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CONTENTS.

TWO grand juries, one in New York and the other in Philadelphia have recently been called upon to act in regard to cases where, presumably through neglect or carelessness of some kind, innocent persons had been killed or injured in falling or burning buildings. The case brought before the New York Grand Jury was that of O'Brien and Levy, the proprietors of the building on Grand Street and South Fifth Avenue which fell some months ago, causing the death of ten persons. At the coroner's inquest it was shown that the proprietors had received repeated notice of the unsafe character of the houses, but had allowed the warnings to pass unheeded until just before the fatal catastrophe; and upon this evidence a verdict of severe condemnation was returned. The Grand Jury, however, upon consideration of the same evidence decided in favor of dismissing the complaint preferred by the coroner, and the indictment has been dropped. In Philadelphia, the object of pursuit was Mr. Joseph Harvey, the owner of the Randolph Mills, which were burned last spring under such distressing circumstances, and after due deliberation nine separate bills of indictment were found against him for involuntary manslaughter in having caused by his negligence the death of that number of persons. The trial which must follow the presentment of the jury will be an interesting one. So far as we know it is the first of the kind which has occurred in this country. Of civil suits for damages on account of loss of life through carelessness or negligence there have been many, but the criminal aspect of the case is new, and if Mr. Harvey should be found guilty, and condemned to suffer the penalties provided by the statutes for his offence, we may expect to witness a considerable flutter among landlords and mill-owners, not in Philadelphia only, but in all the States, where the decision of a Pennsylvania court will be held to establish an important precedent. Meanwhile, the ex-Mayor and Police Inspector of Vienna, the former Director of the Imperial Austrian Opera-House, and a foreman of the Fire Brigade, besides several other persons, are under trial at Vienna for their connection with the burning of the Ring Theatre, so that we shall have an opportunity of comparing German with American justice.

THE Citizens' Sanitary Society of Brooklyn, a young but energetic organization, has commenced its career of public usefulness by the issue of a series of small tracts upon matters of hygiene and preventable disease. Seven of these have already appeared, including treatises on the Sanitary Defects of Schools, on Scarlet Fever and its prevention, Sewer-Gas and Bad Plumbing, the Summer Diseases of Children, and the Dangers from Damp Cellars, besides a Letter to Working Men, and an Appeal for the Protection of the Parks. With such subjects as these there should be no trifling, and even a small infusion into tracts destined to have a wide circulation and somewhat permanent character, of the ignorant nonsense which is put forth day after day in the newspapers as sound medical advice would be little short of criminal. The character of the officers of the society affords, however, a reasonable guaranty that care will be exercised in this respect, and if all the other tracts are as good in their way as the one before us, they will be, if industriously disseminated, the instrument of much benefit to all classes of citizens.

AMONG the other enterprises in which the society is said to be now engaged is a crusade against the ailantus trees which shade many of the streets of Brooklyn as well as of New York. The tree was introduced from China into this country some forty years ago, heralded by extravagant praises, which led to its extensive use for street planting. For a time its hardiness and extremely rapid growth kept it in favor, but the blossoms which cover it for a few weeks in spring have a peculiarly unpleasant odor, and of late years it has been gradually disappearing. Now, however, it is reported that the perfume of the flowers is unwholesome as well as disagreeable, and that "prostration of the nervous system," an "oppressive feeling in the throat," "swollen joints" and other afflictions are caused by inhaling it. Under these circumstances it is not surprising that twenty-two "eminent medical men," and over fifty house-holders, should have signed petitions against the trees; the only wonder is that they should not, as soon as their pernicious character was diclosed, have armed themselves with axes and incontinently extirpated the species from the town. However, the citizens of Brooklyn usually act with a commendable deliberation in such matters, and it is gratifying to learn that the Sanitary Society is "collecting data from physicians and others" before giving the signal for the general destruction of the trees.

ACCORDING to the New York *Times*, all the important corporations engaged in electric-lighting have combined to form a huge monopoly under the name of the Gramme Electric Company, which now comprehends in its organization the Brush Electric Company, the Edison, Fuller, United States, Western, Jablochkoff and American Companies. Each of these corporations possesses valuable patents, and one principal object of the coalition is said to have been an offensive and defensive alliance of the owners of such patents against the swarm of speculators who defraud the public, and bring electric lighting into discredit by the sale of shares in pretended electric-light companies, which represent no real property or franchises whatever. Another, and very obvious advantage of the combination, is the amicable settlement of the disputes between the rival companies, which have led to so much expense and loss of veracity among their officers since the opening of the Paris Electrical Exhibition last summer. The Gramme Company maintains a Committee on Harmony, a Committee on Prices, and a Committee on Shortening Litigation, all of which will probably have their time fully occupied for the present, the more so as it is agreed between the parties to the combination that all differences among them shall be settled by expert referees without going into court.

MANY of our readers probably received invitations to witness a test of fire-resisting shutters and doors which took place at East Berlin, Connecticut, a few days ago, under the direction of the Corrugated Metal Company of that town. The circular of invitation described the mode of testing very fully. A brick enclosure was built, ten feet square, with an opening on each side, three feet wide and six feet high. Two of these openings were fitted with corrugated iron shutters, made double, with a space of about two inches between the outer and inner sheets. In one pair this air-space was left entirely empty; in the other it was filled with mineral wool. A third opening was fitted with a patent shutter of wood with a sheet-iron casing, the wooden part of which was made hollow and filled with mineral wool; while the fourth was closed with a wooden shutter covered with tin, made, as the circular stated, "according to the specifications of the Boston Manufacturers' Mutual Insurance Company." The building, as we learn from the Hartford *Courant*, from which we borrow an account of the test, was filled with dry hickory and elm, with some dry boards set up in front of the shutters. The wood was kindled and allowed to burn for nearly two hours. At the end of that time the corrugated-iron shutter packed with mineral wool was still cool enough to allow the hand to be held against it without discomfort; while that without packing showed some blistering of the

paint on the outside. The patent cased and packed wooden shutter was slightly burnt at the top. The tin-covered wooden door began to smoke in less than twenty minutes after the fire was lighted, and at the end of the trial the wood in it was all burnt, and the tin was only held together by the bolts of the hinges.

The question of Government action in repairing the levees on the banks of the Mississippi, broken down by the recent floods, has been settled in what seems to us a very satisfactory manner by the passage of a bill authorizing the expenditure of five million dollars on the Mississippi, and one million on the Missouri, not for making special repairs on the banks, but for deepening the channels and improving the navigation of those streams, in accordance with the plans of the River Commission, and under the direction of the Secretary of War. The bill forbids the use of any portion of the appropriation for building or repairing levees for the purpose of protecting private lands from overflow, so that we shall not be likely to see the public money squandered in rewarding the more ignorant and careless riparian owners for the ruin which their negligence has brought upon themselves and their neighbors, while the endeavors of the Commission to promote the general good will in the end be of quite as much value to individual proprietors as the exercise of an indiscriminate and degrading charity. The good effect of the decision of Congress not to allow its liberality to supplant individual effort is already apparent in the call made upon the planters inhabiting the lower portion of the river banks to discontinue the practice, which is now very prevalent, of cutting flumes in the levees for the purpose of irrigating their crops of rice. It is hardly necessary to say that the open channels thus made in the soft substance of the levee form a source of frightful dangers during times of high water, but so long as the Government stood ready to pay the losses occasioned by their means, it would be hopeless to expect the planters to expend money in purchasing steam-pumps or wind-mills to replace them, and it should be a matter of rejoicing rather than otherwise that necessity is likely to compel them to cooperate with the efforts of the River Commission, instead of becoming a permanent burden on the public treasury.

The long-discussed plan of overflowing the Desert of Sahara has been again revived; this time, it is said, by M. de Lesseps, who thinks that the military value to France of a barrier of water between the frontier of Algiers and Tunis and the wild tribes of the desert beyond would be great enough to make it worth the while of the French government to take a serious interest in the project. At the latest advices, however, the proposition for taking preliminary steps toward carrying out the scheme had been rejected in the French Assembly, so that the projectors will have to wait a while, at least, before soliciting again the attention of the only national body which is ever likely to give them the least encouragement. Meanwhile, it seems as if it might be well to spend some time in obtaining reliable data to show the practicability of the plan. Since Captain Roudaire's time nearly every fact of comparative level which he imagined that he had discovered has been flatly contradicted, many authorities maintaining that so far from being readily converted into an inland sea, the Sahara is above the level of the Mediterranean, and the proposed canal would fail to overflow anything except, perhaps, a few of the "schotts," or salt marshes between Algiers and Tunis. If these questions of fact were favorably settled, the cost of the necessary canal would not seem very great in proportion to the unquestionable benefit which an inland sea would confer upon Africa. The climate, not only of Algiers, but of Southern Italy, would be tempered by it, while the desert itself would be almost transformed before many years by the vicinity of so large a sheet of water in the equatorial portion; and thirteen millions of dollars would seem a small sum to be paid in exchange for such benefits by the only civilized power which would be in a position to secure the advantage of them.

M. Hénard, one of the ablest architects in France, has addressed to *La Semaine des Constructeurs* a letter, in answer to a criticism of its editor upon his pamphlet regarding the architectural instruction at the École des Beaux-Arts, from which, although we cannot pretend to appreciate all the merits of the case, we can extract some interesting statistics. One of the grievances which seems to afflict most the reformers who are now engaged in proposing all sorts of radical changes in the school is the preference, as they call it, which is given to the pupils of the official ateliers in the award of prizes. Considering that the directors of the school ateliers are chosen for their distinguished professional excellence, it is at least reasonable to suppose that their pupils might carry off a large share of the school recompenses without any unfairness on the part of the judges, but in point of fact the case is quite different, and so far from being unduly favored in the *concours*, the students in the school ateliers have for the last ten years actually received less than a proportionate share of the more important prizes. According to M. Hénard's figures, gathered from the files of the school bulletins, from 1870 to 1880 the grand *medaille d'emulation*, which is awarded annually to the pupil of the first class who has received the greatest number of honors during the year, was given five times to members of the official ateliers, and six times to those of the "*ateliers libres*," which are authorized by the government to receive pupils from the school, but are not directly connected with it, and do not, like the regular school ateliers, furnish instruction gratuitously. The Muller prize, given in the second class in the same way as the grand medal in the first class, was awarded between 1870 and 1880 four times in the free ateliers, and seven times in those of the school. The Rougevin prize for design was gained but twice by the official ateliers, and nine times by those outside, and the Blouet prize, given in the first class to the pupil who has received the greatest number of honors since his entrance into the school, was awarded four times to the official ateliers, and seven times to the others. For the *prix de Rome*, the greatest of all the recompenses, M. Hénard quotes the figures for the last ten years only, and gives with them the account of the honorable mentions, the first-second grand prize, and the second-second grand prize, as they are called, which are awarded at the same time to the competitors who approach most nearly to the highest excellence. Of these, the prize of Rome was given seven times in the free ateliers, and three times only in those of the school, while out of the twenty inferior honors but three were carried off by pupils of the school ateliers, to seventeen by the others. Out of one hundred "*logistes*," as those pupils are styled who are admitted after preliminary examination, ten each year, to take part in the competition for the grand prize, thirty-three in the last ten years were from the official ateliers, and sixty-seven from those outside, so that M. Hénard is apparently quite justified in saying that so far from the unofficial candidates being excluded from the recompenses by the jury, the contrary is true.

L'Architecte gives a brief description of an exhibition recently made by the *Société Française d'inoxydation et de platinage*, of the practical methods to be employed in its establishment at Grenelle, near Paris, for the protection of iron against rust by the Bower-Barff processes. It is well known that many difficulties have been met with in perfecting these processes and reducing their cost to a point which should make them of commercial value, but the last of these now seems to have been overcome, and the representatives of the patentees, both in France and England, are prepared to engage in business on a large scale. The protective coating of magnetic oxide which forms the subject of the patents is now applied to wrought-iron and steel as well as cast-iron, but by very different processes. At Grenelle the operation of treating cast-iron consists in subjecting it successively to the action of a mixture of carbonic acid and air, and of carburetted hydrogen and carbonic acid, while that applied to wrought-iron and steel consists simply in the immersion of the articles for some time in steam superheated to a temperature of seven hundred degrees Centigrade, or about twelve hundred and sixty degrees Fahrenheit. It is found that the surface of iron so protected is altered for some distance beneath the surface, so that on removing a portion of the film of magnetic oxide with a file, and exposing the article to the influence of air and moisture, the spot of rust which immediately forms on the uncovered metal does not extend laterally beyond the marks made by the file. This gives to iron coated by the process an important advantage over that protected with zinc by the process called galvanizing, in which rust, after once seizing upon an exposed point, works it way under the zinc to an indefinite distance in all directions.

BUILDING SUPERINTENDENCE.—XVII.

WHERE pebbles of suitable size are plenty a narrow path may be completely filled in with stone to within six inches of the surface, which gives good results at considerable expense. Driveways on very costly estates are occasionally built with a layer of broken stone one or two feet deep; or sometimes a single "French drain" is run through the middle. The latter plan costs nearly as much as that of two lateral drains, and is far less effective. It is impossible to take too much pains in the laying out of avenues and paths, and they should be marked through their whole extent with small stakes on each side, three or four feet apart, so as to judge of the effect from all points before work upon them is begun.

When the dust incidental to these operations has subsided, the painting of the exterior may safely be completed. The first coat has, or should have been, put on as soon as possible after the setting of the wood-work in place, to prevent it from warping or "checking" by exposure to the sun, and will now be perfectly dry. The next step will be to fill up all nail-holes and crevices with putty, and for this purpose the heads of all the nails used for securing the exterior finish, including clapboards, must previously have been "set in" to a depth of $\frac{1}{8}$ of an inch or more. Then, beginning with the roof, the house is to be painted downward, so that the portions already finished may not be disfigured by spatterings of a different color from above. With the mineral reds generally used for roofs some of the color is apt to wash down with every rain for two or three weeks after it is put on, so that it is advisable to have this portion completed and dried as long as possible before painting the walls. The colors will generally be chosen by the architect, whose experience in such matters will save him at least from the glaring blunders which amateurs are liable to make; and the general rule is that the smaller the building the lighter its color should be. Tints of green, yellowish, brownish or grayish are by far the most popular, and with reason, since the blending of such colors with those of the surrounding vegetation serves to connect the building with the ground and take away the fragile, portable look which all buildings exhibit whose color contrasts sharply with that of neighboring objects. In rocky districts the gray of the ledges might also be suggested in some portions of the building with excellent results. Where the structure is disproportionately high it is advantageous to make a decided difference in the color of the paint between the first and second stories, bearing in mind that when two different colors are placed side by side they must be of very different shades, one being light and one dark: never both of the same or anything approaching the same depth. The first story may be a dark bronze green and the second a raw-sienna yellow, with very good effect, and a house so painted will seem much lower and more home-like than if only a slight variation or none at all were made in the tint of different portions. Where the proportions of the building are such that any apparent lowering would injure it, two slightly different shades of the *same* color may be used, or the whole painted of one uniform tint. The casings, corner-boards and blinds are usually painted of a darker shade than the rest of the house, the blinds being sometimes the darkest of all, and sometimes of an intermediate tint between that of the "trimmings" and the plain wall; but the architect will be able to judge in each particular case what treatment will most enhance the effect of the design.

Outside Painting.

Choice of Colors.

In the durability of the various pigments used in house-painting there is less difference than is generally supposed. All colors fade somewhat, and as the darker colors, such as olive and sage green, show the effect of fading more plainly than the old-fashioned paints, buffs and light grays, they are generally thought to change more. The best method of preserving the fresh look of an olive or bronze green is to put it on over a first coat of red: white lead strongly colored with Venetian red, or with Indian red and yellow ochre, will do very well. The green covers it perfectly, taking only a transparent, mellow tone, which is very pleasant, and remains long after two coats of green would have faded to a brownish shade. The most fugitive of ordinary colors for exteriors is vermillion, which soon changes, unless under very favorable conditions, either to a black or white. Yellows bleach out by exposure, and browns acquire an ashy shade, although they are perhaps the most permanent of all ordinary pigments. Mineral reds for roofs soon blacken.

The supervision of the painting work is not so difficult as the examination of the materials used. It is hardly necessary to say that whatever may be the composition of the second coat, the first coat should always contain a large proportion of white lead; not that it is desirable to modify the color by the admixture, but because white lead clings to the wood with far more tenacity than any other pigment, and retains with it not only the other colors which are added to it, but also a second coat of less adherent materials. The best lead will keep its hold long after the oil with which it was mixed has been washed away, forming the "chalky" surface so familiar to us on old buildings, while zinc and other inferior paints blister and leave the wood bare. Something may be learned of the character of the paint by observing its behavior in the pot and under the brush, and still more by seeing it mixed, and observing the names on the cans or kegs from which it is taken. The oil is very likely to be of inferior quality, immense amounts of fish oil being employed to adulterate the linseed oil sold for painters' use. Fish oil dries slowly, never acquiring the hardness and resistance to adverse influences of pure linseed oil, so that the adulterated oil should be avoided, except for painting tin roofs, where its softness has some advantage in enabling the paint to yield to the expansion and contraction of the metal without cracking. The patent mixed or "chemical" paints are convenient, and of carefully selected shades, and are said to last well away from the sea-coast; but for buildings exposed to salt breezes from the ocean most architects prefer colors prepared in the usual way. Oil paints of any kind, after long standing, become "fat" and work less evenly under the brush, so that a fresh mixture of good materials is perhaps always to be preferred.

Supervision.

The paint should be put on by strokes parallel with the grain of the wood, and long, smooth pieces, such as window and door casings, should be finished by drawing the brush carefully along the whole length, so that there may be no break in the lines. No work should be started in the morning which cannot be finished before night; for instance, if one side of the house is begun, it should be completed, if not to the bottom, at least down to some important belt or other division line: otherwise the junction of the portions executed at different times will show as an ugly streak.

Where a building is much exposed to the weather, three coats of paint will not be too much to preserve it; but it is usually better to include only two coats — the priming coat and one other, in the contract. In this way the work will be better done, as there is less opportunity to cover up deficiencies, and the paint is less liable to blister than where three coats are applied at once. After two or three seasons' wear, a third coat may be put on and will stay in place.

