, would also invite the removal downwards to the street, in a legitimate way, of refuse unfit for deposit in either water-closet or kitchen sink, or for this purpose garbage-chutes as distinct from the ash-chutes might preferably be employed.

Hopper arrangements should be used for the water-closets in preference to lifting ones, so that a full flush of water may always be secured, and the seats should lift so that the pans may form sinks for chamber slops, and the cooking sinks and atmosphere of the kitchen thus preserved pure. Another great advantage in the hopper water-closet is that the bottom of the trap is in view all the time, showing when it needs to be flushed—whereas more elaborate arrangements, though accompanied with a clean pan-bottom which leaves everything fair to the eye, become in reality mere cesspools of stale abomination, breeding deadly gases which the much overrated water-seal is wholly inadequate to keep down.

The main traps at the junction of the house and the street system, and those of both water-closets and sinks throughout (the latter being even more liable to stoppage by greasy accumulations than the water-closets), should have easily accessible brass screws, permitting the prompt displacement of improper substances. Sinks should be left open underneath, not enclosed for the accumulation of filth and rubbish.

The landlord should see to these points, as also to the lighting at night, by gas, of court-yards, galleries and passage from street; to the regular hose washing of sidewalk, court-yards, etc., and other policing, such as the frequent whitewashing of the wall surfaces of rooms and court-yards as well with reference to increase of light as to purification. Still better than whitewashing, however, would be the use of some wall-covering that would be impermeable to air and consequently to the lodgment, as in plaster and wood, of those noxious exhalations from the human body, the savoring of which, as he passed by any unaired dwelling early in the morning, led the sensitive Thoreau to compare the odor to that of a charnel-house, and the continuous accretions of which in the walls of hospitals—only too closely allied to the densely-peopled tenement-house—predispose patients to the dreaded *pyæmia*. Architects have all their professional lives been familiar with wall-coverings for which complete imperviousness has been claimed, but there really does not appear to be one which stands the test of practice. The best and most thoroughly-worked cement will, if spread on a wall surface, soon show fissures produced by the more or less marked settlement which every building must undergo. If, however, a good cement is well floated on, the cracks filled up after the settlement is complete, and the whole surface treated with oil paint, giving opportunity for periodical

washing, considerable headway will be made toward meeting the case.

The trap of every water-closet and sink should be ventilated through a pipe of appropriate calibre, to the roof, and soil-pipes should be connected with the leaders from the roof so as to be flushed with every fall of rain.

There are several theories among experts as to the best means for ventilating the drain leading directly to the street sewer, and of affording a vent for foul air when the soil-pipes are bringing down the contents of the water-closets and sinks, and also for preventing the chance of the main trap nearest the street sewer being forced by back pressure, and the sewer-gas being carried up to the rooms. Double traps and single traps, as applied to the main sewer-pipe nearest its entrance into the street sewer, both have their adherents. Either should be complemented with a vent-pipe leading to the roof.

The method lately in vogue in New York, where high-class dwellings are concerned, of ventilating the sewer-pipe by means of a shaft carried up to curb of sidewalk would probably not work well for a house of this class, liable to frequent obstructions of snow, dirt, etc., and the perforations for which would be constantly stopped up by street boys. What is preferable is a vent-shaft carried up from the same point to the roof alongside of a stove flue. But in either case, whether carried to roof or sidewalk, this outlet would be extra, and the scheme would not dispense with the arrangements before mentioned. Changes should be all in the direction of additional means for the thorough ventilation of soil-pipes in their whole length. For the same reason that there should be secured a complete circulation of fresh air throughout the house from front to rear and from ground to roof, by means of open court-yards, passages, galleries and staircase, so the plumbing service should be ventilated from top to bottom and from beginning to end. It is the lack of a thorough circulation of fresh air through the whole drainage system of our structures—even the costliest—which is turning our houses into hot-beds of diseases generated by foul air and which are often erroneously attributed to malaria, contracted elsewhere. It is mainly this which is inducing not a few to inquire whether, after all, the community has gained from the labors of the plumber? Not only should the siphonage of the poisonous gas of the street sewer be guarded against at the start, not only should the trap of every water-closet and sink be ventilated by a pipe of ample calibre to the roof, but every stationary wash-tub and wash-basin (though we provide for neither in this class of house) should also be furnished with vent-ducts. Moreover, every overflow and waste-safe in the plumbing system of every house, whether applied to the cisterns, or to pans of water-closets, or to slop-sinks, wash-tubs, or wash-basins, should be completely independent of the soil-pipes from the same places. When this is done; when the trap and valve arrangement is perfect; when every pipe belonging to the plumbing system, whether of supply or drainage, is, instead of being imbedded in the wall, simply placed on its surface, cased up (which can always be managed in closets or in some other slightly way) and made as immediately accessible as the cords and weights of a lifting window, by means of pockets in casing and floor plank; when the main drain, instead of being buried no one knows where under the cellar floor, is slanted (not laid flat as is sometimes the case) along the cellar wall, to be seen of all men as well as the plumber and excavator; when this is done and the slightest defect in the lay of the pipes, or in the caulking or ferruling of the joints, may be seen at a glance, there will be but little occasion to doubt the benefits of that one of the building trades which was meant to be, and should be, one of the chief sources of the cleanliness, comfort and health of the household.

Some years ago an attempt was made to furnish the market with porcelain-lined supply-pipes of metal; earthenware throughout their thickness being inadmissible on account of its brittleness. If any kind of glaze could be secured within economical bounds, adequate to withstand the wear and tear of the chemical forces of air, water, and excreta, and could be supplied to waste as well as to supply pipes of infrangible metal—lead, or still better, wrought-iron, being in this regard preferable to cast-iron—the perfection of plumbing would seem to be of near attainment; it being of course understood that paramount to even mechanical conditions of success is the moral element of fair work, for none of the building trades can bear scamping so little as plumbing, while none offers such temptation to it—a temptation, however, which would be reduced to its minimum if the suggestion for unconcealed work were carried out.

As regards water-supply, the water should be delivered from independent lines of pipes (in all cases placed far enough from front and rear walls to be safe from frost), carried up for each set of apartments; several desirable points being gained by this, an important one being the prevention of quarrels among the inmates on the ground that the drawing of water is unequally shared. Another gain would be that the water could be shut off from any tenement that might be vacated or under repair, without interfering with the water-service of the others.

If the house is on high ground, pumps should be provided to supply the upper stories in case of occasional failure to secure an adequate head of water.

There should be a hydrant in each yard (of the anti-freezing compression kind) as a further provision against temporary failure, and both being provided with nozzles and screws for hose for flushing the yards, galleries, etc. The same in front of the house.

It is not contemplated to lay on a hot-water service; it would be

¹ A paper read at the Fourteenth Annual Convention of the American Institute of Architects, by A. J. Bloor, F. A. I. A., being a report, ordered at the previous convention, on the best method of solving the tenement-house problem.

expensive, and would be fraught with some danger of boilers bursting, etc., under the mismanagement of ignorance.

V. *Seclusion of each Suite of Rooms and Publicity of Access to them:* The arched passage-way from the street, iron staircase and galleries, all of convenient width, give unobstructed and well-lighted access up to the entrance-door of every suite of apartments in the building; that curse of the ordinary tenement-house, the narrow dark passage, being utterly abjured. This door has simply to be opened with a latch-key to secure for each tenant a privacy as complete as that to be found in the most expensive apartment-house. Each suite, though it may be of only two rooms, is absolutely independent in all the appointments—necessarily on a small scale, it is true—required for a household, except as regards water-closet and lift, and the brief periodical uses of those conveniences would be common at the most to only three families. But so far as God's sunlight and fresh air can be appropriated within the narrow bounds prescribed by the necessary limitations involved in the problem presented; so far as the means for the current desiderata of all households for heating, ventilating, cooking, and cleaning, are concerned, each small household, once past his entrance-door, would be king in his own little castle, free to seclude himself and his family when he seeks seclusion; or, when his gregarious instinct prevails, to find in the grouping of a score of households under the same roof with his own an easy opportunity for that constant companionship from which the high-class family is often shut off by its very advantages—its command of ample and independent space, sometimes involving a hurtful isolation—an accessibility of companionship which is doubtless no small compensation for the deteriorating conditions of his poverty, and no trivial factor in the poor man's account, as against the conditions of the rich, in equalizing the sum total of the longevity and happiness of each.

VI. *Convenience of Arrangements:* The relations of the various portions of the lay-out to each other may be gathered in detail from the plan, the various suites being individualized by different arrangements of lines and dots in distinction from the court-yards and common approaches, which are left blank; while the names and dimensions of the different rooms, etc., are also indicated. A close consideration of the maximum of possibilities in the way of convenience through each suite has not been wanting; but low rental and sanitary conditions—light, air, ventilation, security, privacy, in a word, health and decency—have been made paramount to the spaciousness or equilateral shape of a room; for the class it is desired to benefit is accustomed to the very extreme of the *res angusta domi*, and have very little furniture to put in place, and very little eye for anything beyond the readiest use in placing it. Moreover, the close observer knows that the symmetry of a room by no means secures the most space for, and the best arrangement of, furniture. After a careful study of a great many alternates, the lay-out of rooms proposed in this plan is thought to meet the requirements of maximum living-space and convenience of arrangement as effectually as is perhaps possible, under the limitations imposed.

At first glance it would seem that the spaces between the gallery and two of the lobbies might better be thrown into the respective suites; but one gives an additional window to a living-room, and both, with the staircase between, afford convenient turn-outs to prevent crowding the gallery when several persons meet.

There is quite a difference of opinion among house agents, and among tenement-house tenants themselves, as to whether it is the better plan to open the rooms of each suite into each other, or to isolate each room and have communication with it only through the passage-way common to all. The former method affords opportunity for better ventilation and greater ease of inter-communication; the latter gives more room for the placing of furniture and secures greater privacy for each room, an advantage for sleeping-rooms occupied by persons of different sex and various ages which is very obvious. A compromise may of course be effected by inserting inter-communicating doors, keeping them locked when desired and placing heavy furniture against either side. Every owner would have, in building, to decide this point for himself. The plans show where these doors between rooms may be placed; but, unlike the doors that are essential, they have lines drawn across them.

As to other details under this head, it need only be said further that every living-room in the building would be provided with at least one locked closet having shelves and hooks.

VII. *Inexpensiveness:* On this point careful estimates show that the house just described could be built at a cost of not more than fifteen per centum—reducible in proportion to the lowering of the standard for fire-proofing—above that of the common tenement-house built with no precaution against fire, and with ordinary lath-and-plaster walls; and it is believed that the difference would probably be more than covered by the much surer collection of rents and the large decrease of expenditures for repairs consequent on the constant wear and tear of the ordinary tenement-house, for insurance and for legal proceedings (the eviction of non-paying tenants, etc.). No suite in such a structure would ever be unoccupied by the thriftiest of the class had in view, who would at once be the gainers themselves and leave their old and poorer quarters as a gain to others of still lower grade. Such was the unvarying testimony given by London tenement-house administrators before a royal commission, such has been the testimony since in Glasgow and other manufacturing towns in Great Britain, such is the case in Brooklyn, and such, there is no reason to doubt, it would be in New York.

CO-OPERATIVE APARTMENT-HOUSES.

ONE of the principal troubles in the practical life of New Yorkers of average means has been for thirty years at least, and still is, to find a temporary place of residence. Permanence is not expected by them, since they cannot afford to own a house, and without such possession they are obliged to move continually, two or three years under the same roof being regarded here as a protracted term. This domiciliary evil has been mitigated somewhat by the building of small dwellings in the region around and above Central Park, and by the rapid increase of apartment-houses in various parts of the city. They are a marked improvement upon the old method of paying a great price for a large house—a rent often twice the amount, or more, of the lessee's entire income—and trusting to hoped-for returns from rented rooms to make up the sum required. But, notwithstanding the fact that things are not as bad as they have been, they are bad enough to need amelioration. Rents are still very high and going higher, as many tenants will be informed the next quarter day, the coming Feb. 1. It may be safely said that in no city on the globe are rents so exorbitant as in New York. They eat up the salaried man's substance—and the great majority of our citizens depend on salaries—rendering his life an endless struggle. Visiting Europeans are always surprised at the enormous rents asked here for inferior accommodations, and cannot understand how the inhabitants can pay them, nor, it may be added, can the inhabitants themselves. Where to live and how to live continue to be the hardest problems for most dwellers on this island to solve.

A solution of the momentous problem is offered just at present in the erection of co-operative dwellings—apartment-houses—which promise to benefit several families at once, both as to the character of their quarters and a diminution of their expenditure. Some of these buildings are now nearly finished and others are going up, so that the long contemplated experiment will soon be fully, and it is believed satisfactorily tested. Most of the apartment-houses, even those designed for the best class of tenants, are, with few exceptions, badly planned, badly ventilated, badly lighted, and deficient in room. These defects are to be remedied, it is said, by the new co-operative plan, which is: to form a club of several families desirous of obtaining a comfortable and wholesome place of residence at a reasonable rate; to buy such land and erect such a building as they like, with suites of apartments in excess of their needs, the excess to be rented for the purpose of paying off a mortgage on the whole property, or of merely meeting the interest on the mortgage, the remainder going toward the current expenses.

It is proposed to erect a fine building on this basis, beginning next spring, and completing it in time for occupation in October. The front will be of red brick, laid up in red mortar, enriched with carved and moulded work in terra-cotta in the Queen Anne style, something like the Strathmore, in upper Broadway. The interior will be durably and substantially finished, and decorated to suit the taste of each individual owner. Three lots, 100 feet deep, and giving a 75-foot front, will be purchased for not more than \$60,000, on which it is intended to put up an apartment-house 56 feet wide. The remainder of the frontage will be used for a small house of only a moderate depth, in order to insure light and ventilation to the apartment building, and to aid the fund for liquidating the mortgage on the property. Each main apartment will cover an area of about 2,217 square feet; will have neither light nor ventilating shafts, but will have every window opening to the sun and air. This area does not include a private passage-way of 256 square feet, closets, coal-cellar, and rear private balcony to each floor 20 feet long by 5 feet wide. The dimensions of the room will be:—

Private hall.....	13 by 6	Chamber.....	17½ by 9
Library.....	17 by 16	Trunk-room.....	8 by 6
Chamber.....	15½ by 12½	Reception-room.....	15 by 9
Servant's chamber.....	13½ by 6½	Dining-room.....	20 by 20
Parlor.....	23½ by 16	Chamber.....	17½ by 13½
Butler's pantry.....	8 by 8	Kitchen.....	14 by 11½

Total area, about 2,217 square feet.

