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ACCORDING to the New York *Mail and Express*, a bill is now before Congress providing for the establishment of an official Bureau of Fine Arts, to be placed under the direction of the Secretary of the Smithsonian Institution, and to be devoted to "aiding the development of the fine arts in the several States and Territories of the United States by the reproduction, for the use of art-schools and academies, of casts of statuary and other objects used in giving instruction in art." The duties of the Bureau are to include also the holding, in Washington, of an annual exhibition of works of art, and the publication of an annual register, "containing an account of new discoveries, inventions, and methods of instruction useful to students of art." The casts produced by the Bureau, together with its publications, are to be "distributed among institutions of art, under such regulations as the Secretary of the Smithsonian Institution may establish." The *Mail and Express*, in commenting upon this proposition, says, with truth, that the assumption upon which the bill is based, that the people of the United States need to be encouraged to establish more of the institutions for "art-education" which swarm in the Eastern cities, is a fallacy; and, we may add, one which cannot be too strongly denounced. As the *Mail and Express* suggests, of instruction in "practical, prosaic, workmanlike drawing" we need as much as we can get, and everywhere, but we already enjoy a superfluity of facilities for teaching people who know no better to make themselves ridiculous by works in which there is not the smallest artistic quality, and if the aid of the United States Government can profitably be invoked to foster art in this country, we would rather see it employed in exterminating the whole race of cheap instructors of silly amateurs than in extending their facilities for doing mischief.

A CURIOUS dispute has arisen between the granite-cutters of Cincinnati and their employers in regard to the sort of work which the former shall be called upon to do. Granite-cutting being an occupation requiring special skill, those who practise it receive high wages, ranging from three and one-half to four dollars a day, and the masters have of late endeavored to reduce their expenses by hiring cheap, unskilled workmen to do the rougher part of the cutting. This change has thrown out of employment some of the better men, who have been accustomed to receive high pay for ordinary work, and a movement has been made in the Granite-Cutters' Association to compel the masters to return to their old practice by striking against all shops where unskilled labor is employed. As a man who pretends to be an expert in handling granite ought to be able to do even the roughest work at least twice as fast as one unaccustomed to that intractable material, the masters could afford to pay them double wages; but the problem is complicated by the fact that a single individual employs three-fourths of the members of the Association, and quite naturally, feels himself in a position to manage his business as suits him best. According to the account in the Cincinnati *Commercial*, however, he has been so far impressed with the arguments of the workmen as to offer to give a grand banquet to all the granite-cutters in the city and vicinity, at an expense of four hundred dollars, if they would withdraw their proposition. We should think it quite reasonable in the granite-cutters to reflect that if a single employer could afford to spend four hundred dollars in persuading them to recede from their position, it would probably be worth quite as much to them to persevere in their demands; and we trust that if they are to be bought off in this way, they will sell their prospects and principles for something more valuable to their families and themselves than a foolish dinner.

WE had occasion a few days ago to inquire into an accident of a kind new to us, and interesting to architects, plumbers, and others who use brass pipes for any purpose. In the present instance a piece of heavy drawn-brass tubing, about three-quarters of an inch in diameter was used to connect a hot-water tank in the basement of an office building with a cold-water tank on the roof. The height of the pipe was about ninety-three feet, and the pressure at the bottom therefore about forty-five pounds to the square inch, but the metal was nearly an eighth of an inch thick, and should have been capable of withstanding with perfect safety a strain of two or three hundred pounds. The flow through the pipe was always downward, so that the temperature of the water in it was nearly constant at from fifty to sixty degrees Fahrenheit. After the pipe had been in use about two years, it suddenly gave way, the length of straight pipe tearing in long, ragged seams, in two or three places at once, and letting the water escape in a flood over the basement. On shutting off the supply, it was found that so many lengths of pipe in the stack were affected that it was necessary to replace the whole. This happened in warm weather, so that there could have been no question of the freezing of the water in the pipe, and even if it had occurred in winter its situation in a building kept warm throughout, and its proximity in the basement, to a steam furnace which was constantly burning, would have excluded the idea of freezing. From the testimony of the engineer of the building, and of a plumber of experience, it would appear that such mishaps are not infrequent with brass pipe, and that they are perhaps more common with the heavy than the light tubing. The only explanation which seems likely to be well founded is that the particles of brass, in being forced over the mandrel by the enormous pressure which it is necessary to exert, are thrown into a state of internal tension, like that which exists in badly proportioned or unskilfully cooled iron castings; and that this internal tension, especially if aided by other circumstances may determine the disruption of the pipe at any moment. In the present case, the pipe carrying only a steady flow of water, and hammering in the pipes having been carefully guarded against by air-chambers, the molecular disturbance seems to have been alone responsible for the accident. It is said that the manufacturers of the tubing have learned from experience to anneal it before putting it on the market. In that case it would be very desirable for those who use it to be furnished with some rule for judging whether what they buy has been subjected to the annealing process or not. If any one of our readers can throw more light on the subject we shall be very glad to hear from him.

THE *Sanitary Engineer* mentions an occurrence which, although in itself of rather unusual character, accords so completely with the ordinary practice under similar circumstances that architects who deal with official bodies would do well to take note of it. Some time ago contracts were entered into for the construction of a sewer in the city of Paterson, New Jersey. The specifications on which the contract was based required, as usual, that the cement used in the mortar should be of a certain degree of fineness, and should give a certain minimum of tensile strength when mixed with water and tested in the usual way. A part of the cement delivered on the ground passed the tests successfully, but a lot was one day brought which satisfied neither of the requirements of the specification, and the city engineer, Mr. Hilton, refused to allow it to be used. Finding his powers of persuasion inaffectual against the engineer, the contractor betook himself to

the engineer's superiors, and made his appearance before the Street Committee of the city government, accompanied by a body of other contractors, cement dealers and friendly citizens. Moved by this array of influential respectability, the Street Committee voted to allow the contractor for the sewer to use in the work the cement which the city engineer had rejected. It is unfortunate that the contractor should have been put to the trouble and expense of buying any good cement at all for so accommodating a city government, but perhaps some further opportunity will present itself for making good this inadvertent outlay.

THE *Scientific American* calls attention in a recent number to the superiority of the workmen trained in small machine-shops and factories over those bred in larger establishments, where the division of labor, and limitation of the responsibility of individuals, prevent the development of that self-reliance and ingenuity in overcoming difficulties which those compelled to make the most of imperfect tools, and to turn their hands to a variety of work, are constantly obliged to exercise. For this reason, the mechanic who has learned his trade in a shop where only two or three men were employed is generally very welcome in the larger ones. Although the costly machine-tools of the great establishments are new to him, and some time may pass before he learns to use them properly, he generally succeeds at last in understanding them far more thoroughly than those who have not been accustomed, by the invention of homely make-shifts, and contrivances for using common tools in unusual ways, to acquaint themselves with the properties and capabilities of the parts which they find combined in a new form. Most architects have probably had occasion to make the same remark in regard to builders' men. The man from the small shop, particularly in the country, is commonly quick, ingenious and reliable. He may in some instances be less skilful with his tools than the city workman, who is not obliged, like him, to turn to other employment during a large part of the year; but he more than makes up for that in his better mental development, which enables him to enter into the ideas of the architect, and to seize opportunities for advancing or improving the work, which his plodding brother from the great shops would not see or care for.

CAPTAIN JOHN ERICSSON distinguished himself many years ago by some attempts at the utilization of the sun's heat for obtaining motion. As we remember, the apparatus which he devised for this purpose depended for its operation upon the expansion of a long metal rod, which, of course, developed an enormous force, acting within very narrow limits. There is so much difficulty in making joints close enough to transmit without loss the movement of a rod extending only about a hundredth-thousandth of its length that the utilization of the force of expansion is always a matter of great difficulty, and Mr. Ericsson's device came to no practical use. Within a few years, however, he has returned to his early studies, and has just constructed a sun-motor of a kind entirely different from the other, and perhaps less ambitious, but much more likely to be successful. The new machine, instead of depending for its motive force directly upon the sun, employs the solar power by a roundabout way, through the medium of a steam-engine, supplied with steam from a small boiler close by, which is fixed in the focus of an immense parabolic mirror. The mirror is cheaply made, consisting merely of slips of silvered glass, each three inches wide and twenty-six inches long, set in a frame so shaped as to concentrate the rays reflected from them into a single narrow line. In this line is set the boiler, consisting of a tube, which serves as a brace to the frame of the mirror. The mirrors, when properly exposed to the sunlight, serve to intercept a beam of about one hundred and fifty square feet in section, and to concentrate these rays by reflection upon an area of about eight and one-half square feet, increasing the heat nearly twenty times, and readily boiling the water contained in the tube in the focus. The steam so generated is conveyed to the cylinder of the engine by a flexible tube, and the mirror frame is pivoted in such a way that it can be moved to follow the sun's course through the sky. In the model engine constructed for experiment the pressure of steam was easily kept up to thirty-five pounds to the square inch, and the average speed of the engine, working with a six-inch cylinder and eight inches stroke, was one hundred and twenty revolutions a minute.

AN interesting little piece of chemical practice, which some of our readers may have occasion to remember hereafter, is to be found in the process for the removal of the stains upon the Liebig statue at Munich. This statue, which was set in place less than a year ago, is of marble, and its beautiful color tempted some dirty rascal to try to spoil it. For this purpose a liquid containing in solution permanganate of potash and nitrate of silver, two of the substances which produce the most ineffaceable stains upon cloth, was squirted with a syringe over the statue, covering it with black spots, which penetrated deeply into the soft stone. As soon as the injury was observed, competent chemists were set at work to devise means for repairing it. An analysis of scrapings from the surface of the stained marble showed the presence of silver and manganese, and the form in which they were employed was readily guessed, since the nitrate of one and the sodium-salt of the other are the only soluble compounds of them in common use. The natures of the stains being discovered it was necessary to invent a method for converting the substances which constituted them into others which could be removed from the stone, and the experts resolved to attempt their transformation into sulphides, with a view to their subsequent solution and removal by the aid of cyanide of potassium. In order to secure the continuous application of sulphur necessary for the complete conversion of the spots, fire-clay, saturated with sulphide of ammonium, was plastered over them, and renewed at intervals until the action was complete. The paste was then removed, and the marble washed with pure water until all the alkaline sulphides were removed. Another fire-clay paste, saturated with solution of cyanide of potassium, was then prepared, and applied to the spots in the same way as the first. The sulphides formed in the marble were dissolved by the new reagent, and the solution absorbed by the clay; and on the final removal of the paste the spots were found to be perfectly removed.

EVERYONE knows that the liquefaction of what were once called the permanent gases forms one of the most interesting and important labors of modern chemists. Determinations are made in this way in regard to the nature of the elements subjected to the trial which would be otherwise impossible, and science waits anxiously for the reduction to a liquid form of those substances which have not yet been conquered. One of the latest liquefactions successfully accomplished was that of ozone, which, under an enormous pressure, is converted into a fluid of a dark-blue color. One of the most singular things about this transformation is that ozone in the state of vapor is quite colorless, while all the other gases which are colored in the liquid form, such as chlorine, nitrous acid and a few others, are strongly tinted in their normal condition. Within a short time two other simple gases, oxygen and nitrogen, have been liquefied, using for the purpose great pressure, combined with intense cold, in the same way that all the other liquefactions have been accomplished. Of the two, oxygen seems to be the most readily reduced, the temperature at which, after being liquefied, it boils away under the pressure of the atmosphere being two hundred and ninety-three degrees below Fahrenheit's zero; while nitrogen, at a temperature of two hundred and twenty-four degrees below zero, requires a pressure of nine hundred pounds to the square inch to keep it in a fluid condition. The cooling agent used in both these reductions was ethylene, a light hydro-carbon gas, which is itself first liquefied under pressure, and being then allowed to evaporate rapidly in a vacuum, in contact with the glass tube containing the more refractory substance, cools it to a point between two hundred and fifty and three hundred degrees below zero. In general, the more obstinately a gas resists liquefaction, the greater is the degree of cold which the evaporation of its liquid or solid form produces, and it is thought that the vaporization of liquid nitrogen, if it can be obtained in sufficient quantity, will afford the means for the conversion of hydrogen, the lightest of all gases, which no experimenter has yet undertaken to reduce from its ordinary condition. It is very unlikely that any gas would be more difficult to liquefy than hydrogen, so that its reduction may be looked upon as the limit of physical research in this direction; while the singular chemical character of the gas, which is ranked among the metals by some authorities, will make investigators all the more curious to see the form which it will take when compelled by superior force to give up that of elastic vapor.

SOME ENGLISH CATHEDRALS, AND ROUND ABOUT THEM.

CLOSE by the river Stour, in a fertile valley in Kent, rise the crumbling walls of the ancient city of Canterbury. Although we are told in an old chronicle "the walls of the city are builded well," only the west gate remains of the six originally existing. The upper part of this gate, together with an adjoining building serves as the city prison, and many a sigh and malediction ascends to heaven to-day from the iron-bound windows above, whence in early times the anxious guardians of the city watched with angry expectancy the coming of the foe.

