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WE regret to have to record the death of one of the most widely respected and beloved of American architects, Mr. Charles Dexter Gambrill, of New York, which took place in that city on Monday last, September 13. Mr. Gambrill was born in Roxbury, now a part of Boston, in 1832, his father having been a surgeon in the Navy. He was educated in Boston, and graduated from Harvard College in the class of 1854. After graduation he studied architecture, first in Boston, under Mr. George Snell, and subsequently in New York, under Mr. Richard M. Hunt, and has since continued to practise in New York, at first in partnership with Mr. George B. Post, and later with Mr. Henry H. Richardson. Shortly before his death he had formed a new association with Mr. H. E. Ficken. Mr. Gambrill was remarkable for the refinement and intelligence which characterized his artistic thought, and all his work bears the impress of a scholarly and singularly fastidious mind. Perhaps, indeed, his genius was too highly tempered and too sensitive to bear with equanimity the shocks of life. If his modesty had not been even greater than his merit, he could have obtained a certain degree of literary distinction, as those who were near to him had frequent occasion within the limits of confidential intercourse and correspondence to admire the fine quality of his humor, the unusual scope and felicity of his language, and the evidences of nice discrimination in his literary taste. Personally, he was regarded, not only in the profession, but among a very wide circle of friends, with an esteem and affection such as falls to the lot of very few. He was one of the earliest Fellows of the American Institute of Architects, holding various offices in that body, and had long been a prominent member of the government of the Century Club. In general society he was well-known and popular, and his death will be widely mourned, both in and out of the profession. He leaves a wife, but no children.

CINCINNATI, which has long been said by its artistic predilections, its cosmopolitan habit of mind, as distinguished from the provincialism of many of our cities, and the cultivation and refinement of its people, to represent the Paris of this continent, may justly lay claim to a position still more honorable, that of a town, the public spirit of whose citizens supplies the place of imperial ostentation, and whose adornments owe no small part of their attractiveness to the thought that they are the expression of a noble and unassuming generosity, and not the parade of pompous tyranny, made at the cost of unwilling peasants. The latest instance of that thoughtful munificence which we have learned to associate with the name of Cincinnati is found in the noble gift of Mr. Charles W. West, who offers one hundred and fifty thousand dollars toward the erection of a permanent museum of the fine arts, conditional upon the raising of an equal additional amount by other subscriptions. With a courtesy only exceeded by his generosity, Mr. West waives his claim to dictate the location, plans or management of the museum, proposing that all this shall be left to the subscribers. Other individuals are rapidly adding their contributions, and it will hardly be long before the whole sum is raised. The buildings once ready, the accumulation of a collection will be comparatively easy. Many works of art are already promised, and possessors of valuable pictures naturally incline favorably towards the idea of lending or bequeathing them to such an institution, where they will be safe from harm, appreciated and cared for, rather than run the risk of having them scattered, to fall perhaps into ignorant and careless hands, so that the generosity of such persons may be confidently counted on.

THERE is one form which the liberality of public benefactors, or at least, a portion of them, might take, with great advantage, not only to the cause of art, but of science and industrial skill; that is, the foundation of prizes for distinguished merit. A certain number of such premiums are already established, such as the Boylston prize in Massachusetts for medical treatises on given subjects, and a few others, but they are not of very great amount, and the reputation which they confer upon those who gain them is confined to a comparatively small circle. Occasional prizes are sometimes offered, of considerable value, but they neither have nor confer the distinction which belongs to an established foundation, made famous by the long list of illustrious names upon which it had itself bestowed, perhaps, the first public honor. For the advancement of fine art, and especially of a truly national art, we are sure that the regular annual distribution of a few great prizes, awarded by the most distinguished judges to be obtained, and presented with some little formality, would be of very great service. The principal hindrance to our artistic progress we believe to be the lack of emulation, criticism and comparison among artists, and just such advantages as these an annual *concours* would supply. No matter how untaught or ill-taught a man may be, if he has a periodical opportunity for studying the works which the best judges approve, comparing the good with the bad, and both with his own, he will, if he has any artistic capacity, come to understand his errors and abandon them; will continually find suggestions of new beauty, and try to follow them, feeling his own strength continually more and more, and will thus advance in true and living art, while such teaching by observation and selection gives a freedom and diversity of development which we need at present more than any other quality. The sum required to found an annual prize of one or two thousand dollars in painting, sculpture, music, or architecture, would not be very large, while the awarding of it would, if well managed, soon become a most important occasion, awakening the interest and emulation of thousands, and conferring no small distinction upon the city in which the trial was held.