To this must be added an extra servant's chamber, about 12 by 10 feet, for each owner, and a large drying-room on top of the house.

The cost of this building, of first-class material and workmanship, erected under the most careful superintendence, will be about \$80,000. A clear idea will be gained from the following summary:—

Land not to exceed \$60,000. Building complete not to exceed \$85,000, including a possible expenditure of \$5,000 for excavating rock for cellars and foundations, and making first-class connections with mains and sewers through rock. Loss of interest and taxes in the interim during the completion of the building, \$4,140.....	\$149,140
Amount of mortgage on land and building, complete about October next, 60 per cent of cost.....	89,484
Amount of cash to be furnished by eight original members.....	59,656
Cash to be furnished by each member who owns one and one-half apartments, in about six payments, spread over 10 months.....	7,457
Annual income for four apartments, two lower, double, each, \$2,000; two upper, each, \$1,300.....	6,600
Interest to be paid annually on first mortgage, at 5 per cent.....	4,474
Annual cash income toward sinking fund.....	2,126

The financial responsibility of each member on entering the house, if the present system of heating and steam power is adopted, will be as follows, the amounts being given for a year:—

Interest on investment of \$7,457, worth to owners, say, 6 per cent.....	\$447
Janitor and engineer.....	900
Fireman—six months only each year, at \$9 per week.....	234
Three elevator youths, ordinarily to attend hall door, at \$6 each per week.....	936

One hall-boy, at \$3 per week.....	156
Coal to provide power for elevators, steam heat for halls and all passages, rooms not included.....	650
Property tax, 2½ per cent on 60 per cent of \$149,140, say \$89,584.....	2,237
Water tax.....	100
Keeping front sidewalk in order.....	25
Repairs to roof, front, and hall.....	100
Engineers' stores.....	50
Divided among members.....	\$5,388
Share of common charge to each member yearly.....	673.50

To obtain the full benefit of the third lot of land, purchased to secure air and light to the apartment-house, a four-story English-basement house, with 19 feet front, will be erected by the original members, the entire outlay on which can, if desired, be covered by a mortgage. The land has already been charged off to the large house, so the cost of a first-class, serviceable building, about \$14,000, has alone to be considered:

Allow this house to rent per annum for only.....	\$1,500
Deduct property tax, wear, and tear.....	350
Which leaves.....	\$1,150
Less interest on cash investment.....	\$5,600
	8,400
	\$14,000
Balance yearly toward sinking fund.....	\$382

The financial responsibility may, if preferred, be shared by the original members until \$5,600, cash advanced, has been repaid to them. An annual sinking-fund of \$2,126 plus \$382, or \$2,508, will discharge the whole debt in about thirty-five years. Should the members choose, instead of a sinking-fund, to divide the surplus income from the four apartments and the small house, it would much reduce each member's rental.

Surplus from four apartments after paying interest on mortgage, taxes, etc.....	\$2,126 00
Surplus from small house after paying interest on mortgage, taxes, etc.....	382 00
Total surplus.....	\$2,508 00
Divided among eight members is.....	\$313 50
Running expenses already detailed.....	673 50
Difference.....	\$360 00
Add interest on cash investment (\$7,457).....	447 00
Yearly rental.....	\$807 00

The total annual rental payable by each member will, therefore, not exceed, if the mortgage is to be paid off, \$1,120.50, or, if a perpetual mortgage be preferred, \$807.

It is necessary in order to appreciate this co-operative plan fully, to compare the sizes and rents of certain rooms in well-known apartment-houses here deemed very desirable. The owner of a large apartment-house in an excellent neighborhood asks \$1,400 a year for rooms of the following dimensions:—

Private hall.....	12 by 5½	Chamber.....	12 by 9
Dining-room.....	18 by 12½	Library.....	14 by 9
Chamber.....	12 by 9	Chamber.....	15 by 15
Parlor.....	20 by 14	Servant's.....	12 by 7
Kitchen.....	11 by 12	Servant's or trunk room.....	12 by 8
Total area, 1,450 square feet.			

All the above rooms save three are lighted by a shaft. A second landlord gets \$600 for 800 square feet, and a third \$700 for 1,206 square feet, both of these in a slightly inferior locality; a fourth gets \$1,220 for 1,305 square feet, a fifth \$1,050 for 1,177 square feet, a sixth \$1,250 for 1,815 square feet, a seventh \$1,000 for 1,100 square feet, and an eighth \$1,900 for 1,682 square feet; all of these in an excellent neighborhood. An average of the eight gives \$1,140 for 1,324 square feet. Compare this accurate and fair average of first-class New York apartment-houses as exist to-day with what will exist twelve months hence, viz.: \$807 for 2,217 square feet, with from 50 to 75 per cent more air and light, and it is found to be nearly 2½ times to 1, or, to be exact, 2.37 to 1, in favor of this proposed building. A small three-story house, with the above area of 2,217 square feet, in an equally good neighborhood, will rent to-day for \$1,600. Above all, it should be remembered that the members might, by paying off the mortgage debt, become absolute owners of the property inside of thirty-five years. Very high rents are, with few exceptions, the only safeguards against objectionable inmates. Landlords know this, and, to add force to their high charges, resort to extravagance in mere ornamentation, especially on the halls and front of the building, as some sort of a compromise, which too often ill accords with the interior arrangement and comfort of the apartments themselves.

There is and can be no legal obstacle in the way of these co-operative buildings. The members as a corporate body hold the property in common, and lease to each individual member his particular apartment at a nominal rent for, say, a term of ninety-nine years. Each member is consequently both part owner in the entire property as well as lessee of his own apartment, and can sell or transfer his share without interfering in the least with the holdings of the other members. But should he be compelled to dispose of it, subject, of course, to the constitution and by-laws which the members had determined on, and incorporated in the several leases, the purchaser, whoever he might be, would assume necessarily the same obligations. Co-operative building is a strict business association, and does not involve or imply the slightest social contact, any more than now exists in the regular apartment-house. It is always possible, too, should a member wish to give up his apartment at any time, either to sell or rent it at a large advance on his original investment. As the apartments will be valuable as well as desirable, an auction sale might be held at an early date to determine the location of its members. This would be advisable, because some members would be

willing to pay a few hundred dollars more than others for the privilege of selection. An equitable and satisfactory way would be for the eight members to bid together for the choice and to divide the proceeds of the sale among the members, some of whom would pay something, while others would receive something, and thus establish an acceptable adjustment all around. By holding this auction as soon as the relative position of each apartment and the general size and shape of each room is determined upon, each member might, for his own suite of rooms, make small alterations and additional conveniences, such as would not interfere with the main construction of the building. As it is proposed to dispense generally with expensive and superfluous decorations, each member might, if he chose, ornament his apartment in any manner with any variety of hard wood, frescoing, or other finish, to suit his taste and purse.

It is claimed that this co-operative building is one of the best, because one of the most certain and profitable, investments that can be made here, whether a man wishes to save in rent by occupying an apartment himself, or whether he rents it far below the current price, and yet net a gain of 16 per cent. The two classes most to be benefited by it will be those who, having country homes, commonly hire furnished houses in town during the wintry months, and want spacious rooms for social entertainments, and those who object to the expense and fatigue of a regular city house. The structures may be put up of such size and style and in such a situation as may be wanted by persons wishing to invest \$2,000 or \$20,000 cash.

A first-class co-operative building will be erected in the spring between Thirty-fourth and Forty-second Streets. An association in which each member's cash investment will vary from \$3,500 to \$4,000 is now forming, and the rooms will have the same ample proportion of space, light, and air. Another building has been proposed with thirteen rooms, covering an area of 4,650 square feet, where each member's investment will be about \$18,000. In all the buildings two or more well-known and responsible persons, as the members may decide, will be invited to contract for each branch of work, which will be the best compatible with true economy in order to secure easy mortgage and insurance rates. Co-operative building has just begun, if it may be said, indeed, to have begun at all; but it is almost certain to be attended with such success and with results so wholly satisfactory, as to insure its steady continuance and increase. Many New Yorkers are now waiting to see the experiment actually and fully tested before embarking themselves in an undertaking that holds such flattering prospects. Early in the spring, some of these buildings will be occupied; more will be in the autumn, and, unless all indications fail, the occupants will be so pleased that they will wonder they had not adopted this or a similar plan long before. There has never hitherto been anything in the building line which afforded so much hope and encouragement to New York and New Yorkers as the present co-operative scheme. It threatens to effect a great and most desirable revolution in keeping house and securing homes. — *New York Times*.

ARCHITECTURE: GOTHIC AND RENAISSANCE.¹

THE book before us will be welcomed by a large and growing class of readers, who have long been seeking some work, which, whilst it would give them a simple and straight-forward account of the growth, development and succession of the different architectural styles, should avoid all such technical treatment as is necessary when writing of architecture from the purely professional point of view. Up to the present date no book has come under our observation, which is so well calculated to give the intelligent and cultivated layman that general insight into the architectural styles, which is necessary to his thorough appreciation of the movements, great and small, which travel, photographs and pictures are constantly placing before him, as this text-book upon the Gothic and Renaissance.

The scheme of the book is carefully adhered to throughout, and all questions that might seem too technical have been carefully avoided — the author confining himself entirely to the external differences which distinguish the styles one from another, and touching only, in the most general manner, upon the deeper differences of construction and sentiment. In spite of the fact that the book is thus limited in its scope to a descriptive catalogue of the main features and details of different styles, its clearness and directness, and a careful avoidance of repetition or redundancy, make it as easy and pleasant an introduction to its subject as the nature of the case will admit, and we recommend it not only to the amateur reader directly, but to the notice of professional men whose advice may be asked by their lay friends as to what book they had best read to give them a first insight into the mysteries of the styles.

There are but a few points upon which we feel inclined to take issue with the author. The first is, whether he has not unnecessarily limited himself to the purely descriptive treatment, and whether a general introduction which would have given an analytical *aperçu* of the theory of construction underlying and leading to the different phases of architecture, would not have given the lay reader an insight into the reason of things that would have enabled him to see more understandingly and co-ordinate more readily, in his own mind, the great mass of detail necessarily presented to him. We question again the wisdom of the sub-divisions of the work into I, Classic and Early Christian (not yet published) and II, Gothic and Renaissance,

¹ *Architecture: Gothic and Renaissance*. By T. Roger Smith, F. R. I. B. A. One of the series of "Illustrated Text-books of Art Education," edited by Edward J. Poynter, K. A.: Scribner, Welford & Co., New York, 1880.

—especially as by that division the 11th and 12th century work seems either to have been separated from the Gothic, to which it is most closely allied, and classed with the early Christian, or else to have been but slightly treated.

The division that would, it seems to us, have been more natural, would have been into I, Classic, II, Early Christian and Gothic, III, Renaissance.

The nationality of the author has, we think, led him into two errors of judgment: in the first place, into choosing English Gothic as a basis for his dates, transitions and general outlines, and subordinating French Gothic and the Gothic of the Continent as variations, whilst if either, the opposite is true. The excuse of convenience to the English student is given but in the face of the nearness of many of the best French and Flemish examples and the abundance of obtainable photographs and drawings, this convenience does not nearly counterbalance the disadvantage of distorting the beginner's ideas of the relations of time and influence of the work of one country upon that of the other. Another weakness that we should surmise is an unconscious Anglicism is the fact that 150 pages are devoted to Gothic and only 83 to Renaissance work.

The book itself is presented in very excellent taste and in a very attractive manner in all its details. The illustrations are unusually good and selected with great discrimination, and the letter-press is clear and careful and very free from typographical errors. B. W.

THE ILLUSTRATIONS.

CHICAGO AND NORTH-WESTERN R. R. DEPOT, CHICAGO, ILL. — MR. W. W. BOYINGTON, ARCHITECT, CHICAGO, ILL.

THE basement is built of rock-faced limestone; above this it is built of St. Louis pressed brick, with ruled joints, white mortar, and relieved with Huron stone and ornamental brick; cornices of iron, roofs of slate. The basement story is finished in oak, first story in walnut, and second story in walnut, and third story in pine; all plaster finish in the Eastlake or modern Gothic style. The first story is to be painted, the ceilings in water-colors and the walls in oil. The carshed is all of iron. There is a continuous skylight on ridge, as shown on the drawing.

HOUSE FOR MR. G. P. KING, BOSTON, MASS. — MR. W. W. LEWIS, ARCHITECT, BOSTON, MASS.

LIBRARY OF THE SAME.

COMPETITIVE DESIGNS FOR A HOTEL ENTRANCE-HALL. MR. A. T. MATHEWS, OAKLAND, CAL., AND MR. C. A. GIFFORD, NEW YORK, N. Y.

We quote from the jury's report the remarks which apply to these designs:—

"'Ionic' fails entirely in conception of the programme; he sends us unmistakably the hall of a handsome private house, and a city mansion at that. This misconception is the more to be regretted in that 'Ionic' shows himself very strong in design. The disposition of his plan lends itself to decorative effects, which have been developed with keen artistic intelligence. The drawing, especially in the details, is precise and remarkably refined; but the perspective is too labored, and too pale for successful reproduction.

"The design distinguished by 'a heraldic hand holding a tulip' is not without interest, for its homely and straightforward treatment. The right conception of the programme is evident, but the author has not worked out his idea sufficiently; his plan also lacks thought."

LEGAL NOTES AND CASES.

Liability of Proposed Purchaser for Repairs.

WHITELAW had a contract with Morden to repair a boiler in his saw-mill, and whilst he was at the work he received the following letter from Taylor, the defendant: "As Mr. Morden's saw-mill at Bismark is about to come into my hands right away, and as I am to assume the expense of repairs to the boiler, be good enough to push forward the work to be done by you on the boiler as fast as possible; everything is at present at a stand-still, waiting on you. Please push on the work and oblige, yours truly, R. Taylor." Whitelaw, without communicating with Taylor, went on with the work. The negotiations between Taylor and Morden fell through. Whitelaw sued Taylor for his work, but the court dismissed his action, holding that defendant had not made himself liable by his letter. *Whitelaw vs. Taylor*, Canada Court of Appeals, Dec. 20, 1880. H. E.