It is becoming common to stain or varnish the exterior of wooden buildings instead of painting them. In the shingled Swiss houses the stone basement is frequently painted in two colors, while the wood-work above is always left in its natural condition, to turn gray by the action of the atmosphere, and a similar treatment for picturesque buildings, particularly in rocky situations, often has a charming effect. Under other circumstances, where a greater variety of color is desirable, stains serve to change the tints of the different portions without destroying the transparent richness due to the varied grain of the wood. Linseed oil alone is occasionally used as a dressing, but although the effect is good for a time, the wood soon mildews and becomes black. Oil of creosote, which can be obtained at a low price from any gas-works, gives a blackish stain at once. Linseed oil mixed with umber, raw or burnt, Vandyke brown, sienna, or other colors, is sometimes used for a stain, and the surface then protected with wax or varnish. By applying these pigments, selected as pure in quality as possible, until the desired shade is obtained, and finishing with two coats of wax dissolved in hot linseed oil, a lasting surface of a pleasant texture is produced. Pellucidite, or other good water-proof varnish, answers the same purpose as the wax, and the varnish alone is sometimes used.

Exterior Staining.

The last part of the outside painting is the "drawing" of the window-sashes. It is essential that these should be securely protected against the absorption of moisture, and at least three coats must be applied, of red, yellow, black, bronze green, white or other color, as may be preferred.

For inside work the same materials are used as for the outside, but it is even more necessary that they should be of the best quality. Fish oil, for instance, which will soften on damp days, is very unsuitable for inside use. The puttying should be done with great care to avoid unsightly spots, and one coat of oil or paint must be put on before puttying, to prevent the putty from shrinking and falling out through the absorption of the oil from it by the dry wood. In very cheap houses, finished in hard wood or pine of the natural color, two coats of oil often complete the work, and this application answers well enough if a polish is not desired. Where, however, a shining surface is intended, one coat of oil only should be put on to bring out the grain of the wood, followed by a "filling" of patent paste composition, white wax, chalk, oil mixed with pigments of some kind, or with wood-dust, and finished with shellac, pellucidite, or some other varnish, or a wax polish. Of these, shellac, if simply put on in one or two coats, without rubbing down, forms the cheapest and poorest dressing. If, on the contrary, it is put on in three or four coats, rubbed down with emery-cloths dipped in oil after each coat, it forms the most expensive, and the best of all applications. The patent varnishes, of which there are many kinds, are easily applied, and give, with two coats, a good finish. The hard wax polish gives a beautiful surface, which may be renewed, wholly or in part, at any time.

Inside Work.

Where a painted finish is intended, the principal point to be observed is the thorough covering with shellac, before priming of

knots and pitchy places, which will otherwise discolor the paint over them.

Bad knots cannot be "killed" even by this application, and should be cut out, and a piece of sound wood set in their place. The most annoying stains come from the minute dots of pitch which often speckle the entire surface of a pine board, but escape notice until after the painting is completed, when each one manifests itself by a yellow stain. Some architects, to make sure of complete protection, specify that the whole of the pine finish shall receive one or two coats of shellac before priming.

Zinc is much used for interior work instead of white lead, and is preferred by some on account of its freedom from the tendency of lead to turn yellow in rooms which are not well lighted. The character to be given to the surface varies with circumstances and fashion. Usually, a dead or "flattened" finish is preferred, and is obtained by mixing the final coat of paint with pure spirits of turpentine instead of oil. Where the paint is exposed to the contact of clothes or fingers, an "oil finish," containing little or no turpentine, is employed, and gives a somewhat glossy surface which can be washed readily. For hotel rooms and other places liable to much wear, a "China gloss," made by mixing the paint with varnish, is often specified for the last coat, or the whole is varnished after completion. Whatever the style of finish, the manipulation should be careful and neat. Every coat of paint except the last should be sand-papered to a smooth surface, and in *each* coat the brush-marks should be so drawn as to follow the lines of the wood-work, without joinings.

Fresco.

If fresco color is used, the most experienced workmen only should be employed to apply it. So much depends upon the consistency of the size, the mode of putting on the color, and other circumstances, that an unaccustomed hand is almost sure to fail.

Floors.

Hard-wood floors are not easily finished in a perfectly durable and satisfactory manner. The soft, elastic varnishes which answer for the doors and standing finish are, although sometimes employed, unfit for floors, while the hard spirit varnishes, though more durable, will ultimately wear away in certain portions of the floor, leaving the pores of the wood exposed to dirt, which quickly fills them, and after this nothing but replaning and revarnishing will restore them. For this reason, the ancient wax polish, although more troublesome, is perhaps to be preferred. The wax fills the pores of the wood so that, although the surface may be worn away, dust will not enter so long as any wax remains, and by periodical waxing and repolishing the floor may be kept clean and shining until absolutely worn out. An advantageous substitute for the ordinary wax, which is so sticky as to need frequent polishing to keep it bright, is made by mixing it with more or less hard paraffine. Such a compound is sometimes sold for use in dancing-halls in blocks, which are scraped, and the resulting powder scattered over the floor and rubbed into the wood by the feet of the dancers; but the best varieties are softened with turpentine to a paste, which is sold in cans, and needs only to be applied evenly over the floor, and after a few hours' drying polished with cloths, or with weighted brushes, made for the purpose and dragged to and fro over the room. The same brushes are used to brighten the surface when it becomes dull, and any worn spots can be brought back to an equal polish with the rest by a new application of the wax.

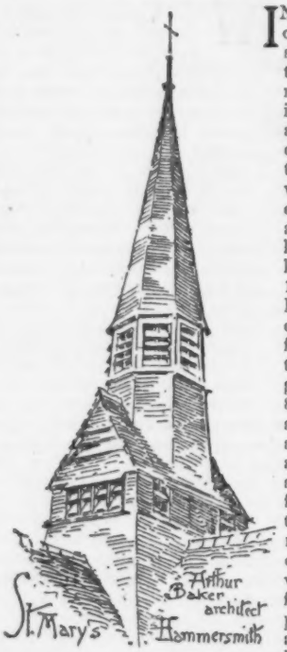
Glazing.

The glazing is usually done by the painter, who sends the sashes to the building with the glass all set, and the superintendent will have little to do except to see that the glass is of the specified quality, and that all the work is left whole and clean. The difference between first and second quality sheet-glass must be learned by observation, and in judging of the glass in a building it must be remembered that it is much easier to obtain small lights free from defects or uneven places than large ones; and that double-thick glass, such as should be specified for all lights larger than about 16″ x 30″ unless plate-glass is used, shows any unevenness of surface more plainly than the thinner sheets.

This last item having been examined, the young architect's duties of supervision will be ended; and it will only remain to review the notes which he ought to have made during the progress of the building, in order to fix in his mind more clearly the observations contained in them, and thereby prepare himself to carry out his next commission with still greater satisfaction to himself and his client. More particularly for the information of persons intending to build, an actual set of specifications for a country house of moderate cost, together with contracts for the same, will follow.

Importing German Air. — A German newspaper some time ago related an amusing story of the famous scientist, Alexander von Humboldt, who took advantage of the exemption from duty of the covering of articles free from duty, formerly the rule in France. In the year 1805 he and Gay-Lussac were in Paris, engaged in their experiments on the compression of air. The two scientists found themselves in need of a large number of glass tubes, and since this article was exceedingly dear in France at the time, and the duty on imported glass tubes was something alarming, Humboldt sent an order to Germany for the needed articles, giving directions that the manufacturer should seal the tubes at both ends, and put a label upon each with the words, "*Deutsche Luft*" (German air). The air of Germany was an article upon which there was no duty, and the tubes were passed by the custom officers without any demand, arriving free of duty in the hands of the two experimenters.

BUILDERS' SCAFFOLDING. — III



In the present paper we will first consider the conditions of use of a stone-mason's scaffolding, as it is the first to be employed in the routine of ordinary house-building operations (and shall briefly allude to some of the strains produced in the various parts) in the process of building stone-walling, and the scantlings required to resist those strains in a given example. In ordinary house-building, where the walling has to reach to a height of only 10 feet to 15 feet above the cellar-floor, the scaffolding is usually of the most primitive character: frequently it is merely 2 inches thick "grub planks" laid close together, forming a platform 6 to 8 feet wide, and supported by strong trestles 5 feet high, which serve both as putlogs and standards and braces combined. A still more primitive combination, for we can't dignify it by the term construction, consists in merely supporting the outer ends of putlogs (the inner ends of which are laid on the wall 5 to 8 feet apart) by short 2-inch thick plank set upon end, and serving as standards. Another plank is laid diagonally up to the inner end of, and spiked to the putlog, with its foot set in the ground, out from wall 6 or 7 feet, and acting as a cross brace. Counter cross bracing is seldom deemed necessary in ordinary stone walling, as the stability of the wall is sufficient, being usually backed up by earth. (Data and formulæ will be given in a future paper which will be useful to ascertain when counter bracing may be needed in such circumstances.)

Across the putlogs are laid the scaffold platform or plank floor. Longitudinal bracing is spiked lengthwise of the scaffolding, between some of the standards. Ledgers are generally omitted in such crude arrangements. In some places what are called "grub plank," i. e., plank with several 2-inch auger-holes, which are made for the purposes of rafting down rivers, etc., are much used for this purpose, being the cheapest kind, but in selecting and using them great carelessness is often manifested, and frequently minor accidents happen from the weakening effect which is produced by these auger-holes when they happen to be at or near the centre of the length of pieces, and either above or below the neutral axis, in pieces used to resist transverse strain as ledgers, putlogs, etc. When high walls are to be built, such as high abutment and wing walls of bridge-work, deep cellars for mezzanine floors under the stages of large theatres, etc., which will run up several scaffolds high, careful construction of scaffolding is necessary to avoid accidents, and therefore the form of the combination of parts must be arranged on the recognized principles of mechanical construction; the standards, ledgers and putlogs carrying the planking must all be of adequate strength and disposition of materials in the form best suited to resist the various stresses; the various parts of sufficient scantlings and the connections secure so as to possess stability, because, in rubble work, large rocks have to be handled, hammered, squared and shaped, etc., on the scaffold. In building broken ashlar or range work, the rock or stone is usually dressed on the ground and derricked up to the scaffold. Where heavy embankments are to be sustained, as when the walling performs the additional duty of a retaining-wall to the earth around, large stones are used, 4 or 5 feet long, 14 inches to 24 inches high, and 2 to 3 feet bed, which will contain 20 to 30 cubic feet and weigh in round numbers 1½ to 2 tons. This weight does not, of course, usually come upon the scaffold, as it is derricked up and set while suspended by the derrick. Rock or stone containing 10 to 14 cubic feet, or ¾ to 1 ton, and others containing 4 or 5 cubic feet and weighing between 500 and 800 pounds, according as they are limestone, sandstone, etc., would sometimes require to be moved upon a scaffold, on rollers, and which as usually estimated would produce a force equal to twice that which is due to the dead weight, or say half a ton or upwards, as a central load on a putlog, or on a ledger spanning a distance of 8 feet between standards. If this were the entire load upon it, such a ledger would require to be 2″ x 8″ scantling, of good, sound, straight-grained white-pine timber, and straight in form and free of cross-limb knots and weakening flaws, etc. But in ordinary rubble walling there would probably be in addition scattered over a scaffold, between standards, rocks varying from ½ to 1½ cubic feet, and spawls of less and varying sizes, say an aggregate of 4 feet square, covered 6 inches deep, which would be equal to 8 cubic feet, or about ½ ton, and if four men weighing say 700 pounds, which with mortar, etc., on the scaffold will make ¾ ton in all, including the momentum of the rolling rock, making 1¼

tons between two adjacent standards to be provided for in transverse resistance in putlogs and ledgers. This aggregate weight would be divided between two putlogs and also between the ledger and the wall: therefore, in round numbers, say one ton would be the net load on each. A putlog of 6 feet span would require to be of 4″ x 12″ scantling, laid flatwise, the end to be notched down to thickness of a brick. The ledger of 8 feet span should be of 2″ x 13″ scantling, with a factor of safety of 3. The standards, if 10 feet high to platform, would require to be 3-inch-square scantling, and if 20 feet high to platform, the scantling should be 4¼ inches square, with a factor of so-called safety of five times the breaking strain of short test posts of two or three diameters of perfect specimens.[1] It is to be observed that where standards are very high in proportion to diameter, or least side of a rectangular cross section, they are liable to break by bending before the initial crushing strength is approached, and therefore it is to resist this stress that special formulæ are required when the height is more than 6 diameters. (See table appended hereto.[2])

The best disposition and form of bracing under special conditions, requires intelligent appreciation of the functions it performs, whether a tie to sustain tension or a brace to resist compressive stress, or a tie-brace to resist both tension and compression, and the respective amounts of each in the same member. Of course, the most economical function, generally, is a tie, when it can conveniently be provided for, because it requires less section of materials to resist tension than compression when the length exceeds six times the least side of section. The angle at which a tie or brace acts most effectually varies from 45° to 30° with the vertical, depending on circumstances, (see Figs. 1 and 2.) If the spread or "run" of the foot is 8 feet (from standard to standard) and the rise of the head above its foot is 10 feet, or two scaffolds high, then the length of brace $= \sqrt{10^2+8^2} = 12.8$ ft. Hence knowing the length of brace we can readily find the strain which a vertical load will produce on a diagonal piece. Thus if only the alternate standards are braced, and the estimated load between adjoining standards is 1,000 lbs., the combined load between alternate standards will be 2,000 lbs., then the strain on the diagonals, either compressive as on a brace, or tensile as on a tie, is proportional to $\frac{\text{Diagonal } 12.8' \times 2000 \text{ lbs.}}{\text{Vertical rise } 12'} = 2500$ lbs.; now to resist this stress, if compressive, a scantling of 3 inches square is necessary with only a factor of mis-called "safety" of three against breaking, but which will be more than enough if to resist only tensile stress.[3] We have found the strain on the braces and the scantlings which will resist it, but we must also find if the fastenings of ends of brace to the standard, and if a tie-brace, also the fastenings of foot of brace are sufficient. If 20*d.* nails are used, they will be found large enough, if 2-inch-thick plank braces are employed, to avoid liability of splitting in the nailing. Now nailing will give way by shearing of the nail, by its splitting or cleaving, and crushing the wood, followed by a bending at the point and, by aid of a degree of leverage thus attained, withdrawing. The shearing strength of a 20*d.* nail at the middle will be about 1,300 lbs., the fibre of the pine will be crushed sidewise or laterally by, say, ¼ to ½ ton according as the nail would bend near the point, and also the amount of crushing would depend on the liability of the wood to cleaving; the nail near the point would probably bend under a weight of 150 lbs. The cleaving is a very uncertain factor, depending on the kind, and growth, and condition of the wood, condition of seasoning of the piece and whether the grain is straight or crooked, and the distance of the nail from the end of the piece: when the nail bends near the point and the fibre is riven and crushed, one side of the nail will be partially relieved of pressure of wood, and therefore the nail would still be held by pressure and friction mainly on an equivalent of three sides, and if the nail by these forces is brought to an inclination of 30° to 45° with the direction of the line of compressive or tensile stress on the brace-tie, probably by aid of the leverage action produced ¼ ton of force would then withdraw the brace with the nail from the standard. It will thus be seen, though necessarily very vaguely, that about three 20*d.* nails would be required to resist the strain, if the wood was not split, shaky, sappy, etc., but there ought to be some compensatory allowance for the uncertainties alluded to, and therefore we will say that six 20*d.* nails are required at each end of such a tie-brace. Of course, these figures are only given as a convenient sample of a process of investigating this important part of the subject, and are necessarily the merest approximations based on uncertain assumptions, in the absence of the necessary direct intelligent tests with the given pine and nails employed in any particular resistance. It may be noted that a blunt-pointed nail will not hold in wood as well as a chisel-pointed nail. Our data is very meagre as to the holding power of the various sizes of common nails and spikes in wood of various kinds and thicknesses, with the stresses applied in various directions, with regard to the axis of the nail.

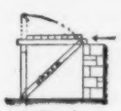


Fig. 1.

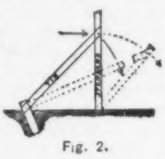


Fig. 2.

It will be observed that in order to erect safe scaffolding a varied, practical knowledge is essential, not the rule-of-thumb of the so-called "practical man," but the intelligent, appreciative knowledge which is alone acquired by scientific study and adaptation of practical uses at their proper value, combined with an intelligent knowledge of the proper *appreciation* or *depreciation* from any adopted standard to be allowed to any given timbers by inspection.

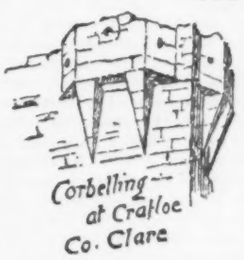
I append a small table of comparative strength of pine pillars of various heights in relation to diameters, and would observe that the co-efficients of strength of materials are merely an attempt to assign an experimenter's fixed average mechanical value of the best specimens of each species and genus of wood afforded by any selected locality, from which he procures his test pieces, *to all* the infinite varieties of strength of each species as they may be derived from the different localities of their geographical distribution, as well as to that in different individual trees of the same species and locality, all being influenced in strength, and each in varied degrees in different individual trees, by the comparative elevation and nature of soil, degree of light, shade, exposure, heat, moisture, and other meteorological influences, and the varied other conditions and circumstances of growth producing vigorous, rank, soft, slow, compact or diseased vegetation, these and the time of felling, manner of seasoning, all in their different degrees modifying the strength and durability of individual trees so that no two are alike in strength. Moreover, there is a great diversity in strength of pieces cut from different parts of the same tree, all of which is proven even in the experimental attempts by being obliged to adopt an *average* co-efficient, as well as by different experimenters getting widely differing results from the same nominal variety of wood. The most dangerous consequence is that many inexperienced persons who use the tables of strength of materials, adopt them as absolutely applicable to their purpose without regard to the above variations, as if they did not exist. The co-efficients are therefore, at best, but approximations so far as their direct applications to practical construction is concerned. By a promiscuous crowd of builders with promiscuous materials, a liberal margin should be allowed to compensate for the doubtful strength compared with that of the experimental unit on which the co-efficients are based, for a factor of "safety" (?) so that *absolute* (and not theoretical) safety shall be secured, to at least a reasonably probable degree, in the midst of the prevailing forces and resistances involved in any given structure.

[1] The data and formulæ by which the scantlings are computed and the analysis of strains and stresses produced on certain structures under conditions of use, will be treated in a subsequent paper.

[2] The writer of these articles, who is temporarily in England, and therefore inaccessible, has neglected to furnish the table of strengths of pine timber mentioned in the text, but as it can probably be introduced hereafter to just as good purpose, we do not feel that it is necessary to withhold the publication of the present article until the oversight can be repaired. — EDS.

[3] The tensile resistance of pine, 10,000 lbs. per square inch is double its compressive resistance (5,000 lbs.) in short blocks, say of 3 or 4 diameters.

FOUNDATIONS.



AT the meeting of the Civil and Mechanical Engineers' Society, held at 7 Westminster Chambers on Thursday, January 19th, the following paper on "Foundations" was read by Mr. William C. Street, A. R. I. B. A.