NEW YORK has begun to carry into effect a law passed by the last Legislature, which provides for the registration at the police stations of doctors who are willing to attend poor patients at night for the uniform charge of three dollars a visit. The character of the physicians is ascertained, and they are only required to extend their services to respectable persons. By this means the better class of the poor are enabled to obtain the best professional advice at a fixed and reasonable charge, and need neither hesitate before seeking it through exaggerated ideas of its cost, nor be induced to put themselves into the hands of the cheap quacks, who will in the end plunder as well as poison them. As compensation for the very considerable sacrifice, both of comfort and money, which many of these physicians make, out of pure charity, in binding themselves to answer such calls, the statute provides that they shall at least be sure of their fee. If the patient's friends are unable to raise the money, the police captain of the district certifies the fact, and the physician is paid out of the public treasury. It seems therefore that in New York, at least, the law considers a doctor's services to be of some value, and holds that he is entitled to be paid by those who ask his advice according to the time he gives them. This is not so in all professions. According to the analogy of one that we know of, the ingenious and enterprising invalid should have only to hang out a yellow flag, inscribed with the legend "To Physicians," followed by an announcement that competitive diagnoses and prescriptions would be received up to a certain date, to see his door besieged by medical persons, most of them, it is true, having the aspect either of over-enthusiastic youth or rather unscrupulous maturity, but all flourishing a diploma of some kind, and

eager to devote their collective skill to the healing of the patient, without asking more in return than the possibility that *one* of them might receive a sum which would barely remunerate him for his own services alone.

It is asserted in a letter to the Chicago *Tribune*, that by private agreement of certain parties who will furnish large sums of money for the New York Fair of 1883, and will therefore have a large influence in regulating its affairs, the so-called Morningside Park location for the exhibition buildings has been decided upon. This park, whose very name is probably unfamiliar to most of our readers, exists as yet only on the map, although the funds for its completion have been appropriated. It extends from the Stranger's Gate, at the north-western corner of the Central Park, to One Hundred and Twenty-Third Street, a distance of two-thirds of a mile, forming a rather narrow tract on the eastern slope of the bold hill which rises, crowned by the Bloomingdale Insane Asylum, between it and the Hudson River. The river shore itself, on the western slope of the hill, is reserved for three miles, from Seventy-Second to One Hundred and Twenty-Ninth Street, under the name of the Riverside Park, and the exhibition grounds will, it is understood, embrace this as well as the Morningside Park, and the Asylum grounds which lie between. A nobler site it would be hard to find. All those who have been over the elevated railroad to One Hundred and Tenth Street will remember the imposing curved viaduct by which it rounds the upper angle of the Central Park, and the rocky heights, almost buried in luxuriant foliage, which rise toward the left. Once ascended, the hill presents a magnificent prospect, not only of the Hudson, with the Palisades directly opposite, and Hoboken and Jersey City below, but of the other side of the island, the East River, Brooklyn and Williamsburgh, while all New York lies spread out toward the south.