Fire Insurance. — Carpenter's Shop. — Storehouse.

A building was used by a carpenter, who was erecting a house close by it, to keep therein his tools and the window-frames he had made, but he did no work there, and it was burned. In a prosecution for arson, to convict the defendant it was necessary to hold that this building was used "to carry on the trade of carpenter," under the Act of 4 and 5 Vict. The court held that it was not such a building. *Regina vs. Smith*, 14 Upper Canada Reports, 546 (1880). H. E.

Notice of Unsafe Condition of House and Grounds.

The owner or the occupant of real estate is under no obligation to keep the house and grounds in a safe condition for any one to enter. But if he induces or invites persons to come into the house or upon the grounds, directly or by implication, he will be liable for any injury which may happen by reason of his negligence in not preparing secure means of entrance, and a safe condition of the house and grounds.

If he induces or invites any one to enter upon a dangerous place without warning, and an injury ensues, then he is liable for the negligence. *Sweeney vs. Old Colony Railroad Co.*, 10 Allen, 368; *Carleton vs. Iron and Steel Co.*, 99 Massachusetts Reports, 216; *Severy vs. Nickerson*, 120 Ibid., 306; *Larue vs. Farren Hotel Co.*, 116 Ibid., 67; *Davis vs. Central Congregational Society*, Massachusetts Supreme Judicial Court, September, 1880.

[Cases of this character generally arise out of injuries resulting from a neglected condition of a finished house and grounds, but a builder must warn any person whom he induces or invites to come upon premises occupied by him against any unexpected danger. H. E.]

Purchase of Materials, and Part Removal. Title to Remainder.

Temple, a brick-maker, had 100,000 bricks in a kiln, and sold to Close one-half of them; Close paid the price and took away 16,000 brick; the remaining 84,000 were in the kiln, there was no separation of the 34,000; and the sheriff upon an execution, in an action by one W. against Temple, sold all the remaining brick. Thereupon Close brought an action of trover against Temple for the 34,000 bricks, claiming that the property in the entire 50,000 bricks passed to him upon the sale, and the court held that the contract was an executed contract, and that the property to the bricks passed to Close at the time of the sale. *Close vs. Temple*, Supreme Court of New Brunswick (Canada), January, 1881.

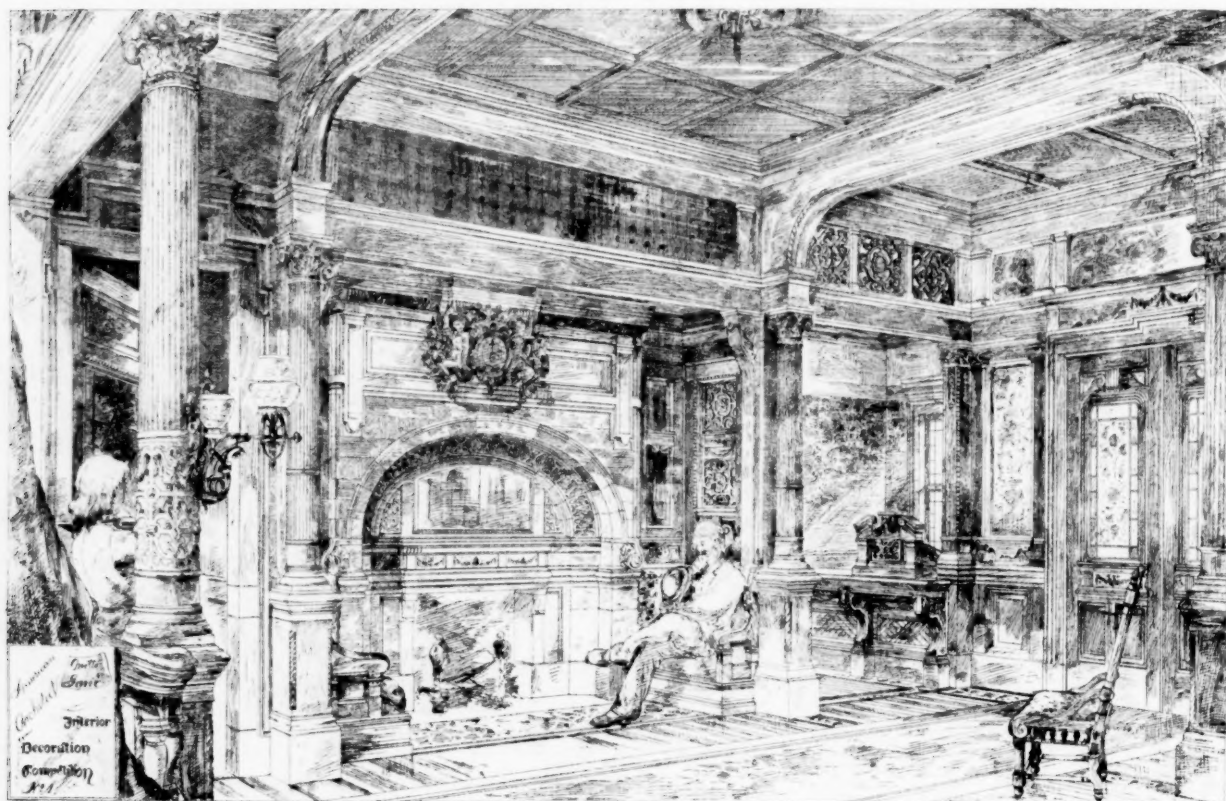
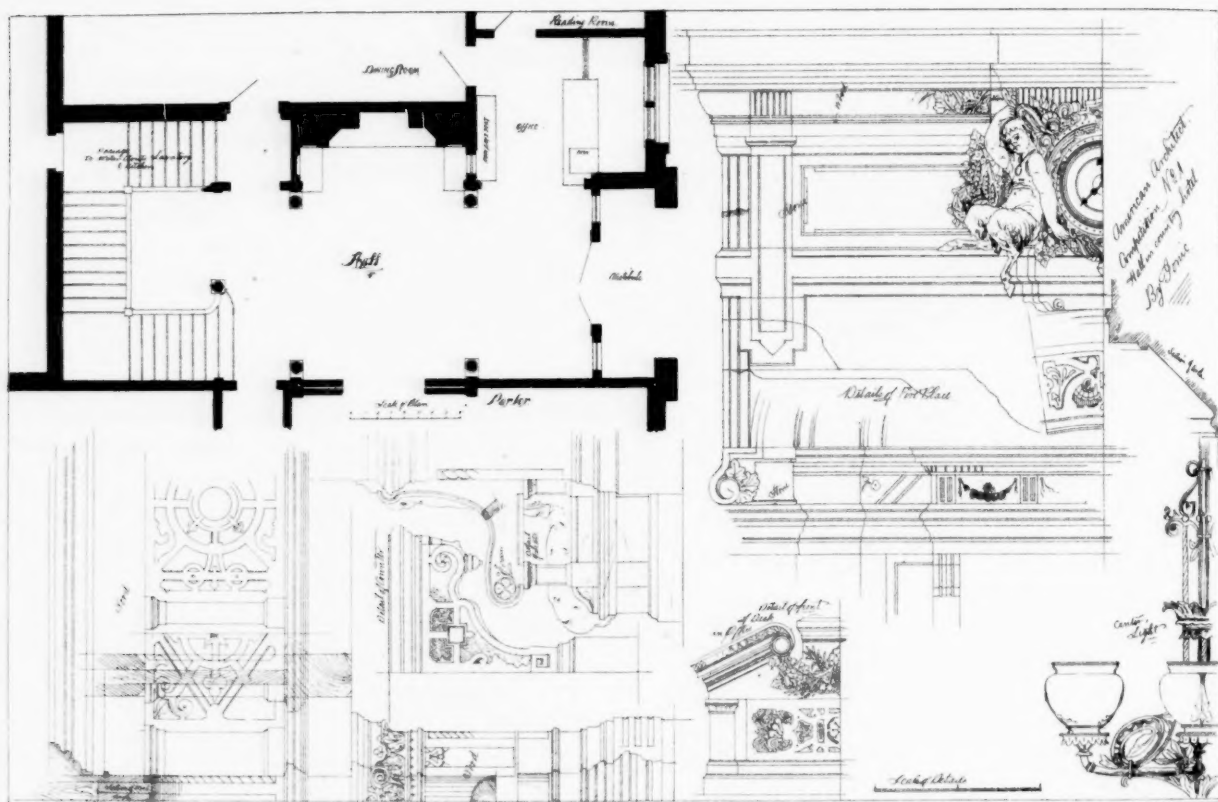
[The question which is raised upon a contract for the sale of goods from a quantity in bulk, from which none or a part only is removed, is whether the contract is executed or executory only; for if it is not executed, as between the purchaser and third persons, no title passes from the vendor, and the property bought and paid for will go to satisfy the debts of the vendor. The decision here given rules in favor of the purchaser, holding the contract to be executed.] H. E.

Injuries from Defects in Houses and Grounds.

An important decision in the Supreme Court of the United States, *Bennett vs. The Louisville and Nashville Railroad Co.*, has been rendered recently upon the liability of the owner or occupant of land, for injuries suffered by persons invited upon the premises, because of the unsafe condition of the house and grounds.

The husband of the plaintiff was a passenger on the cars of the defendant, and at Danville, Tenn., he left the train to take the steamer *Rapidan* to continue his journey. The customary landing at Danville was at a wharf-boat moored at a lot near the station; the lot and wharf-boat were the property of the railroad company, and controlled by it, and it had on the lot an open shed-depot, about 240 feet in length, in which there were spaces or hatch-holes to facilitate the handling of freight. The steamboat company was authorized to use the approach to the landing at the wharf-boat, and there was an arrangement between the companies for a community of interest in the freight and passenger traffic at Danville. Mr. Bennett left the hotel, where he awaited the arrival of the *Rapidan*, at the customary time, at night, to go to the boat, taking the proper path over the grounds of the railroad company; he had a lantern, but the light was accidentally extinguished, and on crossing through the shed-depot he fell through one of the hatch-holes, which had been left unguarded and injured himself severely.

As to the liability of the railroad company, Mr. Justice Harlan, in delivering the opinion of the court, said: "This case comes within the rule — founded in justice and necessity, and illustrated in many adjudged cases in the American courts — that the owner or occupant of land who, by invitation, express or implied, induces or leads others to come upon his premises, for any lawful purpose, is liable in damages to such persons — they using due care — for injuries occasioned by the unsafe condition of the land or its approaches, if such condition was known to him and not to them, and was negligently suffered to exist, without timely notice to the public, or to those who were likely to act upon such invitation. *Railroad Co. vs. Hanning*, 15 Wall, 659; *Carleton vs. Franconia Iron and Steel Co.*, 99 Mass., 217; *Sweeney vs. Old Colony Railroad Co.*, 10 Allen, 373; *Wharton's Law of Negligence*, §§ 319 to 352; *Cooley on Torts*, 604-7, and authorities cited by those authors. The last-named author says that when one 'expressly or by implication invites others to come upon his premises, whether for business or for any other purpose, it is his duty to be reasonably sure that he is not inviting them into danger, and to that end he must exercise ordinary care and prudence to render the premises reasonably safe for the visit.' The rule is illustrated, also, by the following cases in the English courts: *Corby vs. Hill*, 4 Scott's C. B. Rep., N. S. 562; *Chapman vs. Rothwell*, El. Bl. and El., 168; *Lancaster Canal Co. vs. Panaby*, 11 Ad. and El. 242; *Gibbs vs. Trustees of the Liverpool Docks*, 3 H. and N.; affirmed in the House of Lords, 11 House of Lords Cases, 686; *Indermaur vs. Dames*, L. R. 1 Common Pleas, 288, and L. R. 2 Common Pleas, 313. In the last-named case, the court, — referring to the class of persons who visit premises upon business which concerns the occupier, and upon his invitation, express or implied, — said that it was settled law that a visitor of that class, 'using reasonable care on his part for his own safety, is entitled to expect that the occupier shall, on his part, use reasonable care to prevent damage from unusual danger which he knows or ought to know; and that, where there is evidence of neglect, the question whether such reasonable care has been taken, by notice, lighting, guarding, or otherwise, and whether there was contributory negligence in the sufferer, must be determined by a jury as a matter of fact.' . . . It is sometimes difficult to deter-