In bringing this subject forward as a topic of discussion, I would claim that it merits the earnest attention of both engineer and architect. It is often taken as too much a matter of course, and in consequence, some of our greatest efforts in construction are brought to grief, and that by the neglect of what is obviously the first essential of all good building; while on the other hand, sometimes the most creditable and successful part of our work, and what has cost us most thought and care, is hidden from view, and its importance quite unappreciated, especially by those long-necked geese who would be most sapient and loudest in condemnation if anything were to go amiss.

It were almost needless to say that before dealing with any particular foundation, it would be well to consider and calculate the weight of the wall or the work we were going to place upon it, and also whether it will be a steady weight or one subject to vibration. The weight imposed on the footings of an ordinary London house, say fifty feet high, with four floors all loaded, is perhaps about seven tons per square foot, while in St. Paul's Cathedral the greatest strain is fourteen tons per square foot. Almost every substance in nature is capable of supporting some other substance or weight, and given a capacity of sustentation, if ever so little, per square foot, it is a simple sum to determine how many square feet will be required to take in absolute safety the weight transmitted. By distributing the weight over a sufficiently large area, almost any soil may therefore be safely built upon, provided that its conditions are of a permanent character.

This question of constancy is one requiring more than ordinary forethought. Of course there are cases in which no one could foresee what was subsequently to take place. I know, for instance, of two churches in the London district which were threatened with de-

struction by the construction of railways in their vicinity. One is in the Southeastern or Bermondsey district, and many years ago during the construction of one of the viaducts carrying the Greenwich Railway, the contractors opened a large extent of deep foundations, which had to be kept clear of water by incessant pumping. This, of course, underdrained and contracted or lowered the ground in the locality, and several alarming cracks made their appearance in the building: a great outcry was raised by the parochial authorities, and the railway company was threatened with heavy damages, but by judicious procrastination on the part of their agents, the dispute was deferred until after the completion of the work, when the pumping having ceased, the level of the water in the soil gradually rose to its former height, and the cracks nearly closed again, so that, by aid of neat pointing, the permanent damage was but slight. In the second case, the church was built with quite adequate and apparently deep enough foundations, but seven or eight years afterwards a suburban railway was constructed, passing here in a cutting over twenty feet below them, and only a few yards off. In this case the drainage was, of course, permanently lowered, and the eastern end of the church, that nearest the line, showed a decided inclination to part company with the nave. The architect, of course, advised that the right thing to be done was to underpin, to a sufficient depth to insure permanent stability. This heroic and costly sort of procedure was objected to by the penuriously minded, and one of the church-wardens, a votary of modern science, bethought himself of a cunning worker in metals, who took the matter in hand, and has tied together the ruptured parts, in an economic manner, with iron bands. Up to the present this has sufficed. I only hope that what was the weaker member may not ultimately pull the stronger with it to destruction, and I would sooner have contributed to good masonry underpinning than to this ingenious artifice. Also in the case of the destruction of several large shops and houses in the Seven Sisters' Road, about two years since, the disaster was, I believe, clearly proved to have been occasioned by the disturbance of the ground, at a dangerous depth close to them, for the formation of a sewer just after they had been erected, and when everything was green and unset. It is, therefore, always wise to carefully consider what possible, if not probable, alterations may take place, changing the condition of the substratum or foundation from that in which it is when you build. I will now proceed to notice several different kinds of foundations, and, so far as I know, the best way of dealing with them.

In some soils, such as peat, it is often practically impossible to carry your walls down to a sufficient depth to meet with a solid base or foundation; and in such cases you have three courses open to you: either to found on a strong concrete floor spread over a sufficient area, or to use piles, or to use cylinders of iron or brick. If the first course is determined on, you should not only carry your floor all over the surface to be occupied by your buildings, and see that it is constructed so as to be thoroughly sound and homogeneous, but take care that the edges extend well beyond the footings of your walls. I believe that the cracks and settlements in some buildings, with which I was connected as clerk of the works, and constructed on such a foundation, were entirely due to very heavy walls coming close onto the edge of the concrete floor, causing it to buckle and crack, and to settle irregularly as weighted by walls of unequal thickness, etc. Another characteristic of this settlement was the gradual and continued settlement of the heavy corners, and I think the French system of forming a lip on the underside of the edge is a good one, as it tends to keep the substratum within its limits, and makes the concrete floor or foundation into a kind of inverted tray. The material of your foundations cannot be too strong and homogeneous; but with regard to the superstructure I would prefer a coursed and bonded or articulated construction that would, if necessary, yield slightly at the joints, and accommodate itself without fracture to any slight or unequal settlements during construction. This is the more necessary when the foundation to be got is not of the best. In the case of some mansions, close to where we now are, they also are floating on peat, and this precarious condition was, I fear, aggravated by putting in the foundations in small sections, at different times, and with inferior concrete. The consulting engineers who were called in deprecated underpinning, and built a retaining-wall of concrete on the eastern side, and made concrete inverts to some of the basement chambers. I am, however, greatly deceived if the buildings have not continued settling since this was done, about May, 1878. The Admiralty buildings at Whitehall are also upon a similar foundation, but are built upon piles, and apparently with great success, for I do not remember having noticed any particular settlement about the building. That the ground in the locality is sufficiently lively I can personally testify, for the passage of a heavy two-wheeled cart would make a room in Whitehall Place, in which I used to work, vibrate so much as to frighten those who were unused to it.

In founding work on running sand the utmost care and consideration are needed. I have known a length of wall to be undermined by the pumping out of the sand with the water when putting in the foundations for the next length. The only way in such a case is to make a good concrete floor the entire width of the trench, and put it in as quickly as possible; to seal the sides of the trench as well as you can, and to pump out what water comes in from the level of the top of the concrete, and not from a sump. In the case of dock-walls founded upon running sand, it is also necessary to consider what, if any, will be the effect produced when the pumping operations, necessary during construction, are brought to a termination, and the water allowed to exert a varying pressure on the floor of the dock and the foundations of the walls, in accordance with the variations of tide-level outside the dock. It is open to us all to be very wise after an occurrence has taken place, and the circumstances connected with it sufficiently explain the nature and causes of the accident, while if we had had anything to do with the direction we might not have done nearly so well as those upon whom the misfortune of failure fell. Therefore, in indicating in any case, not connected with my own practice, how, in my opinion, the foundations, as seen by the light of others' experience, might be improved in the reconstruction, I do so with all humility, and do not pretend for a moment that I should have foreseen and prevented what really did happen.

In a recent notorious case, the damage to the works did not happen until after their completion, when the water being admitted to and constantly retained in the interior at the level of high water, the pressure of the water downwards and outwards at low water was such that it forced itself through the sandy floors of the dock, and under and along the line of the dock foundations out into the river, sucking with it such immense quantities of silt or running sand as to cause a general undermining and ruin of the dock-works. There was, of course, a similar varying pressure inwards from the river during the construction of the works, but the dam at the entrance kept this sufficiently far off to prevent ill effects. When, however, this dam was removed and the distance reduced, the effect of similar pressures outwards was so much greater that in a few weeks the underground passage was established, and the catastrophe occasioned. It would not perhaps have happened had the pile apron across the mouth of the lock on the inner or dock side been driven to a greater depth and sufficiently close and tight together so as to retard the subterranean flow of water and sand. Apparently only a very little extra force one way or other was sufficient to turn the balance from safety to danger. The most eminent engineering advice has been taken with regard to the reconstruction, and I am perfectly unacquainted with the measures proposed; but it would appear obvious that in such a case the new lock might be made longer with much advantage, and thereby the distance between the river and the floor of the dock increased, also, that right across the mouth of the lock, at both river and dock ends, two rows of either wood or iron sheet-piling should be driven as deep as possible, and the sand between them excavated for some depth, and the space filled in with good clay puddle, so as to form two water-tight underground walls at each end, and sufficiently remote from each other not to occasion danger. Further, the floor of the dock might be covered with a good thick layer of clay puddle, as is usual when a reservoir is made to hold water for the supply of towns, and I do not know that engineers have any good reason for neglecting this precaution when they build a reservoir to hold water and ships, especially when the natural foundations are well known not to be water-tight.

While speaking of the narrow line between safety and danger, and insisting upon always being upon the right side, it is perhaps well to know what can be said upon the other side. The engineer to a Scotch dock not long since was remonstrated with by one of the commissioners with regard to a slight mishap which had occurred to a portion of the work, and he replied that he considered it proved his ability, because he could well have insured safety and his reputation, if he had made the work cost double the amount it did; but he had been so careful of their interests that he had made a very cheap dock, and with only an insignificant accident. Such reasoning can be carried too far, and as foundations are but a small portion of the expense, while they are the most important so far as stability is concerned, you cannot be too safe there.

With regard to foundations for bridges or piers, on or across sands, the usual plan now is to sink tubes or piles with large disk or screw shoes or feet to them, as by making these feet of suitable diameter you can adjust your area so as to support any reasonable weight. Mr. Brunlees was the first to use this form of foundation, and by its means carried a railway across the treacherous sands of Morecambe Bay. These sands he proved by numerous experiments to possess at a few feet from the surface a uniform supporting power of about five tons per square foot, and this was apparently not increased if you went down to a great depth. He sank the iron piles by means of hydraulic pressure, conveyed through the centre of their columns down to their feet, thereby disturbing the sand beneath them, and allowing them to sink to the desired depth, when the pressure being withdrawn the sand returned to its former consistency, and the piles remained stationary.

Leaving for a moment the character of the soil, I will notice the pneumatic process of sinking and excavating large cylinder foundations under great external water-pressure. This was first introduced by Mr. Hughes in the building of Rochester bridge. In this case some of the cylinders were 9 feet, and some 6 feet in diameter. The joints of the several lengths of cylinder were made water-tight, and a wrought-iron cover securely bolted to the top. Through this cover two cast-iron chambers project 2½ feet above the top of the cylinder, and 3¾ feet below the cover. These chambers form air-locks, one for the passage of men and materials, and the other for buckets containing the materials excavated. These air-locks are furnished with cocks communicating from the interior of the cylinder to the chamber, and from the chamber to the atmosphere. The cylinders were filled with compressed air at a sufficient pressure to withstand the head of water on the outside of them. To pass into the cylinder the air in

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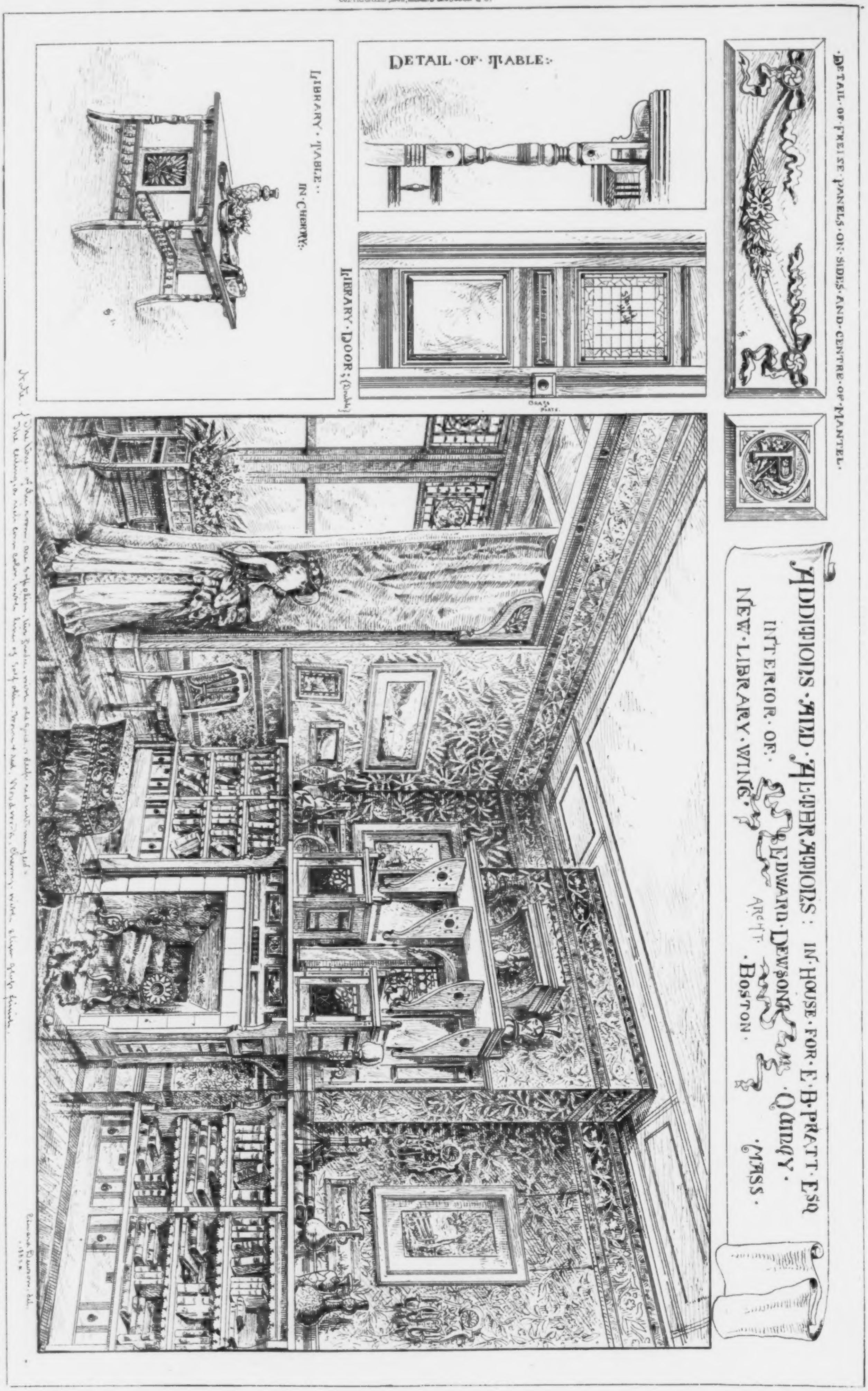

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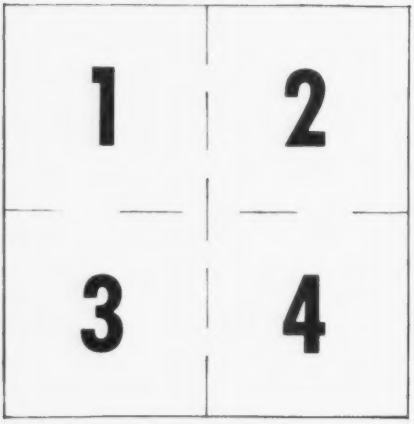

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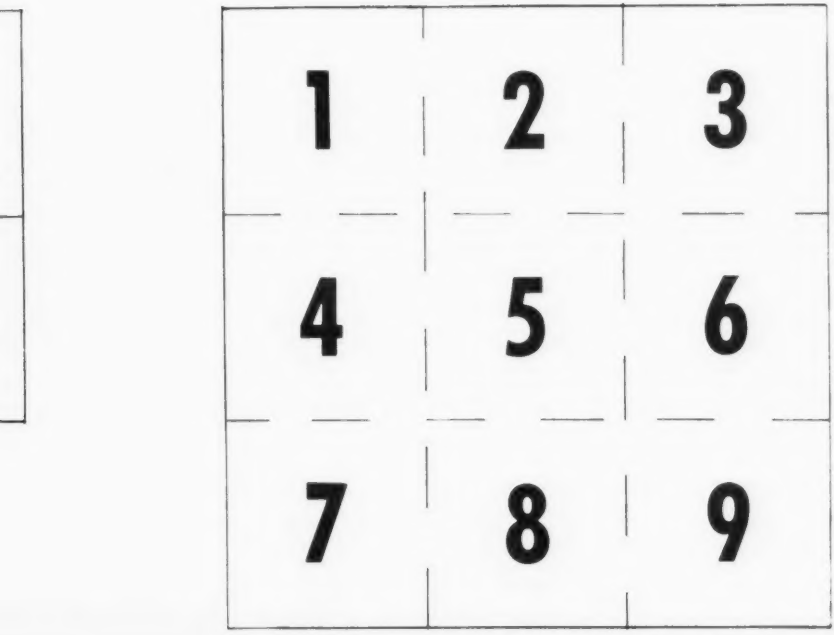


Towers · Belfries and Spires

Central Tower of Church at Nogent-les-Vierges France:

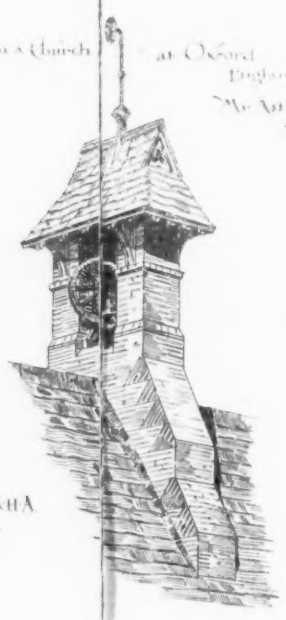
Drawn by Mr E Wimbridge

From Municipal Buildings Chester Eng:

Mr W H Lynn R.H.A. Architect.

From a Church at Oxford England

Mr Arthur Webb Architect



From a Home for [illegible]

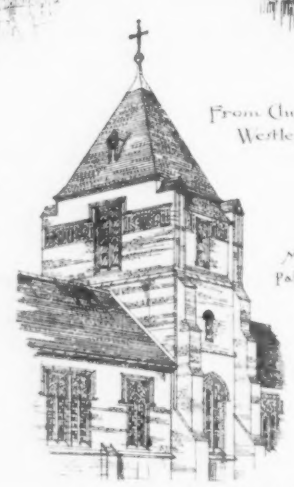
Mr David Walker Architect

From Chapel in Heaton Cemetery Bolton le Moors Eng:

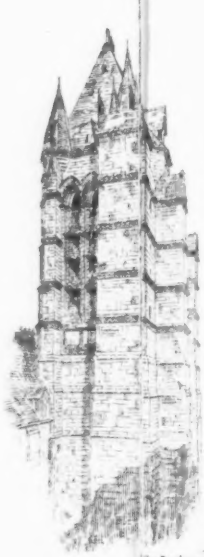
Mr R. Knill Freeman Architect:

From Church at Westleigh Mill, Eng:

Messrs Paley & Austin Architects.