The *Fireman's Journal* remarks upon the inconveniences attending the use of water for extinguishing fires; the difficulty in many places of obtaining it in anything like adequate supply, the trouble which it gives in very cold weather, and especially, the damage which it causes to goods stored in the buildings burned. It estimates that in general the value of the property destroyed by the water used in extinguishing fires nearly equals that destroyed by the blaze itself, and predicts that a radical change in the methods of controlling fires is at hand. This change, it thinks, will consist substantially in the use of gaseous instead of liquid extinguishers. Carbonic acid, which suggests itself as the most available gas, is heavy enough to be thrown in the same way as water, and like water, it will flow after delivery to the lowest point which it can reach, settling down among the flames and quenching the burning timbers, while it is perfectly harmless to the most delicate goods. The reputation which it has of being poisonous might lead one to suppose that its use would be attended with danger to firemen or other persons in a blazing building, but such cases would be rare. In most instances the smoke would render the air of the rooms irrespirable by its acrid and corrosive action upon the membranes of the lungs long before the carbonic acid could accumulate in sufficient quantity to displace the oxygen so far as to cause suffocation. The manufacture of carbonic acid is so easy and cheap, and it is with such facility obtained under pressure, that the *Journal* thinks it will not be long before its use for this purpose is well established. A proposition was made a short time ago for generating it in large reservoirs, and conducting it by pipes through the streets for immediate use in case of necessity, just as water is laid on to the hydrants.

Mr. Joseph Nimmo, Jr., of the Bureau of Statistics, has taken the pains to make a very thorough and able analysis of the evidence tending to indicate what would be the probable amount of business passing through a canal cut across the isthmus of Panama. In brief, Mr. Nimmo concludes that sailing vessels would not use such a canal, on account of the difficulties of navigation. Through the Suez canal only three sailing vessels passed last year, and the inference is that the proportion would be no larger on this side the Atlantic. For steamers, he shows that the Suez canal furnishes a shorter route from all European ports to those of Asia, and even as far as Australia and Japan, so that the benefit of the Panama passage would be confined to trade between Europe and the western coast of America, and that between our own Atlantic ports and the two shores of the Pacific. That this would be large enough to make the traffic remunerative he does not believe. The trans-continental railways have already absorbed nineteen-twentieths of the business between New York and San Francisco, and as they multiply and compete with each other they will take still more, and the small remainder is but a poor dependence for furnishing an income on so vast an outlay. In answer to this valuable and interesting essay, Admiral Ammen publishes a letter in which, though not disputing any of Mr. Nimmo's facts, he represents that although the Panama canal would lie in a region of calms, unfavorable for sailing vessels, that through Nicaragua would not, but could be used by them much more freely than even the Suez canal, and the inducement to do so would be greater than in the case of the Suez canal, inasmuch as the navigation around Cape Horn is far more dangerous and difficult than that about the Cape of Good Hope. As to the absorption of traffic by the railroads, he thinks that a large grain business would be encouraged by the canal, which could not profitably be taken by rail, and to it would be added a commerce in wine, wool, oil, timber, and cotton, coffee and other bulky products, sufficient to pay dividends on the cost of the work, which is now estimated at only forty millions.

One of the most striking papers in the last report of the Health department of the Massachusetts combined Board of Health, Lunacy and Charity, which is published separately, so as to form a continuation of the valuable series issued by the old Board of Health, is that on Health of Towns, as illustrated by inquiries into the occurrence of typhoid fever in five of the best situated and most salubrious country towns of the State, four of them forming a contiguous group in Middlesex County. In nearly every case, a connection between the disease and the contamination of drinking-water by filth was established in a manner which admits of no refutation. In one, perhaps the most interesting instance, a physician testifies to having himself attended twelve persons sick with typhoid fever, all of whom acknowledged having drunk water from a certain well, and others were known to have been patients of other physicians. Close to this well passed a pipe-drain from a sink, which had broken at the nearest point, allowing the slops to trickle in, where they could be seen as a bluish stream over the stones. The character of the cases gave perhaps the clearest evidence that has yet been recorded that the poison was received from the water, and not from any contagion, five of the sufferers being school children who drank from the well on their way to or from the school, while two others were workmen living at a distance, who drank of the water during the day, and the remaining five were from families living in two houses near by. Several other cases amply confirm this view.