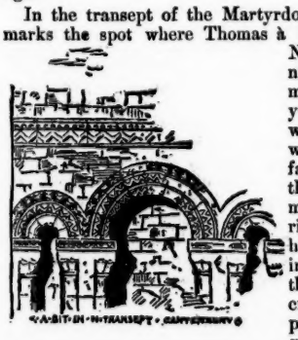
Wandering through an obscure churchyard on the suburbs of the town, I came across a decaying tombstone. On the blackened surface one word alone was visible, "Torch-bearer!" Doubtless the fellow was the retainer of some noble house, else his calling must have been a lucrative one to afford him even so humble a monument. "It is well you are but dust in this nineteenth century," thought I; "you would have a sorry time of it, I fear, threading your way here and there through the brilliantly-lighted street, depending on your torch for daily bread. Passing through Canterbury Lane, through the beautiful public walks of the Dane John (a corruption of Donjon), would you not stand aghast at the sacriligious use made of the keep of that Norman castle you once reverenced? The state, and pomp, and revelry are departed forever, and the modern vandal has converted the sacred remains into a gas-factory. Verily, your torch is useless now."

When Chaucer's pilgrims left the "Tabard Inn" in Southwark, doubtless many of them dwelt with quite as much enthusiasm on the "Checquer's Inn" at Canterbury, whither they were going, as they did on the penance which was ostensibly the object of their journey. Had Chaucer lived to complete those wonderful pictures of everyday life in the fourteenth century; had his thirty pilgrims reached their goal, if we are to judge by the tales they told, St. Thomas would have scanty measure of descriptive coloring compared with the anticipated high-holiday at "Checquer's Inn." The inn and the shrine they never reached, save in intention, exist no longer; but by the ancient Mercery Lane near its site stands the present cathedral. Viewed from a distance it rises with magnificence, but upon a nearer approach a feeling of disappointment is experienced, owing undoubtedly to the want of space which seems to be absolutely necessary in a building of such magnitude. It is built in the form of a cross, with a semicircular apsis or eastern end.

First established by Pope Gregory the Great, in 579, it was rebuilt by Lanfranc, the first archbishop after the Conquest, between 1070 and 1089. The eastern part was re-erected by Anselm, his successor. The oldest part of the present structure dates from 1184.

The architecture is varied and peculiar; yet withal so harmonious that looking down from the great choir through the long vista of arches painted in a thousand hues by the sun's rays through the stained-glass windows, I almost fancied myself belonging to an earlier age.

In the transept of the Martyrdom, a small square piece of stone marks the spot where Thomas à Becket was murdered in 1170.



Nothing now remains of the magnificent shrine dedicated to the martyred archbishop; for one year after the murder, the church was desecrated. Divine service was not performed; the bells were fastened; the pavements turned up; the hangings and pictures were removed; and dirt, and decay, and riot within the walls. After a time, however, treasures began to flow in, and a costly shrine was built; the remains were taken up from the crypt, and the coffin of wood was placed in one of gold, studded with precious stones, and part of the skull was placed on a superb altar by itself. July 7, 1220, was set apart for a high festival, and all along the route by which the people were to come, great conduits of running wine were placed, and refreshments were served to each and all.

In the sixteenth century, however, when the crafty Henry VIII sat on the throne, he issued a proclamation abolishing all high festivals between the first and twenty-ninth of July. His plea was neglect of the harvest, and so the seventh of that month became an ordinary day again; and Archbishop Cranmer gave support to the king by eating meat, "whereas he had heretofore abstained from flesh on that day;" and, finally,

> "Dark fanaticism rent
> Altar, screen and ornament;"

and in 1643, in consequence of an order of Parliament, one Richard Culmer headed a band of enthusiasts, and undertook to "purify" the church. After the restoration of Charles II, the cathedral was partially repaired.

Passing through a round-arched, early Norman gateway, I came suddenly upon a bit of green, lighted up for a moment by the last rays of the setting sun, which cast a shadow on the arched and pillared cloisters round about. The sprightly figures in priestly gowns gliding to and fro in the shadowy stillness little resembled the sombre, long-robed monks of old who bent their weary steps up the narrow, stone stairway to the cold, bare scriptorium above, where bending over the rude desks of the time, they painted the brilliantly-illuminated missals and psalters, which, in spite of their crudeness in outline, we now so highly prize.

In a garden adjoining the cloisters is an old circular Norman tower in a good state of preservation, which is now called the baptistery.

The remains of the ancient monastery of Augustine, and of its domestic buildings in and about Green Court, call to mind the legend of the poor minstrel whom the "gude monks" sheltered from the storm, and who proved "so sweete a singer" that they were loth to allow him to depart, and so he remained with them; and when he died, the mantle of his song fell on Caedmon, who sang "the creation."

Although somewhat late in the day, I climbed the hill at the back of the cathedral, that I might have a better view of the city. Never shall I forget my last impressions of Canterbury. The moon was just rising over the neighboring hills, the bright little river was all aglow with many colored boats, while ever and anon the warm evening breeze wafted to my ears gay laughter, and the gleeful shouts of little children happy in the mysterious charm that clings to the "last play" when the day is done.

While King Harold was feasting at York after the battle of Stamford Bridge, William the Conqueror landed at Perensey. Onward he came with his stalwart soldiers carrying everything before him, and when at last he entered the Roman-built city of Eboracum, now York, he built him a castle within its walls between the Ouse and the Foss. Scarcely a town in England is so rich in historic associations, and few can boast equal wealth and antiquity. In its infancy the tessellated pavement re-echoed the tread of the Roman soldiery; later, along the same thoroughfare the scholastic sage deep in meditation bent his lagging steps towards the great school even then famous for its learning; and later still, this capital of the north became the chosen residence of several English sovereigns, and many parliaments were held here in the reigns of Edward II and Edward III.

During the early period of the Middle Ages, the literature of England lay in the hands of the minstrels and the monks. The power of the Church was increasing, hence we find many traces of abbeys and convents dating from the time of the Norman conquest. The ruins of St. Mary's Abbey established in York immediately after that event are still visible; and although the stones are weather-worn, some of the tracery is very beautiful. By reason of its Roman origin, the collection of local antiquities found in the museum of the Yorkshire Philosophical Society is especially interesting. It is not unusual to-day for builders while excavating a cellar to unearth bits of pottery, and occasionally a coin.

Coming upon the walls of the city, I ascended them close by the Micklegate Bar, through which, before the wall was pierced for the railway, the lumbering stage-coach on its way to London daily rumbled and rattled, and swayed to and fro with its cumbersome load.

Perhaps the best way to obtain a general view of the city is to walk along the walls, crossing the Foss and then the Ouse, by means of a bridge and ferry, and taking the walls again. The houses are for the most part quaintly built. The streets are here and there long and narrow, with tall, gabled houses leaning toward each other. Farther away, where two roads cross, stands, or did stand, a dilapidated inn of plaster; a wooden sign-board, its colors faded beyond recognition, creaked on rusty hinges; the low, diamond-paned latticed windows were black with age, and dirt, and cobwebs; the court-yard was paved with solid, smooth pebbles, but the outhouses had disappeared; the only vestige of utility that remained was a huge cistern in the centre of the yard, and an old oaken bench hard by. It seems it was not only an inn of some pretension, but royalty had feasted there; and plots and plans innumerable are chronicled in some old books owned by its successor, "The King's Arms," as having been conceived and matured under its roof, and many a song and jest, whose fame has outlived that of its author, owes its origin to the combined effects of the blazing logs, and the loving cup which too freely passed among those lovers of good cheer. I believe the inn has been removed, the site being considered too valuable to be wasted on a useless and possibly dangerous relic, and modern Yorkshire is practical in the extreme.

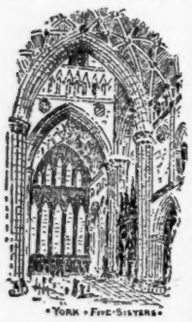
High above all surrounding objects, the lofty minster towers rise in solemn majesty.

As early as 634, Pope Gregory sent a missionary from Rome to found the bishopric, but not until long years afterward was the cathedral dedicated. St. Peter is the patron saint. The arms of the see adopted in the time of Wolsey, are the well-known emblems of the apostle — the crossed keys.

> "Two massy keys he bore, of metals twain;
> The golden opes, the iron shuts amain."

York Minster is perhaps the most widely celebrated of all the English cathedrals. It may not be as beautiful in detail as some; yet few can compare with it in dignity and massive grandeur. Entering from the south transept, from which perhaps the finest view may be

had of the cathedral, I was very deeply impressed by the vastness of the whole; the wonderful length, breadth, and height, and the great central towers with its curious lantern supported by arches. One of the most beautiful windows I remember to have seen is "The Five Sisters," in the north transept; the stained glass is original and of exquisite beauty. The great west window with its rows of saints and archbishops is very grand. I was told that most of the painted glass in this cathedral is original, and is probably the most perfect of any in England. However true this may be, the effect of the sun's rays upon the colors is so delicate, and soft, and well blended, that it seems to me it was here in York Minster late in the afternoon of a day in early spring, that the poet was inspired to write:—



"From altar to baptismal font
The groined arches echo the ascending anthem,
By angels caught and wafted up to God.
The painted windows, kissed by light of Heaven,
Reflect prismatic hues; tinge pillar,
Statue, stall, and reredos,
And touch the soul with thoughts of love divine."

Leaving York with regret, I ran up to London one day, from thence took a south-bound train for Salisbury, and in a few hours was comfortably stowed away in a room in the "White Hart Hotel," near the grand old cathedral. I had an old English nurse in my childhood, who came originally from Salisbury, and whose whereabouts I felt it incumbent upon me to look up. Most prominent among the many pleasing fictions with which she beguiled my impatient hours was a marvelous description of her native town, and its magnificent church, "quite equal to all the churches in Boston put together." I found, however, that she was justified in teaching me the following lines, written by Dr. Heylin, on the magnitude of the cathedral, as I found them in an authentic work on that subject:—

"As many days as in one year there be
So many windows in this church we see;
As many marble pillars here appear
As there are hours through the fleeting year.
As many gates as moons one year does view,
Strange tale to tell, yet not more strange than true."

During the fifth year of the reign of Henry III, in 1220, the cathedral was founded by one Bishop Poore. Very reliable account of its early history are still preserved. Built of Chilmarth stone, with pillars of Purbec marble, the effect is very striking, and although the windows are devoid of coloring, the want of it does not seem to detract from the beauty of the interior, yet it lacks the warmth and tone that stained glass alone can give; and this defect is enhanced by the unusually strong light which is due to the fact that the cathedral is somewhat isolated from surrounding buildings. The cloisters are perhaps the finest in England; at least none surpass them. A door from the cloisters opens into the Episcopal palace, a rambling, irregular picturesque pile of gray stone.

The town of Salisbury is situated in a beautiful valley at the junction of three rivers, the Upper Avon, the Bourn and the Wiley, and very near a fourth, the Nadder. Not far from the market-place, in the centre of the city, I found the object of half a day's search—an old stone house, with quaint overhanging gargoyles. Years and years ago it was the gate-house to an estate of some importance; and although the manor-house has long since disappeared the present inmates of the lodge are direct descendants of the old feudal servitors. Entering a court-yard paved with well-worn flag-stones, beyond which lay a modest, trim-looking garden, I came upon the remains of two stone lions on either side of the broad low steps that led to a heavy oaken door, black with age, banded and crossed by iron bars, and studded here and there with nails. With difficulty raising the huge knocker my feeble summons was timely answered by a rosy-cheeked boy in yellow stockings and a long blue coat, whom I readily recognized as belonging to the "blue-coat" school, and who bore a striking resemblance to that recounter of nursery classics whom I had come to see.

"Ma's not at 'ome 'm, an' please 'm it 'ill be a shillin' to see the 'ouse." This was my greeting, but I bore it well, and followed my guide *incognita* from room to room. The floors were of oak, seamed and indented by the footsteps of generations; the ceilings were low, and for the most part formed of beams of wood, crossed and recrossed from end to end. In one room, which was larger and of more pretension than the rest, the wood-work was elaborately carved, and the high oaken mantel bore the arms of the family, exquisitely carved and in a state of perfect preservation. The small infrequent windows were chary of the light, but I could see that the furniture was old, solid and plain. Upstairs the ceilings were lower still, and the roof sloping, but from the latticed windows I looked over the roofs of the adjacent houses, which were upon lower ground, and far down the valley saw where the rivers widened and separated, and hurried on to the not far distant ocean.

At his mother's urgent request I occupied the room that night where many a time during the hunting season a certain lord of the manor had held high carnival when the game was a fox or a timid hare, not what civilization makes it there to-day—money! Romance when you read it is inspiring and oftentimes enviable, but to find oneself at midnight alone in a centuries-old house, smothered in a walled, double-doored bedstead, watching through the crevices the lights and shadows cast by a weird moon on grotesque figures and far-away corners, be one as brave as may be, a modern, every-day house with a nineteenth-century bedstead is preferable.

Leaving the town of Salisbury I took a south-westerly direction to Exeter. The county of Devon is justly celebrated for its exquisite beauty. Exeter is situated on a steep hill sloping down to the River Exe. The view from the high ground above the city, over the lovely wooded valleys, sheltering fuchsia-covered cottages, and dotted here and there with charming country-seats, is so beautiful that I believe that I echoed the sentiments of Pat, who, coming from unromantic Cork, for some reason chanced to visit Killarney; "Whist ye now," he cried, "had I not come from Cork, 't is here I'd be afther stayin' foriver!"