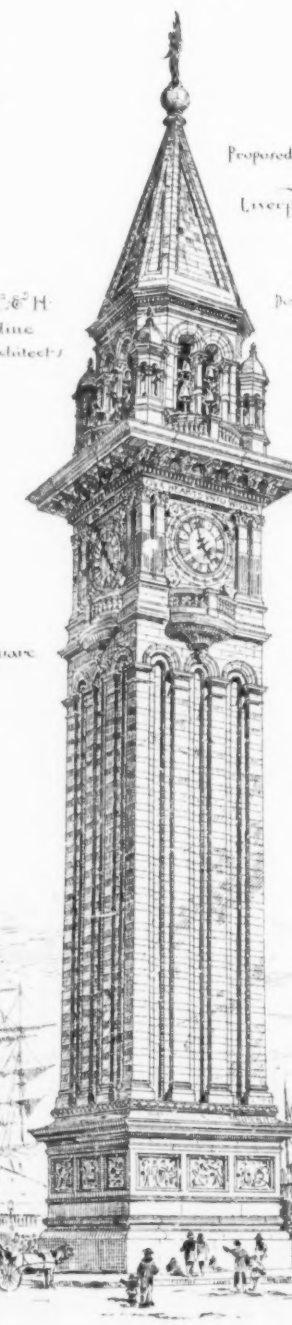


The British Architect



The Building World.

Ayton Cathedral France West End Tower East View



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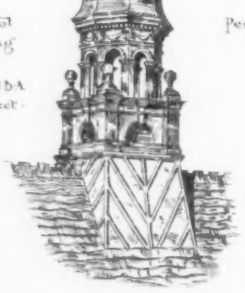
Liverp[illegible]

Messrs E & H Shelmerdine Architects

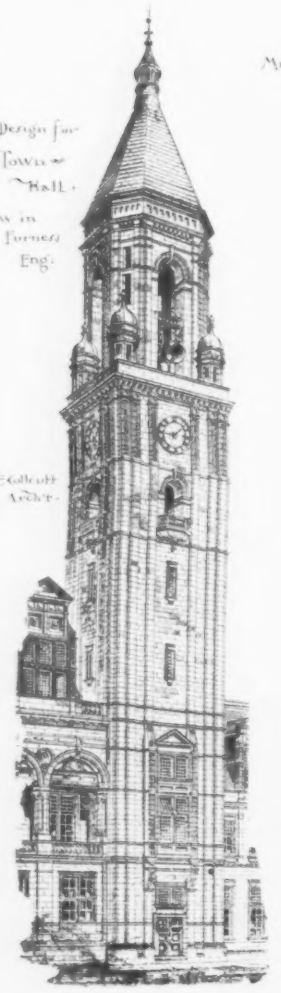
From School Building Pencoed Wales:

Mr H C Harris A.R.I.B.A. Architect.



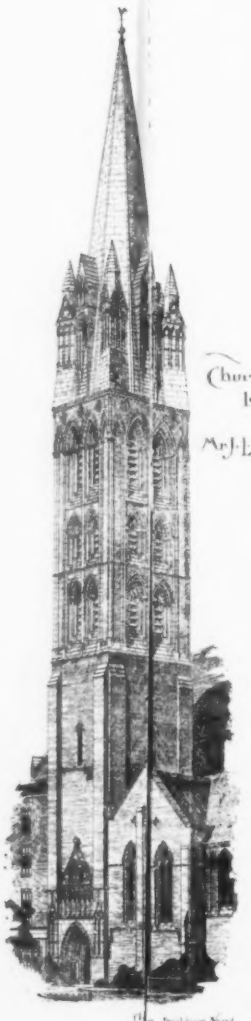
From Design for Town Hall Barrow in Furness Eng:

Mr T E Collcutt Architect.



From Workshops Thames Ditton England

Mr S J Nicoll Architect:



Church in Red lion Square London, Eng:

Mr J L Pearson A.R.A. Architect

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…Aged Mariners'
…Egremont Cheshire
Eng:

Tower of S. Salvi
Albi:
France

…ES
…PIRES.

…posed Memorial Clock
…Tower
…iverpool Pier Head
Eng.

…Design Placed
Second

The Building News

Tower of St Mary's Church Brighton Eng.
Mr W. Emerson Archt.

…Art Club Com… petition:
…rial Clock
…wer

…ed
…irst.

From a School
Building
Sheffield
Eng:

Messrs. Innocent
& Brown
Architects

Chartres Cathedral
France:

Spire & South Side
West Front

The Building World

Proposed Memorial Clock Tower
Liverpool Pier Head
Eng:

…r A. Waterhouse ARA
Archt:

Design Placed
First.

Church at
Beckenham
Eng:

Messrs Bonker
& Clarke
Architects

The Building News

From Design for a
Town H…
Wrek…

Mr E. W. Godwin
Architect

From St Peters
Hospital
Covent Garden

From School
Building
Ox…

Mr T. G. Jackson
Archt.

From a Church at
Matlock Bath
Eng.

Mr J. H. Burton Archt.

The Building World

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petition:

From a School Building: Sheffield Eng:

Messrs Innocent & Brown Architects

From Design for a Town Hall Winchester Eng:

Mr E W Godwin Architect

The Building News

Detached Tower: West Walton Church Norfolk. England:

From St Peter's Hospital Covent Garden London Eng:

Mr J M Brydon Archt

From a Mountain Chapel: Wales Eng

Messrs Paley & Austin Archts

Chartres Cathedral France:

Spire: South Side: West Front

The Building World

Memorial Clock Tower Liverpool Pier Head Eng:

ARA Design Placed First.

From School Building: Oxford Eng:

Mr T G Jackson Archt

The Architect

The New Tower Cardiff Castle: Wales

The late W. Burges Architect

Church at Beckenham Eng:

Messrs Daukes & Clarke Architects

From a Church at Matlock Bank Eng:

Mr J. H Burton Archt

The British Architect

The Building News

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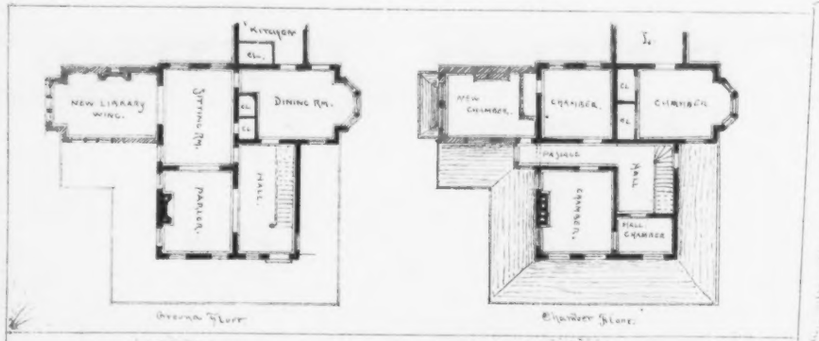


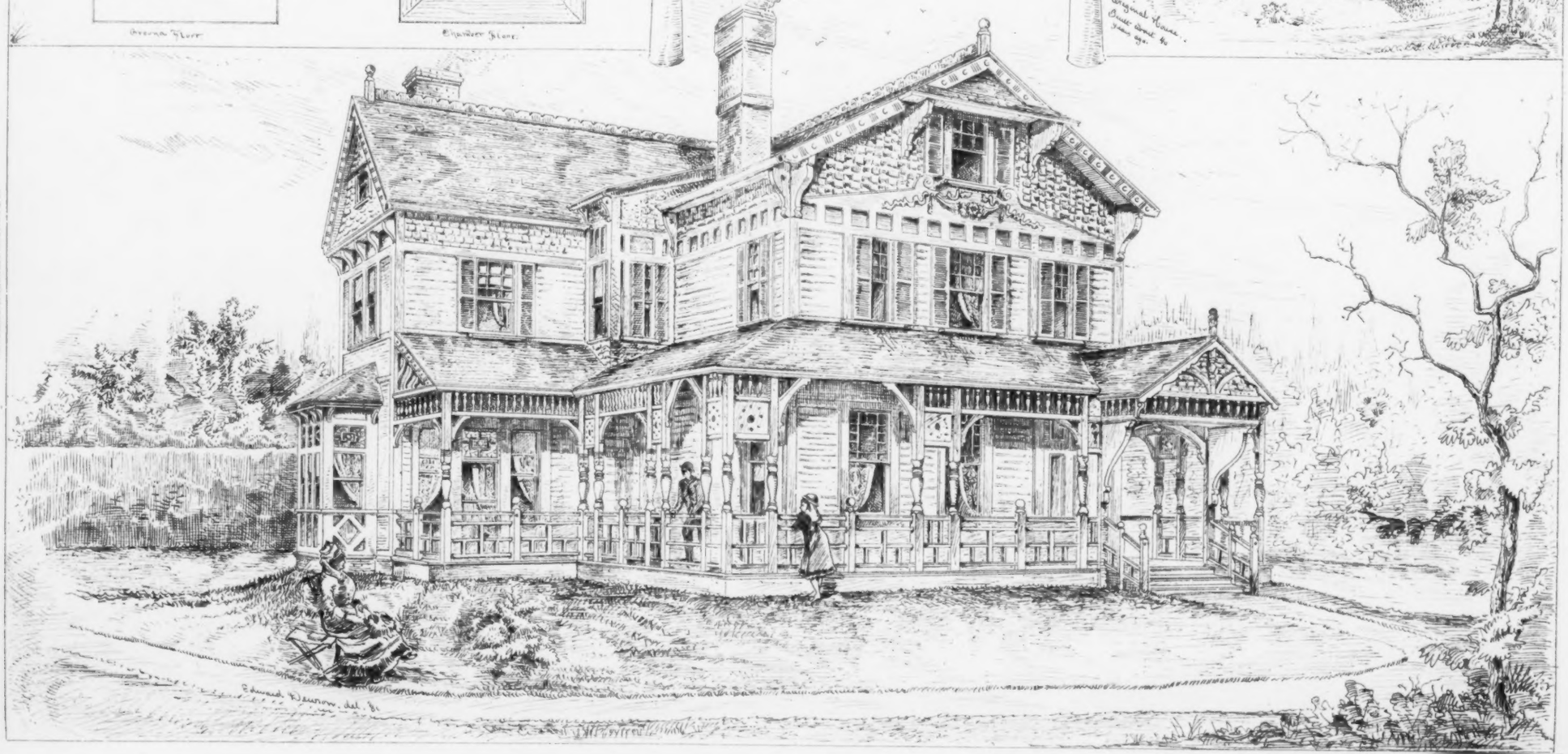
ADDITIONS AND ALTERATIONS

IN HOUSE FOR E. B. PRATT, ESQ.

QUINCY, MASS.

EDWARD DEWSON, BOSTON

ARCHITECT



one of the chambers by means of one of the cocks is lowered to the pressure of the atmosphere, and whatever is to pass enters the chambers, when the door is closed, and the cock communicating with the inside opened, by which the pressure is gradually raised to that within the cylinder, when you can pass from the chamber into the cylinder. To come out was the same process reversed. There was a pipe in the form of a siphon, the longer leg of which reaching to the bottom of the pile, was subject to the pressure of the condensed air on the surface of water within, while the shorter leg leading into the river, had the effect of relieving the cylinder from any unnecessary or irregular pressure, doing the duty of a safety-valve, as well as of an outlet for the continual change of air. The greatest depth of the foundations at Rochester was about 61 feet below high water; but in the construction of the foundations of the St. Louis bridge, in America, on the same principle, part of the work was executed under a pressure of 102 feet of water. When an Act for constructing a railway under the Humber was applied for some few years since, the engineers to the promoters designed an ingenious adaptation of this principle. It was proposed to build the tunnel, which was not to be anywhere more than a few feet under the bed of the river, in small sections, using an oblong chamber as a sort of diving-bell, excavating the river-bed, and building a section within it, and jointing it to the next section by brickwork set in cement under water as the work progresses and the air-chamber is raised. The excavation would be in river silt and chalk rock.

In carrying out works in the neighborhood of London we have frequently to encounter what is, especially if on the side of a hill, one of the worst foundations, — that of the London clay. If it is in an evil mood it gives you but short notice. I have known an excavation look as right as possible overnight, and in the morning found the ground had surged in on us, breaking strong timbers as if they were lucifer matches. This soil, as a rule, does not slide or part piecemeal, but seems to wait till the whole mass is of the same mind, and it then comes on you with a quiet and almost irresistible energy. There would appear to be slippery seams in it which contain or allow of the transmission of water, and the upper part will slide forward upon one of these seams, so that if you fairly disturb and set the mass in motion, you can easily understand that instead of an ordinary case of angle of repose, it is a hillside with which you have to deal. The only thing is to meet it at right angles, and to disturb as small a section as possible at a time, so that any forward impulse may not be communicated to the mass, and to take care that you have strong cross-walls in your basement to act as buttresses. In clay more particularly you must be careful to carry your foundations down to or below the ultimate drainage-level, as by any subsequent draining of the subsoil, it is caused to shrink, and is the occasion of ugly and sometimes disastrous settlements. I have been fortunate generally, but in one case when the money was pinched, I thought we need not carry the foundations of a portion of the building, which was only one story high, down to the depth required for the remainder, where the walls were not only lofty, but very thick. The drainage caused by the larger part, which contained a basement, so affected the ground, that the outer corner of the small part with shallow foundations settled considerably. For this, the just penalty of underpinning to the proper depth had to be paid.

In another case a permanent water-level was thought to have been left just half-way up the concrete, for at any time during the building, by opening the ground anywhere in the basement, the water would in a few hours rise in the hole to that level and never above. This looked satisfactory; but within a few months another of those useful but unpleasant Metropolitan railway-extensions similar to the one referred to at the commencement, was constructed, with, of course, a drainage considerably below the level I had established. It is, however, some distance off, and the house was also thoroughly well set, and so far no damage has occurred. In this case the outside of the walls were asphalted all round up to the ground-level, varying from 6 to 12 feet, and by this means the building has been kept eminently free from damp, though nothing can be wetter and colder generally than basements or foundations at that depth in the London clay. In another case when building the eastern end of a large church on the top of a clay hill, the foundations had to be taken down about 5 feet below those of the adjacent walls, and in which an old settlement had taken place, passing from the ground right through the aisle and also through the clerestory wall, up to the eaves. This looked risky, and under the circumstances I kept the concrete foundation of the new walls at as great distance as I dared, and then threw up from them an arched buttress against the old walls, and built that portion of the new wall upon it. We pointed up the old settlement before commencing, and this did not open in the least, thus removing much anxiety during the process. Adding to or making a junction with an existing building is, however, always attended with some anxiety, even where the foundations are of the best character. Not only is it well to put up all the walls of a building at the same time, and, if necessary, leave the completion of the interior, but it is also far cheaper; more than one building with which I have been connected having cost more from the postponement of portions, and being done piecemeal. If you can do no more, you ought to make an effort to have the whole of the foundations put in at the same time, so that *they*, at least, should be solid and homogeneous. Even then it will be difficult to secure a perfect bond with the toothings left out for you from the old part, as all ordinary brickwork or masonry will settle a little or compress the mortar joints. Some of our best builders, in fact, prefer, because of this, to make a junction by building into a groove or chase cut in the old walls to attempting to bond fresh work into the teeth of the old.

With regard to the weight imposed on the foundations, or lower courses of buildings of any great height or weight, it is also necessary to consider what kind of material you are using, as very recently the tower and the western wall of a church a short distance from London have had to be underpinned on account of the lower courses crushing, the stone used having been an inferior kind of Kentish rag. It is very seldom you come across so weak a stone, but it is well to know that it is possible to do so. No brick that would be fit to be passed as fit for any part of a good building would be liable to be crushed. There is one kind of foundation which I have hardly touched upon, viz.: timber piles with a strong timber platform on the same. This is a very common foundation in Holland. Generally, when the timber is constantly submerged, it endures for centuries, and the supporting power of timber piles is a subject treated of in the office text-books, books for both architects and engineers, and does not need comment from me. This description of foundation is the same as that which used to be employed for bridges across the Thames, but is now generally abandoned, it being considered preferable to take your foundations, cylinder or otherwise, down to the London clay. In the case of Waterloo bridge the recent improvements in the shape of embankments have so increased the scour of the river that the bed is now in several places some feet below some of the timber platforms, and measures are now being taken to strengthen and make good the foundations before they settle like old Blackfriars. The late Mr. Page proposed a plan, I believe, for putting in cement concrete under existing foundations by means of a spoon and bag.

Viollet-le-Duc, in his "Dictionary of Architecture," states that the ancient Romans always founded their buildings in the most solid manner, by means of large blocks of concrete composed of quarry rubbish, of gravel, sometimes of burnt earth and an excellent mortar. This formed under the superstructure homogeneous basements, and the Roman foundations are veritable artificial rocks, upon which one could place the most heavy buildings without any fear of rupture or settlements. During the later Roman period the foundations were much neglected, and the architects of the twelfth century had seen so many instances of important edifices fallen by reason of bad foundations, and of arches badly buttressed, that they paid particular attention to establish durable foundations, and to render their constructions so elastic that settlements were not to be feared. To them succeeded others who sometimes, at the request of the ecclesiastical authorities, when means were not plentiful, attempted to make a grand or attractive show of buildings at little expense, and putting in mean and inadequate foundations, occasioned the subsequent failure of some most important edifices. Thus periods of good and bad foundations have succeeded each other like tides, or action and reaction. In conclusion I can only express my regret that the time at my disposal has really been so small that I feel I have not done the subject anything like justice. I would, however, take the opportunity to urge upon everybody to whom building is intrusted, its great importance; and that though the money to be spent upon the entire work may be small, it is not in the foundations that they should be parsimonious. Let the superstructure or ornamentation be curtailed — they can be extended or attended to later on, when money may be a little more easy; but your foundations once put in, as a rule have to remain, or at any rate do remain in the state in which you finish them until after a possible catastrophe has happened.

THE ILLUSTRATIONS.

CORRECTIONS. — The design for a town-hall tower published last week was submitted in a competition of the Boston Sketch Club, by Mr. Albert W. Cobb, of Chicago, Ill., and was awarded the first place.

A typographical error in our issue for April 15 credits the design of the Union Theological Seminary to Mr. W. A. Porter instead of to Mr. W. A. Potter, late Supervising Architect of the Treasury Department.

TOWERS, BELFRIES AND SPIRES.

ADDITIONS AND ALTERATIONS IN HOUSE OF E. B. PRATT, ESQ., QUINCY, MASS. MR. EDWARD DEWSON, ARCHITECT, BOSTON, MASS.

LEGAL NOTES AND CASES.

CHARLESTON, S. C., April 19, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

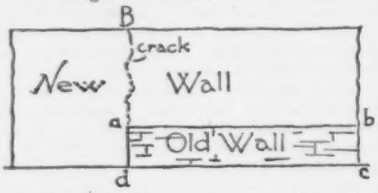
Gentlemen, — The following, as an addition to your list of "Legal Notes," may prove interesting: —

R. P. Southard, architect, *vs.* Frederick W. Wagener, merchant. Common Pleas, February 1882, before Judge Fraser.

This was a claim for a balance alleged to be due, the payment of which was refused by defendant on the ground that he was not liable, for full professional services, compensation of five per cent to be calculated upon the entire cost of the building (the plaintiff having been discharged from the service of the defendant for alleged negligence before the completion of the building) the same as if he had not been discharged, but had remained in the employ of

the defendant until the building was completed, and the full service had *actually* been performed. The facts in the case, as the testimony showed, were as follows: —

A certain old foundation wall *a b c d* was incorporated into a new wall in the manner shown by the figure annexed. The use of the old wall was objected to very strongly by the plaintiff, who prophesied a crack — *a* B. The defendant urging his right as owner to do as he pleased, etained the old work and would not allow it to be tampered with or molested in any way. From the circumstances of time and place and the fact of its being impossible for him to resign his position, the plaintiff was obliged to submit to be over-ruled.