Among the many interesting chapters in the recently published *Manuel des Lois du Bâtiment* is one upon the relation of the architect and employer, or client, as we call him. According to the French law, the architect is considered as hired by the client, under a *contrat de louage*, in the same manner as a painter who is engaged to paint a portrait, and his plans are regarded as tools to be used for his work. Unlike our common notion, which, as we were once informed by a census enumerator, classes architects among manufacturers, because "they manufacture plans," that law excludes the supposition that there is anything in the nature of a sale between the parties, more than in the case of a physician's prescription. To a certain extent, however, the architect's service includes more than that of a doctor, a painter, or a sculptor, in that he acts as agent for his employer, the rule being that in the absence of any expressly delegated powers, he is understood to be authorized to direct and oversee the execution of the structure built from his plans. For his compensation, if no previous stipulation has been made, the architect is entitled to the usual commission, with travelling expenses. As to these it is the established rule that they are to be reimbursed in full, without any deduction for what the architect would have spent if he had staid at home. If the latter, again, meets with an accident or mishap during the performance of his duty, without imprudence or negligence on his part, his employer is bound to indemnify him for the damage he may suffer, and if several persons employ him jointly on a work in which they are interested, each one of them may be held for the whole of the payment due him. If the client dismisses the architect without fault on his part, the latter is entitled to recover not only payment for all that he has done, but also the amount of the profit which he would have received if he had fully completed his commission.

RESTORATION OF THE TRENT CATHEDRAL.

TRENT is still the richest and most important city of Italian Tyrol, though its period of glory is past, its commercial and manufacturing interest stagnant, and the census diminishes from year to year. Its ruined towers and palaces, its low, trellised houses, stand upon the banks of the Adige, between the vine-clad hills of the Rhetian and Carnic Alps which direct the swift waters of the river southwards, until, near Verona, they turn towards the Adriatic, — flowing more gently through the fertile plains of Polesina. It is a station familiar to all who cross the Brenner, that great natural stile between Germany and Italy. The city was one of those strongholds of religious political power which, like Bamberg, Fulda and Treves, was to a certain degree independent of the temporal sway of the German Emperors. Christianity had been preached in the Roman *Tridentum* during the first century; Hermagoras, a pupil of the evangelist Mark, is said to have installed the first bishop of Trent. Ecclesiastical might increased until, in 1027, the city was wholly delivered over to the clergy by the emperor Conrad II, the Salian. Trent is famed in theological history by the council there held, with some interruptions, from 1545 until 1563; it was there that the Catholic church fixed its dogmas as infallible and inalterable, making all reunion or mediation between it and rapidly advancing Protestantism forever impossible.

The cathedral was founded shortly after the surrender of the city by Conrad, but it was midway between the important dates of that event and of the council that the construction known to us was undertaken; an inscription upon its walls dates this back to 1212, while it was completed early in the fifteenth century. The building was thus a landmark of theocratic as well as of architectural history. Designed and executed by Italian masters it is a remarkable example of the brilliant and fully developed transitional style which stood midway between the Longobardian and Germanic Romanesque. Few peculiarly Italian reminiscences are recognizable; the details are almost exclusively Northern in character. The great peculiarity of its general proportion is the excessive height allowed the side-aisles.