The deep fosse under the castle walls having been filled up, a promenade has been made, called Northernhay, which is a favorite resort, particularly as it affords an excellent view of the city and river. I came across some very curious old houses in the high street, with a multiplicity of roofs and beams and bow-windows, but the most interesting thing to see is the cathedral. Although situated on high ground there seems to be a want of elevation in the body, hence the effect is heavy and lumpy, especially as it has no central tower, and the roof is unbroken from end to end. On the whole the exterior effect is not good, the walls being too sloping. Many portions of the interior of the roof are exquisitely carved, and the tracery in and about the windows is very fine. Of the original cathedral, completed in 1206, only the two Norman transeptal towers remain. Since it was injured by fire, some time during the twelfth century, it has been rebuilt and altered bit by bit. In 1871 the modern restoration was commenced. In a gable niche in the west front is a figure of St. Peter, to whom the church is dedicated. The three doorways in the screen are elaborately carved, and are surrounded by niches which contain countless statues. In the north transept is a very curious clock, dating from the early part of the fourteenth century. The earth is represented as forming the nucleus of the inner circle; the moon, painted black on one side, turns by clock-work to represent its phases, and moves in the second circle; the sun, embossed with a *fleur-de-lis*, traverses the outer circle, and indicates the hour of the day. During the present century the clock has been regilded and restored, therefore little of the original works remain.

I am very sure that the organ in this cathedral is the oldest in actual use in England, and although built in the middle of the seventeenth century, it is one of the finest.

The bishopric of Lichfield was founded in 656 by Oswy, King of Mercia. The present structure dates from about 1128. The arms are blazoned on a red and white field, and consist of a golden cross potent, or cross of Jerusalem, between four small crosses, not unlike the ensign borne by the chief of the crusaders, Geoffrey Bouillon, and refer to the five wounds of Christ. The altars of the primitive church were all marked in this way. The cathedral, although small, is one of the most beautiful in England, and is the only one having three spires; it is also the only one perfectly isolated. Its chief defect is a want of elevation. The stone of which it is built is of a dusky red, and so soft and frail that it is continually crumbling and peeling off. The west front is, however, magnificent. In the centre, over the great door, is a figure of St. Chad, and on either side, altogether, are the statues of twenty-four kings. The interior is remarkably cheerful, and has an air of neatness that is very refreshing.

"Here circling colonnades the ground enclose,
And here the marble statues breathe in rows."

The monuments by Chantrey of two little children is deservedly famous. The monument to Lady Mary Wortley Montague consists of a figure in marble, inscribing the record of inoculation for small-pox. In the nave is a monument to Addison's father, and in the library, over the chapter-house, are the busts of Garrick and Johnson.

At the corner of the market-place stands, or rather leans, an old house on three wooden pillars. Here, in 1709, was born Dr. Samuel Johnson, "that ill-dressed, slovenly, ponderous, tea-drinking" friend of "rosy-colored, good-humored, fresh little Davy Garrick." Together they left their native town and went up to London; the one to eventually become a favorite actor of high merit; the other, the ill-favored son of a poor Lichfield bookseller, to mount to the dictatorial throne of English criticism.

The oldest church in England is St. Martin's, built by Christians of the Roman army, about 187 A. D.; it is known to be of Roman origin by the Roman brick in the walls of the chancel. The church stands on a sloping hill back of the town overlooking it; from the

tower, beautifully overgrown with ivy, the little spire peeps. In this church Christianity was first embraced by a British king.

Arrived at the "Adelphi" in Liverpool one spring morning, waiting the departure of the homeward-bound "*Scythia*," with every promise of the usual rainy weather, it occurred to me that I might better run down for a farewell look at Chester. So to Chester I went, and to the old familiar "Grosvenor."

First Eastgate and Bridge Street claimed my attention. Ascending short but too often crazy-looking steps, one enters the "Rows," a sort of arcade formed by taking away the first-floor rooms of the houses. Although somewhat dark, and often musty with dampness and age, and here and there, in the less frequented ones, obstructed by over-crowded merchandise, they attract by their very primitiveness, and are particularly convenient in wet weather, being protected by the upper stories, and many of the best shops being side by side.

I next turned my steps toward the ancient rouge-colored, "ivy-mantled" walls. Everything was wet from a recent shower, but the sun, kinder here than in Liverpool, seldom hides his face long at a time, and was shining brightly; the cloudless sky smiled above the city, while loud and clear pealed the cathedral bells calling each and all to morning service. I could not resist the summons, so turning toward the towering pile of red sandstone I followed in the wake of a few every-day worshippers, who were not of that type alluded to by the precocious boy, who, when demanded by Bishop Wilberforce the reason of his mother's non-attendance at church that day, it being Tuesday, replied, "Please, yer honor, ma's a Sunday Christian."

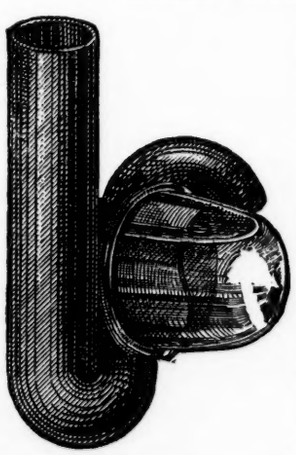
The music of St. Werburg has a wide reputation, and great pains is taken with the choristers. The little soloist, a bonny lad with an angelic voice, thrilled the very souls of his wondering listeners, and had I not had direct evidence of his mortality — if sticking pins into his neighbors during his leisure moments be proof—I could well have believed, as he stood apart in his white robe, with upturned eyes of heavenly blue, the lights and shadows chasing each other over his golden hair, that he was indeed an angel, and not of earth.

Of all the monuments of antiquity, the church is said to exercise the greatest influence on present generations. The power of past centuries is felt in minor things as well as great, so entering the cathedral door we leave the practical present on the other side, and the odor of sanctity savors, not so much of to-day as of yesterday, which by the narrow-minded is found an objection, — and why? Leaving creeds out of the question, whatever raises our thoughts to better things, be it born of the dust of a hundred years, or if it first see the light to-day tends to the same ending, and by reason of this influence it is so often true that

"Fools who came to scoff remained to pray."

F. G. STONE.

SANITARY PLUMBING. — XXIII.



TRAPS having sections constructed of glass for the purpose of permitting the inspection of the interior are usually so formed that it is impossible in practical use to know whether they are full or empty. The color of pure water in small quantities is the same as that of air, and water discolored by impurities either becomes clarified by precipitation after standing a certain length of time, or deposits on the inside of the glass a thin, opaque film, which is not removed until the next discharge of the fixture takes place; or the deposit may, under adverse conditions, become permanent. Such a deposit may be very thin and practically harmless, or it may be heavy and objectionable, according to circumstances, as we have heretofore explained; but even a deposit so thin as to be almost absolutely transparent renders it impossible for a casual observer to detect whether a trap as now constructed is full or empty. Now it is extremely important that such detection should be both easy and certain, especially for those traps whose seal is likely to be destroyed by siphonage, evaporation, momentum, capillary attraction, or back-pressure, and a trap, where possible, should always be placed in open view.

To accomplish this it is only necessary to so form the trap that a portion of the *surface* of the water standing within it at its normal level shall be visible from the outside and shall cross the glass section of the trap. The edge of the surface of water standing in a vessel is drawn slightly upwards by capillary attraction and forms a bright sparkling line which can be detected even behind a deposit of considerable thickness. When the deposit becomes so thick as to obscure this bright line, it is an indication that it is time to clean out the trap. The initial cut shows the effect of this water surface in our trap. The front corners of the body of the trap are here rounded. This is found to improve its self-cleansing, without diminishing its anti-siphonic properties. Figures 132, 133, and 134 show the trap taken apart for the removal of a match or any foreign substance which might have passed through the strainer of the fixture and become lodged in the bends. The central partition is detachable, as shown in Figure 134. This permits of an easy approach to all parts of the trap.

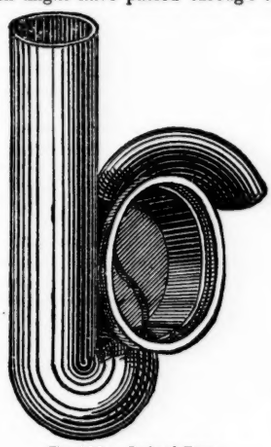


Fig. 132.—Body of Trap.

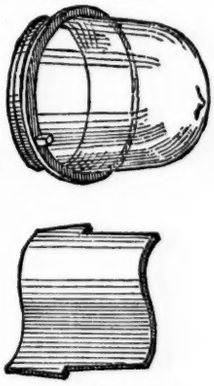


Fig. 133.—Glass Cap.

Fig. 134.—Partition.

We are usually recommended to place the trap as near as possible to the fixture it serves. This is not always wise. Within a distance of two feet the trap should, for wash-basins, be placed as far from the fixture as possible to be above the floor, provided the connecting pipe from the strainer to the trap be a straight one, and the strainer be detachable, so as to allow the pipe to be easily cleansed, and large enough to fill the pipe full-bore. The water will then fall from the fixture into the trap, when the plug is removed, with great force, and thoroughly scour it, as well as the waste-pipe above and below it. It is obviously more important that the trap should be kept clear of sediment than the waste-pipe above it.

Moreover, a long waste-pipe above the trap will effectually resist back-pressure, as already explained, provided, of course, the capacity of the trap is sufficient to hold the amount of water necessary to balance the air-pressure. A short pipe will not permit of the formation of a column of water long enough to resist the severest back-pressure met with in practice.

In the case of bath-tubs this rule need not be observed. The water discharged from this fixture has a much greater scouring than fouling effect on the trap, and bath-tubs are seldom placed at the foot of a soil-pipe, where only severe back-pressure can be exerted. Grease and water-closet traps form, evidently, also exceptions to this rule.

Thus, when used under lavatories, the anti-siphon trap will be placed just above the floor. Properly set in this position, with waste-pipe and strainer of proper size, it can never become clogged with sediment. The upper corner, containing the only acute angle, is directly above the entrance of the inlet-pipe, and receives the full force of the water as it is driven suddenly against it under the momentum acquired in its fall from the fixture. Such a shock acts on sediment like the stroke of a chisel. The trap is here made slightly larger than as hitherto shown, and has a power of resistance to siphonic action correspondingly greater. The diameter of its body at the centre of the inlet and outlet mouths is 3″. It is intended to be connected with a 1½″ pipe from the fixture. The width of the water-way through the body is slightly less than 1½″, because the thickness of the partition takes a little from its size; but the body bevels outwards slightly, to facilitate the draught in casting. Hence the sectional area of the passageway is a little greater than that of the inlet-pipe, and this increase of size, while greatly increasing the power of resistance to siphonage, is not sufficient to diminish materially its self-scouring power.

The outlet arm of the trap is made like that of a ¾-S trap. This gives it a form which is adapted to almost every use or position. If a ½-S is desired, a portion of the outlet arm may be sawed off by the plumber. There will still be sufficient length of arm to make a joint, but the direction will be altered as desired. If a full-S is desired it can be obtained by slightly bending the end of the pipe to be connected with the outlet arm.

When used where trap ventilation is prescribed by law, this trap can, of course, be ventilated like any other. The vent may be applied at any part of the outgo, either at or below the crown. But since, unlike S-traps, its seal cannot be destroyed by self-siphonage or momentum, the vent need not be applied at the crown; it may be applied anywhere below the crown far enough away to avoid the injurious effects of evaporation. Hence ventilation does not produce the same destruction to the seal that it does with other self-cleansing traps, and may be used with impunity. Trap ventilation is nevertheless in this case, as in all others, absolutely useless, and its installation is a total loss to the house-owner.

[1] Continued from page 233, No. 438.

Self-Cleansing Properties of Traps.

In order to test their self-scouring power several traps of different kinds now in common use were set in the usual manner under an ordinary wash-basin having an outlet and strainer of the usual size and form. The basin was one which was subjected to very trying usage. Matters of all kinds were washed in it; inks, dies, water-colors and the various waste matters used by artists in their work were emptied into it. Shaving, washing and every variety of toilet work was conducted in it. In short, it was used very much as a species of slop-hopper, and it was used constantly. All the varieties of traps tested under this basin were styled by their makers "*self-scouring.*" A few days was sufficient to produce in each and all of them under this treatment a collection of slimy curiosities, which seemed to embrace every species of refuse, and to rejoice in every stage of decomposition direful to contemplate. This basin was then removed and a new one constructed by the writer, and furnished with an outlet large enough to fill the waste-pipe full-bore when emptied, was substituted in its place, and the varied usage of the basin was continued as before. An anti-siphon trap was substituted for the last one tested, and the trap was set close to the floor, the discharge-pipe being 1½" in diameter. The waste water rushed through the trap at the rate of about half a gallon a second, seeming almost to shake it in the violence of its passage. The soapy deposit from one discharge was scraped off by the next, leaving the interior of the trap and glass cap as clear at the end of a week as it was when first put in. The glass was absolutely undimmed and spotless. Various substances were then thrown into the basin to see if they would be retained by the trap. A handful of ashes, containing bits of coal a quarter of an inch in diameter, was thrown into the basin; a single discharge removed every vestige of it. The strainer was then removed, and several handfuls of ashes were thrown down the waste-pipe. This ashes contained numerous bits of coal and partially burnt wood and charcoal, some pieces being *an inch in diameter.* Two discharges passed everything through the trap and left it full of clean water. The experiment was repeated a number of times, sometimes using enough of the dirt to almost fill the trap. The force of the water was always sufficient to remove every vestige of the matter in one or two discharges.

Matches of unusually large size were next tried. Even whole ones 2½" long were safely carried through the trap, though occasionally they stuck in the lower bend of the pipes, and required several discharges to disentangle them. In all probability matches would sometimes get permanently stuck, and require the glass cap to be unscrewed for their removal.