The wall did subsequently crack, and the plaintiff being discharged was requested by the defendant to render his bill. The plaintiff accordingly rendered a bill for full compensation of five per cent upon the entire cost of the building, which was fully known up to the time of his discharge, and was estimated thence (by plaintiff) up to the time of completion.

This bill the defendant refused to pay, and entered a counter claim for damages for the broken wall, on the ground that the architect's (plaintiff's) plans and specifications contemplated that the old foundation should be used and underpinned, and that in not having this old wall underpinned the plaintiff was guilty of negligence and was therefore not entitled to any compensation, and was, besides, liable for the cost of the necessary repairs.

After hanging in suspense for nearly two years, the matter was at last brought up at the February term of the Court of Common Pleas, when it was conclusively shown: —

1. The building was erected by day's work and not by contract, as was at first intended, the defendant being his own builder.

2. The plans and specifications, which were submitted to contractors to estimate from were *not* the same from which the building was erected.

3. Very material changes were made from these plans, rendering necessary:

4. An entire new set of plans.

5. The plaintiff, not having to deal with contractors, did not write a second specification, but used the original one as a memorandum-book for his own guidance as far as was necessary in conjunction with the new drawings.

6. That although the original drawings contemplated the *use of an old wall*, it was in a very different manner from that in which the old wall which was retained was finally used.

7. That the old wall which was used was *not* the old wall referred to by the original plans and specifications, *but an entirely different one.*

8. That it would have been impossible (had it been desirable) to underpin the old wall, surrounded as it was by rubbish, earth, etc., for in removing this the old wall must have been destroyed.

9. That the defendant made use of the old wall contrary to the expressed objection of the plaintiff, who warned him fully of the danger he (the defendant) was incurring.

The claim of the plaintiff was based upon his understanding of the customs prevailing amongst members of the American Institute of Architects, and evidence (by commission) was given by three members of the Board of Trustees of the American Institute of Architects to show what those customs are. The schedule of charges of the Institute was also put in evidence.

JUDGE FRASER'S CHARGE.

This is a question arising on a contract about which there is a dispute between these parties. The first question is as to what really was that contract. The plaintiff gives one account of it in the complaint, and the defendant in the answer gives another. And just so it is with the witnesses on the stand: they do not agree. Whether the contract was that the plaintiff should be simply an architect, or an architect and a supervisor and superintendent, is for you to determine. You will also determine whether these parties have not used these terms themselves (superintendent and supervisor) interchangeably. You will find that in the answer the word "supervisor" is used perhaps in the same sense that "superintendent" is used; but when you make up your minds what the contract was, then you will determine what those words mean in that contract. I have no right to settle the meaning of those words, because if I did I would settle the contract.

You have heard the testimony of these witnesses as to the custom as to what the words "supervisor," "constructor," etc., mean in New York, and what they mean in Charleston. The contract between these parties is that meaning of the words upon which they have themselves agreed. Whatever their understanding was, was their contract. Words may have different meaning in different places. They may have one meaning in San Francisco, another in New York, and another in Charleston; but the real question is, what meaning did they have to those people who made the contract?

I have been requested to charge you by the defendant as follows:

I. "An architect and supervisor or superintendent of a building contracts for skill and care, and where skill as well as care is required in performing the undertaking, the party purporting to have skill in the business and undertaking for hire, is bound to the exercise of due and ordinary skill in the employment of his art or business: in other words, he undertakes to perform it in a workmanlike manner. In cases of this sort he must be understood to have engaged to use a degree of skill, diligence and attention adequate to the due performance of his undertaking, and if he has not the proper skill, or, having it, omits in other respects the proper degree of diligence and attention required, he will be responsible for the damages sustained thereby by his employers."

Whenever a man undertakes to do anything, he undertakes to use the proper care in the discharge of that work. The physician undertakes to use skill, but the court cannot determine *what* that skill is. So it is with a lawyer: a lawyer must have proper skill as a lawyer, and must exercise it properly, but it is not for the court to determine *what* is the proper skill. Assuming that that is the proper view to take of this case, counsel has gone into testimony to show what are the duties of an architect, superintendent and supervisor. They undertake to explain by testimony what are the proper amounts of skill to be used by persons occupying these positions. Whatever you find him to have been acting as, that amount of skill which it was proper for such an officer to use, you will hold him to. It is a good proposition of law, only I don't instruct you *what* the amount of skill the architect or supervisor or superintendent has agreed to furnish.

II. "If a person undertakes to build a house on a specified plan, and with certain materials, and he departs without leave from the terms of the contract, he is not entitled to any compensation for his labor."

I take that to be good law. If the variations were slight, the jury in such a case, if they thought so, would have a right to disregard them.

III and IV, not being of particular importance and altogether wide of the mark, I will not trouble you with. — R. P. S.

V. "The plaintiff is not chargeable for changes or omissions in the work made with the consent of the owner of the building. Although there are cases where the consent of the owner will be implied from the fact that he was present when the alterations were made and did not object, yet that inference should be cautiously drawn. The variation must be plain and palpable from the plan agreed on, and it must be made in such a manner that he must have seen it and known its effect."

Or assume the risk after having his attention drawn to it.

I think with that modification it is a very good proposition of law. A man, however, may see a defect and not know the exact danger that may accrue from it, and yet if he knowingly takes the risk he is just as much bound as if he knew all about it. I charge you this: that if a man employs one to work for him as an architect, and has his attention called to any change in the plan and he assumes the risk of such change, I don't think the architect would be called upon to point out to him *why* there was danger.

VI., of no importance. — R. P. S.

VII. "That in order to justify the leaving the old foundation in the ground that it was by the acquiescence of Mr. Wagener, it was the duty of Mr. Southard to have advised him in such a manner that he could have understood the effect of leaving it."

Or have known that he took the risk. I have already said to you that I think it was enough if he called Mr. Wagener's attention to it and to the fact that it did not have his approval. I think that is sufficient when reasonable, sensible men are dealing with each other. *The architect was not bound to explain the scientific reasons why he disapproved of it.* I think it is enough for him to have disapproved and for the owner to have exercised his own judgment afterwards, to render the owner responsible for the risk he assumed.

The case was then submitted to the jury, the jury returning in ten minutes with a verdict for the plaintiff for the total amount of his claim.

Hoping that the above will not prove too voluminous for your use, or tax your patience, I am, Very respectfully,

RICHARD P. SOUTHARD.

A Claim for Extras. — Work Shown in Specifications and on Plan, but not detailed.

E. C. Crofton, builder, brought suit against Geo. H. Thompson, owner, for several items, among which were two book-cases, which plaintiff claimed he did not have to put in, because there was no detail drawing, although they were shown on the plans and described in the specification. In his charge to the jury, Hon. Judge M. F. Force held that the contractor would have to make the book-cases from such supplemental drawings as the architect might furnish, and whether the architect furnished such supplemental drawings or not, the contractor was still bound for the book-cases, to be made in keeping with the character of the rest of the inside finish, or allow the owner a fair price for the same. C. C.

MONUMENT TO MARIA THERESA. — It is said that an immense monument to Maria Theresa, the work of Zumbusch, will shortly be erected in Vienna, near the New Museum. The figure of the Empress, which is ten times the size of life, will be surrounded by statues representing Force, Justice, and Mercy. Figures of the principal men of her reign will also be introduced, as well as illustrative bas-reliefs in profusion.

STONE-DRESSING MACHINERY.

MR. FRANK TRIER, a member of the London Institute of Civil Engineers, lately gave a description of the Brunton and Trier stone-dressing machinery before the Boston Society of Arts. Mr. Trier illustrated his remarks by frequent reference to several large diagrams. After alluding to the difficulties attendant upon the application of machinery to stone-dressing, and to the many attempts which have been made to adapt machinery to the work, Mr. Trier said that we have in stone, a material composed for the most part of particles hard enough to cut and wear away the hardest steel, but held together by a cohesion relatively far feebler than that which holds together the molecules of steel or chilled iron. Hence, in attacking such substances with a metal tool, it is of the first importance that attrition be avoided. If this enters in any considerable measure into the conditions of the contest the metal will be worsted; but if it be a question of simple pressure the stone will inevitably be overcome. A circular rotating cutter, operating by rolling to clip off from the stone the irregularities of its surface, fulfils the requirement just set forth. The elementary principle of its action may be stated as a rolling pressure brought to bear at the base of a certain projecting portion of stone with the intent to force it off. The great power of such a pressure to effect the desired object is due to the fact that the arc of contact of the cutter with the stone is very small, and that upon this point the whole force in exercise is concentrated.

It is in the mode of application of such a tool that the peculiarity and success of our inventions lie. The first application of the principle of the rolling cutter was to the turning of stone, and especially granite. The stone to be turned is first roughly shaped by knocking off the corners of a square-sectioned stone, which is then placed between the centres of a lathe and caused to revolve rapidly. The cutter is fixed to a freely-revolving spindle mounted in a socket on the slide-rest, and set at an angle of about 25° to the stone. As soon as the cutter, travelling along the bed of the lathe, comes in contact with the revolving column, it begins to revolve also, at the same time chipping away the stone with great rapidity. With two cutters, one on each side of the column, an inch and a half or more is taken off the hardest granite in a single traverse. In fact, the work of a fortnight is brought within the compass of a day, while the character of the work produced is in every respect superior to hand labor. The work is so true that polishing is done in one-third of the time it takes to polish hand-dressed work. By recent improvements, the curved outline so requisite to the beauty of a column can be readily attained, and the most delicate and fragile marbles can be turned. A skilled turner will turn balusters, urns and vases of most intricate mouldings in any kind of stone. Our lathes are largely used in Aberdeen and other parts of England and Europe, and all the imported granite columns in this city were turned by them.

Although the mode of applying the circular cutter as described was a complete success in the lathe, when we came to extend its application to dressing plane surfaces, many difficulties arose.

The machine finally devised as a chuck, or cutter-carrier, is a circular cast-iron box bolted to the flange of a hollow shaft. Into it are fitted the cutter spindles, three, six, nine or twelve in number, according to the size of the chuck. These spindles carry the cutters at their lower ends. On each spindle is keyed a bevel pinion, and all the pinions contained in a chuck gear are driven by a central bevel wheel keyed on a central shaft, which passes through the hollow shaft and receives motion by means of a pulley. The chuck is driven by another pulley. The diameters of these pulleys and of the drums driving them are so adjusted that the cutter edge shall exactly roll in the track it describes while being carried around by the chuck.

With an exact roll of the cutter edges on the stone there would be no attrition at all; but coincident with the roll of the cutter there is a forward movement of the stone, which is in fact a rub distributed over the edge of the cutter as it rolls, and to this it is due that there is any appreciable wear of the cutters at all. Since the cutters roll whether they are on the stone or not, they can be driven at great speed, and to those practically conversant with the mason's art the most surprising characteristics of these machines is the velocity with which the cutters pass over the stone without sparks or injury. The speed of a chuck, according to its size, varies from 250 to 500 revolutions per minute, giving to the cutter a circumferential velocity of about 2,000 feet per minute. Experience has shown that the greater the velocity the better the machine acts. Oil as a lubricant is not to be thought of for a moment, as dropping upon the stone it would spoil it. Lubrication is accomplished by the use of soap and water: the chuck is kept about one-third full, and when in motion the soap and water finds its way to all the parts.

I have next to explain a refinement which is of great value, namely, the placing of the cutters in steps, so as to cut at different levels. We usually employ the cutter in three planes: those working in the first plane dress off the great bulk of stone to be removed; those in the second take a less heavy cut, and those in the third take a light cut, and put a finish on the stone. Not only are you thus able to take cuts from one to two inches in depth, and to finish the surface at one traverse, but the danger of plucking it is entirely removed. We have thus been able to dress such stones as the lithographic stone without plucking, which is absolutely impossible to dress by hand.

For all kinds of sandstones, grindstones and freestones, as well as for the magnesium limestones and oölites, chilled-iron cutters answer perfectly. They are constructed as hollow truncated cones, and are chilled on the outer conical face, so that as the cutter wears and is ground on the lower edge or base of the cone, the cutting edge is always formed against the chilled surface. The endurance of these cutters is very great. In a six-cutter chuck, pressing from forty to fifty square feet of Newcastle millstone grit per hour, the cutters will last several hours without changing. For hard limestone and marble, steel cutters are necessary; but the wear is quite insignificant, a set of cutters lasting several days without changing. For granite steel cutters are necessary. Their wear depends on the hardness and composition of the stone. But in all cases the tool-cost is very considerably less than that attendant on hand labor. A cutter is ground very quickly by means of an ordinary grindstone with a simple mechanical appliance, and is then ready for use again. A cutter will usually last for twenty such grindings. When the diameter of a steel cutter is too much reduced by grinding to be of service on the surfacing machine, it can still be used on the lathe. The chuck cutters are capable of putting the finest arrises on all stones but granite. The crystals in granite are apt to break out, but with a very simple auxiliary machine the sharpest arrises and corners can be readily cut. The machines are provided with several tables, so that while one stone is being dressed another is fixed on another table, and the tables follow each other almost continuously through the machine. Our cutters travels through ordinary granite at the rate of a foot a minute, cutting a strip fifteen inches wide. This is at the rate of five superficial feet in four minutes. A very good stone-cutter will scarcely accomplish this in a day of ten hours. Hard marble and limestone are surfaced at about the same speed; but the rate of surfacing freestone is much greater, as the average speed of travel of the stone through the cutter is from eighteen to twenty-four inches per minute. The surfaces left by the machine are perfectly true, and the stone is left without any of the bruising and disintegration of the surface which is inevitable when stone is dressed by percussion. Machine-dressed stone is therefore admirably fitted to resist atmospheric influences and to receive a polish if desired. — *Boston Transcript.*

NOTES ON BUILDING WOODS.

PASSING on to American woods, we have first to consider yellow [Canadian] pine. This wood comes over both in logs and deals, and both are used for joinery purposes. Pine deals are, however, never used for bearing purposes, for which they are unsuitable altogether, but the logs are often used for beams, and previously to the general adoption of pitch-pine, they were frequently brought into service.

The advantage of yellow-pine logs for the making of large beams is that they are much lighter than are pitch-pine logs, and they also taper much less: thus yellow (or white) pine logs are often employed where a great distance is required to be spanned. Yellow pine possesses more tenacity than pitch-pine, the strength of the latter-named logs sometimes being affected by the tapping process they are subjected to in the collection of their resin. This sometimes so weakens the logs that, under a pressure suddenly applied, they have been known to snap. Unquestionably yellow pine is the most suitable wood for inside joinery purposes, and it should therefore always be specified for the making of inside doors, mouldings, skirting-boards, etc. The advantages associated with its use are that it is capable of receiving a higher state of finish than either redwood or whitewood, and it warps less, and is generally less affected by heat than either of the latter woods. Of all the known woods pine takes paint the best. There are several sorts of inferior pine deals, such as Miramichi and Richbucto pine deals, so called from the ports whence they are shipped; but these shipments are immensely inferior to the Quebec pine deals, and therefore, when pine is desired, architects should clearly specify that all the inside-joinery work of their building shall be manufactured out of Quebec yellow pine, of good quality.

Pitch-pine varies very little in quality, and it is mostly of good quality. It is also a very cheap wood. No other wood possesses so few (other than what may be termed natural) defects as pitch-pine. The logs when cut into nearly always open clear and clean. They reach this country in two forms of manufacture, viz.: in a hewn and in a sawn form. The natural faults of pitch-pine are that it is heavy, that it tapers very much, and that it lacks tenacity. The sawn logs, of course, have not the fault of tapering. American spruce comes only in the shape of sawn deals and battens. It is a good weight-carrying wood, and it is a cheap wood; it also comes forward abundantly in useful sizes. Doubtless the immense yearly importations of spruce into this country have been, and are likely to continue to be, of the greatest service. In the large industrial towns of Lancashire, spruce

is reckoned, on account of its cheapness, to be the most desirable wood that can be employed for the joists and roofs of factories.

Placed in such positions, where the air is usually dry, it may, and indeed it is said to, supply every requirement demanded of it. There can be no doubt that spruce is a tenacious and excellent weight-carrying wood so long as it retains its soundness. Our experience of spruce, however, is that it is likely to rapidly decay, if it be placed under conditions that are in any way unfavorable to wood retaining its soundness. Some architects specify spruce for the flooring-boards of factories and cottage tenements. In those districts where the operatives wear wooden clogs and hob-nailed boots it is a most useful wood for flooring purposes, on account of its tough hard-wearing nature. The softer whitewoods of Sweden, Norway and Russia are of much finer quality, but they are desirable only for floors that are intended to be protected by a covering of carpet or other similar material. The choice of woods intended to be used in a building must, for the purpose of securing economy, of course be largely regulated by geographical considerations. Some ports, like Liverpool, for instance, are to be regarded as purely American ports, and at the towns, therefore, in the vicinity of Liverpool, American woods must be mainly employed.

We have not desired in this paper to offer any extended remarks concerning the suitabilities of the various kinds of building woods imported, because, beyond defining the species of wood required by such general terms as redwood fir, whitewood fir, American spruce, Quebec yellow pine, Canadian pitch-pine, etc., we do not think that architects would or could benefit themselves. The selection of the timber, further than the species required, should be left to the experience of the builder, aided, as it will be by the knowledge he will have of the ever-changing conditions of the timber markets. To trespass upon the domain of the trader is no part of an architect's profession. A knowledge, however, of the technical or trade names by which the different species of building woods can alone be recognized, is an imperative necessity to architects; for, in the absence of it, complete ambiguity is likely to characterize their wood-work specifications.—*The Builder.*

MONTHLY CHRONICLE.

April. Death of Dante Gabriel Rossetti, poet and artist.

April 2. Wind-storm destroys several buildings at Reading, Pa. Several lives lost.

April 2. Burning of the Dakota Territorial Insane Asylum at Yankton, Dak. T. Three insane patients burned to death; the remainder of the fifty-four patients are safely removed.

April 4. Burning of the business portion of Hopkinton, Mass.

April 5. Cyclone destroys one house at Clay Centre, Kansas. One life lost, six persons injured.