More than twenty years ago, at the instigation of the Austrian Arch-duke Charles Louis, the vaults and arches of the cathedral, known to be slightly fractured, were carefully investigated by architect Essenwein. Some of the fissures were found to be very old, wooden wedges having been driven into them so long ago as to be worm-eaten and partially decayed. Essenwein at the time prepared plans for a restoration of the structure, but as the defects did not threaten any immediate downfall, the matter was neglected and forgotten. About eighteen months ago the architectural police of the district again examined the building, and it was discovered that the cracks had so increased that the sinking of several vaults was imminent. Extensive repairs were required. The governmental architects of Innsbruck worked out a project for securing and staying, by iron ties and braces, the masses of masonry that threatened rupture. This plan was accepted, probably with the conviction that nothing better in the way of a radical rebuilding of the impaired vaultings could be expected, by the institute commissioned to preserve the monuments of the Austrian Empire, — a body to which antiquaries and architects are equally indebted. Upon their representations the sum of twenty-one thousand florins, almost ten thousand dollars, was devoted to the purpose by the Imperial Parliament. But at this stage the decided action of a number of non-professional gentlemen caused an entire change in the course of affairs. All who are familiar with the almost personal interest felt by Continental citizens in their public monuments, will understand the solicitude felt by the educated members of the community of Trent for the well-being of so prominent a landmark as their cathedral. Even in so small a provincial town, of only fourteen thousand inhabitants, there were many advisers who at least agreed in so far as to insist that no architectural empiric should be allowed to bring affliction upon so high-standing a patient by the unconsidered adoption of a restorative remedy. They objected to the iron palliatives prescribed by the governmental builders of Innsbruck, maintaining that the proposed clamps and anchorings would forever disfigure the great vault. Architect Henry Nordio, a native of Trieste, was called to Trent about eight months ago, nominally as director of a school of modelling and carving which had long there existed. He was employed to prepare a new survey of the cathedral, with especial reference to the defects of the masonry, and the feasible manners of remedying them. Nordio applied himself to the work with the greatest energy, and in a short time completed the necessary measurements and plans; he hesitated, however, to recommend a definite system of reconstruction. By his advice the well-known expert, Oberbaurath Schmidt, the first authority in Austria concerning such matters, was last month (August, 1880) called from Vienna to examine the building and pronounce a critical opinion upon the various forms of repair under consideration. His recommendations have now been unanimously adopted by the officials in whose hands a definite decision reposes: the representatives of the civic government of Trent, of the cathedral estate, of the commission for the preservation of the Austrian monuments, etc. Architect Nordio has been entrusted with the preparation of plans and working-drawings according to their instructions. The applications of iron supports and ties will no longer be considered, — the defective masonry of the vaults and arches will be rebuilt. The timbered roof of the great central dome will be entirely removed, its present form not harmonizing with the style of the cathedral; its reconstruction will be guided by traces recognized upon the present walls, which betray the pitch and shape of the original roof. The exterior composition of the building will thus be greatly improved. To effect these changes in the upper structure, the walls of the nave are to be heightened from 1.2 to 1.3 metres, and the girders of the side-aisles walled up above the vaults to support the rafters. These chief constructive alterations are necessary to preserve original features; their execution demanded immediate attention and will be the first care.

The restoration of the cathedral in artistic respects is another question, and may not be definitely undertaken for the present. The next step towards such an end would be the completion of the designer's intention by carrying up of the projected tower. The cupola above the central dome, which is an objectionable feature, would remain, — Oberbaurath Schmidt is of opinion that its weight is of decided statical importance, but it should receive a more fitting exterior expression. The sum devoted by the government is sufficient to repair any positive ruin which has befallen the structure, — but to do little more. It is uncertain whence funds will be obtained for a further restoration. In the present age, the clergy, even of good ultramontane Tyrol, find difficulty in obtaining all the money they desire. Times have certainly changed since the Cardinal Louis Madruzzi, in a synod held in this same diocese of Trent, A. D. 1593, passed the law that no notary could draw up a will, or render such a document valid, if the testator were not of mind therein to include some substantial legacy for religious institutions, — and those connected with them. Such drastic means, however efficacious in the times of ecclesiastical supremacy, can hardly be enforced by the Bishop's crosier to-day. Assistance is now obtained for rebuilding by an appeal to nobler motives, and as far as can be judged from the subscriptions offered by friends of art during the short time elapsed since the publication of the projected restoration of Trent Cathedral, — planned to be artistically and historically satisfactory, — there can be little doubt that the undertaking will succeed. J. T. C.

CHIMNEY FLUES.[1]

IT is customary for the public to imagine that the certain cure of the smoking of chimneys surpasses the capability of the average intellect, that the causes are legion, shrouded in impenetrable mystery. The reason for this belief is that in nine cases out of ten no systematic method is followed to discover the cause, and the cure is often difficult to apply. The simplest and most natural method is to tabulate a list of all the possible causes of smoke arranged in the order of easiest detection, and with this in hand to examine the chimney thoroughly for each defect in succession. In some cases the fault is in open sight, and the cure is simple and close at hand. In others important demolitions will be necessary to discover it, and still more expensive reparations to effect its cure. Therefore in making our list the defects easiest to see, should come first in order, so that no unnecessary expense may be incurred.