Hair-felt was then thrown in. Pieces as long as 3" and as thick as 1¼" were invariably whisked through and out as easily as if they had been house flies.

Jute in strings as long as 6" was whirled away without any apparent impediment, as if no trap existed. Larger pieces were not used for fear of clogging the drains. A heavy paste was now made of wet ashes and soap; this was smeared all over the inside of the glass cap, and pressed into it until it stuck like cement. A single discharge removed the paste and left the glass as brightly polished as before. Iron nails about an inch long were thrown into the basin; they flew through the trap like cork. In short, every kind of substance tested gave way before the powerful torrent which this large head of water produced. The form of the trap was such that the force of the current was undiminished at any point, and its self-cleansing power was demonstrated.

The subject of grease-traps will be hereafter considered in a separate chapter.

For water-closets a simple S-trap should always be used. This should be protected from siphonage by means of an anti-siphonic supply-pipe, as already described under the heading of "Self-sealing Water-Closets."

Conclusion.

We have thus shown ways in which the plumbing of our houses may be greatly simplified and its cost reduced without injury to its character or usefulness. The simplification has rather been accomplished in such a manner as materially to improve the quality and safety of the work.

In the next chapter we shall endeavor to point out still other ways in which this economy may be extended with equal advantage to the work.

THE ILLUSTRATIONS.

THE EDEN MUSEE, NEW YORK, N. Y. MR. HENRY FERNBACH AND MR. THEODORE DE LEMOS, ARCHITECTS, NEW YORK, N. Y.

THIS building was designed for the purpose of exhibiting works of art, statuary and French wax-works, and evokes by its architecture general interest, both with the members of the profession and with the public. The material employed in the façade is bluestone for the water-tables and steps, Ohio stone of the McDermott & Berea Stone Company for the upper parts, while panels, etc., are of red polished granite. The style of architecture is richly-developed French Renaissance. The interior is divided into a number of spacious rooms, suitable to the purposes of the exhibition. The measurements of the great saloon are 57' 7" x 71' 8" in the clear. The heavy transomed ceiling is supported by means of queen-post trusses, and lighted by ornamented ceiling-lights of plate-glass. The building extends from Twenty-third to Twenty-fourth Streets. On the Twenty-fourth Street side there is located a winter-garden or concert-hall, including orchestra and a small stage. This room is 68' 9" x 76' in the clear, with curved iron roof supporting large skylights and turret lights. Spacious galleries extend around the walls. The floor of this room is tiled; parquet floors have been laid in the other rooms of first story. The basement is vaulted throughout, and the whole building is heated by steam and lighted by electricity. Especial care has been taken to obtain a perfect ventilation.

Annexed is a list of the contractors employed in the erection of the building; The masonry and interior plaster-work of the building has been in the hands of Messrs. Marc Eidlitz & Son, 298–310 East Fftyninth Street; the stone-cutting and sculptor work, both of the Twenty-third and Twenty-fourth Street fronts, were executed by Messrs. James Sinclair & Co., foot East Thirty-ninth Street, the material employed being Berea stone, from the McDermott & Berea Stone Co., Ohio; the complicated roof construction and all interior carpenter-work have been done by Messrs. McGuire & Sloane, 151 West Twenty-eighth Street; the iron-work, including the roof of winter-garden, has been furnished by Messrs. J. B. & J. M. Connell, Centre Street; the metal stairs, leading from basement to grand saloon, were built by the Hekla Iron Works, Brooklyn, E. D. (Messrs. Poulson & Eger); the work of the interior ornamental plastering has been carefully and artistically executed by Mr. Edwin G. Scherffins, 120 West Twenty-fifth Street; Mr. Oliver Barrett, 103 South Fifth Avenue, had charge of the plumbing work; Messrs. Kelly & Jones, 202 Greene Street, of steam-heating and ventilation; all skylight works, including the three ornamental ceiling-lights over great saloon, have been executed by Mr. George Hayes, 71 Eighth Avenue; the complicated gas-fittings by Messrs. George Kitchen & Co., 23 University Place; the marble wainscoting of vestibule has been furnished by Messrs. S. Klaber & Co., 217–223 West Fifty-first Street; the tiling of the vestibule and winter-garden has been laid by Messrs. Thomas Aspinwall & Son, 75 West Twenty-third Street; the parquet floors have been provided by the National Wood Manufacturing Co., 16 East Eighteenth Street; the electric-lights are provided by the Edison Electric-Light Co., New York.

GRANDS MAGASINS DU PRINTEMPS, PARIS, FRANCE. M. PAUL SEDILLE, ARCHITECT.

[From *L'Encyclopédie d'Architecture.*]

EL PANTEON,—TOMB OF BISHOP MARTIN,—SOUTH TRANSEPT OF SAN ISIDORO, SAN ISIDORO, LEON, SPAIN. SKETCHED BY MR. ROBERT W. GIBSON, ARCHITECT, ALBANY, N. Y.

SEE article on "Spanish Architecture."

STUDIES IN ARCHITECTURAL STYLE.[1]

WE confess that the title of this book puzzles us. If only the preposition had been "of," in place of "in"; or if an "s" had pluralized the final and most distinctive word; or, better still, if the contents of the book had been other than they are, it would have been so much easier to grasp the author's meaning, both as to the title and as to the purpose of the publication. A study of *styles* might be expected to be a descriptive history, pictorial or otherwise, of the styles of architecture chronologically considered. A study of *style* might be assumed to be a striving to reduce to formal terms that most intangible and ineffable attribute of artistic work which is as impossible to define in architecture as it is in a lady's dress or bearing. But a study "*in style*" can hardly be either of these, and may possibly mean the gropings of an artist who endeavors to express his understanding of the term "style" by aid of his pencil, having learned the impossibility of defining it by words. If this is what Mr. Pullan has attempted, he has essayed no trivial task, and we may fairly look to find in each subject a more subtile meaning than is found in ordinary designs; indeed it would hardly be too much to hope to come upon pure idealization.

But so far as we can discover, the title bears but an indifferent relation to the contents of the book, which is, broadly, a collection of Mr. Pullan's own designs for buildings of many classes, some of which have been carried into execution and others have not, arranged, it is true, with a regard to the chronological sequence of the several styles in which the different buildings were designed. This sequence is best preserved in the half-dozen plates of altars, where the series seems to be fairly complete, so far as the wretched printing of the plates and the worse lettering will allow the observer to discover.

The book contains about one hundred plates, which are about equally divided between ecclesiastical and secular subjects. Of the

[1] *Studies in Architectural Style.* By Richard Popplewell Pullan, F. R. I. B. A. London: 1883.

first class the most interesting is the unexecuted design for the memorial church, at St. Petersburg, to the murdered Czar Alexander II, which is designed in the Byzantine style as being most in consonance with the sentiment of the Greek Church, and of which the striking feature is the placing of the Czar's monument in the centre of the narthex, enclosed on all sides by ornamental iron *grilles*, which fill the three large intercolumniations of the front, so that the monument is visible to the passer in the street, as it is to those passing through the vestibules or halting in the atrium which separates the narthex from the body of the church. The lofty, broach spire to the semi-detached square campanile seems hardly to belong in a pure Byzantine design, however. The next most interesting subject is the design for Lille Cathedral, which is based on the elaborate system of triangulation which Mr. Pullan, following Viollet-le-Duc, has discussed more than once in the English professional papers. Just what was the relative share borne by Mr. Pullan and by Mr. C. Heath Wilson in preparing their joint design for the decoration of the dome of St. Paul's, we do not know, but it is certainly a very telling composition, and as the design was worked out to one-sixth full size, an eighth part of the surface of the dome being taken for treatment, there is every probability that the constructive features of the dome have been duly regarded. A full description of this design may be found in the *Transactions of the Royal Institute of British Architects* for December, 1882, and also in the *American Architect* for January 13, 1883.

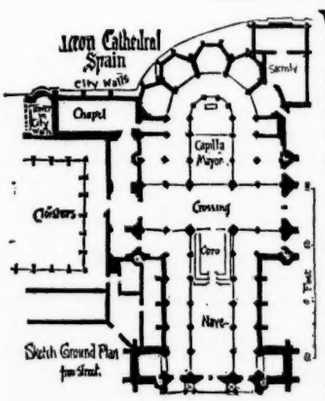
The second part of the book, which is of equal bulk with the first, is devoted to secular architecture, and is somewhat less interesting than the first, and the author has attempted no chronological classification of styles. But we find in Plates 76 to 86 a study of *style* which seems to prove that the author himself was somewhat uncertain what was the real purport of his book, and had therefore thought it best to adopt an ambiguous title. These plates exhibit simply studies for sundry public buildings, made with the object of determining whether what Mr. Pullan calls a "monostyle," a "duostyle" or a "triastyle" treatment produced the most satisfying results. Apparently the question was decided in favor of the monostyle treatment, which, as might be anticipated, means the employment of a single Classic order which embraces the full height of a façade, and this is considered by him the most dignified sort of composition, and has hence been employed in several of the designs shown. "Duostyle" describes the use of two orders, one superimposed on the other; and "triastyle" refers to the employment of three orders in the same façade.

The designs shown in this portion of the book are not particularly interesting, though as a rule their composition is sufficiently correct and formal, if we omit the somewhat extraordinary design for the Glasgow Town-Hall, the central feature of which, as seen in elevation, shows a decidedly unusual and disagreeable employment of Classic forms. As seen in elevation, the most vivid impression it conveys is that the two groups of statues on their enormous pedestals at either extremity of the central pediment are making most undignified use of it by indulging in a game of see-saw, the pediment being nicely balanced on the keystone of the large arch which spans the central bay, in the lower part of which is the main entrance. The side elevation exhibits an even more eccentric employment of these features.

The book is an exceptionally disappointing one, and as a matter of book-making it reflects little credit on the lithographers, for a more wretched collection of prints was rarely put within covers, for there is scarcely a plate in the whole book that would not technically be described as "rotten." The "ink-photos" are somewhat better, but they are much below the average of Messrs. Sprague's usual work.

SPANISH ARCHITECTURE.[1]—XV.

VALLADOLID.—LEON.



VALLADOLID seemed to be one of the busiest and most prosperous cities I met with. It is not very large, about forty thousand inhabitants, but there are fair shops, abundant tree-planted *paseos*, and a more energetic air of business in the place than in most of those already noticed. There is in commercial life a good deal of French influence. The station is on the main route from France to Madrid, and is the centre of an important district which consumes much of French manufacture. But a few hours sufficed to examine all the old architecture which I cared to see. There is not very much of it; an old church, "Sta. Maria l'Antigua," is the chief attraction in this respect. It is of A. D. 1180, through the thirteenth century and later. The outside cloisters, very good in their original form, are mostly walled in with common materials, with doors and windows, and partly concealed by a row of little wooden shops and peddler's stands. The tower is old, but not particularly attractive, and (with some other parts of the church, and indeed of all the old work) shows that Lombard and Italian ideas had a foothold here in the days of their building. The interior is crammed with the usual theatrical plaster and gilding.

The cathedral is an unfinished work of Herrera (A. D. 1585), and the portion executed is of such character as to prompt congratulations that there is no more of it. Cold, cheerless, soulless masses of masonry, a most ambitious design as regards dimensions, but simply a magnified adaptation of the same hard pilasters and stolid cornices, and monotonous windows, which can be designed best by copying, compose this structure. The rich, or rather elaborate, church of San Pedro in late Gothic style is worth inspection, but all description it needs is already published. The same may be said of the other churches.

The bridge is picturesque; mostly of pointed arches, and somewhat resembling the many already described, but in this the arches are of every possible size and shape, and resting on piers and abutments equally varied. The River Pisuerga is pleasant looking, dammed frequently for mills, and not navigated by any craft of size. The climate apparently causes the rivers to be very unreliable as highways; they are apt to dwindle down to mere brooks in summer. Here there are trees, too, and they are welcome; the banks opposite the city are quite well wooded. Few other things in Valladolid call for mention here. There are in some streets picturesque arcaded footways, with the house-fronts built out over them, and they are very shady and agreeable.

Not so the new iron-and-glass market-places which I noticed in course of construction in two of the public squares. They are doubtless great improvements over the antique umbrella or awning dyed in picturesque colors, but it seems to me the dealers will sigh at times for the breezy openness of the canvas shelter when they swelter in the new glass house.

Palencia was the next place upon my list. I did not stay at Palencia longer than the train did. This station is the junction of the Santander and the Leon railways, and a glimpse of the city can be had during the short wait. The church of San Miguel has a bold massy steeple over the western bay of the nave—an unusual position—and it is a very fine work. Mr. Street illustrates and describes it.

We soon got on the road again, and I had an opportunity to criticize Spanish railway practices. An incline rather steeper than usual, and a slight drizzle of rain upon the rails sufficed to bring us to a dead standstill; the locomotive had no sand-box, so the engineer and stoker had to get to work and sand the rails with shovels; then we advanced as far as the sanding was done, and there stopped again. It was clear we could not get far in this manner, but fortunately Dame Nature released us; heavier rain fell, and the slippery effect was lessened.