April 6. Tornado passes through Homer, Williams, Beaver, Kawkawlin, Au Gres, to the north and west of Bay City, Mich., doing much damage.

April 7. A cyclone from the south-west passes through Rice, Stafford, Butler and Clay Counties, Kansas. Three lives lost.

April 7. Cyclone destroys several buildings at Fort Riley, Kansas. No lives lost.

April 10. Death of Julius Etienne Joseph Quicherat, archæologist.

April 16. Burning of the theatre at Schwerin, Germany, during the performance. The audience escapes uninjured. Building totally destroyed.

April 17. A cyclone destroys the business portion of Brownsville, Mo. Eleven lives lost, two hundred and fifty wounded.

April 17. The roof of Doc Gully tunnel, on the Baltimore & Ohio railroad, thirty-three miles east of Cumberland, caves in, burying twelve laborers under the débris, and maiming them in various ways, some probably fatally.

April 19. Several houses at Scotsdale blown down.

April 19. Cyclone passes through the region between Broadford and Pennsville, Pa. Heavy damage to buildings. Two lives lost. Many persons injured.

April 19. Whirlwind at Carrollton, La., destroys twenty-five houses. One life lost.

April 20. Death of Charles Robert Darwin, man of science.

April 20. Death of Henri Gifford, engineer and balloonist.

April 22. Tornado from the west passes through Cairo, Ill., destroying five buildings, one of them a church. No lives lost.

April 22. A cyclone with a track half a mile wide, destroys the town of Monticello, Miss., (population 150) leaving only three buildings standing. Fifteen persons killed, thirty wounded.

April 22. Burning of the town of Lake City, Minn. Loss about $400,000. No lives lost.

April 22. A cyclone passes through Dallas, Bibb, Twiggs, Jones and Wilkinson Counties, Ga., doing much damage to buildings. Seven lives lost.

April —. Death of Sir Henry Cole, C. B., founder of the South Kensington Museum.

April 24. Business portion of Eau Clare, Wis., destroyed by fire.

April 26. A tornado passes through Lewis County, Ky.; probably the same one visits Laurence Creek, O. Several persons injured, none fatally.

April 27. Death of Ralph Waldo Emerson, poet and philosopher.

BUILDERS' SCAFFOLDING.

April 8, 1882.

To the Editors of the American Architect:—

Dear Sirs,—The writer of the papers on "Builders' Scaffolding" did not have an opportunity of reading Mr. Berg's criticism in your issue for April 1st, until his arrival in Boston on the 6 inst., as for the past two months he has been moving about in Western towns where the *American Architect* is not kept on sale; therefore he could not reply to the criticism in the same issue in which it appeared, as your courtesy would have enabled him to do.

He therefore desires to state that the shape in which the modified Gordon's formula was incidentally introduced in article under above caption was that which was believed would be the most readily understood by those unaccustomed to reading formulas. The shortening the tediousness of the operations indicated or actually involved not being *yet* discussed, Mr. Berg is prematurely judging the article from an isolated part of it.

The foot-note was intended to read 4,800 lbs. is the crushing resistance per square inch, obtained from 2″ cubes.

The breaking weight as the value of the formula stated to be per square inch, was a mistake inadvertently made in hurriedly copying out his original notes while recovering from a painful sickness.

Of course, he is glad to have the criticisms, and invites more; and when given and received in a friendly spirit it will bring more pointedly before the student points with which he should be impressed.

With regard to the 4,800 unit crushing strength of white pine: it was the nearest usual constant which would represent the weaker kind of lumber which is used for scaffolding. If your correspondent will divide 20,000 by ¼ square inch, he will get 5,000, which some reliable authorities use. Your correspondent is probably not aware of the great disparity which experimental tests on a large scale has revealed, ranging from ⅓ to ¼ less than the constants gave as breaking strength.

Alexander Black.

In the last portion of the article, page 151, first column, 2½″ for thickness of brick, should read 2½″.

VICTORIA GOTHIC.

To the Editors of the American Architect:—

Sirs,—I am a student of architecture, and have been accustomed to consider Gothic architecture more capable than any other historical style of being modified to meet modern requirements. It was therefore with surprise that I read in your editorial columns of April 8th the following reference to the design for the new library of Congress:

"The elevation presents a mass of Victoria Gothic somewhat undisciplined but well divided, and capable with sufficient study of being made rich and effective. That it can hardly be more than this is not the fault of the architect, as we understand, but of the committee, who forced upon him, for some reason of their own, the employment of an extravagantly costly, inconvenient, and almost obsolete style, in place of the much more appropriate Renaissance which he had intended to use; and any beauty which he can bring out of the materials before him will add the more to his credit."

Information on the following points will be interesting to me, and I doubt not to many others among your readers.

1. Wherein is the Gothic style necessarily "extravagantly costly?"
2. Wherein is it necessarily "inconvenient?"
3. Is architecture a matter of fashion, like millinery, and would you advise an architect to abandon his reasoned convictions when they become "almost obsolete?"
4. Why is Renaissance "much more appropriate" for a library than Gothic?
5. What are the artistic qualities, beyond richness and effectiveness, which can be attained in Renaissance and cannot be attained in Gothic?

Respectfully yours, Ernest Greene.

[1 and 2. The Gothic style is not in itself extravagantly costly or necessarily inconvenient: as interpreted, however, by those architects whose works the design for the Congressional Library resembles, it is generally both.

3. Architecture is very much a matter of fashion. There are usually at least two ways of solving a given architectural problem, and it is in general best to choose the one most in harmony with the prevailing taste in such things. As to "reasoned convictions" about pointed arches and jamb columns—that is another thing: architects who have such must be their own advisers, so far as we are concerned.

4. Renaissance would be more appropriate than Gothic to a public building in Washington, because all the other important edifices in the city, with the single unhappy exception of the Smithsonian Institution, are in that style.

5. Having other duties which will necessarily occupy a portion of the remainder of our lives, we think it best not to open a discussion on this question, which, at the best, has no bearing whatever, so far as we can see, upon the points in our note which our correspondent wishes explained. These related to the design of the library, rather than to the merits of styles in general, and it would be unfair to the architect to criticise his work as shown by such inadequate drawings as those published.—Eds. American Architect.]

THE MEMORIAL TO COLONEL SHAW.

Boston, April 29, 1882.

To the Editors of the American Architect:—

Dear Sirs,—It may well be said that in the preparation of the architectural design to sustain the memorial to Colonel Shaw, Mr. St. Gaudens will have the aid of Mr. H. H. Richardson.

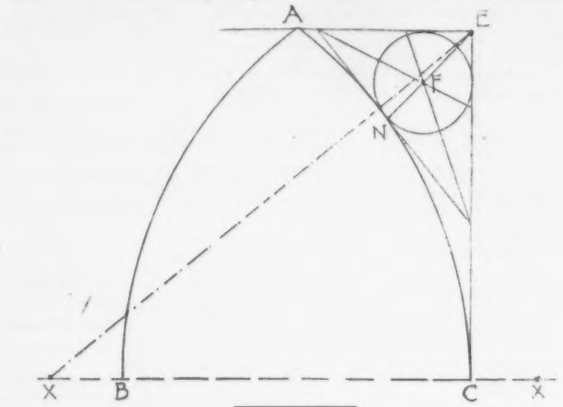
Yours truly, Edward Atkinson, Treasurer.

THE PROBLEM OF THE SPANDREL.

New York, April 25, 1882.

To the Editors of the American Architect:—

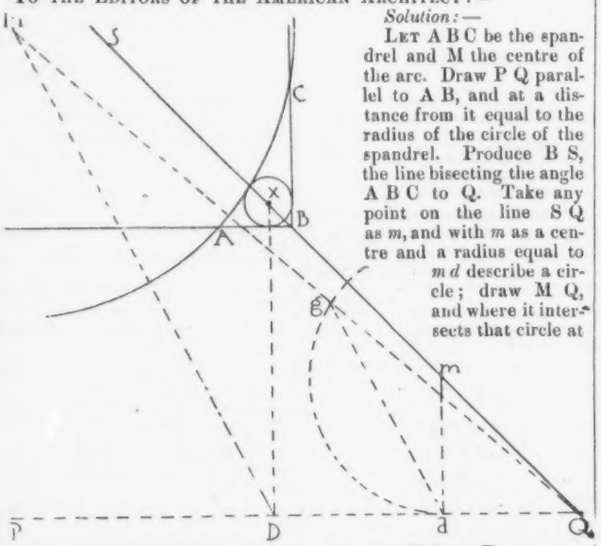
Dear Sirs,—I take issue with Mr. Miles on the subject of the spandrel and inscribed circle, for I find the rule given by "Another Student" works equally well whether the horizontal and vertical lines are equal to each other or not. I think the mistake of Mr. Miles lies in constructing the triangle incorrectly. In the accompanying sketch—certainly the most different from a round arch—it will be noticed that the centre F does not lie on the line of the centre of the arch E X, but that the triangle is constructed by drawing a perpendicular to that line; the centre F of course lies on the line E N, bisecting the angle, but not, as Mr. Miles supposed, necessarily the arc. Yours very truly, Edward Chestre Smith.



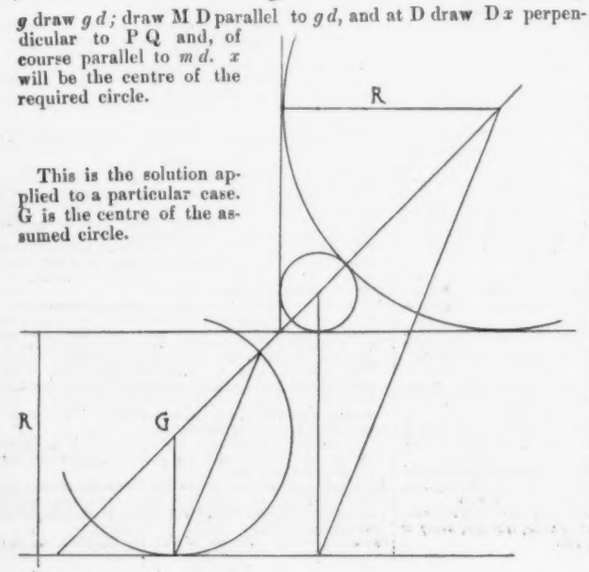
To the Editors of the American Architect:—

Solution:—

Let A B C be the spandrel and M the centre of the arc. Draw P Q parallel to A B, and at a distance from it equal to the radius of the circle of the spandrel. Produce B S, the line bisecting the angle A B C to Q. Take any point on the line S Q as *m*, and with *m* as a centre and a radius equal to *m d* describe a circle; draw M Q, and where it intersects that circle at *g* draw *g d*; draw M D parallel to *g d*, and at D draw D *x* perpendicular to P Q and, of course parallel to *m d*. *x* will be the centre of the required circle.

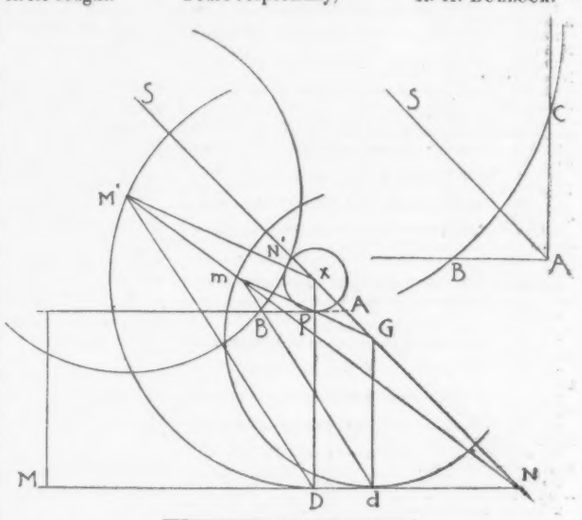


This is the solution applied to a particular case. G is the centre of the assumed circle.



The problem may also be solved in the following manner:—

Let A B C be the given spandrel and A S the line bisecting the right angle. Now since it is evident that a circle which is tangent to A B will also be tangent to A C we may dispense with either A B or A C; suppose A B is used. Now find the centre and radius of the arc B C; then draw a line M N, Figure 2, parallel to A B and at a distance from it equal to the radius of the arc of the spandrel. Now suppose the required circle is found, then it is evident that $M'N + xN'$ is equal to $DP + Px$, because P D and M′ N′ were made equal. Hence, if a circle can be found whose centre lies on A S, tangent to M N and passing through the centre M′, the problem is solved. This is very easily done by similar triangles. Take any point, G on A S or A S produced, and with G as a centre and a radius equal to the perpendicular G *d*, describe a circle and draw the line M′ N; then *m* is a point similarly situated on the auxiliary circles; draw *m d* and through M′ draw a line M′ D parallel to *m d*, and at D erect a perpendicular D *x*. *x* will be the centre of the circle sought. Yours respectfully, R. H. Bullock.



PORTABLE HOUSES.

To the Editors of the American Architect:—

Gentlemen,—Can you or some of your readers tell me of any builder or building company who supplies sectional or other ready-made buildings in such shape that they can be easily transported and put up? Very truly yours, P.

[We feel certain that if the makers of portable houses, of whom we believe there are several in the country, knew how many inquiries for such buildings reach us in the course of the year, they would keep their advertisements constantly in our columns. The only firms whose addresses we can at present recall are those of the Portable House and Manufacturing Company, 335 Broadway, New York, and the Adjustable Building Company, 132 Broadway, New York. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Restoration of Architectural Structures.—T. V. Parravicini severely criticises the rage for restoration which has prevailed so largely during the last half-century. While much good may have resulted from the minute investigations and profound architectural studies to which they have given rise, he fears that, if the buildings continue to be treated as they have been, our grandchildren will be unable to form any idea of their original beauty. In many cases more has been done for the destruction of noble monuments of art than had been accomplished in the preceding ages of ignorance, barbarism, and devastation. When the strange and fatal idea of restoration first arose, monumental archæology was still in its infancy, and had not learned that the historic and artistic importance of a building depends wholly upon the authenticity of its various parts. The idea of the restorer implies the possibility of taking from a monument some part of its life, with the sole object of representing in the building the best times in its history, or giving it a unity of style which it never had, without any other guide than individual caprice. In past ages any suspicion of falsification was removed by the fact that builders had no knowledge of preceding styles: hence, when any repairs or changes were made, they necessarily followed the fashions of the time, and thus maintained a truthfulness which should always characterize the highest excellence in art.—*Il Politecnico.*

Injurious Elements of Illuminating Gas.—M. Pobek, of Breslau, finds that the chief poisonous agent in illuminating gas is carbonic oxide. In some cases, when the gas traverses a stratum of ground which is not yet saturated, it deposits the hydrocarburets which give it its characteristic odor and then diffuses itself in dwellings without its presence being perceived. In such cases the danger of explosion is added to that of poisoning. Explosions are comparatively rare, because the definite proportions which are required for an explosive mixture are not present. When the gas is imperfectly burnt, as in heating apparatus, there is an excess of moisture which is injurious to health.—*Chronique Industrielle.*

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.]

256,816. Hinge. — John G. Beck, Mechanicsburg, Ill.

256,852. Paint-Distributor. — Abner Peeler, Fort Dodge, Iowa.

256,860. Portable Summer-House. — Netta G. Rood, Evanston, Ill.

256,867. Wrench. — John Thomson, Brooklyn, N. Y.

256,874. Fire Escape. — Nicholas H. Borgfeldt, New York, N. Y.

256,882. Heating-Drum. — Charles H. Chapman, Joplin, Mo.

256,916. Art of Staining or Enamelling Glass, etc. — Sydney J. Newsham, New York, N. Y.

256,919. Chimney. — Jacob M. Patterson, Woodbury, N. J.

256,926. Door-Knob Alarm. — John Simon, New York, N. Y.

256,929. Door-Hanger. — Le Grand Terry, Dundee, N. Y.

256,981. Automatic Gate for Elevators. — James Cushing, Dubuque, Iowa.

256,990. Fire-Escape. — Frank P. Fish, New York, N. Y.

256,991. Lathe for Turning Polygonal Bodies. — John H. Fisher and Cassius Peck, New York, N. Y.

256,938. Extension-Leg for Scaffold-Supports. — Joseph Gorman, Elizabeth, N. J.

257,016. Platform-Elevator. — Thomas Keith, New York, N. Y.

257,022. Strap-Hinge. — William M. Kurtz, Columbus, Ohio.

257,041. Miter-Box or Gauge. — John J. Meyers, Buffalo, N. Y.

257,046. Well-Lining Apparatus. — Alfred W. Morgan, Indianapolis, Ind.

257,048. Sash Fastener. — Daniel P. Morrell, South Norwalk, Conn.

257,061. Imitation of Marquetry by Painting. — William Schroeder, San Francisco, Cal.

257,107. Air-Flue Register. — Henry A. Tobey, Dayton, O.

257,141. Door-Bolt. — William B. Purves, Chicago, Ill.

257,142. Sash-Balance. — Thomas H. Bonham, Grand Rapids, Mich.

SUMMARY OF THE WEEK.

Baltimore.

Building Remodelled. — Janney estate, building n e cor. Holliday St. and Exchange Pl., converted into offices; cost, $8,000; Mr. Chas. L. Carson, architect; Messrs. Wm. Ferguson & Bro., contractors.

Warehouses. — Mr. Thos. H. Gaither, 2 six-st'y warehouses, in place of old buildings now being torn down, Nos. 269 and 271 West Baltimore St.; brick, stone, iron and terra-cotta will enter into the construction of the new buildings; Mr. Jackson C. Gott, architect; Mr. Henry C. Albaugh, builder.

Store and Hall-Building. — Mr. Moses Fox, three-st'y and mansard roof brick building, 25' x 90', to be built corner of Baltimore and Bond Sts., and consist of store, two halls, and photograph gallery; cost, $5,000; Mr. Geo. Archer, architect.

Building Permits. — Since our last report thirty-five permits have been granted, the more important of which are as follows: —

Geo. G. Sickel, three-st'y brick building, Holland St., e of Aisquith St.

M. L. Strauss, two-st'y brick stable, in rear of No. 250 Eutaw St., between Henrietta and Montgomery Sts.

John A. Hammon, four-st'y brick warehouse, No. 46 Howard St., s of Lexington St.

John Allback, three-st'y brick building, Hull St., between Beason and Marriott Sts.

Dr. Theo. Cook, two-st'y brick building, Charles St., 16' s of Randall St.

Mrs. G. H. William, 3 three-st'y brick buildings, Gittings St., commencing 100' w of Williams St.

Lewis C. Smith, 6 two-st'y brick buildings and 1 three-st'y brick building s e cor. Randall and Charles Sts.

A. D. Clemens, two-st'y brick shop, 18' x 70', North St., between Centre and Bath Sts.

Traders' National Bank, two-st'y and mansard roof brick bank-building, German St., between Calvert and Light Sts.