(1). The subject of inquiry which should first occupy us, as being the one most easily answered, concerns the supply of air necessary to furnish the draught. The opening or openings for the supply of air to the room should be as large in area as those for the exhaust, including both fire-place, smoke-flue, and all special exhaust ventilating-flues. If this precaution be not taken the result will be as shown in Fig. 225. One chimney is said to "overpower" another when both are built in the same room or in rooms adjoining and insufficient fresh-air supply is provided. When the doors separating these rooms from the hall or other rooms are closed, the hotter flue will overpower the cooler and draw from it its supply of air, bringing the smoke with it. The action of the overpowering chimney is exactly the same with that of the tower in Fig. 225. Even the range-flue or the flue of some fire-place in the house quite remote have been known to overpower all the other flues in the house from this cause.

In order to make certain whether or not the want of a sufficient supply of fresh air is the true and only cause of the smoking, it is only necessary to open a door or window in such a manner as to admit the required amount of the air without allowing it to blow on the fire in gusts.

To cure this defect, furnish a supply of air as large as the exhaust. This may be done (*a*) by bringing outer air into the room through some kind of ventilator over the windows, or in the cornice, which may be perforated all round and so arranged as to admit the air in a thin film along all the four sides; (*b*) by carrying a hot-air flue from the furnace to the room, or (*c*) by building a ventilating fire-place in place of the old one.

(2). The position of a door in a room, when standing at certain angles may, by allowing draughts to strike across the fire, be such as to drive the smoke into the room.

The cure is to hinge the door on the opposite side of its frame, or to provide proper fire screens.

(3). The size of the smoke-flue is too small, or too large for that of the fire-place. A flue too small will not allow of free passage of the products of combustion. One too large allows its movement to be too sluggish, and less able to resist any unfavorable influence, and gives opportunity for troublesome eddies. The flue should be somewhat larger than the throat to allow for clogging by soot, friction

[1] This paper, by the writer of the Open Fire-Place articles, will be incorporated with them in their separate form.

against its walls, the disadvantageous form of its section (the circular, or best section being seldom practicable), and for the bends more or less abrupt in its course. Roughly speaking, a brick flue of the usual form should have a sectional area equal to $\frac{1}{10}$ of the size of the fire-place opening. For a round iron flue $\frac{1}{12}$ would be sufficient. More accurate formulæ could be, and have been given, but such formulæ are usually too complicated, and too difficult of application to be of any service to the general public. According to our rule a small fire-place .80 meters wide and .75 meters high (32 by 30 inches) would require a brick flue of 600 square centimeters in sectional area, which is equivalent to an ordinary 8 by 12 inch flue. A large fire-place of one meter square, should have a brick flue of 1,000 square centimeters area, equivalent to a little over 144 square inches, or an ordinary 12 by 12 inch flue. A very large fire-place of two meters wide by one meter high would have a flue, say 40 by 50 centimeters, or 12 by 24 inches, and an old-fashioned fire-place of extraordinary size, say two meters high, and two meters wide, or large enough to contain a dozen tall men standing, or "to roast an ox whole," should have a flue of 400 square centimeters, or one foot by three feet. Such a fire-place and flue built for use at the present day would have to be constructed in the manner shown in Fig. 224, to ensure a good draught under all circumstances. To ascertain the size of the flue, measure it at the top or just above the throat.

Generally the only cure for a flue too small is to diminish the size of the fire-place to correspond. To enlarge the flue is usually too serious an undertaking to be attempted.