The country around Leon is better looking than Castile. Fertile fields are separated by hedge-rows of closely-planted poplar trees, which though a trifle monotonous are better than no trees at all. The hillsides show masses of verdure in places, too, and the distant mountains close in the view with a blue line of relief. The town itself is upon nearly level ground a little away from the river, which is now a clear rapid stream wandering about in divided channels, vainly endeavoring to occupy completely a gravelly bed, big enough to accommodate six times the volume of water; yet they say that occasionally it is not big enough. There are elms in Leon, too; a fine *paseo* from the bridge (the new iron one) up to the plaza, and in the orchards and plantations around the city nightingales are abundant, and their voices delightful when place and opportunity occur.

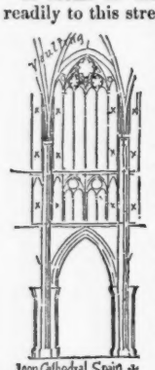
The cathedral is wonderful, both in respect to the highly developed artistic character and the advanced engineering skill displayed in its structure; but it is more purely French than any other building in the country. It is a splendid example of that period of French Gothic, during which aspiring lightness was aimed at beyond everything else, even at the expense of stability and grandeur. It is evidently of the thirteenth century, although Spanish writers love to ascribe it to more ancient times, and certain documents support their views; but the story of the stones themselves is carved upon them as clearly by the moulder's chisel as if a letter-cutter had covered them with inscriptions, and they assert that Leon Cathedral was erected at least as late as and probably later than certain French examples whose dates are known. Spain has no precedent leading up to this work; she has earlier efforts tending this way, but many links in the chain of evolution of the highly developed style are missing, and can be completely seen only in France.

And much of its character is antagonistic to the Spanish instincts in building, most especially the enormous area of glazed windows. Stained glass was being produced in its fullest, deepest beauty, and the French architects revelled in its glow and glory of color, so that the masonry almost sank into the subordinate attitude of necessary framing and support. The Spaniards had done nothing like this; but here, at Leon, it is carried to a culminating point, where the stability of the edifice is endangered by the size of its windows and slenderness of its supports. The lower arcades are of ordinary proportions, the triforium over them light and ample in height, and the clerestory enormous; the capitals of the vaulting shafts running up a considerable height above the triforium, and the windows being

[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 220, No. 437.

(originally) the full breadth from shaft to shaft of the bay of the vault. The triforium was glazed too, the aisle-roofs being inconsistently sloped inward (as well as outward) from a longitudinal ridge to permit it. This was, perhaps, a worse defect than the omission of the triforium, and the appearance it now presents, of a "blind" story, is undoubtedly far better. Very soon after the completion of the work, signs of weakness about the pillars between the clerestory windows led to all the openings of the latter, next to the pillars being built up solid with masonry, and of course the triforium below had to be treated in the same manner, making the aspect of these features more like that in other examples.

It seems to me curious that the design accommodates itself so readily to this strengthening process; one might almost suspect that the architect had so arranged his bold experiment that this way of retreat to avoid either failure was purposely provided. Choosing between the probabilities which Mr. Street offers, that either the architect was determined that his work should exceed all others in slender airiness, or that he was extremely incautious or reckless; I would incline to the first view, believing that only by the greatest care could the work have been so devised as to stand so long and so well as it did.


Leon Cathedral. Spain.
Diagram showing parts of Traceries built up solid

I found the building full of scaffolding and shoring; the South transept had been entirely taken down, and was in course of reërection; the vaulting generally was being removed, and, in short, the whole of the nave, choir and transept were being reconstructed rather than repaired. This labor was formerly entrusted to the architect Señor Don Juan de Madrago, who had lately died, and its continuance was in the hands of Señor Don Demetrio de los Rios, to whose courtesy I was indebted for a thorough view and explanation of the works. Restoration, especially so thorough as this, is admittedly difficult, and doubtless demands very reverent study of the old work; but this did not seem to be lacking, and I can hardly admit that Mr. Street's argument, that the difficulties attending it in England are multiplied in Spain by reason of want of practice, is a fair one. It is the "little knowledge" that is dangerous in the former country, combined with pedantic assurance. And again this is not a restoration after an obliterating decay; much of the old masonry is reused, and it is claimed that all new is faithfully copied from the old. So little was then done that I could form no definite opinion of the merit of the restoration, but I was struck with the lavish expenditure upon preliminary labors. The scaffolding is all planed and finished as if it were the end instead of the means, with nicely-finished stairs and rails, and even ornamented cut ends to some of the timbers. Generally the framing was very scientific and well adapted to its heavy strains, although here and there a cross-strain was allowed in a truss, and there seemed to be a maximum rather than a minimum of material throughout. Then the drawings were wonderful to see; even working diagrams of vault-ribs shaded with pen etching. I should have preferred to see more of *the* work done, and less of this preparation. The old stained glass was being carelessly treated, too. It is superb beyond description, and ought to be treasured as priceless. It is removed part by part, but not until much damage is done it by the carpenters.

A sketch-plan of the cathedral is given above, and with it the following dimensions will be better understood. It is about 300 feet in total internal length, and 83 feet in width, and has a height of about 100 feet. The nave is about 35 feet wide, and its stone vaulting is, therefore, a structure of considerable weight and thrust, and it is so high that the flying-buttresses are doubled one over the other. These seemed to have worked fairly well, but that internal weakness which I have before mentioned as being so frequent in Gothic architecture, namely, the pushing inwards of the nave pillars by the aisle vaults is very marked, and in some places the vaulting-shaft is thrust into such a convex line that it is a marvel it does not fall. There is, however, one good lesson which many modern architects would do well to observe. This building is twisted and bent by enormous strains, yet comparatively very few stones are fractured, and nowhere is there danger of unexpected collapse, because *stones of moderate size, laid with good honest mortar joints*, constitute the structure, and it has considerable elasticity. This is especially apparent in the vaulting; some of the ribs are terribly distorted. Had they been long stones close set with a brittle cement they would have fractured and fallen inevitably, but they stand even when the curve is fallen almost to a straight line in places.

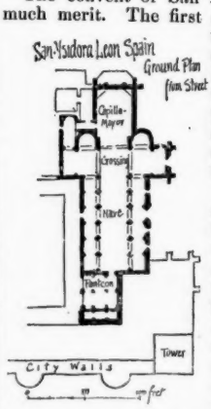
It was impossible to sketch any of the interior of the main building because of the maze of wood-work which filled it, but I did manage to get a drawing of one of the gems of art which adorn it. It is the tomb of Bishop Martin in the north transept, a beautiful monument, one of the best I have seen of its class. The round arch is richly carved with crisp, spirited foliage and angel figures, and the cusps with more angels censing. In the back, over the effigy, are two tiers of relief carvings. The upper is the crucifixion (much damaged), and the lower an assembly of priests, acolytes and mourners around the effigy of the bishop; all are finely carved. Upon the front of the tomb is another interesting relief showing the charitable deeds of the dead bishop: he is represented distributing loaves of bread to crippled and poor persons. The inscription gives the date Era 1280 (A. D. 1242), yet the carving (foliage as well as figures) appears of an extremely advanced character for that age. Possibly the completion of the monument was considerably delayed. All the ornament and the effigy are much mutilated by wilful injury, said to have been inflicted by the French soldiery. There are many other tombs and monuments, and innumerable articles of furniture and ritual, all of beauty and interest beyond my opportunities for description. There was also a tawdry Renaissance altar structure, which had been carefully taken down as if to be rebuilt. It is a curious commentary upon the kind of taste fostered by the Church in these days, that this vile jumble of wood and plaster, gilt cornices and cupids should be better cared for than the magnificent old stained glass. The cloisters and chapels (in which the services are now conducted) have some very fine work. Doorways especially have been conceived and executed in the most artistic spirit. The great western portals are extremely beautiful, profusely decorated with that thirteenth-century sculpture, which is probably the best art-production of the Middle Ages. Every carver was a preacher, and his "sermons in stones" were strikingly pointed and vigorous. The exterior generally, although imposing as such a building will always be, is scarcely so fine as one would hope to find it. The interior was in those days the subject of special design, the outside being secondary, and this principle seems to me to be at the bottom of Gothic method, and worthy of more attention than it receives in this age. Except for the western doorways and some views of the east end, Leon cathedral is even defective in external effect, and its French character is very pronounced. The sketch-plan shows how the east end is built into and with the city walls. It reminded me of Avila a little, but it is not fortified as that is. To conclude, the cathedral is dedicated to Sta. Maria de Regla, and is the third edifice, the see of Leon being one of the earliest recorded in Spain.

The church of San Isidoro is a fine old Romanesque work of the eleventh century, much earlier, therefore, than the present cathedral. It appears that the body of the patron saint was deposited here in A. D. 1063, and many are the legends and fables about San Isidoro and his buildings. He was a popular and deeply-venerated saint, and wrought wonderful miracles even after his death.

The church is composed of a nave of six bays, with aisles, crossing and transepts, like other Romanesque churches already noticed, and apses. The central apse has, however, been replaced by a sixteenth-century *capilla mayor*. There is no *coro* in the nave, nor is there any lantern over the crossing, but the nave barrel-vault continues over it. The arch of the transept is notable; it is round, and ornamented with eight large cusps, a very unusual thing, though not inconsistent. It was possibly suggested to the architect by some Moorish work. The building generally is of the ordinary round-arched massy character, very interesting and effective, but much marred now by wretched attempts at coloring with lime-washes.

The exterior of the south transept (shown on the drawing) is a good subject for study. Unfortunately, I was compelled to a too near view for its best effects. The arcade with doubled shafts is very satisfactory; so is the simple doorway. The tympanum is sculptured with a Descent from the Cross, and the arch flanked by two statues is surmounted by a semicircular label-moulding at considerable distance, a very uncommon feature. At the west end of the church is an ancient building called El Panteon, really a chapel dedicated to Sta. Catalina, which seems to have been the first shrine and church of San Isidoro. There are several tombs of royal personages here, yet it is only a small, low-vaulted structure of earliest eleventh-century work. My perseverance in efforts to get a sketch of it was at last rewarded after almost intolerable delays and impediments. The building is worth careful attention. The pillars are simple cylinders; the capitals carved with a conventional foliation almost as simple as the Egyptian, yet with a well-developed Romanesque character. The vaulting, a very irregular work, probably in massive rubble, is extremely primitive, and is covered with old color decoration in a very fair state. It appears now principally in browns, and grays and white, undoubtedly having been brilliant with blues and reds originally.

The convent of San Marcos has a rich Renaissance façade of much merit. The first (or ground-floor) story is a very good arrangement of pilasters, with surface enrichment paired and alternating with windows. In the second story there is too much fantastic work about the columns of old "bed-post" style. Inside there is a fine stone staircase, and a large church of late style, and a sacristy also late, but unusually pleasing in effect.



There are some curious bits of house architecture to be seen in the little city. One example I noted, a Renaissance corner building with a window right on the angle, and so constructed that the elevation was the same as if it had belonged to a flat façade. The pilasters, cornices, and even the round columns of the elaborate trimmings being worked to returns of 45° or 135° instead of 90° on plan. It is this sort of vagary which contributes much to the bad effects of Spanish classic art.

As a type of better style I may mention a house and shop, a three-

storied building; the first, a single great semicircular arch; the second, a pedimented window, with a decorative tablet on each side, and the top story an open loggia of three arches with light cornice over, altogether a most pleasing bit of street architecture.

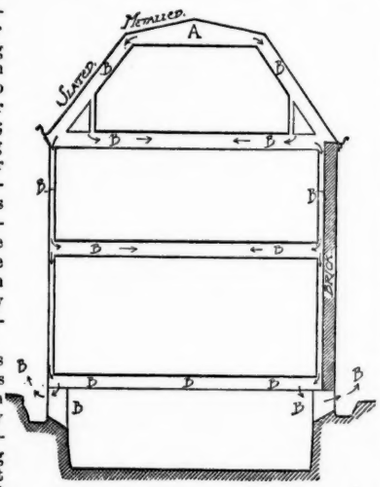
ORDINARY ROOFS CONDENSERS OF HEAT.

BOSTON, May 14, 1884.

ONE of the most important safeguards called for by the Factory Mutual Insurance Company has been the substitution of a flat roof, made either of 3-inch plank or of 2-inch plank, sheathed crosswise inside between the timbers, so as to leave no air-space, in place of all other forms or descriptions of roof; the plank, of course, resting on heavy timbers, 8′ to 10′ 4″ on centres (*all* roofs resting on rafters 12″ to 24″ on centres being condemned). In dealing with dye-houses, machine-rooms of paper-mills and other buildings in which a great deal of heated vapor is generated, every question relating to the convection of heat through a roof, the condensation of moisture on the inside, and other like problems, have of necessity been considered.

The method of placing steam-pipes for heating purposes overhead, instead of at the sides of rooms, has also made it necessary for us not only to study the convection of heat, in order to overcome the ridicule with which this plan was first met, before we could secure its general adoption in all rooms where the pipes can be put at a sufficient distance from workmen to keep them free from the discomfort of the direct radiation upon their heads, but also to enable us to insist upon trials in single rooms against the convictions of mill-managers. It is now the common practice in all new mills, and the pipes have been raised in a large portion of the old mills, the experiment in a single room invariably convincing the mill-managers that all their *a priori* theories regarding the distribution of heat had been without warrant in fact.

In the consideration of these two problems it has occurred to me that the common construction of the roofs of dwellings, to which we so much object because the hollow spaces between the rafters or above the upper ceiling are so dangerous with respect to fire, may also be subject to another very grave objection; namely, that of making the roofs *condensers* or *reservoirs* of *heat*, whereby not only the attics are made almost unbearable in summer, but the whole house may be heated excessively, in spite of almost any thickness of the vertical walls.