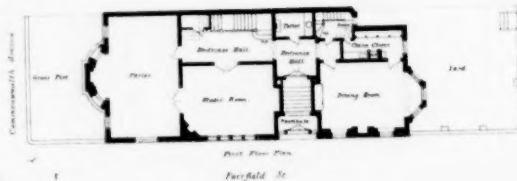


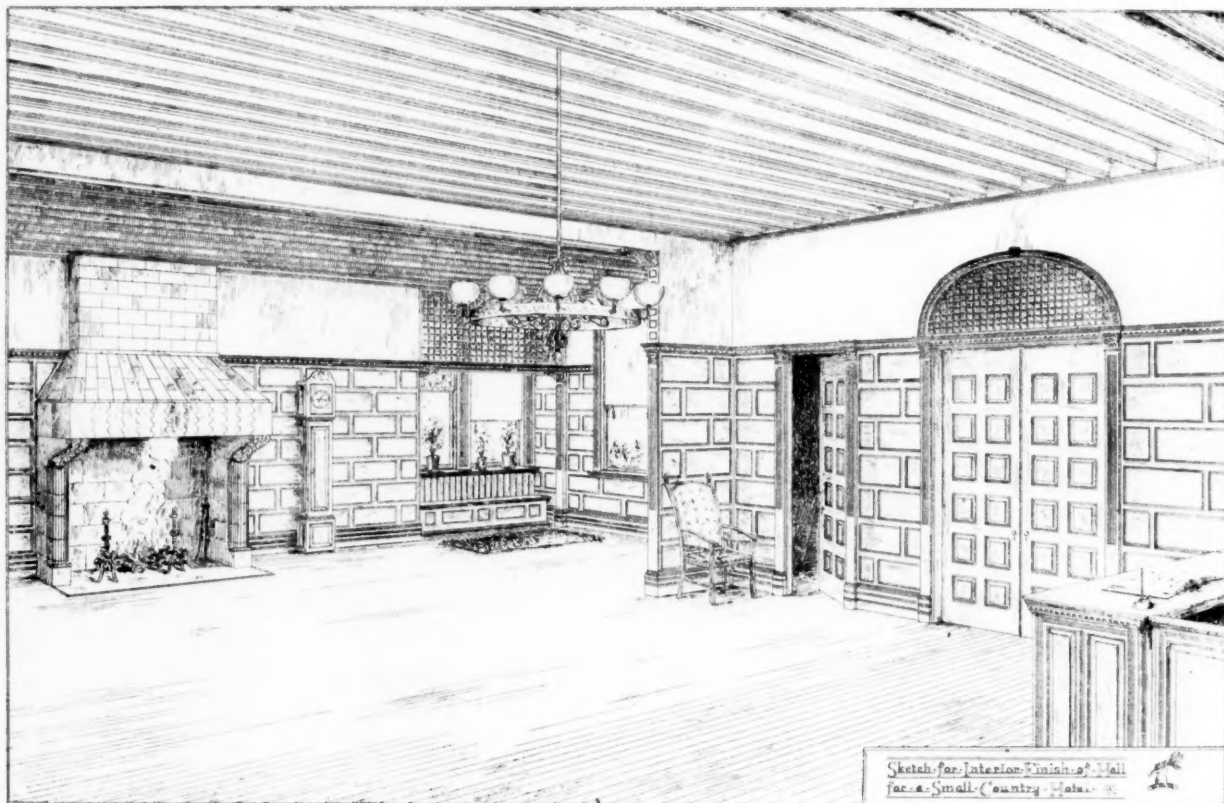
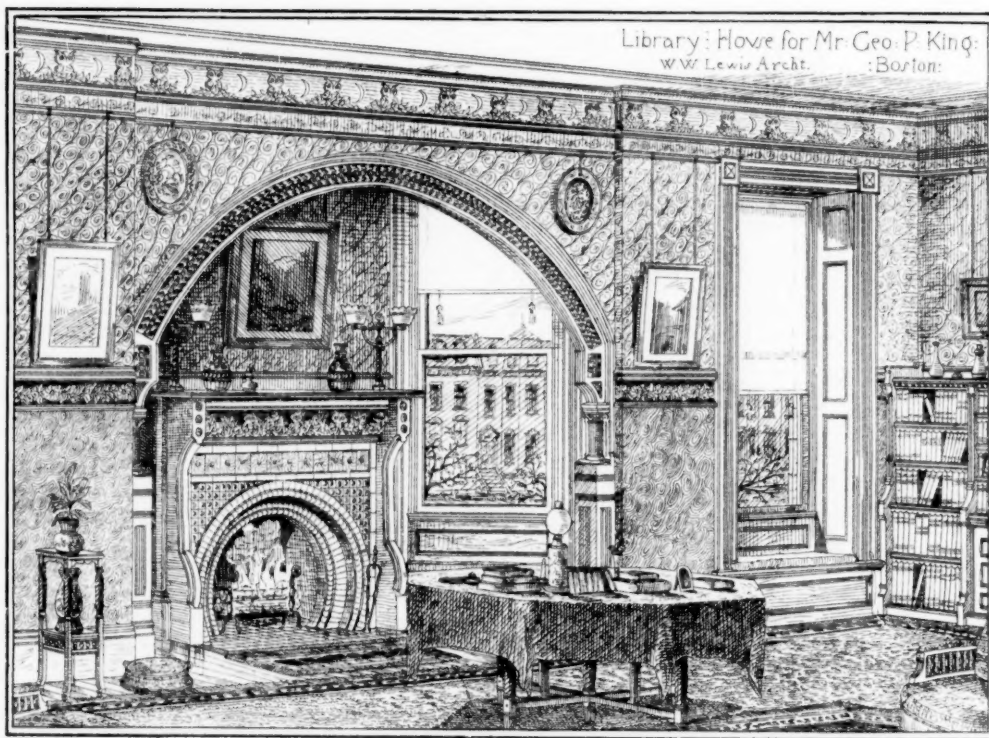
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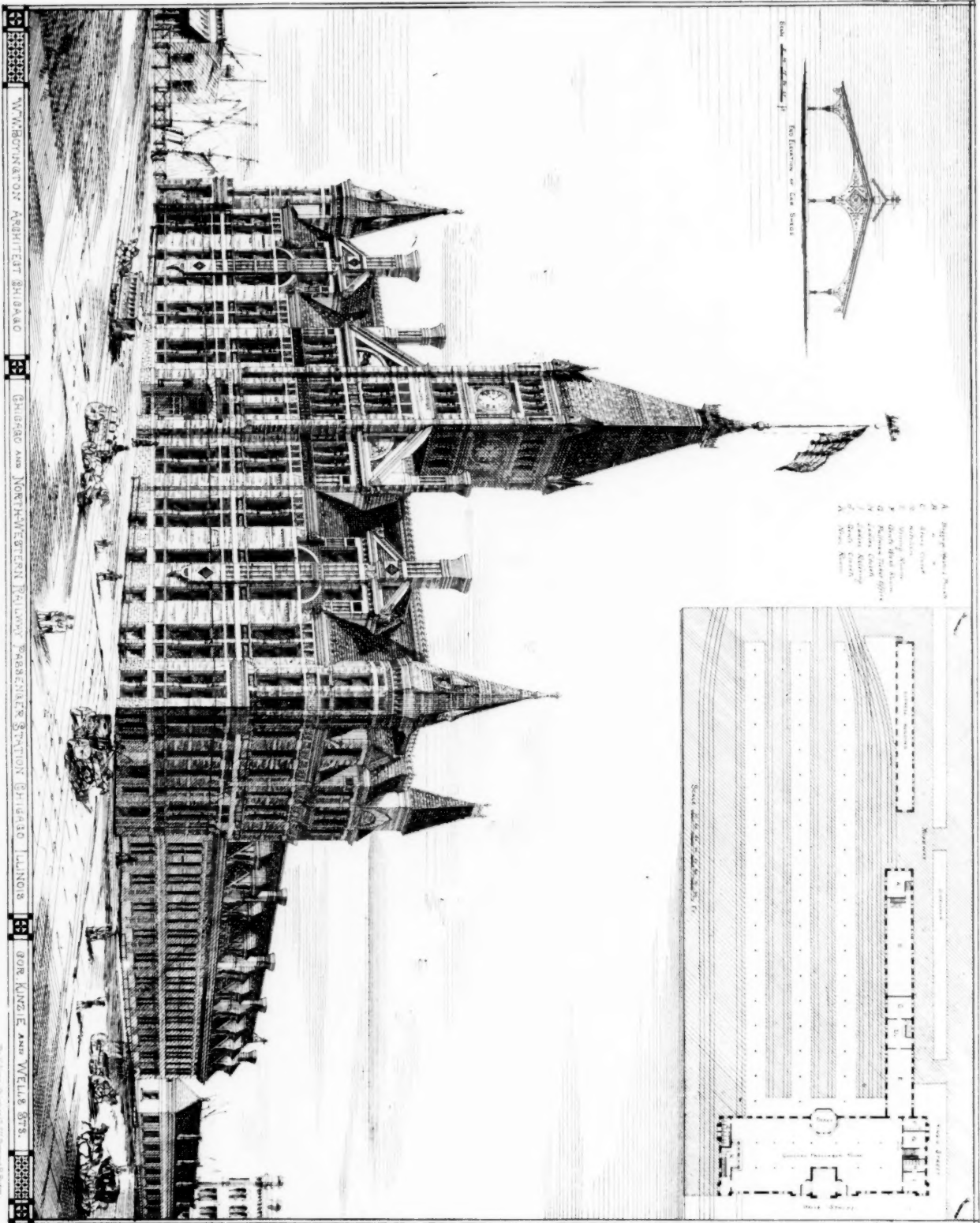
W. Whitney Lewis Archt.
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mine whether the circumstances make a case of invitation, in the technical sense of that word, as used in a large number of adjudged cases, or only a case of mere license. 'The principle,' says Mr. Campbell, in his *Treatise on Negligence*, 'appears to be that invitation is inferred where there is a common interest or mutual advantage, while a license is inferred where the object is the mere pleasure or benefit of the person using it.' As each case must largely depend upon its special circumstances, we shall not attempt to lay down a general rule upon the subject. It is quite sufficient to say that no difficulty of discrimination exists in the case before us." H. E.

Fixtures in a Mill. — Water-wheel.

A water-wheel is a part of the mill, without doubt. It is not only used in but is adapted to the mill. Without the wheel the mill is not complete, it cannot be operated. "It is not the mere fastening that is so much to be regarded as the nature of the thing, its adaptation to the uses and purposes for which and to which the building is erected or appropriated." *Pope vs. Jackson*, 65 Maine, 165; *Blethen vs. Toule*, 40 *Ibid.*, 310. It is entirely unlike those movable machines referred to in *Pope vs. Jackson*, "whose number and permanency are contingent on the varying circumstances of business, subject to its fluctuating conditions, and liable to be taken in or out, as exigencies may require." The wheel was in as a permanent fixture, necessary for any and all uses for which the mill was erected. *Lapham vs. Norton*. Supreme Court of Maine, 1886. H. E.

SUBMARINE QUARRYING AT SOMBRERO ISLAND.¹

It is some years since the works about to be described were carried on, and having no notes to refer to, the Society will have to accept an account necessarily imperfect. It may be interesting, however, as there is a constantly-growing tendency to attempt works that require either the deepening of channels from which water cannot be removed, the deposit of foundations in such places, or the construction of tunnels through strata under water.

My connection with Sombrero Island, West Indies, commenced in 1867, being then engaged by the Board of Trade to erect a lighthouse on the island, designed by Mr. William Parkes. This subject is referred to because it was the means of introducing me to the Sombrero Phosphate Company. The word Sombrero is the Spanish for hat, and was applied to the island because it was supposed to look like a hat floating on the water.

The Island of Sombrero stands in what is called the Anegada Channel, leading from the Atlantic into the Caribbean Sea, and is exposed to the full force of the Atlantic waves, both from north and east. Owing to its small area, 80 acres, and low elevation, 10 feet to 40 feet, the green water of the great rollers has gone completely over it; notably so in 1858, and many times have I seen nearly all the island submerged. The spray rises far above the lantern of the lighthouse, an elevation of 150 feet, and the wind carries it landward, deluging the island. The highest seas occur during the calm weather, and come from the north. One wave that I measured was 72 feet from trough to crest. The vertical sides of the island, extending to great depths below sea-level, cause the exhibition of wave force to be unusually grand.

As to tides, there is little or no semi-diurnal; but at midsummer and midwinter the diurnal tide has a range of about 15 inches.

The island is in the path of most of the hurricanes that periodically desolate the West Indies. I experienced that of Oct. 29th, 1867, and described it in a paper read before the Meteorological Society.

This leads me to explain that the surface of the island is devoid of vegetation, except a few prickly pears. The natural rock is very rough, and difficult to walk on, being worn by the spray into sharp points. Several large boulders are found strewn about; some on the highest part must weigh quite 40 tons, and one at a lower level at least from 150 to 200 tons. These boulders have evidently been broken off the face of the cliff and rolled inland by the waves. The sea-spray and foam eat away the rock a little above sea-level, and when it has been thus well undercut, portions are broken off and forced inland by the huge Atlantic rollers. Since the occupation of the island, a space of nearly thirty years, none of the large boulders have been moved, to my knowledge, nor have any of such weight as 40 tons been thrown up, notwithstanding the high seas that have been experienced during that period.

This leads me to the belief that, during recent times, the island has been at such a low level as to allow the waves to have greater power than now over the boulders. Other islands in the neighborhood have sunk during historic times. In fact, the whole crust of the earth in the West Indies seems in a very unstable condition; the frequency of earthquakes, and the great number of extinct and semi-extinct volcanoes, are the certain and tangible evidence of such a state of things. The rock of which the island is composed results from a coral reef, or island. It consists entirely of carbonate of lime, except the comparatively minute quantities of phosphate of lime and phosphate of alumina that constitute its riches. Its texture is tough, and "backs" and crevasses occur. There are also smooth-sided holes 2 feet to 3 feet across, and extending downward in a tortuous way to a depth of 10 feet or 15 feet.

Vast ages must have elapsed since the coral insects lived that formed this rock. If you look at the chart, and examine its present

shape, and bring to your mind the laws that govern the formation of coral reefs and islands, you will at once perceive that, as hinted above, but a mere fragment remains of what once existed. What time, and what oscillations in level must have occurred, to eat away vertically the sides of this hard rock, none now can tell.

The island was once the home of pirates that preyed on the commerce entering the Caribbean Sea; but, much more important, it was the home and breeding-place of vast multitudes of sea-fowl. I have been told by old men in Anguilla that when young they went to it in search of eggs. Their method of proceeding was to fire off pistols to frighten the birds away from a selected spot, then sweep it clear of eggs and wait for a couple of days, when they found a fresh supply sufficient to load their boat.

If this island with its congregation of birds had been situated in a smooth sea on the Peruvian coast, it would have been piled up with guano, for there the air is dry and little rain falls. But in its actual position it is so deluged with spray, and the air is so damp, that none could remain except when caught in the holes and crevasses of the rock. However small this quantity may have been, from it has resulted, in the course of time, the phosphate of lime that has made this little rock so well known throughout Europe and America.

Not professing to be a chemist, any remarks made by me on the question of how the bird deposit gave rise to the phosphate of lime as we find it, should be made with caution and humility. In this frame of mind I may state the conclusions I have come to after a good deal of thought.

The phosphate of lime, as we find it, occurs in some places in veins, in others in mass. It is of all colors, from ivory-white to black; sometimes it is semi-transparent, of a yellow color. It is always hard in texture, and generally crystalline. Sometimes corals, shells, and sponges have been converted into phosphate of lime.