For a flue too large, a defect seldom met with, and one little likely to cause inconvenience if the throat be of the proper size, the simplest treatment is to increase the height of the chimney, and top out with a Van Noorden ventilator; but the best method is to make a virtue of necessity, and, by introducing within the large flue a smaller one of tile or sheet-iron, to construct a ventilating flue on the Douglas Galton principle, as already described, and utilize the heat of the smoke in heating and ventilating the house. Either a tile or an iron flue may be easily lowered into the large flue, cementing the pieces one to the other as they are lowered, and connecting the lowest joint with the fire-place with masonry. To make the lower connection an opening may have to be made in the chimney-breast above the mantel. The ventilating openings and details of the construction have already been described.

(4). The chimney-throat is too large, allowing an unnecessary amount of cold air from the room to enter the flue along with the products of combustion. By this the column of air becomes cooled, and its movement consequently sluggish. Measure first the size of the throat and see how far it varies from the rule we have established, then test the effect of diminishing the throat temporarily with dry bricks or other non-combustible materials.

The cure is to brick up the chimney-throat so as to give it a sectional area equal to one-twelfth of the area of the fire-place opening, and the shape shown in, and described in connection with, Fig. 52.

(5). The throat is too small to admit freely the products of combustion.

The cure may then be effected by diminishing the size either of the fire-place itself, by relining its back and sides, or of its opening by means of sliding blowers, or new facing. If there are objections to diminishing the fire-place, increase the size of the throat. First measure the throat and fire-place to ascertain as before the amount of diminution of fire-place, or of enlargement of throat necessary, then test the effect of diminishing the size of the fire-place opening with card-board, or of removing bricks, one by one from the throat.

(6). The air in an unused chimney may, when the temperature of the outer air, becomes, for a time, warmer than that in the house, sink in the chimney until the equilibrium is restored. In so doing the smoke from an adjacent flue may be drawn down with the reversed air-current. The only remedy is to close the fire-place with a damper as long as it remains unused, unless it is found that the flue may be raised in height without injury to the draught of the adjacent flues.

(7). The length of the smoke-flue may be less or more than is sufficient or desirable. If the flue be too short the difference of weight of the column of smoke and the exterior air column will be insufficient to produce a movement of the requisite velocity or strength.

If the flue be too long compared with the size of the fire, the loss of heat and the friction against its sides may reduce the velocity to too great an extent, though this is a cause rarely met with.

The cure for the former is to lengthen the chimney, and for both to diminish the size of the fire-place and its throat so as to cause less cool air to enter the flue.

(8). The flue of one fire-place entering that of another sometimes leads to the cooling of the hot current by the air from the fire-place not in use, to such an extent as to destroy the power of the draught.

The fact of whether or not the flue of one fire-place enters that of another may be ascertained at the chimney-top by means of smoke made successively in each fire-place, and the effect of one flue entering another may be learned by closing each fire-place successively while the other is in use.

The cure is to build another flue; or if this be impracticable, to close one fire-place by means of a damper in the throat while the other is in use.

(9). A sudden bend in the flue especially near the fire-place throat may cause the smoke to rebound into the room. The presence and position of such a bend may be ascertained by means of a weight tied to a string and dropped down the flue.

The cure is either to diminish the fire-place or straighten the flue by rebuilding.

(10). Bricks, mortar, vermin, or other obstructions may have become deposited in the flue. Rats and birds sometimes build obstructions in flues long unused.

Ascertain the position of the obstructions with weight and cord. If a bend in the flue prevents examination in this way, the flue must be opened below the bend and the weight dropped from this opening.

The obstruction, when discovered, if it cannot be raised with a hook from above, may be removed either by firing the chimney, or by opening it at the point where the obstruction occurs.

(11). A wind passing horizontally over the top of a chimney may have the effect of closing the flues like a plank placed upon them. A Van Noorden ventilator on each flue will form an effectual cure.

(12). The chimney-top is commanded by higher buildings or hills. The air condensed by a gust of wind falling against these higher objects descends the chimney in expanding or rebounding.

The only cure is to raise the flue beyond the influence of the commanding surfaces.

No bonnets, cowls, or patent ventilators can prevent this except in so far as they increase the height of the flue; because no such device can prevent the expansion of compressed air in every direction in which a free opening is left for its passage.