A Hillman, 3 two-st'y brick buildings, Chase St., between Enor St and Harford Ave.

J. J. Abraham, 2 one-st'y brick sheds, on old Canton Marine Railway Co.'s property, s of Boston St.

John Farber, three-st'y brick building, n w cor. North and Pleasant Sts.

Boston.

The Post-Office Extension. — The last stone has been laid in the construction of the post-office and sub-treasury building on Post-Office Square.

Y. M. C. A. Building. — $67,105 of the $70,000 asked for by the trustees of the Boston Young Men's Christian Union, for the enlargement of its building on Boylston Street, is announced by Hon. Otis Norcross, treasurer.

Building Permits. — *Brick.* — *Waverley St., No.* 71, Ward 21, for Robert B. and B. Wm. B. Williams & Hall, 3 dwells., 22' x 37', three st'y.

Waverley St., No. 71, Ward 21, for James W. Newell, 6 dwells., 22' x 37', three-st'y.

Wood. — *Maxwell St.*, near Milton Ave., Ward 24, for M. H. Jackson, dwell., 22' x 32'; ell, 15' x 18', two-st'y; M. H. Jackson, builder.

Market St., rear of, cor. Faneuil St., Ward 25, for Julius Picot, carriage-shed, 20' x 60'; Fogg & Watson, builders.

Milton Ave., cor. Rockwell St., Ward 24, for Hammond H. Haskell, dwell., 26' x 34', two-st'y; Ezra Heustis, builder.

East Sixth St., opposite Q St., Ward 14, for Geo. Grant, hotel and saloon, 40' x 50'; ell, 15' x 32', two-st'y; Fogg & Watson, builders.

Circuit St., near Summit St., Ward 21, for Orrin G Mosar, 2 dwells., 15' and 20' x 37'; ell, 15' x 32', two-st'y; Wm. R. Hudson, builder.

Glenn St., rear, near Trull st., Ward 24, for Samuel Clapp, stable, 18' x 31'.

Thornley St., near Dorchester Ave., Ward 24, for Neil McNeil, dwell., 28' and 30' 2" x 34', two-st'y; McNeil Bros., builders.

North Beacon St., Ward 21, for Geo. W. Hollis, 4 dwells., 13' and 20' x 46', two-st'y; Jacob W. Berry, builder.

Unnamed St., from North Beacon St., Ward 25, for Geo. W. Hollis, 2 dwells., 13' and 20' x 46', two-st'y; Jacob W. Berry, builder.

West Seventh St., No. 76, Ward 13, for John Wartz, dwell., 21' x 33', three-st'y.

Baltar St., Nos. 303-309, for Samuel K. Williams Estate, 4 dwells., 18' x 34', two-st'y; J. T. Tighe, builder.

Erie Ave., near Merrill St., Ward 24, for Wm. H. Wallace, dwell., 20' x 35', two-st'y mansard; Wm. H. Wallace, builder.

Erie Ave., cor. Merrill St., Ward 24, for Wm. H. Wallace, dwell., 18' 6" and 24' x 42', two-st'y mansard; Wm. H. Wallace, builder.

Wyman St., near Curtis St., Ward 23, for Ernst L. Kreppel, dwell., 21' x 30', two-st'y; Jacob Luippold, builder.

Blue Hill Ave., cor. Southwood St., Ward 21, for J. C. and E. A. Lord, 2 dwells., 20' 2½" and 20' 6" x 52' 5", three-st'y; Adam Holm, builder.

Brooklyn.

Building Permits. — *Walton St., No.* 176, s s, 225' w Throop Ave., three-st'y frame tenement; cost, $4,500; owner, Jacob Lies, 134 Walton St.; architect, Th. Engelhardt; builders, H. Grasman and D. Kreuder.

North Eighth St., n s, about 50' e Sixth St., one-st'y brick factory; cost $5,000; owners, Edgar Holliday's Sons, on premises; architect, E. F. Gaylor; mason, J. Rodwell.

Dikeman St. and Partition St., s and n s, 125' w Ferris St., two-st'y building for machine shop; cost, $15,000; owner, Lidgerwood Mfg. Co., 96 Liberty St., New York; architect, Q. V. Beekman; builders, P. Carlin & Son and Jas. Martin.

Seventeenth St., n s, 20' e Eighth Ave., three-st'y brick tenement; cost, $6,000; owner, architect and builder, Thos. Green, 195 Sixth Ave.

Oakland St., w s, 100' n Eagle St., three-st'y brick tenement; cost, $4,900; owner, —— Riesker, 4-6 Manhattan Ave.; architect, F. Weber; builders, M. Vogle and J. D. Eggers.

Richards St., w s, 204' s Elizabeth St., 2 one-st'y brick storehouses; cost each, $8,000; owners, Beard & Robinson, 149 Amity St.; builders, —— Bentzen and H. Turner.

Carroll St., Nos. 584 *and* 586, s s, about 320' w Fifth Ave., 2 three-st'y brick tenements; cost, each, $3,500; owner, E. S. Plant, on premises; architect, J. D. Hall; builder, R. F. Clayton.

Pulaski St., s s, 275' w Marcy Ave., 5 two-st'y and attic frame dwells.; cost, each, $4,000; owner and builder, Thos. E. Greenland; architect, I. D. Reynolds.

Floyd St., n s, 25' e Sumner Ave., 2 three-st'y frame stores and tenements; cost, $4,400 each; owner, John Kramer, Floyd St., near Sumner Ave.; builder, John Rueger.

Twentieth St., n s, 80' w Seventh Ave., two-st'y frame dwell.; cost, $2,600; owner, Joseph Clark; architect, Thomas F. Houghton; builder, P. J. Carlin.

Java St., n s, 75' e Franklin St., 3 three-st'y brick dwells.; owner, G. J. Roberts, 157 Kent St.; architect, F. J. Evan.

McDonough St., n s, 350 w Reid Ave., 3 two-st'y and basement brown-stone dwells.; cost, $3,000 each; owner, R. H. Hensman, 904 Madison St.

Franklin Ave., e s, 131 n Butler St.; also, *Butler St.* s e cor. Franklin Ave. (4 on Franklin Ave. and 10 on Butler St.), 14 three-st'y frame dwells.; cost, $2,000 each; owner, Emerson W. Perry; architect, Amzi Hill; builder, T. S. Denike.

Decision Ave., s s, 106' 5" w Clymer St., three-st'y brick store and dwell.; cost, $8,000; owner, August Waeldin, Division Ave., opposite Fifth St.; architect, John Platte; builders, G. Lehrain and F. J. Berlenback.

Monroe St., s s, 225' w Reid Ave., two-st'y and basement brick dwell.; cost, $2,500; owner, G. E. Miller, 72 Stanhope St.; architect and builder, Thos. Miller.

Third Ave., e s, 90' n Bergen St., one-st'y brick storehouse for brewery; cost, $2,000; owner and builder, Long Island Brewery, 81 to 91 Third Ave.; architect, M. J. Morrill.

Alterations. — *Livingston St.*, s s, between Court St. and Boerum Pl., 3 brick extensions; also, basement partitioned, etc.; cost, $15,000; owners, trustees Brooklyn Eye and Ear Hospital; architect, Henry Dudley; builder, P. Castner and Edwin Burnet; plumber, Jas. Powers.

Plymouth St., Nos. 250 *and* 252, brick rear foundation, etc.; cost, $2,000; owners and architects, Cary & Hooper, on premises; builder, E. S. Force.

Walworth St., w s, 140' n Willoughby Ave., one-st'y brick extension; cost, $2,500; owners, Doty & McFarlan; builder, Jas. Lock.

Chicago.

Library. — The corner-stone of the new Hammond Library which is to form a wing of the Chicago Theological Seminary, on the corner of Warren and Ashland Aves., was laid April 27.

Building Permits. — Alice M. Butterfield, three-st'y brick dwell., 23' x 64', 97 Elm St.; cost, $6,400.

James Frake, two-st'y and basement brick dwell., 45' x 62', 627 and 629 Fulton St.; cost, $10,000.

Walter Reeves, one-st'y brick cottage, 21' x 50', 577 West Harrison St.; cost, $2,100.

A. Holmgren, two-st'y brick dwell., 22' x 45', 53 Hurlbut St.; cost, $3,000.

Kent Bros., two additional stories, 45' x 80', 151 and 153 Monroe St.; cost, $12,000.

F. Albrecht, two-st'y and basement brick dwell., 21' x 54'; 129 DeKoven St.; cost, $3,700.

Steinmetz & Eilenberger, 2 two-st'y and basement brick dwells., 44' x 72'; S. Park Ave., near Thirty-second St.; cost, $13,000.

Klausner Bros., three-st'y and basement stores and dwells., 48' x 50', s w cor. Ogden Ave. and Harrison St.; cost, $11,000.

Z. C. Peck, two-st'y brick barn and milk depot, 26' x 52', 259 and 263 Franklin St.; W. J. Brookes, architect; cost, $2,500.

Maurice Einstein, two-st'y brick barn, 25' x 38', 1628 Prairie Ave.; cost, $3,000.

North Chicago City Railway Co., two-st'y brick barn, 100' x 200', Clybourn and Racine Aves.; cost, $ 0,000.

Chas. Roehl, one-st'y brick basement, 20' x 60', 772 West Lake St.; cost, $2,500.

A. F. Waite, 3 two-st'y cellar and attic brick dwells., 62' x 69', Astor St., n of Division St.; cost, $25,000.

Mrs. M. E. Quinn, two-st'y brick flats, 27' x 50', 411 Leavitt St.; cost, $5,500.

J. J. Clause, one-st'y and basement brick machine shop, 50' x 75', Market and Ontario Sts.; cost, $6,000.

W. A. Gibbs, two-st'y brick addition to dwell., 27' x 34', 43 Twenty-fourth St.; cost, $2,500.

Mrs. A. Kuehne, two-st'y brick dwell., 21' x 60', 3557 Vincennes Ave.; cost, $4,500.

J. M. Hutchinson, two-st'y brick dwell., 25' x 70', 547 West Jackson St.; cost, $6,500.

Chicago West Division Railway Co., two st'y barn, 129' x 140', on Lumber St., near Johnson St.; cost, $18,000.

Ignatz Fakel, two-st'y brick dwell., 20' x 40', 527 Eighteenth St.; cost, $2,700.

A. S. Brown, one-st'y and basement brick cottage, 22' x 48', Maplewood Ave., near North Ave.; cost, $2,400.

J. Frick, three-st'y brick dwell., 23' x 57', 422 Oak St.; cost, $8,000.

Cincinnati.

Building Permits. — Since our last report the following building permits have been issued: —

F. Langdon, repair Second German M. E. Church, Everett St., near Linn St.; cost, $2,000.

H. Brokamp, two-st'y brick dwell., Liberty St., between John St. and Central Ave.; cost, $2,000.

J. W. Barton, addition to three-st'y brick dwell., Ohio Ave.; cost, $2,400.

Wm. Sparring, two-st'y frame dwell., 1838 Eastern Ave.; cost, $3,000.

A. Snelling, three-st'y brick dwell., 218 Clark St.; cost, $5,000.

St. Xavier's Catholic Church to rebuild, church recently destroyed by fire; Louis Picket, architect; cost, $80,000.

G. Stutzman, two-st'y frame dwell., Railroad Ave., near Main St.; cost, $2,300.

G. H. Hill, repair three-st'y brick dwell., 131 and 133 West Front St.; cost, $5,000.

J. All, three-st'y brick dwell., Hopkins St., between Central Ave. and John St.; cost, $6,500.

J. T. Jones, five-st'y brick printing-house, No. 51 Longworth St.; Charles Crapsey, architect; cost, $20,000.

G. T. Roberts, repair four-st'y brick dwell., cor. of Eighth and Race Sts.; cost, $6,500.

H. Michael, three-st'y brick dwell., McMacken Ave., near Walnut St.; cost, $4,500.

H. Werdman, three-st'y brick dwell., Cutter St., between Court and Clark Sts.; cost, $4,300.

Mills & Kline, 4 one-st'y frame dwells., Poplar St., near Western Ave.; cost, $2,400.

J. Lowman & Co., addition to four-st'y store, corner of Pearl and Race Sts.; cost, $3,000.

A. W. Anderson, three-st'y brick dwell., Richmond St., near Harriet St.; cost, $7,000.

Chas. M. Steele, 7 two-st'y frame dwells., Walker Mill Road; cost, $6,000.

P. S. Kivlahy, two-st'y frame dwells., 28 Baum St.; cost, $3,000.

Twenty-three permits for repairs, costing $10,800.

New York.

Hotel. — For Messrs. Robert & Ogden Goelet, plans have been drawn for a hotel, about 90' x 120', which they propose to build at the cor. of Broadway and Forty-third St. It is to be of brick with terra-cotta trimmings; architect, Mr. Hugo Kafka.

Studio Building. — Mr. Rd. M. Hunt has drawn the plans for a three-st'y studio building, 25' x 92', to be erected at No. 9 West Forty-ninth St., for John Q. A. Ward, to cost $12,000.

Apartment-Houses. — Two apartment-houses, 40' x 90' each, are to be built on Sixtieth St., w of the Boulevard. The fronts will be of polished granite up to the second story; above will be brick, with polished granite and terra cotta trimmings.

On Fifty-seventh St., between Fifth and Sixth Aves., seven-st'y apartment-house, 75' x 90', to be of brownstone, is to be built for Mr. Tallman, at a cost of about $200,000. The building will be fire-proof; Mr. H. J. Dudley is the architect.

Messrs. Fife & Campbell have purchased a portion of the Gramercy Park Hotel property, and will alter it into French flats.

Hospital. — The St. Vincent's Hospital, owned by the Sisters of Charity, is to have a very extensive addition made on West Twelfth St., from designs of Mr. Wm. Shickel.

Church. — The Church of the Incarnation, on the

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

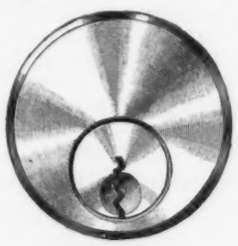
No. 4.] SATURDAY, MAY 6, 1882.

THE NEW YALE LOCK AND CORRUGATED KEY.

The Yale Lock Manufacturing Company of Stamford, Conn., have just brought out, as is conceded by all who have had the opportunity of examining it, the most important addition to the safety mechanism of locks, and the most radical improvement in keys, which have been made since Linus Yale, Jr., about 1861, by the introduction of the original Yale Lock, with its small flat key of sheet metal, revolutionized the art of lock-making in America.

No. 1.

The new Yale Corrugated Key, as shown in cut No. 1, consists of the original plate key, altered only by having its blade, or portion which enters the lock, corrugated in longitudinal lines. By special machines, of great ingenuity, the lock has formed in it a key-hole of sinuous cross-section conforming to that of the key, as shown by cut No. 2.



No. 2.

By means apparently so simple, improvements have been effected of the utmost importance, both in the lock and its key, which have made the New Yale Lock as much better than the original Yale Lock as the latter is conceded to be superior to other locks.

In imitation of the original Yale Locks, many cheap and insecure locks have been furnished with flat keys, and palmed off at high prices by calling them "Yale" Locks; but the genuine Yale Locks (all of which are plainly stamped with the company's name) wherever known, are the recognized standard of excellence for safety, non-interchanging of keys, and good workmanship.

Not content with the achieved position of their products, it has for years been the practice of this company to continually experiment, often at large expense, for their still higher development. The improvements herewith presented embody their efforts for the final perfecting of the Yale Lock, and are the fruit of more than *five years* of patient study and experiment.

To facilitate an understanding of the advantages arising from the new form of key and key-hole, careful attention is invited to the following enumeration of them.

First. "Tilting" of the key in its key-hole is impossible, as the two are interlocked throughout their entire length, thus making it absolutely certain that the key will go exactly in place, and that the lock will always work smoothly.

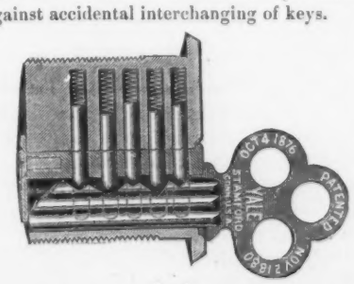
Second. No weight, such as a bunch of keys, can tilt the key and cause the lock to "stick."

Third. The lock cannot possibly be operated by any key but its own.

Fourth. The lock cannot possibly be picked except by some tool which will raise the tumblers. But the shape of the key-hole renders it impossible for any tool to raise the tumblers, because, even if one be made small enough to be inserted in the key-hole, it cannot be moved up and down.

Fifth. Should an unauthorized person temporarily get possession of a key, it would not enable a duplicate to be made, because the corrugated key must conform with the nicest accuracy to the exact contour of its key-hole, or it cannot enter. This accuracy is only attainable practically, by means of successive processes by special and very expensive machines, without which duplicate keys cannot be made of any material or by any manual process, so that illicit duplication of keys is perfectly guarded against.

Sixth. No key ever heretofore made will fit, or even enter, one of the new locks, so that users of the latter have absolute protection against accidental interchanging of keys.



No. 3.

Cut No. 3 is a cross section of the escutcheon of a Yale Lock exposing the tumbler mechanism and showing the new corrugated key in position under the pins or tumblers.

The Company is now prepared to fill special orders for any of their entire line of Rim and Mortise Door Locks with the new Corrugated Key, and during the coming season expect to occupy the new buildings they have erected during the past year, and thereafter to fill all orders with the new goods. They will, at the same time, complete a new and full line of Cabinet Locks, also embodying the same improvement.

Their large catalogue will be furnished to any architect or dealer not already supplied, and a "Pocket Catalogue" will be sent on application to any address. All correspondence relating to any of the various specialties manufactured by them, will receive prompt attention.

YALE LOCK MANUFACTURING CO.,
STAMFORD, CONN.

CLARK'S PATENT SELF-CLOSING ELEVATOR DOOR.

This apparatus was devised to meet a want which nothing in the market seemed to supply, — that of a reliable means for automatically closing, when not in actual use, the doors opening into the elevator shaft of a certain dry-goods warehouse, in order both to guard against accidents and to secure the protection against the spread of fire which is afforded by the certain closing of all openings into such shafts at night or when not under the eyes of the employes. Proving completely successful it was immediately adopted for a number of other elevators in the vicinity, both for passengers and freight, meeting with the universal approbation of owners, lessees and customers, whose expressions in regard to it lead to the belief that it is suited to satisfy a demand very generally felt. The invention does not attempt to *open* the doors automatically. Useful as such an arrangement is with hatchway elevators, it has little or no value where the platform moves in an enclosed shaft, as the porters on the load can in this case readily open the doors for themselves, without the noise, wear and tear and loss of hoisting power which the use of self-opening doors would involve. With it the door, opened by hand when the elevator arrives at or within a few inches above or below the floor where the passengers or goods are to be landed or received, remains open without further attention until the load is transferred and the elevator is started again, when, as the platform moves away, either upward or downward, the door gently closes of itself. Thus no carelessness on the part of any one, inside or outside, can

possibly result in leaving an opening into the shaft unprotected, for the reason that the door, unless purposely wedged or blocked, will stay open only so long as the platform remains beside it. The action is precisely the same whether the car approaches from above or below, and is quite independent of the speed with which the elevator runs, — an important consideration with the swift modern machinery.