In the holes above described is found a deposit of a soft brown earthy substance that consists to a great extent of phosphate of alumina; but the sides of these holes, and any pieces of carbonite of lime that have found their way into them are coated with layers of phosphate of lime. This latter fact, uniformly occurring, has led me to be bold enough to hazard the following opinion, viz., that phosphorus having a greater affinity for lime than for alumina, it leaves the latter and combines with the former. No doubt there is phosphate of lime in the bird deposit that would not require to go through this process. But it must have got into solution before it assumed its present form, and while in solution it would be liable to be washed away in its entirety, as only coming in contact with carbonate of lime it would not have a tendency to leave one of its constituents behind. It is much easier to believe the phosphate of alumina in solution parting with its alumina and the phosphorus combining with the lime of the matrix rocks, and so forming the phosphate of lime we find. It must be evident, then, if this hypothesis be correct, that we have remaining on the island but the minutest remnants of the vast quantities of deposit made during past ages.

As before stated, the island from remote periods has been the haunt of pirates, and visited by those in search of eggs. But in course of time some American naturalists in their wanderings discovered the deposits of phosphate of lime. These were worked by an American firm for some years, during which large profits were made, as they obtained the phosphate at a low cost of quarrying, till they reached a depth of 2 feet below water-level, which is uniform with that of the sea, the rock being porous. At this level they gave up working. Three circumstances combined at last to draw the attention of the English authorities to this island; they were the large profits of the American adventurers, the hoisting by them of the American flag, and the necessity of having a lighthouse erected to guide vessels entering the Caribbean Sea.

The English Government at last enforced its rights by hoisting the national flag, and giving a lease of the island to the Phosphate of Lime Company. This company was dissolved, and the Sombrero Phosphate Company took over the lease. Not having seen this document, I can only state the principal items to have been the payment of rent, the Government reserving sufficient land for the lighthouse, and that the tenants should keep order. The island not forming part of the territory of any colony, the superintendent of the company has magisterial control of all individuals on it, and of vessels in the roadstead.

Consulted by the Sombrero Phosphate Company during the time I was erecting the lighthouse, I could not disguise the fact from them that the legacy left the English company was poor in comparison with the virgin wealth the Americans found. I came to the conclusion that the only profitable way of working was to extend the use of machinery, and continue the former excavations under water.

Having completed the erection of the lighthouse, I returned home, and at my suggestion the company purchased and sent out a large quantity of plant. While at home I inquired into the question of explosives; for, from experience, I deemed gunpowder unsuitable in this case. At this period a strong controversy existed between the advocates of gun-cotton and dynamite. Gun-cotton at that time could not be exploded unless confined, which did not quite meet my requirements, as I intended to adopt the system of submerged surface blasting, i. e., simply placing the charge on the submerged surface of the rock without boring a hole. The object of this was to save labor and expedite the work. After consultation with Messrs. Prentice, the manufacturers of gun-cotton, a cast-iron shell was devised for holding the charges, and causing them when fired to exert

¹ From a paper by Mr. R. Harkness Twigg, M. I. C. E., read on the 8th ult. before the Civil and Mechanical Engineers' Society.

their full power. This answered very well, but I found that it would be almost impossible to get freight for loaded shells, and I would not undertake the risk of charging them on the island; however, a considerable quantity of gun-cotton was sent out, a few uncharged shells, and some dynamite.

The preference given by me at that time to gun-cotton in comparison with dynamite, had no reference to their relative efficiency as explosives, but arose from the process pursued in their manufacture. The gun-cotton, being pulped after the nitric acid is applied, is of necessity thoroughly cleansed from any acid that might remain free, and is therefore, from that cause, not liable to spontaneous combustion; whereas in the manufacture of dynamite there existed no such guaranty, the elimination of free acid depending on the fidelity of the workmen in the factory.

The object in working, as about to be described, was not so much to get phosphate at the minimum cost per ton, as to get the maximum quantity in a limited time, without thereby unduly increasing the cost per ton. The result eventually arrived at was that the output was doubled and the cost per ton considerably reduced.

It will be remembered that when the Americans left off working, there were 2 feet of water in the quarries. The process pursued for getting the phosphate that lay deeper was to drill holes and blast with powder and gun-cotton enclosed in tin tubes, till a depth of 5 feet or 6 feet was reached, the loosened rock being removed by naked divers. To carry the excavations deeper still, cans containing a charge of 5 lbs. of gunpowder were placed in the bottom, and exploded with fuse or the galvanic battery. It was found by experience that 5 lbs. of powder in this depth of water was the heaviest charge that could economically be used, and the rule adopted was to increase the weight of the charge in proportion to the square of the depth. This method of blasting was continued till a depth of 10 feet was reached, and the loosened material was removed with naked divers as before.

Blasting at a greater depth than 10 feet was performed still by explosives placed on the surface of the rock; but gun-cotton was, as a rule, substituted for gunpowder, the heaviest charges used being 7 lbs. of the former, and 20 lbs. of the latter, and the greatest depth of the excavation was from 25 feet to 30 feet. Several methods of raising the loosened material were adopted: (1) by means of ordinary helmet divers, the apparatus being supplied by Messrs. Siebe & Gorman. (2) By means of a wrought-iron diving-bell, about 9 feet long, 2 feet 6 inches wide at the bottom, 15 inches at the top, and 3 feet deep, weighted round its lower edge with slabs of cast-iron. This bell was found to be very cumbersome, and required strong tackle to lift it out of the water. Besides it was, till the defect was remedied, to some extent dangerous, by means of the violent oscillations that occurred when the compressed air escaped, as it always did at the ends. The remedy devised for this, and adopted in all bells afterwards, was to make a small hole a little above the under edge, so that the air, after driving out the water to that level, escaped quietly in a constant stream. However, with this long-shaped bell, anything causing one end to be much higher than the other led to the old oscillations, and eventually, at the urgent request of the men, it was abandoned. (3) By means of wooden diving-bells, made of 2-inch plank, and weighted with old chain wound round them, supported on bent iron bars. These were found very handy, as the chain could be unwound off its supports, when it was required to take the bell out of water, which was not often, as the naked workmen dived down underneath the edge and came up inside. (4) Another form of wooden bell was used in a small quarry where there was only one weak derrick for hoisting the excavated material. This bell was supported on legs like those of a table, and the hole for allowing the air to escape was made higher up than in those bells described above, to prevent any chance of the bell lifting. When it was required to move this bell, all that was necessary was to plug the hole till sufficient weight was taken off the legs by increasing the air-space, to enable the small derrick to move it while under water. An accident happened to this useful apparatus in its early days. The workmen, not being aware of the effect a submerged blast in its neighborhood would have, fired one while the bell was under water. The result was a wreck, which was speedily repaired, the apparatus being very useful. (5) Among the general stores sent out at my suggestion from England were a considerable number of hoisting buckets, 2 feet 6 inches in diameter, and 2 feet deep; some of these, small as they were, I converted into bells, by turning them upside down, and bringing the handle over the bottom to sling them by. Then, as in the case of the wooden bells, old chain was wound round, and the air-hole drilled. The theory I acted on in this case was that a naked diver, obtaining air from these bells when submerged, would be able to continue at work longer under water than if he dived from the surface with his lungs filled with air at the ordinary pressure. The result proved that I was correct, and, further, time was saved, as the men could have the bell where they wanted, whereas without the bell they would have had to go to the surface to breathe. In some cases these bells were suspended from a wire rope strung high over the water, in others from short derricks on a punt. Excavation could be carried down, with such men as I employed, to a depth of 30 feet in this way.

The naked divers, whether working from the tub bells or from the surface, carried with them a sheet-iron vessel like an old-fashioned coal-scuttle. Lying on the bottom with this against their chest, they filled it by scraping into it, with pieces of sheet-iron they held in their

hands, the broken stone. In shallow water they walked out with the scuttle full; in deep water they emptied it into a hoisting box or tub. The extent of the work may be judged, when it is stated that forty helmet divers were daily at work, forty men in diving-bells, and sixty naked divers working without any kind of apparatus. This has reference only to the submarine department; on dry quarry work there were many others engaged, the whole gang numbering 400 on an average. To economize labor to the utmost, the air for nearly all this apparatus was compressed by a double-barrelled air-pump, the barrels being about 5 inches diameter, and the stroke about 2 feet, driven at 60 strokes per minute by a steam-engine, and stored in an old steam-boiler, from which it was conveyed through gas-pipes to various parts of the works. Storing the compressed air thus allowed of the engine being stopped for a few minutes without calling the divers up. The engine was worked to its full power, being set to do a number of things, not only to save labor, but, by condensing the steam, to give a supply of fresh water, saving, I have been told, 5,000*l.* per annum, the previous expenditure on water.

The experience gained by practice at Sombrero in the use of gun-cotton led to extended knowledge of its properties. It was stated above that when I left England gun-cotton could only be exploded if confined in a shell or bore-hole. Shortly after, Professor Abel, of Woolwich, found that if it was ignited with a strong charge of fulminate of mercury it would detonate without being confined. I had a large supply of such exploders sent out, and with this help got on very well with the cotton charges for submarine work, having made special arrangements with Messrs. Prentice to supply charges for this purpose of from 3 inches to 7 inches diameter. These were made up of round, flat cakes, having a central hole to convey the fire throughout the mass; they weighed up to 7 lbs., and were each enclosed in a neat brown paper wrapper. It was usual at first to enclose these in tins before putting them under water; but one time running short of sheet-tin, it occurred to me that all that was necessary, now we had fulminate exploders, was to keep the water from the charge. This the tin did imperfectly, as the pressure of the water often broke the cans. I resolved to try the experiment of coating the charges, outside the brown paper wrapper, with a waterproofing composed of boiling pitch, lime and sand. With the view of creating confidence in the charge-makers, that no danger was to be apprehended from putting the cotton into the pitch-pot while there was a strong fire under it, I made the experiment myself, they looking on in terror. It succeeded as I felt confident it would. After much disputation, a regular method of doing the work was arranged, and, to my knowledge, no accident has ever occurred during the operation of waterproofing. Charges thus prepared were thoroughly efficient, and tin-smiths and tin-plates became unnecessary.

While writing about Sombrero, it may be interesting to describe a simple way in vogue there of burning lime. A hollow about 18 inches deep and 10 feet or 12 feet diameter is made in the rock; across this, on the bottom, are laid two trunks of trees, about 10 inches diameter and 2 feet apart. The space between these is filled in with brushwood, laid crossways; over these are branches to a depth of about 1 foot, then a layer of 6 inches of rock; on this is sprinkled a little small coal, over this about 2 feet in depth of stone, then a little more coal, and so on, till a height of 8 feet or 10 feet is attained; the whole is then covered up with stones, lighted, and tended, to prevent the heat escaping faster from one part than another. When the stack gets cool the limestone inside is found to be thoroughly burnt, and the outside stones are dried ready to form the centre of the next stack.

LE TIREUR D'ÉPINE.

THERE has lately been exhibited and sold in Paris one of the rarest and most beautiful of the smaller art treasures of the world, a delicately patinated bronze reduction of the Greek prototype of the Roman "Spinario," known also as the "Le Tireur d'Épine," from which it differs in detail considerably. This statuette is probably a specimen of Greek art of the fourth century, and the figure as seated is nine and seven-eighths inches in height. It was lately bought by the firm of Rollin & Feuardent, of Paris, where its exhibition created much sensation in the art world, and has been sold for 70,000*f.* (\$14,000) to the Baron Edmond de Rothschild, who carried it off while the authorities of the Louvre were debating about buying it, and those of the Berlin Museum were anxious to secure it. In an article in *La Chronique des Arts* of Dec. 18th, M. Adrien de Longperier, a distinguished archaeologist and *ex-conservateur* of the antiquities at the Louvre, pitches into the present authorities for their hesitating policy in regard to the purchase of the work, of which he gives a highly appreciative account. We are able, however, to supplement his article by some facts as to original discovery and owners of the statuette. Some fifteen years ago it was found at the Acropolis, on the site of Sparta, Laconia, and sold for a small sum to Mr. Merlin, English Consul at Athens. While on a Continental voyage, which included Greece, the present Duke of Saint Albans saw the work and bought it of Mr. Merlin, paying £200. One day some years after, in London, the duke brought it to Mr. Gaston L. Feuardent, now of this city and then head of the London house of Rollin & Feuardent, and asked him what he would offer for it if he (the duke) were willing to sell. Mr. Feuardent, recognizing its value, promptly answered, "One thousand pounds." This offer was much higher than a previous one which had been made to the duke, who promised that when he did sell his statuette he would give the first choice to

the house of Rollin & Feuardent, which we infer he has now done. Mr. Feuardent, who spent a day with Professor Comyns Carr in admiration and examination of the statuette, says that it is truly an art work of the highest merit. It shows, he says, the art of Greece proper, which is different from that of Magna Græcia. The latter in general is pleasing, graceful, but slightly effeminate if compared with pure Greek work.

The legendary story of the "Spinario" is as follows:—A young shepherd, seeing the Latins enter in the night-time the Roman territory, ran to the capital to tell the Senate. On the way he got a thorn in his foot, but did not stop. He endured the pain on his continued course, and after having delivered his message, sat down to extract the thorn. The Senate, in admiration of and to perpetuate his fame and patriotism, decreed that statues, representing him taking out the thorn, should be erected in his memory. The seated figure is that of a young man, the muscular indications on whose body show that he will become an athlete. As he bends forward to extract the thorn from his left foot, which rests on the right by the knee, the expression of his face, and the whole anticipatory shiver seen throughout his body, show that he knows that it will be a painful operation, but that he is bent on going through with it. This particular statuette differs from the usual Roman type in that the right leg is extended and rests on the heel, the ground and the rock are longer, the youth's hair is short, and the whites of the eyes are of silver.