In dealing with this matter certain questions will be submitted upon which observations may well be taken. Referring to the accompanying section of a house built in the common way, and in which there is a more or less direct connection or open way in the walls, between the spaces which separate the rafters or which are over the attic ceiling and the lower portion of the house or cellar, so that there is or may be a sluggish circulation of air from one point to another, the question arises in what direction will that circulation work under different conditions.

It will be said that heated air rises, which is the usual comment on the first suggestion of overhead-heating; but it is equally true that cold air falls. Hence it follows that confined air when expanded by heat may force its way *downward* if the only outlet is below; if the heat and expansion are then continued, all the cold or cool air may be forced from the attic down and out from the lower parts of the building, and its place may be taken by warm or hot air, varying somewhat in its temperature according to position in the height of the column.

Let us assume a building consisting of a single room of the ordinary height of a house, or containing a column of air fifty feet high, with *one* opening at the top and *one* at the bottom. Now let heat be forced in at the bottom; will it not immediately rise and pass out at the top without much affecting the lower stratum of air in the building? Will not a column of heated air pass through the atmosphere already in the building without affecting the whole atmosphere of the building in any great degree, and especially without warming the air near the floor?

Now reverse the order. Suppose heat is forced into the opening in the top of the building, will it not meet such resistance from the cooler air within as to spread sideways from wall to wall, and thus force *all* the cooler air out at the bottom, as if it were working a piston in a cylinder?

Such has been the practical result of overhead pipes in stone-floored basements which could never be made comfortable by means of side pipes, but which have been warmed throughout by overhead pipes.

We will now apply these questions to the dwelling-house on a summer day: thermometer in the shade 70°, and in the sun 100°. This hot sun strikes a roof consisting of thin unmatched boards laid over ten-inch rafters, 12″ on centres, covered with slate on the steep pitch and copper on the flat pitch, with a triangular space over the attic ceiling, designated *A* on the section. The question is to what degree will the air in the space *A* and between the rafters be heated? Will the temperature rise to 120°?

The observations which have been taken on the upper part of high library rooms lighted by *skylights*, which are great condensers of heat, indicate that the heat under a roof or skylight may be raised much higher than 120°. (See Poole's pamphlet.)

Assuming 120° in a space from which the only possible circulation is downward between the plastering and the outer walls, and out by the cellar-windows, as indicated by the arrows and letters *B B B*, will not this vertical interspace and between the floors and ceilings be also heated to a point above the outside temperature in the shade?

These are questions which are capable of being answered by adequate observations which might give useful results. The only case within our experience which would serve as a guide has been in a factory[1] which had a pitched roof (see notes), which was sheathed on the inside of the rafters, covered outside with unmatched boards and slated. The attic was almost impossible to heat in winter, and was very hot in summer.

In order to avoid the danger of fire in the roof, the owner was advised to remove the sheathing from the under side of the rafters, and to screw it solidly upon the roof-boards between them. This he did, and he then found his attic much cooler in summer and very easily heated in winter.

From such cases as this, and also by the treatment of roofs for the purpose of preventing condensation on the inside in cold weather, we have reached the conclusion that a 3-inch solid plank is the best non-conductor of heat and cold, but that for many purposes 2-inch will serve; in both cases the plank should be well seasoned, groved and splined — pine preferred.

It might be possible to test the circulation of heated air from the interspaces of the roof to the lower parts of the house, by injecting oil of peppermint and observing the odor below. Perhaps it would be well to inject valerian in the roof and observe the action of the cat in the cellar.

E. A.

A COLD-AIR SUPPLY. — Four large cold-storage warehouses are now in operation in New York city, and it is said that the time is not far distant when cold air will be served in pipes throughout the city just as gas and water are now. One of the novel features of the new Washington Market, now being constructed, is a network of pipes running through the building, through which cold air will be furnished to the different meat stands. — *Exchange.*

AMERICAN TECHNICAL ABILITY. — America bids fair to become the great technical university of the world. Its resources are boundless, its industry is unceasing, its mechanical ingenuity and inventiveness are already unrivalled. Its people have little respect for tradition, no distrust of intelligence, and an unbounded confidence in their own capacity to improve on the ways of their forefathers. If, in addition to these natural advantages and national characteristics, they resolve to make science and theory keep pace with their industrial practice and their rare mechanical aptitudes, it needs little foresight to predict that the industrial supremacy of the world will some day belong to them. — *London Times.*

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[1] The roof-boards are ordinary *inch* boards, not matched, and not laid perfectly, edge to straight edge.

The slates are nailed to these boards, and the roof thus described constituted the sole cover to the "cock-loft," *as was.*

The sheathing is 3-inch stuff, planed and matched, and furnished the covering-in, so to call it, of the attic room, *as was.*

As was.

As is.

This sheathing was taken down and *screwed between rafters, direct and tight to the inch roof-boards, after introducing between them one thickness of heavy "hardware paper."*

This gave to the attic room the entire space described within lines of floor and roof.

The room thus changed is much more easily heated in winter, and is much cooler in summer.

THE COMPOSITION AND STRUCTURE OF WALLS.

WE lately drew attention to the materials used for floorings, their physical and artistic qualities, and in the course of our observation remarked upon the effect of some floorings in modifying the temperature of a room, by robbing it or otherwise of heat. Architects are not usually disposed to forego a handsome tile or mosaic pavement, because it has a greater conductive capacity than wooden flooring, any more so than they would be to improve the acoustic properties of their building by sacrificing any costly wall-lining or feature. Yet to those who have to pay for the cost of heating, or to endure the discomfort attending a cold building, the consideration of material is a matter of more concern than the designer imagines. We here speak of the effect of material on the warmth and comfort of habitable buildings, and as the composition and structure of walls exercise a large share in the condition of the question, we may first consider them. The power of some materials in conducting heat, and of others in absorbing it, is well known, though not acted on by architects. They have to do — broadly speaking — with conducting and non-conducting substances, and the proportion in which each of these kinds enters into the composition of a building bears a near relation to its degree of comfort and warmth. While wood and thatch and plaster are productive of comfortable rooms, another class of materials, in which we must place brick, and stone, and iron, and glass, are known to be extremely cold when employed in any bulk. Not only the substances used in building, but the manner of putting these together, have to be regarded, such, for example, as in making solid and hollow walls, inside facings, and impermeable outer coverings.

The transmission of heat, or the principles of conduction, with regard to the rate at which heat passes from one particle to another of any body, is still imperfectly known to physicists. All that we know is that heat is more readily transmitted in metals than in wood and other substances, and different rates of transmission are noted for different metals and other materials. Many of the experiments that have been made have not been conducted upon scientific principles. It has been ascertained, however, that the temperature of the material has something to do with the rate of conductivity; that, in fact, that of metal diminishes as its temperature increases. At least, we are perfectly sure of one thing, and that is that the transmission of heat through different substances has a great deal to do with our sense of comfort, both in regard to clothing and the materials of building, and the inquiry is one which has very special bearing on the comfort and health of our dwellings. With reference to building materials alone, the question is one worthy of extended investigation, which we hope the results of the forthcoming Health Exhibition will help to farther. The group under Dress will contain, at the suggestion of the committee, specimens to show the comparative value of different dress fabrics, with reference to their warmth, their hygroscopic properties, and the influence of color in modifying effects of sun heat; and in the same manner building materials might admit of classification, according to their conductive capabilities, their hygrometric properties, texture and color. The modes of dealing with materials are numerous, and often modify, to a large extent, the results that would be obtained if they were used in solid homogeneous masses. Thus a brick wall faced with stone would have a different degree of transmission to one of homogeneous stone, and even the facings or skins of plaster and cement or tile have a perceptible difference of effect upon temperature and dryness when measured by the thermometer and hygrometer under varying states of the weather.

There are a few established facts in relation to the question, to which we may refer. And first let us refer to the materials. Roughly speaking, there are four kinds of materials used in building walls — these are stone, brick, concrete and wood; and there are two modes of construction adopted — the solid and the hollow, or cavity systems. Each of these kinds of wall has to be considered as regards its warmth-retaining properties. A solid, porous wall is probably the worst form of wall building that can be adopted; the porosity in itself is favorable to warmth, so long as the material is not charged with moisture; but we all know that the absorbing quality of some bricks renders them detrimental to health in wet weather, when they are saturated with water. It is well known by all scientific sanitists that a damp wall causes a great absorption of heat, by evaporation of moisture, to take place; in other words, in the process of evaporation of the moisture a quantity of heat disappears in the shape of vapor; so that, in fact, a porous wet wall, as it dries interiorly, is robbing heat from the room which it incloses, leaving it cold and unhealthful. Every volume of dry air which comes in contact with the surface takes up so much of the moisture with the heat; but as the air always contains a certain percentage of water in it, a large number of such volumes or cubic feet of air are necessary to dry a certain extent of walling. It has been stated by Captain Galton in his work on "*Healthy Dwellings*," that a new house, containing 100,000 bricks (each brick sucking up from seven to ten per cent of its weight of water), contains, at a reasonable calculation, 10,000 gallons of water in it. All this quantity of water has to be removed by evaporation, and the rapidity of this process will depend on the tension of the vapor at a given temperature. The rate of transmission of heat through building materials depends upon their texture and composition. According to one authority, the heat in units transmitted per hour through slabs of different materials one inch thick for a difference of 1° Fahr., show that marble transmits more heat than ordinary stone — about double, in fact; and that brickwork transmits only a third of what passes through stone. Here are some of the figures given: Marble, 28.0; ordinary stone, 13.68; brickwork, 4.83; plaster, 3.86; glass, 6.6; fir, 0.83; and paper, 0.346. From these data we see that marble is the coldest building material, stone the next coldest, while brickwork, plaster and wood are considerably warmer, less heat passing through them. We have also in this list good reasons for the employment of brick-casings to our walls, and especially of the value of plaster and paper for the inner skin of walls. Another table given by Mr. Box, showing the loss per hour for 1° difference of temperature, is, if reliance can be placed on it, useful as proving that good brickwork is far more heat-retaining than stone-work of similar thickness. Thus we find the following facts: The amount of heat lost per hour under certain temperatures is through a 4½-inch brick wall, 0.371 units; through a 9-inch wall, 0.275; a 14-inch wall, 0.213; an 18-inch, 0.182. If we compare stone walls, the heat transmitted in units in the same time is for a 6-inch wall, 0.453; a 12-inch wall, .379; an 18-inch, 0.324; and a 24-inch, .284; in short, taking the 18-inch walls of both materials, nearly twice the heat per hour is lost through the stone wall that passes the brick one, and a brick 18-inch wall retains considerably more warmth than one of stone 24 inches thick. The importance of these data in heating buildings is obvious, and the architect would be consulting economy and his client's pocket by selecting materials that will not transmit all, or nearly all, the heat produced by an apparatus, as the rapid conduction of heat through walls and windows often amount to a considerable percentage of loss.

It would be of much value to know the coefficients of transmission for other materials, such as concrete and terra-cotta; but we have enough to show that these materials would be more heat-retaining than many hard stones. As we have mentioned, porosity is an injurious quality in damp weather, and, therefore, the merits of hard-grained and of porous or softer materials partly neutralize each other. In the mode of construction the whole problem is to be solved. The use of an outer or an inner skin in wall building seems to us to be the principle on which a thoroughly good wall should be constructed. There is the requirement (1) of an impermeable facing to throw off the wet; and (2) of an inner casing or skin of a non-conducting substance. These conditions favor a non-homogeneous wall in which the harder and more conductive material is placed on the outside, so as to arrest damp immediately or to throw it off. In our brick buildings the use of an outer covering, like hard tiles of terra-cotta, slate, or concrete slabbing, like Mr. Lascelles', affords, probably, the best and simplest protection from the weather in keeping the wet out of the body of the wall, and the thinner it is, probably, the better. There have been many patents of late years for facing walls, some of which we have noticed; one of these is an interlocking facing-brick, which is secured to the brick wall. Compositions are various, and when we say we have asphalt, and a bituminous substance known as the Hygeian-rock composition, which can be run into cavities or applied to the surface, it is needless to allude to other kinds of covering, and to several water-proof solutions in the market. We might here once more review the many advantages of hollow or cavity walls, the virtues of which are beginning at last to dawn upon the profession, though regarded for some time with unmitigated dislike. All hygienists and constructive architects have declared in favor of a principle of wall-building which preserves an air-space, and which can be turned to many useful purposes, while it fulfils all the conditions of a sanitary wall. We have, lastly, only to mention the inner casing of our walls, and especially of those constructed on the solid system, and here we find the inventive powers of constructors and decorative artists have not remained idle. Never before in architectural history have the inner facings or linings of walls received so much attention, and the recommendation need scarcely be repeated that the architect can select from a variety of materials, from terra-cotta and tiles or marble on the one extreme, to Lincrusta, fibrous plaster, papier-mâché or paper on the other; the one great want being that such a material be employed which will most effectually maintain an agreeable temperature, with a regard to sonorous or other properties, and the necessities of a facing that will remain uninjured by time or violence, and admit of artistic decoration. — *The Building News.*

OUR ILLUSTRATIONS.

WASHINGTON, D. C., May 13, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,—Please inform me what your regulations are in regard to publishing designs. Must they be in ink, and size of your paper? Or can you reduce size and use pencil drawings? And do you return the drawings after you have made use of them? Being one of your subscribers, I would like to submit a design in pencil.

Very respectfully, BEN. B. BRADFORD.