The use of such an appliance in preventing the possibility of accidents from falls down the shaft is obvious enough, but its value as a safeguard against fire might hardly be understood by persons not professionally versed in the arts of building or the science of insurance. After the experience of many conflagrations it has come to be recognized that the greatest danger from fire in manufacturing or mercantile buildings lies in the quick communication of the flame from one story to another by means of the hoistways, which, when the doors are open, allow a small fire on one floor to spread throughout the building in a few moments unless a barrier is interposed between the different floors to resist the ascending flames. A comparatively slight defence, such as a wooden hatch or a tin-covered door, is sufficient to keep back the conflagration until help arrives, but to be of any use the hatches or doors must be shut, and this, without automatic agency, they will never be in the daytime, and seldom even at night, unless subjected to rigid and laborious inspection, while after the breaking out of a fire, either by day or night, there is no further opportunity of remedying any carelessness, and the building must be left to its fate. In some mills a partial protection is secured by hanging the elevator doors on an incline, and holding them back while in use by means of a chain containing a link of fusible metal which, if the door should be carelessly left open, will melt by the heat of a fire in the shaft or room adjoining, and allow the door to close; but this does little or nothing to prevent the draught which tends at the outset to quicken the conflagration and draw it toward the shaft, and an arrangement by which every story not in actual use is shut off from the shaft at all times, by day as well as by night, will be much more effectual in securing the desired end.

There is no difficulty in applying the attachment to any elevator, with either sliding doors or the ordinary kind, and only in rare instances is any alteration, even the slightest, necessary in doors, shaft or elevator.

T. M. CLARK,
178 Devonshire St., Boston, Mass.

CUDELL'S PATENT SEWER-GAS AND BACK-WATER TRAP.

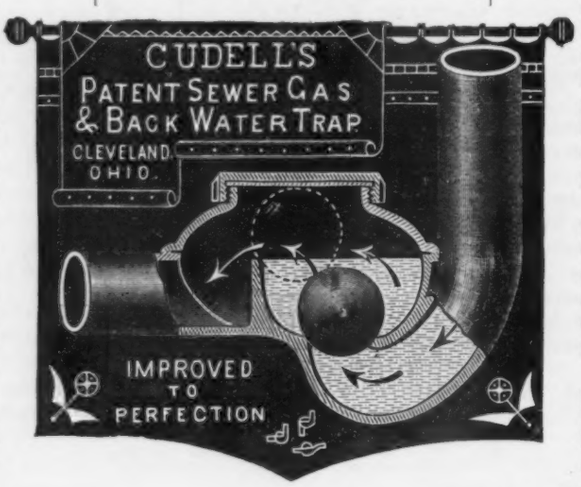
One of the most important of an architect's duties in planning and fitting up his buildings, is to secure to the occupants the best possible health conditions, and any article or device which aids him in so doing, not only alleviates his labors but benefits the public at large.

Such an article is Cudell's Patent Sewer-Gas and Back-Water Trap.

This trap is so constructed as to effectually prevent the passage of sewer-gas into the apartments. It is based on the S form, with the addition of a chamber containing a sinking ball-valve. This chamber contains a good body of water, so that without the ball it forms an excellent water-trap, but with the ball it forms a perfect seal, whether water remains in the trap or not.

The great difficulty with water-traps is their liability to lose their seal by siphonage, which can only be prevented by attaching vent-pipes to supply them with air; the more they are vented however, the more readily will the seal be lost by evaporation. Such traps when placed in spare-rooms, hotels, and the like, must be unsealed a great portion of the time. This difficulty is entirely obviated by the introduction of the Cudell trap, which though left until every drop of water dried out, would still be tightly sealed.

The cover of this trap is easily removed, being made to unscrew by hand, thus giving



access to the inside of the trap or the pipes beyond it. The cover has a rubber washer on the under side which forms a cushion for the ball, makes an air-tight fit and protects the screw-thread from the action of water. This feature makes it the only trap, the inside of which can be reached when applied to bath-tubs. When placed under the floor-boards the cover can always be taken off through an opening in the floor.

The trap is constructed of the most durable materials, the body of cast lead, the dome, cover, and ball, of cast hard metals. The workmanship is of the best quality, and the finish neat. The price is reasonable, being but little more than the ordinary bent pipe.

What speaks well for the merits of this trap is its introduction into the White House at Washington, on the recommendation of Col. George E. Waring, Jr., who was charged with improving the sanitary conditions of that building.

F. E. CUDELL,
204 Superior St., Cleveland, Ohio.

CAMERA VS. SKETCH-BOOK.

Facility in freehand sketching for artists, architects, engineers and draughtsmen generally, is justly considered a valuable accomplishment, in fact, no draughtsman may be considered skilled until he can delineate easily those features of landscape or of constructive art with which his profession is most particularly identified.

Few persons are endowed by nature with the natural requirements of skilful freehand sketching, that intuitive perception of the salient features to be embodied in the view — the exact valuation of parts in their relation to the whole, the witchery of sunlight and shadow, "the mystery of proportion." Nor can this skill be acquired from instruction without long and earnest application, which nothing but an inborn love of art can stimulate — and here we are reminded of our title, and would ask: Why should we not avail ourselves of those facilities of science which have so recently brought an art, heretofore so difficult to practise, within the reach of any schoolboy.

Photography began as a science: hardly a generation has passed away since the faint and fleeting image of Daguerre came to us as a vision — a promise and prophecy of something more tangible, more permanent, and last but not least, in this age of utility, more practically useful. Since then, the skill which has contributed to perfect and simplify the art is almost incredible: from the slow, uncertain and tedious process of the past have come new methods, more sensitive chemicals, finer and more lasting results, and of a necessity, apparatus which for accuracy, ease of manipulation and lightness, bears no semblance whatever of the impedimenta of the past.

The commercially-prepared dry-plates of to-day relieve the amateur of the most difficult and uncertain part of the process, and render it an art easily mastered, and invaluable to tourists and professional people.

The most perfect and beautiful apparatus for amateurs is the Walker Pocket Camera, manufactured by Messrs. William H. Walker & Co., of Rochester, N. Y. This instrument is designed especially for amateurs, and is a most compact and accurate apparatus, weighing complete, with folding tripod and double plate holder, but *two pounds;* with it are furnished chemicals, sensitized paper, dry-plates, and all apparatus necessary to complete the finished picture, even to the card mounts, together with an instruction-book free from technicalities and ambiguities. Truly, this is a diversion fit for the nineteenth century, and a boon for architects and builders long desired.

W. H. WALKER & CO., Rochester, N. Y.

THE DECECO WATER-CLOSET.

This invention is an entirely new departure in the construction of water-closets. Hitherto, in attempting to improve on the condemned "pan" closet, we have had to content ourselves with closets which hold a considerable depth of water in the bowl by movable valves, of which Jennings's and Hellyer's are types, or with plain hoppers having a shallow seal, and of which the unprotected surface becomes soiled with each use.

The "Dececo" *has no moving parts or valves whatever.*

It holds water to a depth of nearly nine inches.

It has a positive seal of over 6 inches.

It empties itself without mechanical aid of any kind, on the addition of a couple of quarts of water.

Its trap is in full view, so that its condition can always be seen.

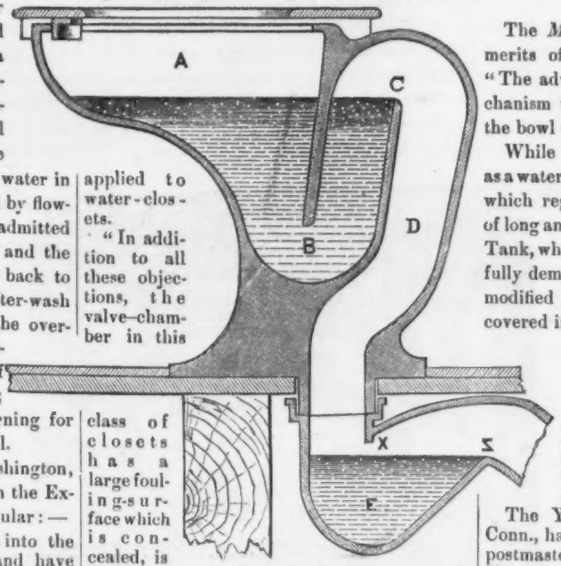
It is a simple vessel of white earthenware, with nothing that needs to be covered or hidden, so that the whole space about it may be neatly

finished (as with white tiles), and exposed to view and to free ventilation.

It is a most convenient urinal and slop-hopper, and obviates the necessity for separate vessels for these uses.

Its method of operation is as follows:

The bowl *A* stands full of water to the height of the bend of the siphon (or overflow point) *C*. On the addition of a fresh charge of water, the overflow through the siphon *D* raises the water in the weir chamber E, until it closes the opening at *X*. This prevents the entrance of air into *D*. The air then remaining is speedily carried out by the falling water, causing a strong siphon action by which the contents of the bowl are forcibly withdrawn. When the water in the bowl falls so low as to admit air at *B*, the flow through the siphon ceases. The water in the weir chamber *E*, is then lowered by flowing out over the weir *Z*, until air is admitted at *X*, when the siphon is "broken," and the contents of its ascending limb drop back to form an immediate seal at *B*. The after-wash then fills the bowl to the height of the overflow *C*. At no time during the discharge of the closet is the whole of the siphon from *B* to *E* unsealed; there is not even a momentary opening for air between the soil-pipe and the bowl.



Hayward & Hutchinson, of Washington, who did the work of re-drainage in the Executive Mansion, say in a recent circular: —

"These 'Dececo' closets were put into the White House by us last summer, and have continued to give entire satisfaction."

They also say, — and all who are experienced in such matters will agree with them: —

"In the class of valve-closets having a water-holding chamber and with trap below, there is a space above the trap, and the operation is to raise the pull after use of closet, and the contents of the water-containing chamber with the excreta are dropped into the trap below, where they remain until the next operation, maybe a day or more, within which time fermentation of the contents of the lower trap becomes active and the gases escape through the water-containing chamber into the apartment. The space between the trap and the water-holding chamber becomes charged with gas, which will puff up through the closet.

"To overcome this objection some manufacturers of such closets advise that there be no trap used, the only dependence being upon the water-holding chamber. This would be safer if valves would never leak, but the defects of all mechanical contrivances for keeping out sewer-gas are largely aggravated when applied to water-closets.

"In addition to all these objections, the valve-chamber in this class of closets has a large fouling-surface which is concealed, is not easily accessible, and obstructs access to the lower trap. . . .

"We think the bulk of evidence is largely in favor of closets *without* any movable mechanism."

The Superintendent of the Water-Works at the White House has given us the following account of his experience with this closet: —

WASHINGTON, D. C., March 17, 1882.

MYERS'S SANITATY DEPOT, 94 Beekman St., N. Y.

Gentlemen, — In reply to your inquiry asking how the five Dececo Water-Closets which were put into the White House some four months ago are working, I have to say that they work well, *and have given entire satisfaction* from the beginning to the present time. I have had occasion to see them almost every day since they were put in, and I have no hesitation in saying to you that they are a most perfect sanitary appliance; the entire absence of valves or other working parts, and the very little, if any, fouling-places in the Closet, think would recommend it everywhere. Wishing the "Dececo" success,

I remain, very respectfully,

WILLIAM H. BAILEY,
In charge of Water and Gas,
Office Public Buildings and Grounds,
Washington, D. C.

The *Metal Worker* in commenting on the merits of the Dececo Water-Closet, says: "The advantages of a closet without any mechanism to become fouled by the contents of the bowl are very great."

While the "Dececo" is an entire novelty as a water-closet, the arrangement of the siphon which regulates its action has stood the test of long and most successful use in Field's Flush-Tank, where its regularity of working has been fully demonstrated. The closet is in reality a modified form of Field's Flush-Tank, and is covered in part by the patents of Rogers Field.

MYERS' SANITARY DEPOT,
94 BEEKMAN ST., NEW YORK.

NOTES.

We regret to learn that the Messrs. McIlvaine Bros., 15th and Hamilton Sts., Philadelphia, manufacturers of "Moist Mineral Colors for Mortars," suffered damage by fire last week.

The Yale Lock Company, of Stamford, Conn., has instituted a civil suit against the postmaster at Baltimore, Md., in the sum of $10,000, for having carelessly made the statement that the locks on the post-office boxes which were recently picked by a colored boy were "Yale Locks." Any one who will read the description of one of the styles of mail lock made by this company which may be found on another page of this issue, will see that the picking of a Yale Lock must require far different manipulation from that practised by the little colored burglar.

J. S. THORN,
ARCHITECTURAL
Galvanized Iron
and ORNAMENTAL CAST-ZINC WORKS.
Hayes Patent Ventilating Skylights (under license). Floor Lights, Vault Lights, Building Specialties and Builders' Light Iron-Work of every description.
Nos. 1203, 1205, 1207, 1209 Callowhill Street,
PHILADELPHIA, PA.

SKYLIGHT LITIGATION.

His honor, Judge BLATCHFORD, has again rendered a decision in my favor — after a very severe and well-contested trial — giving in his written decision, a most conclusive opinion.

The record of the United States Circuit Court for the Southern District of New York now stands:

HAYES *vs.* ERICKSON & GIBSON.	"The usual decree for Plaintiff with costs." SAMUEL BLATCHFORD, November 26, 1880. *Circuit Judge.*
SETON *vs.* HAYES.	"This suit be and the same hereby is discontinued with costs to the defendant to be taxed by the clerk." SAMUEL BLATCHFORD, November 15, 1881. *Circuit Judge.*

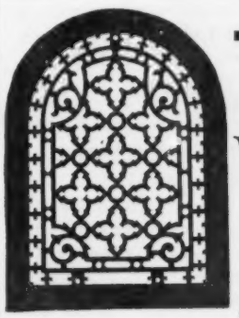
(This suit was predicated upon the alleged infringement of the "Weston Patent.")

HAYES *vs.* BORKEL.	"The usual decree for Plaintiff with costs." SAMUEL BLATCHFORD, March 3, 1882. *Circuit Judge.*

☞ It must now be understood that the Court has decided as infringements, all Metallic Skylights having in combination, gutters in the bars and cross gutters, whether located at the Ridge, Base, Intermediate or elsewhere. And also with Ridge Ventilators, and many other details, either or all of which is absolutely necessary for a complete and perfect Skylight, and that all subsequent patents are void in this regard.

GEORGE HAYES,
71 Eighth Avenue, New York.
March 3, 1882.

"Pioneer" Building Paper.
WATER-PROOF, AIR-TIGHT, DURABLE, STRONG.
Better and stronger than plaster; clean, odorless, and does not stick.
Used for lining, roofing, ceiling, plastering.
SCOTT PAPER COMPANY, Limited,
Manufacturing Paper Dealers,
No. 27 North Sixth Street, PHILADELPHIA, PA., U. S. A.
Write for sample and prices.



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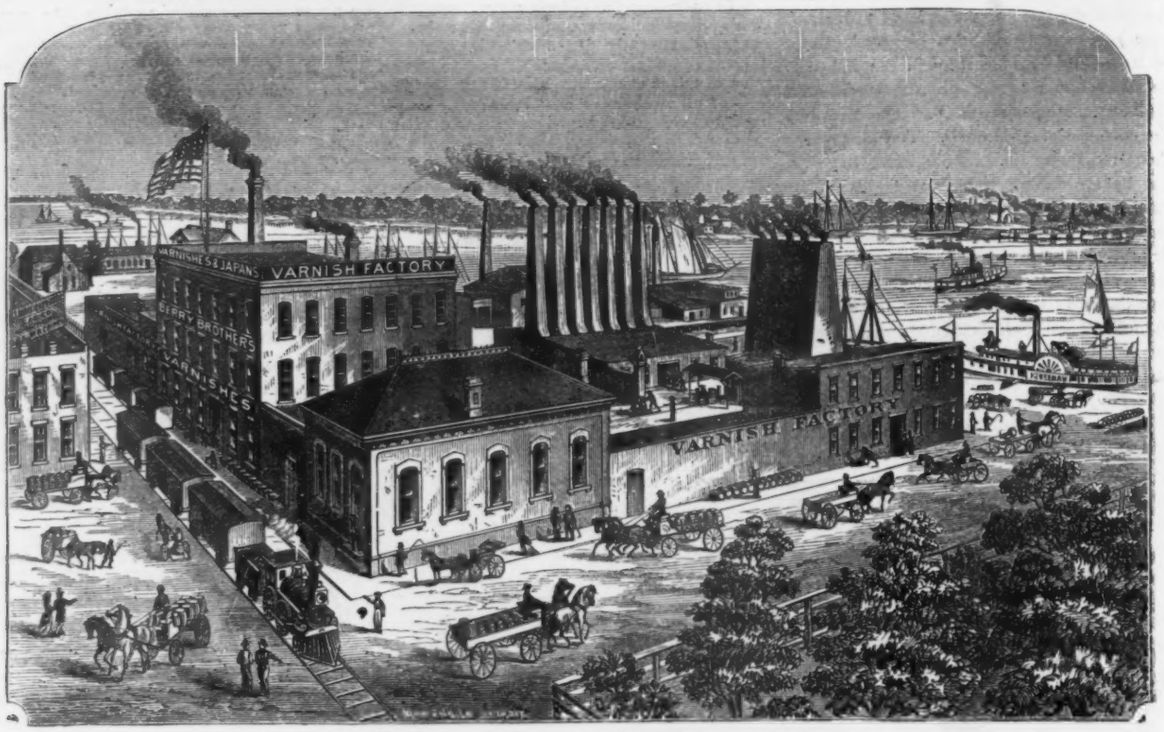
Use BERRY BROTHERS' CELEBRATED HARD OIL FINISH.



ESTABLISHED 1858.—DETROIT, MICH.

Chicago Branch, 236 Lake Street. | Cincinnati Branch, 72 Main Street. | Baltimore Branch, 100 W. Lombard St.
St. Louis Branch, 402 North 2d Street. | Rochester Branch, 116 Front Street. | Philadelphia Branch, 57 No. Front St.
Boston Branch, 141 Milk Street. | New York Branch, 96 John St.

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