The story of the Louvre's loss of the work is stated as follows:—M. Alexandre Dumas, who was one of the first to see it on its arrival in Paris, spoke of it to M. Turquet, the Under Secretary of State for Fine Arts, who after he had seen the statuette, was in favor of its going to the Louvre. The firm who owned it, who had to pay well for their purchase, naturally wanted to make a good profit, but offered to make any terms which were agreeable as to payment. The Louvre authorities hesitated, for part of the sum would have to come out of the budget for this year. They asked for a reduction of price, and decided when this was refused to buy, but finally, in the midst of all these *pourparlers*, let the chance slip. M. Turquet even thought that some of the money should be discounted, which is to come to the museum fund from the sale of the crown jewels. Only the other day the Frankfort Rothschild carried off for 800,000*f*. (\$160,000) the celebrated Jannitzer silver gilt cup, which was in the Germanic Museum at Nuremberg, and now one of the Paris members of the family gets the best of the Louvre and the Berlin and British Museums. — *New York Times*.

FLITCH-PLATE GIRDERS.

In our answer to Mr. Illsley's question in regard to flitch girders, we omitted, in quoting Hurst's formula, to give the value of the constant C. We repeat the formula as follows:—

- b* being the breadth in inches.
d being the depth in inches.
t being the thickness of iron flitch in inches.
L being the length of bearing in feet.
W being the breaking weight in cwt.

$$W = \frac{d^2}{L} (C b + 30 t)$$

- C=4.0 teak.
 =3.7 oak, English or Baltic.
 =3.2 " Canadian.
 =3.0 Memel and Dantzic pine.
 =2.8 American pine and spruce.
 =3.2 elm.

FLITCH-PLATE GIRDERS.

ILL. IND. UNIVERSITY, CHAMPAIGN, ILL., Feb. 7, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Sirs,—The following formulæ for flitch-plate girders may be of interest and service to some of the readers of your journal. They are deduced from formulæ 73, 76, 148 and 149, of Wood's Resistance of Materials, edition of 1875:—

The weight of the girder, being small in proportion to its load, has been neglected for the sake of simplicity; also the weakening arising from the bolts which are used to fasten the parts of the girder together. If these bolts are not placed below the mid-depth of the girder and straps are used for the lower part, instead of bolts, the girder will not be materially weakened by the fastenings.

When a girder is supported at both ends, its load may be arranged in either of three general ways.

- Case 1. Load concentrated at a point midway between supports.
 Case 2. Load uniformly distributed on girder between supports.
 Case 3. Load arranged in any other manner.

Notation employed in the formulæ:—

- Let *L*=length of girder between supports, in feet.
 " *d*=depth of girder and of flitch-plate, in inches.
 " *b*=total horizontal breadth of wooden portion, in inches.
 " *t*=thickness of iron flitch-plate, in inches.
 " *f*=factor of safety: should =5 for quiet, or 10 for moving loads.
 " *r*=maximum permissible deflection of girder per foot of length, in inches.

According to Hatfield (Transverse Strains), *r* should =.04 for warehouses and heavy stores; or .03 for other buildings.

Let *W*=maximum safe load in net tons of 2000 lbs., concentrated at centre of girder, midway between supports.

" *U*=maximum safe uniformly distributed load in net tons.

Let *M*=maximum safe bending moment in foot-tons, acting at any point in the length of girder, between the supports.

" *B*=co-efficient for cross breaking, in net tons, for wood used.

" *B'*=co-efficient for cross breaking, in net tons, for iron used.

" *E*=modulus of elasticity for the wood, in net tons.

" *E'*=modulus of elasticity for the iron, in net tons.

For each case of loading, formulæ are given for breaking and for bending.

Apply both and take the safest result.

Formulæ for Case 1. Load Concentrated.

BREAKING.

$$W = \frac{d^2}{fL} (B b + B' t)$$

BENDING.

$$W = \frac{r d^3}{432 L^3} (E b + E' t)$$

Formulæ for Case 2. Load Uniform.

$$U = \frac{2 d^2}{fL} (B b + B' t)$$

$$U = \frac{r d^3}{270 L^3} (E b + E' t)$$

Formulæ for Case 3. Loaded or Otherwise.

$$M = \frac{d^3}{4f} (B b + B' t)$$

$$M = \frac{r d^3}{1728 L} (E b + E' t) \text{ (Formula A)}$$

$$M = \frac{r d^3}{2160 L} (E b + E' t) \text{ (Formula B)}$$

Two formulæ are given for Case 3, for bending. Formula A is to be used when the mode of loading more nearly approaches that of Case 1; Formula B, when it is nearest Case 2. Evidently, for any mode of loading, the exact result for bending must lie between the results obtained by these limiting formulæ.

Value of *M*, the maximum bending moment in foot-tons, net, can best be determined graphically, for any arrangement of load, by the method explained on page 60 of Clarke's Principles of Graphic Statics, or on page 23 of Ott's Graphic Statics.

Values of Co-efficients, *B*, *B'*, *E* and *E'*, for the Formulæ.

WOODS.		<i>B</i> .	<i>E</i> .
Ash, white,		.302 ton.	807 tons.
Chestnut,		.261 "	516 "
Hemlock,		.193 "	829 "
Maple,		.272 "	1,112 "
Oak, red,		.285 "	1,075 "
Oak, white,		.286 "	750 "
Pine, Georgia or Southern,		.425 "	1,274 "
Pine, pitch,		.278 "	813 "
Pine, red,		.228 "	781 "
Pine, white,		.219 "	858 "
Pine, yellow,		.250 "	925 "
Spruce,		.245 "	783 "
Walnut, black,		.375 "	842 "
METALS.		<i>B'</i> .	<i>E'</i> .
Cast-iron, average,		1.037 "	7,835 "
" " best,		1.250 "	11,450 "
Wrought-iron, common,		1.100 "	11,000 "
" " average,		1.199 "	12,443 "
" " best,		1.300 "	14,250 "
Steel, cast,		2.240 "	14,331 "
" wrought,		2.500 "	14,500 "

These values of the co-efficients are averages of those collected from the best authorities.

When the formulæ are to be used for any particular wood and metal, they can be simplified by substituting the proper values and reducing to the simplest form. Very respectfully,

N. CLIFFORD RICKER, F. A. I. A.

MISUSING UNRETURNED DRAWINGS.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Some time ago I furnished drawings for a building. After the structure was finished, the owner gave the drawings and specifications to another person, who is now building after my design, and I hardly think that he expects to pay me. As a reader of your paper, you would oblige me if you could, through your legal adviser, furnish information as to where such cases have been decided by law. A paper on this subject in your valuable paper would probably be to advantage of a good many of the profession. X. Y. Z.

[X. Y. Z.'s case is by no means an unusual one. As we have before had occasion to say, it will hardly do him any good to go to law about it. Unless his design was copyrighted, which is not probable, he cannot claim the exclusive right to it, and even if it were, the slight alterations which the second possessor would be likely to make in carrying it into execution would constitute it a different, though perhaps similar design, so that he would get no redress. He might demand back the drawings as his property, but the result of this claim would be doubtful, especially as by his own statement he has allowed his former client to retain them for some years. We should advise him to treat with the new possessor of his plans, who is much more likely to be a fair-minded man than the reverse, and will probably recognize his claim to a certain interest in the design. — EDS. AMERICAN ARCHITECT.]

THE NEW ORLEANS COTTON EXCHANGE COMPETITION.

NEW ORLEANS, Feb. 5th, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Please inform your correspondent "Traveller" that the plans presented for the first competition of the Cotton Exchange were exhibited to, or seen by, only one "local architect," Mr. H. Howard, for his advice, he not being a competitor. He reported all unsuited. Let "Traveller" compare the sketch plans for the second competition, which I think have been sent him, with his own, to see if there has been any plagiarism. Yours truly,

JAS. FRERET, Architect,
 Author of the Sketch Plans.

NOTES AND CLIPPINGS.

THE WALL STREET, NEW YORK, WASHINGTON STATUE.—At a late meeting of the Chamber of Commerce, Mr. Royal Phelps, for the special committee on the Washington statue in Wall Street, presented a report and the following recommendations, which were unanimously adopted:

First.—The erection of a statue in bronze to George Washington alone, commemorative of his inauguration as the first President of the United States.

Second.—That it be placed on the abutment of the Sub-Treasury Building, on the corner of Wall and Nassau Streets.

Third.—The said statue shall be in all respects a complete embodiment of the exalted character of Washington, together with the great event the statue commemorates, and that no expense be spared to make it in all respects worthy of the cause.

Fourth.—That J. Q. A. Ward, the sculptor, be requested to make a model in clay of the statue, accompanied by suggestions in regard to size, bas-reliefs, ornamentation of pedestal, exact locality, etc., it being understood that if the committee should approve and adopt his plans, designs and terms, that Mr. Ward will be employed to do the work. If, on the contrary, his plans, designs and terms should not meet the approbation of the committee, he shall be paid \$1,000 for his model.

Fifth.—That subscriptions be received at the rooms of the Chamber of Commerce, and by the Treasurer, Morris K. Jesup, No. 52 William Street, for carrying out the foregoing recommendations.

Mr. Phelps said that the minimum cost of the statue is put at \$30,000 and the maximum cost at \$50,000.

THE CENSUS OF THE UNITED STATES FOR 1880.—The Speaker laid before the House Jan. 17, a letter from Supt. Walker, of the Census Bureau, transmitting the official aggregates of the population of the United States. The figures are as follows:

Alabama.....	1,262,794	Louisiana.....	940,100	North Carolina..	1,400,047
Arkansas.....	802,564	Maine.....	648,354	Ohio.....	3,198,239
California.....	863,686	Maryland.....	954,632	Oregon.....	174,767
Colorado.....	194,649	Massachusetts..	1,783,012	Pennsylvania..	4,282,786
Connecticut.....	652,683	Michigan.....	1,636,321	Rhode Island..	276,528
Delaware.....	146,654	Minnesota.....	780,806	South Carolina.	995,672
Florida.....	267,351	Mississippi.....	1,131,592	Tennessee.....	1,512,463
Georgia.....	1,559,048	Missouri.....	2,168,804	Texas.....	1,592,574
Illinois.....	3,078,969	Nebraska.....	452,453	Vermont.....	332,286
Indiana.....	1,574,262	Nevada.....	62,297	Virginia.....	1,512,806
Iowa.....	1,624,620	New Hampshire	346,984	West Virginia..	618,433
Kansas.....	995,961	New Jersey.....	1,150,983	Wisconsin.....	1,315,480
Kentucky.....	1,648,708	New York.....	5,083,810		
Total States, 49,369,595; District of Columbia, 177,628; Territories, 606,643.					
Grand total, 50,152,866.					

TESTING DRAIN PIPES.—A writer in the *Ironmonger*, from long practical experience in testing drain pipes, confidently recommends for that purpose what he terms a "smoke test," and which gives evidence as to leaks both to the sight and smell. The materials that he employs are soiled cotton-waste and sulphur, the smoke from which, after ignition, is blown into the drain or pipes. If leakages exist in the latter inside of the house, the smoke and smell both issue forth and show that something is wrong, and generally tell also just where the fault or faults are. Sulphur, as well known, is one of the best of disinfectants, and a dose of the fumes from this to the drains, after disease has been in a house, would effect much good.

VOLATILE DISINFECTANTS.—In the Parkes Museum of Hygiene, in London, there are two appliances for charging the air of a room with antiseptic vapor which are worthy of note. One of these, as described, consists of a miniature "round towel," circulating on two rollers, the lower of which rests in a trough filled with a solution of carbolic acid, or any other soluble disinfectant. The other apparatus consists of a metal box filled with Norwegian tar, the lid of the box being provided with metal laminae which are immersed in the tar; when the apparatus is to be used the cover is raised, and the tar-covered laminae are exposed to the air—the odor being at once perceptible throughout the apartment, and highly beneficial as a disinfectant, or inhaled by a tube connected with the apparatus.

HOW ST. PAUL'S IS PROTECTED AGAINST LIGHTNING.—The application of lightning conductors to St. Paul's Cathedral, London, has recently been successfully accomplished. In metallic connection with cross and ball and scrolls are eight copper conductors, each being a half-inch strand of copper wires, this octagonal strand giving the most metal in the least space; these eight conductors pass to the metal railing of the "golden gallery," with which they are in metallic connection; thence they are carried down to the dome, to the metallic surface of which they are again connected at several portions of their length; then down the water-conductors over the leaden roofs of the aisles, in the angles formed by the aisles themselves; again down the water-conductors to the sewers. Further, the choir and nave roofs are connected together by a saddle, or conductor, stretching over them both, and joined to the other conductors. The plan pursued has been, comprehensively, to bring into metallic connection every portion of the vast building that has metal, and to connect these with the moist earth.

POMPEIIAN BRONZE STATUETTES.—Four bronze statuettes, which have recently been found at Pompeii, are now to be seen in Naples. One is a magnificent work about two feet high, representing a cupid holding a dolphin on his right shoulder, the head of which he grasps with his left hand. This figure was found on a pedestal at the side of the entrance to the peristyle of a newly-excavated house, and was a fountain. From the mouth of the dolphin water fell into a beautiful marble vase placed on a marble column. In a niche on the right of the atrium of the same house were found three other bronze statuettes. The one in the middle was placed on a square base. It represents the Goddess of Abundance, having in her right hand a silver plate, in the left a cornucopia full of fruits and flowers. It is draped with a long tunic with short sleeves and a mantle, and is seated on a cushioned chair with magnificently ornamented arms, each of which has a Triton at the extremity. The feet of the goddess are sandalled, and rest on a footstool decorated with two sphinxes. The two lateral statuettes represent two Iari, each with a ryton in the right and a plate in the left hand.—*London Standard*.