[Until within a year it has been extremely desirable that drawings offered for publication should be rendered in ink, though we have been able to reproduce, and have done so, drawings strongly rendered in pencil only.

Now, owing to improvements in our processes of reproduction we are ready to welcome offerings of all kinds, drawings rendered in ink, in pencil or in color, large-sized photographs and *particularly photographic negatives* of which, in these days of amateur photography, there must now be an abundance. It is quite immaterial how large a drawing is made provided the dimensions are proportioned to the size of our field of reproduction (7″ x 11″), but as a rule the best results are obtained from drawings about double the linear dimensions of their proposed reproduction. As a rule drawings are retained until publication and are then returned at once uninjured. We are prepared to render in ink drawings submitted in pencil, but as the finished drawing is returned to the author we make a nominal charge against him for the increased value of the drawing he receives back. We are also prepared to prepare at our own expence perspectives from working-drawings of really noteworthy buildings, such perspectives being of course retained by us.— EDS. AMERICAN ARCHITECT.]

THE ACTION OF SALT-WATER ON CAST-IRON.

CHARLESTON, S. C., May 12, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,— In your issue of May 10, I noticed an article "*Salt Water Supply for New York Fires,*" and as our own city proposes to adopt such a plan. I write to ask if you could give me any information as to the durability of cast-iron pipes used to convey salt water? Any information on this subject will greatly oblige,

Yours truly, CHAS. R. VALK.

[Cast-iron piles are said to soften when immersed in salt water for a time, the surface becoming converted into a substance like black-lead; but the action must be very slow, and would in all probability be entirely prevented by the asphalt coating with which water pipes are usually furnished.— EDS. AMERICAN ARCHITECT.]

TO CURE A DAMP CELLAR.

May 9, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — May I take the liberty of asking through the columns of your valuable journal a few practical questions. The difficulty to be overcome in a new house is the wet cellar. Conditions present concrete not strong enough to resist the hydraulic pressure through a clay soil. No footings under wall (which are of brick). No cement on outside of wall. The water evidently, however, forces its way through the concrete bottom.

(*a*). Will re-concreting (using Portland cement) resist the pressure of water and keep it out?

(*b*). If not, will a layer of pure bitumen damp-course between the old and new concrete do the work?

(*c*). Will it do any good to carefully cement the walls on the inside with rich Portland cement, say 3′ high to exclude damp caused by capillary attractions through the brick wall?

General character of the property is quite high ground.

Pardon for asking so much space.

CONTINUAL READER.

[It is doubtful whether even Portland cement concrete would keep back water under sufficient pressure to force it through concrete made of the ordinary cement. The best material would be rock asphalt, either Seyssel, Neufchâtel, Val de Travers, Vorwohle or Limmer, any of which, melted, either with or without the addition of gravel, according to the character of the asphalt and spread hot to a depth of three-quarters of an inch over the floor, will make it perfectly water-tight. The asphalt coating should be carried without any break 18 or 20 inches up on the walls and piers, to prevent water from getting over the edge; and if the hydrostatic pressure of the water should be sufficient to force the asphalt up, it must be weighted with a pavement of brick or concrete. This is not likely to be necessary, however, unless the cellar is actually below the line of standing water around it.

This, although an excellent method of curing the trouble, the asphalt cutting off ground-air from the house, as well as water, will be expensive, the cost of the asphalt coating being from twenty to twenty-two cents a square foot; and perhaps it may not be necessary to go to so much trouble. It is very unusual to find water making its way through ordinary good concrete, unless high tides or inundations surround the whole cellar with water. If the source of the water seems to be simply the soakage of rain into the loose material filled in about the outside of the new wall, we should advise attacking this point first, and sodding, or concreting with coal-tar concrete, a space three or four feet wide around the building. This, if the grade is first made to slope sharply away from the house, will throw the rain which drips from the eaves, or runs down the walls, out upon the firm ground, and in the course of two or three seasons the filling will generally have compacted itself to a consistency as hard or harder than the surrounding soil, so that the tendency of water to accumulate just outside the walls will disappear; while the concrete, as it hardens with age, will present more and more resistance to percolation from below.

For keeping the dampness absorbed by the walls from affecting the air of the house, a Portland cement coating may be perhaps the best means now available. It would have been much better, when the walls were first built, to brush the outside of them with melted coal-tar; but that is probably impracticable now. If the earth stands against the walls, however, the cement coating should cover the whole inside of the wall. The situation of the building may perhaps admit of draining away the water which accumulates about it by means of stone drains, or lines of drain tile, laid up to the cellar walls, at a point below the basement floor, and carried to a convenient outfall. This would be the most desirable of all methods for drying the cellar, and should be first tried.— EDS. AMERICAN ARCHITECT.]

THE TOLEDO INSANE ASYLUM.

TOLEDO, May 12, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,— In the matter of the insane asylum to be located here, the contract made by the former Board of Commissioners with Miles, Cramer & Horn, of this city, was annulled by action of Supreme Court, on the ground that as the appropriation was but $500,000, and the architect's approximate estimate reached the enormous (?) excess of $502,000, therefore the plans could not have been legally adopted.

Pending this decision, bidders were again at work on estimates, when lo! this fact was developed to them and the work rested. Well, a revised estimate was made by architects, which fell a little below the appropriation, and all was smooth again, and the plans were finally "adopted" by the now potent Board of Trustees. New bids are now the order of the day, and all hope it will be a "go" this time, June 12, prox., being fixed for the opening of bids.

Verily, how weak, how uncertain the tenure in all earthly things! public building contracts not forming a happy exception,— when Law's decree yet hangs in the balance. H. A. M.

THE ARCHITECTURAL ASSOCIATION OF DES MOINES, IOWA.

DES MOINES, IOWA, May 13, 1884.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen,— "The Architectural Association of Des Moines" has just been organized, for the "purpose of uniting all directly or indirectly interested in architecture; mutual improvement; elevating the standard and increasing the usefulness of architecture; disseminating and perfecting architectural knowledge, and correcting unprofessional practices."

Active members must be practising architects.

Draughtsmen may become associate members, entitled to all privileges except voting and holding office, and their annual fees are to be used in obtaining periodicals, etc., for the benefit of all.

Engineers and others interested in architecture may become honorary members by recording their names on the list of the Association's guests.

The regular meetings occur fortnightly.

The officers are J. S. Blake, President, and E. H. Taylor, Secretary and Treasurer.

If architects generally would consider your excellent editorial of March 8 sufficiently to realize the truths it contains, such associations would be formed wherever two or three of them can get together. Respectfully, E. H. TAYLOR,

Secretary.

THE PRINCIPLES OF GLASS-MAKING.

ST. LOUIS, MO.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — To A. H. R., who makes inquiry as to a book called "*The Principles of Glass-making,*" please give the information that the book is one of a series of technological hand-books published by Geo. Bell & Son, York St., Covent Garden, London.

I do not think that it can be had in this country. Any New York dealer would know. Yours etc., M. S. SNOW.

NOTES AND CLIPPINGS.

AMERICAN CHURCH ARCHITECTURE. — The Boston *Watchman* says that within the last nine years nearly eight hundred churches have been burned in America, mostly through defective heating apparatus.

SLOW-GROWN *vs.* FAST-GROWN TIMBER. — A general impression exists that slow-grown timber is the strongest, but the opinion does not, it is said, stand the test of experiment. There is in London a government establishment for testing the quality and strength of all woods and metals used for government purposes, the chronicles of which are said to be very interesting. Among other things which have been proved there, is the fact that fast-grown timber—oak at least — is the strongest, and bears the greatest degeee of tension. — *Exchange.*

EARTHQUAKES AND LUMINOUS PAINT. — The connection between earthquakes and luminous paint would hardly be apparent to any one without explanation. It nevertheless exists, and the recent earthquakes in our own country have served to remind us of its existence. As a matter of fact large consignments of this paint are sent to those countries where earthquakes are prevalent. The use to which it is put invests it with the utmost importance just for the few critical moments of the shock. In the Philippine Islands, where earthquakes are not uncommon, small metallic plates coated with luminous paint are so placed about the premises that at the first warning the inmates are quickly guided to the door, and thus to the street. In Manila it is laid on in patches about the bedrooms and staircases, serving as guides for the door-handles and the stairs, night-lights being considered especially dangerous as likely to set fire to the falling house, and thus to roast the inmates in their own homes. It follows that those who live in districts likely to be visited by earthquakes will do well to adopt this plan, and to burn no flame lights at night, especially in the case of gas, the pipes for which might be broken asunder, and the gas escape and take fire. The gas should be turned off at the main nightly, and luminous labels be so placed as to indicate the door-handles and other guides to the main point of egress, which would enable the residents to find their way out of their houses in the dark before the walls perchance buried them. It will be remembered that at Ischia there was just sufficient time between the first shock of the earthquake and the downfall of the Grand Hotel to permit those who acted promptly to save their lives.— *Iron.*

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.]

298,347. Compound Water-Cock and Sewer-Gas Cut-off. — William Cahoon, Jr., Chicago, Ill.

298,357. Lightning-Conductor.—Thos. H. Dodge, Worcester, Mass.

298,359. Paint-Brush. — James Elliott, Philadelphia, Pa.

298,393. Package for Mixed Paints. — Edward T. Mason and Frank A. Bergman, Chicago, Ill.

298,394. Cock and Faucet. — George B. McCracken, Willimantic, Conn.

298,495. Derrick. — Adam Reitz, St. Louis, Mo.

298,417. Sandstone-Crandall. — Ferdinand Shueddig, St. Louis, Mo.

298,418. Manufacture of Bricks made of Glass. — Francis H. Shaw, Newark, N. J.

298,427. Screw.—Henry A. Stone, Brooklyn, N. Y.

298,442. Chain-Wrench. — William H. Brock, Corona, N. Y.

298,452. Cistern for Water-Closets. — John Demarest, New York, N. Y.

298,454. Shingle-Planing Machine. —Alonzo W. Eldredge, Big Rapids, Mich.

298,463. Roofing-Bracket.—Alfred Guedle, Canal Dover, O.

298,480. Spring-Hinge. — Geo. M. Lane, Asbury Park, N. J.

298,482. Self-acting Elevator-Gate. — Samuel J. Laughlin, Guelph, Ontario, Can.

298,496. Sash-Cord Guide. — Geo. W. Pero, West New Brighton, N. Y.

298,505. Making Artificial Blocks, Stones, etc. — Louis Dosenthal, Frankfort-on-the-Main, Germany.

298,520. Rain-water Trap. — Edward T. Toomer, Mobile, Ala.

298,522. Cold and Fire Proof Storage Building. — Benjamin E. Valentine, Brooklyn, N. Y.

298,528. Lathe for turning Polygonal Forms. —Ludwig Weisse, New York, N. Y.

298,529. Wood-turning Lathe. — Ludwig Weisse, New York, N. Y.

298,532. Portfolio. — Henry S. Williams and Edward L. Shipman, New York, N. Y.

298,542. Bit-Brace.—Charles H. Amidon, Buffalo, N. Y.

298,560. Bench-Dog. — Riley Doty, Leonardsburg, Ohio.

298,567. Anvil. — Clark Fisher, Trenton, N. J.

298,580. Machine for Casting Plumbers' Traps. — Charles E. Heiss, Chicago, Ill.

298,598. Stone-Dressing Machine. — Jonathan Mann, Milton, Mass.

298,675. Window-Screen. — Thomas W. Dowling, Detroit, Mich.

298,680. Hydraulic Elevator. — Edwd. B. Ellington, Chester, County of Chester, England.

298,699. Window. — Anton Matuska, Chicago, Ill.

298,702. Shutter-worker. — Theodore A. Myers, Wheeling, W. Va.

SUMMARY OF THE WEEK.

Baltimore.

Home. — Geo. A. Frederick, architect, has prepared drawings for the Home for Aged Germans of Both Sexes (Greisenheim), for a building cor. Baltimore and Payson Sts., on lot 150′ x 215′, and to consist of a four-st'y centre building, 44′ square; 2 three-st'y lateral wings, 35′ x 58′; and a three-st'y extension, centre 30′ x 90′, to be built of brick, with stone and terra-cotta finish; cost, $50,000; Frederick Decker, builder.

Warehouse. — Isaac Benesch, Esq., is to have built a four-st'y and basement warehouse, of brick, with stone finish, 28′ x 140′, on Eutaw St., between Saratoga and Mulberry Sts., to cost $20,000, from designs by George A. Frederick, architect.

Addition and Extension. — J. F. Reynardt, Esq., is to have built a three-st'y brick, stone, and terra-cotta addition to his house on Park Ave., 22′ x 40′ to cost $4,000.

The Holy Cross Parish is to have built a brick and stone extension, 65′ x 70′, to their church on West St., between William and Light Sts., to cost $35,000, from designs by George A. Frederick, architect.

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

A. L. Shuby, 2 two-st'y brick buildings, e s Hanover St., between Randall St. and Fort Ave.

Michael Mears, three-st'y brick building, s w cor. Chase and McKim Sts.

Wm. Norbeck, 2 two-st'y brick buildings, e s Shield's Alley, between Myrtle and Argyle Aves.

F. X. Ganter, five-st'y brick building, s s Pratt St., between Charles and Hanover Sts.

L. Shoenline, two-st'y brick building, s s Jefferson St., w of Castle St.

John Ulrich, three-st'y brick building, e s Spring St., between Orleans and Jefferson Sts.

Alfred L. Smith, 5 three-st'y brick buildings (square), w s Carrollton Ave., n of Mosher St.