A PRIMITIVE PERSIAN MOSQUE.—A correspondent of the *Daily News*, who has been travelling in out-of-the-way districts of Persia, has given an account of a building near Rathcan, which is supposed to have been the palace of an early Mussulman sovereign. It is a cylindrical structure, built of flat, brownish-red bricks, and having a conical roof of the same material. The entire height is about 80 feet, and its external diameter 45 feet. Within the diameter is 30 feet. The foundation is of large, unhewn pieces of stone from the neighboring mountains. The base of the building, to a height of eight or nine feet, is octangular; above that it is circular, and ornamented with pilasters about two feet in diameter, having capitals resembling the lotus in form, placed so close together that it might rather be said that the wall was fluted. They are separated by an interval of about eight inches, and are composed of the same flat bricks as the rest of the building, arranged in the form of the letter L, placed back to back, and one within the other. The bricks are, of course, edge outward. At the edge of the roof, and partly piercing the vertical wall, are four windows looking to the cardinal points. Twenty-five feet lower down, and exactly under these, are four others, their exterior apertures opening between the pilasters, and being only four inches wide by twelve inches in height. On the interior they widen like a musketry loophole to a breadth of two feet and a height of three feet. There are two doors on a level with the ground at opposite sides of the building, looking respectively east and west, but their architectural features have quite disappeared, owing to the removal of bricks by the peasants. A cornice of slight relief surmounts the entablature, which latter is about seven feet deep, and was originally covered with enamelled tiles of a beautiful deep-blue color, varied by vertical bands of some kind of fine concrete or stucco, bearing large quatrefoil ornaments. The use of the building is a puzzle. It resembles some of the structures at Kars, which are supposed to be tombs, but they are of less height. The correspondent supposes the building to be some primitive form of a mosque, if not a pre-Mohammedan temple.—*The Architect*.

THE CHANNEL TUNNEL.—The statement of Sir Edward Watkin on the British Channel Tunnel at the last meeting of the Southeastern Railway in London imparts a rather more business-like aspect to a scheme which most Englishmen regarded as a chimera. He said that they were entirely in accord with their allies—the Northern of France Railway Company—with the house of Rothschild, and also with M. Léon Say, and a distinguished body of scientific men and engineers. They were about to commence some experimental works, and they were about to invite their French friends over, and as soon as they had bored a mile through the chalk—the distance prepared for the experiment—they intended to invite the shareholders to see the work. The difficulties are the questions of boring, of the application of the requisite power, of drainage, of ventilation, of the removal and introduction of material, of the disposal of the unwholesome if not deadly vapor from the engine furnaces, of accidents, perhaps terrible explosions in mid-tunnel, and of the almost inevitable faults in the stratum. But already Sir Edward Watkin hopes, with improved harbors and boats, to reduce the journey from London to Paris to seven and a half or eight hours, and to substitute fixed for tidal services. This would enable a Londoner to leave the city at five in the morning and be back again at eleven at night, after seeing in two or three hours as much of Paris as most Parisians ever care to see. The tunnel will give him twice as much time for Paris. It will reduce the journey from Dublin or Edinburgh to Paris to the length of a summer's day. The *London Times* discusses the political consequences of its construction, and says: "The tunnel will seem to be a danger and a continual menace. Its possession would be equivalent to the command of the Channel."

DEPTH OF THE FROST.—Frost penetrates to very different depths in the ground, according to the nature of the soil and the amount of exposure. Workmen engaged in thawing out the ground with coal fires, for the purpose of taking up a water-pipe on Windsor Avenue, just above Avon Street, a few days ago, found the ground frozen hard to a depth of two feet or more, at the edge of the gutter; while on the inside of the walk, not twenty feet from that point, the frost had penetrated but nine inches. In the first case it was a stiff, clayey soil; in the latter, sandy. On the other side of the street some preliminary digging on the proposed site of a new building revealed a still less depth of frost—only half a foot. That was a sandy loam, somewhat protected. The general depth of the frost in most parts of Connecticut is probably two feet, and it would be greater but for the protecting cover of snow, which averages at least two feet deep, and is very compact.—*Hartford (Conn.) Times*.

A PORTUGUESE POMPEII.—M. Magitot, a member of the Prehistoric Congress which met at Lisbon last autumn, reports on a Portuguese Pompeii, which he had occasion to inspect while on a tour to the territory of tertiary silex at Otta. The place is called Santarem and Citania. The latter is the general Portuguese name for ruins of ancient towns, which cover entire hills in the neighborhood of Braga. The most important of these very old town ruins is the Citania di Briteiros, which occupies nearly a kilometre square, and is supposed to be of Celtic origin. Circular walls, streets, squares, large architectural monuments, and even a number of houses have retained their typical forms. For twenty centuries this Citania was buried below debris, soil, and a rich vegetation: only a few years ago a zealous archaeologist, Señor Sarmiento, succeeded, by costly and troublesome efforts, in clearing away the covering of centuries and to lay open to the world an ancient city in which quite a primitive state of civilization is apparent. Its architecture and plastic ornamentation point to a somewhat advanced state of art and industry. Many stone monuments are covered with sculptures and inscriptions, which in their general character recall those of India and China, which the well-known Lyons archaeologist, M. Guimet, declares to be of a symbolic and religious character, similar to those found upon the Oriental monuments. It is possible that this fact might be adduced as a proof that the tribes who built these Citanias had originally emigrated from Turan.

BUILDING INTELLIGENCE.

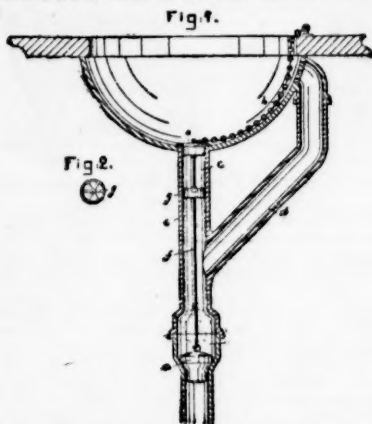
[Reported for The American Architect and Building News.]

[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.]

236,674. VALVE FOR WASTE-PIPES. — John C. Daggett and William W. Whitcomb, Boston, Mass. This invention is an improvement on a valve invented by J. C. Daggett, on which Letters Patent No. 229,972 were granted July 13, 1880. In the said patent the valve was shown placed in a valve-chamber just below the junction of the usual waste and overflow pipes of a wash-bowl, it being made as a plug to fall by its own weight upon a tapering seat, and thus retain the pipe closed to prevent the escape of gas, except when it should be positively raised to allow the water to escape from the bowl. As shown, the valve and basin-stopper are connected by a rod, upon which a screen is secured at a short distance below the stopper, so that in raising the stopper sufficiently to permit the water to flow out the strainer remains in the pipe near its point of junction with wash-bowl; but when desired the screen can be raised enough to be readily cleaned. The valve, *a*, in the valve-chamber, *b*, situated in the waste-pipe, *c*, below its junction with the overflow-



pipes, *d*, are all substantially as in the patent referred to. The valve, *a*, is connected with the usual stopper, *e*, so as to be raised simultaneously with it. Upon the rod, *f*, a short distance below the stopper, *e*, is secured the screen, *g*, to prevent the passage of pieces of solid matter. The stopper, *e*, is provided with the usual chain, *h*. When the bowl is to be emptied, the stopper, *e*, is raised in the usual manner, which also raises and opens the valve, *a*, the screen, *g*, at the same time being brought a little nearer the top of the pipe, *c*. The valve, *a*, will always fall to its seat by its own weight and completely close the waste-pipe, *c*, and so prevent the passage of gases through *c* or the overflow-pipe, *d*. It will answer very well to have only the portion of the connector between the stopper, *e*, and screen, *g*, rigid, the part below the screen, *g*, being flexible. The stopper, *e*, will then be guided by the movement of the screen, *g*, in the pipe, *c*, and always properly come to its seat at the top of the pipe, *c*, to allow the valve, *a*, to close.

237,362. MERCURY-SEAL FOR STENCH-TRAPS. — Joseph Bendor, Philadelphia, Penn.
237,363. COVERING FOR FRAM-PIPES, BOILERS, ETC. — William M. Bitter, Philadelphia, Penn.
237,365. LEAD AND CRAYON HOLDER. — Chas. W. Boman, New York, N. Y.
237,382. FIRE-PROOF BUILDING. — Joseph Gilbert, Philadelphia, Penn.
237,383. SEWER AND STENCH-TRAP. — Charles Halstead, New York, N. Y.
237,384. LEAD AND CRAYON HOLDER. — Joseph Hoffman, New York, N. Y.
237,409. MITERING MACHINE. — Jacob M. Rhodes, Fredericktown, Mo.
237,416. GLASS, TILE, MOSAIC, ETC. — Louis C. Tiffany, New York, N. Y.
237,417. COLORED GLASS WINDOW. — Louis C. Tiffany, New York, N. Y.
237,418. The Same.
237,431. CLAMP FOR WOOD-WORKING. — Wm. H. Davenport, Providence, R. I.
237,469. FILTER. — Julius Bergeman, Woodridge, N. J.
237,471. ARCH-BRIDGE. — Sylvester Bissell, Hartford, Conn.
237,472. WHEEL OR TOOL FOR CUTTING OR GRINDING STONE, WOOD, ETC. — Henry Blackburn, Nashville, Tenn.
237,476. SPRING-HINGE. — Fredrich W. Brook-sleeper, New Haven, Conn.
237,487. LATHE. — Philatus B. Conklin, Newark, N. J.
237,494. FOLDING BATH-TUB. — Geo. Damen, South Brooklyn, N. Y.
237,500. MANUFACTURE OF HYDRAULIC CEMENT AND LIME. — John Dimelow and Robert M. Peadro, Round Rock, Tex.
237,508. HOT-WATER APPARATUS. — Thaddeus Fairbanks, St. Johnsbury, Vt.

237,514. STAIR-ROD FASTENER. — Merion L. Githens, Centerville, Ohio.
237,516. WEATHER-STRIP. — James E. Gowen, Peabody, Kansas.
237,517. AUTOMATIC FIRE-EXTINGUISHING SPRINKLER. — Almon M. Granger, Boston, Mass.
237,527. WIND-MILL WATER ELEVATOR. — John M. Hastings, Oskaloosa, Kansas.
237,533. CONNECTION OF FLOORS AND CEILINGS. — Geo. Howard, Bernese-St., Oxford St., County of Middlesex, England.
237,537. LEAD AND CRAYON HOLDER. — Joseph Hoffman, New York, N. Y.
237,551. SHUTTER-WORKER. — Jacob C. Landes, Souderton, Penn.
237,578. PAPER FLOOR-COVERING. — Daniel H. Morrison, Philadelphia, Penn.
237,579. BRUSH-BRIDLE. — Henry D. Musselman, Lancaster, Penn.
237,583. DOOR-FASTENING. — Lucius C. Northrop, Greenville, S. C.
237,594. WRENCH. — Carl L. Praeger, Philadelphia, and Hubert P. Praeger, South Bethlehem, Penn.
237,604. OIL-CAP FOR SAWS. — Frank Rousseau, Detroit, Mich.
237,609. ATTACHMENT FOR WASH-BASINS. — George F. Schaeffer, Washington, D. C.
237,614. LATHE-CHUCK. — Jerome B. Secor, Bridgeport, Conn.
237,616. FIRE-ESCAPE LADDER. — Obadiah Sherwood, Jr., East Fairfield, Vt.
237,617. CIRCULAR SAW. — George F. Simonds, D. Simonds, and A. A. Marshall, Fitchburg, Mass.
237,654. TOOL-SUPPORT FOR LATHES. — Edward Wright, Worcester, Mass.
237,662. BITUMINOUS CEMENT. — Edward J. De Smedt, Washington, D. C.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — The following building permits of importance have been issued since the last report: Henry Kuesely, four-sty warehouse, iron front, 161 Pratt St., between Charles and Light Sts., 25' x 80'.
D. C. Howell, five-sty warehouse, brick, stone and iron front, cor. Lombard St. and Cypress Alley, 40' x 60'.
John King, Jr., 3 five-sty warehouses, iron, brick and stone front, on Sharp St., between Lombard and Pratt Sts.
Jno. L. Crise, 9 three-sty brick dwell., cor. Mulberry and Green Sts., 16' x 90' each.
C. F. Richter, 4 three-sty brick buildings, on Park Ave., near Preston St.
John Summerfield, addition to greenhouse on Pennsylvania Ave., near Biddle St.
16 permits have been issued for the week.

MARKET-HOUSES. — Resolutions have passed both branches of the City Council, appropriating \$10,000 for an addition to Broadway Market, and \$4,000 for repairs to Belair Market.

DWELLINGS. — Mr. Jno. L. Crise has purchased the lot of ground, 95' x 150', on the north-east corner of Green and Mulberry Sts., on which he proposes to build nine first-class dwellings, with a frontage of about 16' each and 9' deep. The old buildings now on the ground are being torn down, preparatory to making the improvements.

McDONOUGH INSTITUTE. — The contract for the erection of the new building for the McDonough Institute has been awarded to Messrs. S. H. and J. F. Adams, at \$45,558. Only the central building and one front wing are to be erected at present. The building when completed will be in the shape of a T, and is to be constructed of brick with stone finish, 175' long, three stories high.

BAY VIEW ASYLUM. — The plans for the addition to Bay View Asylum, to be used for the insane, have been handed over to the trustees, who are receiving proposals for material and workmanship. The trustees intend to furnish all material and award contracts for the different branches of labor separately. Mr. Frank E. Davis, of this city, is the architect. The building is to be 89' 4" x 208' 4", three stories and basement, and will accommodate 325 patients; cost, \$60,000.

Boston.

BUILDING PERMITS. — *Brick and Stone.* — Newbury St., No. 170, for — Cushing, 1 dwelling, 23' x 42, three stories; Cressy & Noyes, carpenters; Vinal & Dodge, masons.

Commonwealth Ave., No. 334, near Hereford St., for Vinal & Dodge, 1 dwell., 24' x 58', three stories and mansard; Vinal & Dodge, builders.

Wood. — Walnut Ave., rear of, near Elmore St., James D. Driscoll, stable, 25' x 30'; Jas. D. Driscoll, builder.

Cedar St., near Sanford St., for Wm. McFarland, for storage of carriages, etc., 15' x 16'; Frank M. Severance, builder.

Brooklyn.

BUILDING PERMITS. — *Sanford St.*, w. s. opposite Ellery St., one-sty brick foundry, 39' x 100'; cost, \$3,000; owner, Andrew Froehlich, 202 Stockton St.; architect, Th. Engelhardt; builders, H. Grasman and H. Loeffler.

Sanford St., w. s. opposite Ellery St., four-sty brick warehouses, 35' x 36'; cost, \$4,700; owner, Andrew Froehlich, 202 Stockton St.; architect, Th. Engelhardt; builders, H. Grasman and H. Loeffler.

Eckford St., e. s. 100' s. Nassau Ave., three-sty frame tenements, 25' x 44', felt and gravel roof; owner, P. Walker; architect, Samuel Self; builder, John Fallon.