Ed. Sickel, three-st'y brick building, rear n w cor. Baltimore and Bond Sts.

H. & F. Weitzelberger, 2 three-st'y brick buildings, w s Caroline St., commencing cor. Madison St.

H. C. McAfee, 5 two-st'y brick buildings, e s Holbrook Alley, between John and Biddle Sts.

J. F. Weissner, 3 three-st'y brick buildings, w s Belair Ave., between Federal St. and Boyd's Lane.

Johns Hopkins Estate, four-st'y brick warehouse, s e cor. Lombard and Hanover Sts.

F. W. Maldeis, 7 two-st'y and basement brick buildings, e s Paca St., between Hamburg and Cross Sts.; 7 two-st'y brick buildings, w s Malders St., rear above; 8 two-st'y brick buildings, e s Malders St., between Paca St. and Burgundy Alley.

Gail & Ax, three-st'y brick building, s s Bane St., between Light and Charles Sts.

Jas. W. Lindall, three-st'y brick building, e s Valley St., between Chase and Biddle Sts.

Old German People's Home, four-st'y brick building, n e cor. Baltimore and Payson Sts.

Wm. J. E. Diven, 9 two-st'y brick buildings, e s Gilmor St., n of Baker St.

Boston.

Building Permits. — *Wood.—Oregon St.*, rear, near Smith St., Ward 22, for Jeremiah O. Sullivan, stable, 17′ 8″ x 27′, one-st'y pitch.

Carolina Ave., near Lee St., Ward 23, for Joseph Rowe, dwell., 20′ x 28′, two-st'y pitch; M. H. Fassett, builder.

Brooklyn.

Building Permits.—*Herkimer St.*, s s, 300′ w Brooklyn Ave., one-st'y brick stable, gravel roof, iron and brick cornice; cost, $4,000; owner, Brooklyn City Railroad Co., 10 Fulton St.; architect, A. W. Dickie.

Montrose Ave., No. 206, s s, 100′ e Humboldt St., four-st'y frame tenement, tin roof; cost, $5,000; owner, Gottlieb Wahr, 206 Montrose Ave.; architect, J. J. Smith; builder, Wm. Hellmann.

Walton St., s s, 100′ w Throop Ave., three-st'y frame store and tenement, tin roof; cost, $4,600; owner, Frank Seifert, Throop Ave., cor. Walton St.; architects, Schwarzmann & Co.; builders, E. Loerch and J. Rueger.

Leonard St., No. 594, three-st'y frame tenement, gravel roof; cost, $5,150; owner, George F. Walter, 592 Leonard St.; architect, F. Weber; builder, J. Fallon.

Gates Ave., n s, 125′ e Marcy Ave., 2 four-st'y brown-stone stores and flats, tin roofs, wooden cornices; owner, W. H. Aldrich, 1000 Fulton St.; architect, Robert Dixon; builder, W. H. Aldrich.

Bedford Ave., e s, 65′ n Hancock St., two-st'y brick store and dwell., tin roof, wooden cornice; cost, $3,500; owner and builder, S. E. C. Russell; architect, J. D. Reynolds.

Sumner Ave., No. 62, w s, 25′ n Stockton St., three-st'y frame store and tenement, tin roof; cost, $4,000; owner, Andrew Wills; architect, Th. Engelhardt.

Beaver St., No. 64, s e s, 625′ s w Flushing Ave., three-st'y frame dwell., tin roof; cost, $4,000; owner, Ernst Hoffmann, 14 Park St.; architect, Th. Engelhardt.

Catharine St., No. 22, e s, 200′ from Grand St., three-st'y frame tenement, tin roof; cost, $4,100; owner, Frank Hagemeier, on premises; architect, A. Herbert; builders, C. Buchheit and John Rueger.

Fifth Ave., w s, 25′ s Union St., 2 three-st'y brick stores and flats, gravel roofs; cost, $7,000 and $8,000; owners, Wm. Fritz and Wm. Corrigan, 223 Eleventh St.; arthitect and builder, Thos. Corrigan.

South Fifth St., s w cor. Tenth St., three-st'y brick tenement, slate and tin roof, wooden cornice; cost, $4,500; owner and carpenter, Wm. Kohlmeier; architect, A. Herbert; builder, Matthew Smith.

Quincy St., n s, 195′ 1″ e Tompkins Ave., 2 two-st'y and basement brown-stone dwells., gravel roof, wooden cornice; cost, each, $4,000; owner, M. A. De Rever, 663 Greene Ave.; architect, Amzi Hill.

Gerry St., No. 97, n s, 125′ w Throop Ave., three-st'y frame tenement, tin roof; cost, $4,000; owner, John G. Thomas, on premises; architect, H. Vollweiler.

Dupont St., No. 61, three-st'y frame tenement, tin roof; cost, $4,000; owner, Henry Stobie, 103 Dupont St.; architect, H. Vollweiler; builder, —— Eggers.

Dupont St., s s, 125′ e Manhattan Ave., three-st'y frame tenement, gravel roof; cost, $3,600; owner, Jacob Galberg, Freeman St.; architects and builders, Randall & Miller.

Bartlett St., No. 57, n s, 225′ w Throop Ave., three-st'y frame tenement, tin roof; cost, $3,700; owner, Mrs. S. Smith, on premises; architect, Th. Engelhardt; builder, A. M. Sagar.

Gates Ave., n e cor. Patchen Ave., 5 three-st'y brown-stone stores and flats, tin roofs; cost, each, $5,500; owner, etc., Wm. Godfrey, 123 Stuyvesant Ave.

Alterations. — *Gold St.*, e s, 75′ s Sands St., 3 buildings altered, add 5′ to height; also three-st'y brick extension, tin roof, interior altered for flats; total cost, $10,500; owners, J. C. and S. Burling, Sands St., cor. Gold St.; architect, I. D. Reynolds.

Hicks St., No. 170, three-st'y building, tin roof; cost, $5,000; owner, Wm. Van Blankensteyn; architects and builders, Perkins & Green.

Chicago.

Flats. — J. J. Flanders, architect, has completed the plans for a building for Dr. Morton, on Ontario St., to be three-st'y, of brick, stone and terra-cotta.

Houses. — J. J. Flanders is architect of the double house for Judge Barry, to be built on Washington Boulevard, brick and terra-cotta, two-st'y.

Office-Building. — Work has just been started on the twelve-st'y office-building for J. B. Malley; J. J. Flanders, architect; to be erected cor. of Lasalle and Quincy Sts., lot 40′ x 60′; basement and first story to be of granite or brown-stone, the other stories to be of brick and terra-cotta.

Stores and Flats. — Contracts have just been let for 3 three-st'y stores and flats for the Foss Estate, to be cut-stone front; cost, $30,000; J. J. Flanders, architect.

Plans have been completed and contracts let by J. J. Flanders, architect, for the stores and flats for J. H. Kedzie, to be erected on West Madison St., three-st'y, of brick and Bedford stone.

Building Permits. — H. Stap, two-st'y dwell., 607 West Chicago Ave.; cost, $3,500; architect, H. Kley.

M. Ibrin, two-st'y dwell., 909 Fulton St.; cost, $3,300.

L. Carlson, two-st'y dwell., 203 Ohio St.; cost, $5,000; architect, Stafford.

F. Ricke, two-st'y dwell., 265 Dayton St.; cost, $4,000.

F. Wacholz, two-st'y dwell., 244 West Huron St.; cost, $3,000; architect, W. H. Meyne.

Chi. W. D. Railway Co., two-st'y car-barn and stable, cor. Jay and Belden Sts.; cost, $30,000.

J. Schroeder, two-st'y dwell., 92 Cleaver St.; cost, $4,000; architect, J. Rolfs.

Philip Benz, two-st'y dwell., cor. Congress and Hoyne Sts.; cost, $4,000; architect, T. Karls; builder, J. O'Connell.

J. Broderick, two-st'y dwell., 119 Hubbard St.; cost, $4,500; architect, H. F. Starbuck; builder, Geo. Peterson.

L. H. Davis, 2 three-st'y stores and dwells., 1611-1615 Wabash Ave.; cost, $18,000; architect, J. H. Moore; builder, Chas. Moses.

Potter Palmer, two-st'y dwell., Banks St.; cost, $18,000; architects, Silsbee & Kent; builders, Angus & Sirdell.

D. A. Price, two-st'y dwell., 785 West Monroe St.; cost, $7,500; architect, Wm. Thomas; builders, Mahr & Provost.

W. H. Thomas & Son, 6 one-st'y cottages, Elk Grove, cor. Bloomington Road; cost, $6,000.

W. H. Durant, two-st'y addition, 626 Monroe St.; cost, $3,600.

J. H. Kedzie, three-st'y store and dwell., 296 West Madison St.; cost, $8,000; architect, J. J. Flanders; builder, A. Langueist.

Julius Weyman, three-st'y addition to dwell., 571 North Clark St.; cost, $3,500; architect and builder, J. Weyman.

Conrad Seipp, three-st'y store and dwell., 264 Augusta St.; cost, $7,000; architect, Wm. Arndt; builder, S. Hagemann.

G. N. Drake, three-st'y dwell., 510 Jackson St.; cost, $8,000; architect, J. M. Van Osdel; builder, A. Carlson.

J. Wykoff, two-st'y dwell., 55 North Sheldon St.; cost, $4,000; architect, J. J. Flanders.

Schniedewend & Lee, five-st'y factory, 46 and 48 Third Ave.; cost, $20,000.

New York.

Apartment-Houses. — Among the applications for permits is an apartment-house for the Paran Stevens Estate, to be built on East Twenty-eighth St., between Broadway and Fifth Ave; but its erection is not yet a certainty.

Another project still doubtful is the large apartment-house, for which plans have been drawn by Messrs. Gilbert & Thompson, for a building 75′ x 200′, on Madison Ave., between Fifty-sixth and Fifty-seventh Sts.

Stores. — On Greenwich St., extending from Desbrosses St. to Watts St., 6 six-st'y brick, stone and iron stores, three 33′ x 90′ and three 28′ and 29′ x 75′, are to be built at a cost of $180,000, for Mr. Henry Welsh, from designs of Mr. G. W. Da Cunha.

Tenements. — Mr. Jas. Stroud has drawn plans for 2 five st'y brick and stone tenements and stores, 21′ x 51′ each, to be built for Mr. F. C. Lawrence, one at No. 110 East Broadway, and one at No. 101 Division St., at a cost of $22,000.

Mr. Geo. W. Pelham has designed a five-st'y tenement and store, 32′ x 72′, to be built for Mr. W. C. Morgan, at a cost of $20,000, on the w s of Ninth Ave., 50′ s of Forty-eighth St.

Building Permits. — *Seventy-third St.*, n w cor. Ave. A, 4 five-st'y brick and iron tenements, tin roofs; cost, each, $20,000; owner, Henry Steubing, 162 East Fifty-sixth St.; architects, Lederle & Co.

Sixth Ave., n w cor. Thirty-ninth St., six-st'y brick and iron store, fire-proof roof; cost, about $50,000; owner, the Colwell Lead Co., 63 Centre St.; architects, W. Field & Son.

Ridge St., Nos. 81, 83, 85 *and* 87, 4 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner, Ernest Von Au, 83 Fulton St., Brooklyn; architect, Jobst Hoffmann.

Madison Ave., n w cor. Eighty-sixth St., 2 twelve-st'y brick and stone apartment-houses; owner, J. F. Navarro, 61 Broadway; architects, Hubert, Pirsson & Co.

South Fifth Ave., No. 104, five-st'y brick and stone store, tin roof; cost, $16,000; owners, Edw. and Wm. Mitchell, 45 West Fifty-fifth St. and 60 West Ninth St.; architect and carpenter, C. E. Hadden; mason, W. C. Hanna.

First Ave., e s, 86′ 2″ s Seventy-fourth St., five-st'y brown-stone store and tenement, tin roof; cost, $16,000; owner, John W. Love, 1066 Lexington Ave.; architect, John Brandt.

One Hundred and Fifteenth St., s s, 105′ e Fourth Ave., 2 five-st'y brick and brown-stone tenements, tin roofs; cost, each, $18,000; owners, Frank M. Clemens and Emil Haenshen, 1632 Second Ave.; architect, John Brandt.

West Thirty-fifth St., Nos. 529, 531, 533 *and* 535, 4 five-st'y brick tenements, tin roofs; cost, each, $16,500; owner, Gerard M. Barretto, 438 West Fifty-seventh St.; architect, J. L. Ackerman; builders, J. A. O'Connor & Co.

Fifty-seventh St., s s, 100′ e Tenth Ave., 3 five-st'y brown-stone apartment-houses, tin roofs; cost, $35,000; owner, Abraham H. Jonas, 39 Ridge St.; architect, J. C. Burne.

Sixty-first St., n s, 95′ e First Ave., five-st'y brick tenement, tin roof; cost, $14,500; owner, J. Christian Goetz, 438 East Eighty-sixth St.; architects, A. B. Ogden & Son.

Eighty-eighth St., Nos. 121 *and* 123, n s, 250′ w Lexington Ave., 2 five-st'y brick and brown-stone tenements, tin roofs; cost, each, $15,000; owner, Mrs. Hanora Byrne, 117 East Eighty-eighth St.; architects, A. B. Ogden & Son.

West Twenty-third St., No. 42, four-st'y iron dwell., tin roof; cost, $20,000; owner, W. Jennings Demorest, 151 East Fourteenth St.; architect, A. Craig.