Park Ave., n. s. 78' w. Throop Ave., three-sty frame dwell., 22' x 28'; cost, \$2,300; owner, Michael Pressler, cor. Throop Ave. and Park Ave.; builder, J. H. Eich.

Norman Ave., n. s. 70' w. Manhattan Ave., 3 two-sty frame dwell.; owner, Adrian Meserole, 590 Lorimer St.; architect, Stephen M. Randall; builders, G. J. Roberts and S. M. Randall.

Lorimer St., n. e. corner Norman Ave., 4 two-sty frame dwell., 16' 8" and 20' x 40', gravel roof; cost,

\$2,600; owner, Adrian Meserole, 590 Lorimer St.; architect, S. M. Randall; builders, G. J. Roberts and S. M. Randall.

Central Ave., e. s. 25' s. Troutman St., three-sty frame tenement, 25' x 50'; cost, \$3,200; owner, Joseph Baier, 69 Starr St.; builder, P. Scheu.
HOUSES. — On lots Nos. 174 and 176 South Ninth St., a first-class dwelling, brownstone front, 21' x 58', three stories high, to cost about \$13,000, is to be erected from designs of Mr. Wm. Jose, of New York; also, adjoining, a flat to accommodate three families is to be built from designs of the same architect, at a cost of about \$12,000.

FACTORY. — The Ansonia Clock Company are putting up a \$100,000 factory on the site of the building which was destroyed by fire.

Buffalo.

CHURCH. — Mr. F. W. Caulkins, architect, has completed plans for a church, to be built on Prospect Ave. It will be constructed of pressed brick, with brownstone finish, and will be about 90' square; cost, \$35,000.

OFFICE-BUILDING. — The same architect has also prepared plans for an office-building, 50' x 120', on Niagara St., near Franklin St.; cost, \$50,000.

IN GENERAL. — Building is almost at a standstill, but architects are generally busy, and expect that a great many buildings will be commenced early in spring.

Chicago.

BUILDING PERMITS. — Leonard, additional story, 45' x 60', 902 West Madison St.; cost, \$2,500.
F. Ziegler, two-sty brick dwell., 20' x 44', 28 Margaret St.; cost, \$2,000.

Henry Morgan, same, 22' x 50', Dearborn St., near Thirty-Seventh St.; cost, \$1,000.

Chas. Rappert, two-sty brick dwell., 25' x 60', 102 Sherman St.; cost, \$2,000.

Clark & Wise, two-sty brick factory, 37' x 74', Illinois St.; cost, \$2,000.

John T. Davis, two-sty brick dwell., 24' 6" x 100', 300 Indiana St.; cost, \$5,000.

Same, three-sty brick dwell., 28' 9" x 70', 256 Michigan Ave.; cost, \$6,000.

L. C. Higgs, two-sty brick dwell., 21' x 44', 173 Lincoln St.; cost, \$4,000.

Cincinnati.

BUILDING PERMITS. — The following building permits have been issued by the Board of Public Works for the month of January: —

J. A. Fay & Co., four-sty brick, \$6,000.

Emerson, Fisher & Co., five-sty brick, 16,000.

H. Cottmann, two-sty brick, 2,000.

F. Luckenheimer, four-sty brick, 15,000.

H. Mueller, two-sty brick, 2,500.

Seven permits for repairs, 2,850.

Total permits, 13; total cost, \$38,950.

New York.

BUILDING PERMITS. — *Seventy-Third St.*, n. s. 96' e. Fourth Ave., 2 four-sty Connecticut brownstone tenements, 21' x 86'; cost, each \$11,000; owner, Chas. H. Bliss, 823 Lexington Ave.; architects, Thom & Wilson.

Seventy-Third St., n. s. 138' e. Fourth Ave., four-sty Connecticut brownstone tenements, 42' x 86'; cost, each \$26,000; owner, Chas. H. Bliss, 823 Lexington Ave.; architects, Thom & Wilson.

One Hundred and Twenty-Sixth St., n. s. 100' e. Seventh Ave., 6 three-sty brownstone dwell., 16' 8" x 55'; cost, each \$12,000; owner, Charles Batchelor, Madison Ave., s. w. cor. One Hundred and Twenty-Eighth St.; architect, G. Robinson, Jr.; builder, John Stewart.

Seventy-Ninth St., n. s. 175' w. Ave. A, four-sty brick dwell., 25' x 52'; cost, \$10,000; owner, Joseph Peter, 483 East Eighty-First St.; architect, Fr. S. Barus.

Fifty-First St., s. s. 125' e. Ninth Ave., five-sty brick apartment-house, 38' 6" x 65' and 20' and extensions, 20' x 25' 6"; cost, \$28,000; owner, J. S. Pruden, 322 West Fifty-Fifth St.; architect, R. S. Townsend.

Fifty-Eighth St., s. s. 183' 9" w. Eighth Ave., four-sty Connecticut brownstone tenements, 20' 9" x 54' 6"; cost, each \$19,000; owner, Ferdinand Behnhauer, 450 West Fifty-First St.; architects, Thom & Wilson.

Concord Ave., cor. Division Ave., 10 two-sty brick dwell., 20' x 35'; cost, each \$3,500; owner, J. G. Heintze, 547 East Sixteenth St.; architect, A. Spence; builder, C. Bornkamp.

Lexington Ave., cor. One Hundred and Ninth St., 8 four-sty brick apartment-houses, corner, 20' 11" x 52'; cost, each \$10,000; owner, E. M. Meehan, 131 East One Hundred and Ninth St.; builder, H. Meehan.

One Hundred and Ninth St., n. s. 80' e. Fourth Ave., 4 four-sty brick apartment-houses, 18' 9" x 52'; cost, each \$10,000; owner, E. M. Meehan, 131 East One Hundred and Ninth St.; builder, H. Meehan.

Twenty-Seventh St., No. 47 e. one-sty brick and iron car factory, 41' x 74'; cost, \$9,000; owner, John Stephenson Co., Limited, 47 East Twenty-Seventh St.; architect, M. C. Merritt.

Ninth Ave., e. s. 25' n. Fifty-First St., 3 five-sty brownstone stores and tenements, 25' x 85'; cost, each \$9,000; owner and builder, Andrew Ewald, 432 West Fifty-First St.; architect, John Forster.

Third Ave., No. 141, four-sty brick store and tenement, 25' x 53', and extension 10' 6" x 12' 6"; cost, \$10,000; owner, Thomas Martin, Flushing Ave., Brooklyn; architect, Jno. McIntyre.

ALTERATIONS. — *Sixth Ave.*, cor. Fortieth St., raised one story, mansard; cost, \$8,000; owner, Hyman Israel, 155 East Sixty-First St.; architects, D. & J. Jardine.

Broadway, Nos. 1206, 1208 and 1210, entire front rebuilt, altered internally for hotel, with stores beneath; cost, \$15,000; owners, J. H. Breslin & Bro.; architect, Jas. E. Ware.

Forty-Seventh St., Nos. 1, 3, 5 and 7, four-sty brick extension, 20' 8" x 100', interior alterations, etc.; cost, \$40,000; owner and architect, Theodore Weston, 120 Broadway; builders, Moran & Armstrong.

Twentieth St., Nos. 104 and 106 w. one-sty brick extension, 20' x 68', interior alterations; cost, \$6,500;

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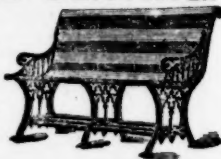
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Specimens of brick or stone treated with the process forwarded free of charge, upon application to **The St. Louis Waterproofing Co., No. 421 North Twelfth St., St. Louis, Mo.**

BUILDING INTELLIGENCE.

owner, H. C. F. Koch, Sixth Ave., cor. Twentieth St.; architect, Wm. José.

Barclay St., Nos. 51 and 53, repair damage by fire; cost, \$5,300; owner, S. B. Chittenden; agent, S. B. Chittenden, Jr., 237 Broadway; builder, E. Smith.

Second Ave., cor. Thirty-Third St., new show windows; cost, \$2,000; owner, R. I. Brown; architects, O. P. & R. F. Hatfield; builders, Joseph Smith and Haight & Monnia.

Broadway, No. 245, raise 29' 8", rebuild front wall, etc.; cost, \$15,000; owner, Lawson Valentine, 64 Fifth Ave.; architect, E. E. Raht; builders, D. Campbell & Co. and Hamilton & Henry.

Eighth Ave., Nos. 183 and 185, repair damage by fire; cost, \$3,000; owner, J. L. Jewett, trustee, 287 Greenwich St.; builders, Jas. Parker and D. Wilkie.

Houston St., No. 318 e, raised one story, two-sty brick extensions, 13' x 25', interior and front alterations; cost, \$3,000; owner, Moses Zimmermann, on premises; architect, J. Boekell.

Fourteenth St., Nos. 116 and 118 w, raised one story (hotel); cost, \$6,000; owners, Pedro Riesgo & Suarez, on premises; architect, W. H. Smith; builder, W. H. Owens.

HOTEL.—Mr. Jas. E. Ware is preparing plans for an extension, 67' x 129', of the Gilsey House, corner of Twenty-Ninth St. and Broadway. It is to be of brick, with stone finish.

HOUSES.—On Fifty-Seventh St., between Fifth and Sixth Aves., 4 first-class houses, two of brick and stone and two of brownstone, four stories high, to cost about \$125,000, are to be built for Mr. Jno. C. Donnelly, from designs of Mr. Jas. E. Ware.

The same architect has also drawn the plans for a house on Sixty-Fourth St., between Madison and Fifth Aves., for Mr. Davidson, to cost about \$30,000.

APARTMENT-HOUSE.—Mr. Jas. Stroud has prepared plans for a first-class apartment-house, 77' x 82', six stories high, to be built in the vicinity of Union Square. The building is to be of Philadelphia brick, with terra-cotta and Scotch Corse Hill free-stone. The cost will be about \$60,000.

St. Louis.

BUILDING PERMITS.—Nineteen permits have been

BUILDING INTELLIGENCE.

issued since our last report, of which 4 are for frame structures of slight importance. Of the rest, those worth \$2,500 or over are as follows:—

OWNERS' NAME.	USE.	Sty.	Fin.	Cost.
Sisters of Charity,	Asylum,	3	20	15,000
Mrs. B. Keyton,	Dwell.,	2	8	2,600
Franz Landl,	Store & dwell.,	2	7	4,000
Jos. Paech,	Dwell.,	2	7	4,000
B. W. Clark,	Dwell.,	2	8	6,000

Philadelphia.

BUILDING PERMITS.—*Eighth St., south of Vine St., theatre-building, 60' x 107'; J. J. McDonough and W. Spangler, superintendents.*

Willow Grove Pike, below Ivy Cemetery, two-sty dwell., 14' x 16'; Jos. Smith, owner.

Mil St., cor. Wise St., 2 three-sty dwells., 15' x 36'; Jno. Tiffe, owner.

Broad St., Nos. 259 and 261, south of Locust St., saloon-building, 38' x 72'; F. Thorn, owner.

Laurel St., cor. Canal St., one-sty gas-tank factory, 59' x 83'; A. J. Nichaus, contractor.

ALTERATIONS.—*Eighth St., Nos. 41 and 43, alterations to stores; R. Whiteside & Son, contractors.*

Nineteenth and Sanson Sts., 1 dwell.; cost about \$4,000; Edmund Lewis, owner; Willis G. Hale, architect.

HOUSES.—Plans have been completed by Willis G. Hale, architect, for 31 houses and 2 stores, three stories, 16' front, to be of brick, with Peerless brick caps and Wrought Valley stone finish, to be built on e s Twelfth St., between Diamond and Susquehanna Sts.; total cost, about \$132,000; P. Sheeh, owner.

Twenty-six houses and one store are to be built on Seventh, Marshall and Diamond Sts., 16' front, three stories to be of brick, with Perth Amboy buff brick and blue marble finish; total cost, \$65,000; Wm. M. Singler, owner; Willis G. Hale, architect.

To be built on Sixteenth St., w s, above Columbia Ave., 3 three-sty houses, 17' front, to be of brick, with brown-stone finish. Also, e s Sixteenth St.,

BUILDING INTELLIGENCE.

above Columbia Ave.; 4 three-sty houses, 18' front, of brick, with brown-stone trimmings; total cost, \$35,000; J. S. Bilem, owner; Willis G. Hale, architect.

MARKET without material change: fire-brick, \$35.00 @ \$45.00.

General Notes.

BERWICK, PA.—Dr. Reagan, of Shenandoah, Pa., is building a frame block on Front St., to contain two stores, and tenements above.

D. Reedy is building a brick block on Front St., for stores and tenements.

R. Berger has a brick block on Front St. nearly completed, for stores and tenements.

Mrs. M. Frantz is building a brick block on Front St. for stores and tenements.

The Jackson & Woodin Manufacturing Co. have 20 frame cottages nearly completed, and will build 30 more as soon as the weather opens in the spring. Mr. John Brugler, of Danville, Pa., is the architect.

The Jackson & Woodin Manufacturing Co. are also making large additions to their car works.

BRYS MAWR, PA.—Plans (competition) for dwelling, 43' x 65', three stories, to be of graystone, Perth Amboy buff brick and red brick, with buff tile roof, was awarded Willis G. Hale, architect; cost, \$16,000; Col. A. Loudon, Snowden, owner.

HOBOKEN, N. J.—Plans for gymnasium building for the Stevens Institute, completed; size, 20' x 50'; Wilson Bros., of Philadelphia, architects.

IRVINGTON-ON-HUDSON, N. Y.—Mr. Jay Gould has appointed Messrs. Pugin & Walter, of New York, the architects for his conservatory, which is to be rebuilt on his estate, Lyndhurst. The building will cover about 100' x 380'.

JEWITT CITY, CONN.—Mr. S. C. Earle, of Boston, Mass., is the architect of a frame house for Mr. Alfred A. Young, about 40' square, two-sty, pitch roof; cost, \$8,000; Arnold & Hiseox, of Norwich, builders.

LAVAYETTE, IND.—The wrangle over the proposed new Court House for Tippecanoe County has come to an end for the present, probably, as the Commissioners have adopted the plan presented by Elias