It is no small source of comfort to the architect to feel that every evil to which chimneys are heirs can be cured without recourse to the patent cowls and ventilators by which the summits of so many of our noblest buildings are disfigured; "some looking like Dutch ovens come up to see the world, some like half-sections of sugar loaves, some like capital H's, and sundry other pleasing objects." Some looking like a pile of inverted milk cans laid out on the roof for an airing, some radiating in every direction long arms, and flourishing them about like demons clutching for prey, or armed with wings gyrating with terrible energy and clamor in squally weather, and when the pivot becomes a little rusty. These "seem perpetually whizzing round for the mere fun of the thing, since any good they do is extremely apt to escape detection."

The Archimedian Screw ventilator is designed to *wind up*, as it were, the air and smoke from below; but it also acts as an impediment in calm weather, and, when rusty, in all weathers. A peculiarly hideous monster frowns upon the writer through his office window from the roof of a neighboring shed. It resembles a huge cuttle-fish with an awkward writhing body, and a hundred eyes covering the whole surface of the main trunk and head in the form of large lenses, designed to concentrate the heat of the sun and throw it into the flue. The idea is ingenious, but the effect produced, though striking enough to dismay the beholder without, is inappreciable to the owner within. Though but lately built, and though braced and clamped with plenty of iron stays, it has already a battered and miserable appearance and seems destined rather to provoke than to appease the wrath of the elements.

"In casting one's eye down the long streets of a smoky city, in taking a survey of the roofs and their tormented chimneys, the infinity of other contrivances is so great that it is scarcely a poetical hyperbole to say our pen starts back from it. Here is patent upon patent, scheme after scheme, each doing its best, no doubt, to obtain the mastery over that simple thing — smoke; and each with a degree of success of a very hopeless amount. There appears to me something intensely ludicrous in these struggles against what seems to be an absurd, but invincible foe; the very element of whose success against us lies in our not strangling him in his birth. Many obstacles are in the way, no doubt; there are obstacles in the way of every good; but I have little doubt, that had the perverted ingenuity which has misspent itself upon the chimneys-pots been directed to the fire-place, we might have now had a different tale to tell. The smoke nuisance is laughed at as a minor evil, by a great practical people like ourselves, who heroically made up our minds to put up with it; but when it is considered as an item in the comfort, cleanliness, and health of a whole nation, it assumes, or should assume, a different position.[1]

THE MEMPHIS SEWERAGE SYSTEM. — II.

[From the New York *Herald*.]

Memphis is built on a high bluff on the east bank of the Mississippi, south of Wolf River. Its total length is about two and one-half miles, and its width one and one-fourth miles. Its north end is about thirty-five feet above low water of the Mississippi, and its south end ninety feet. The highest floods invade parts of the lower district. The bluff is a continuation of the high land of Shelby county, falling away to its least elevation at the north end of the city, and sloping toward the ravine, through which flows Bayou Gayoso. The greatest distance from the river bank to the bayou (at Adams street) is about 3,000 feet. The most thickly built part of the city is between the bayou and the river, and here the land almost invariably slopes toward the bayou. The difference of elevation between Front row and the bottom of the bayou, on Adams street, is about thirty feet. East of the bayou, within the city limits, the land rises gradually to about the same height, and a somewhat greater elevation is attained in the southern part of the city, these latter sections being more largely occupied by residences and less closely built up. The extreme northern part of the city is rather sparsely built, and has not

[1] Tomlinson.

yet been included in the sewer district. In the business part of the town, and to a considerable extent in the eastern and southern divisions, there are alleys dividing the blocks (in both directions) between the streets. The sewers here have already been constructed. It is proposed to extend substantially the same system over the whole area early in the winter. The natural slope of the land is followed in the direction of the different lines of sewers. A few squares in the most closely built part of the town had been sewered by property owners, the main outlets extending directly to the Mississippi River in front of the town, and delivering below low-water mark. These sewers have been bought by the government, and are to be put into good sanitary condition, so far as they need improvement. They are all pipe sewers, and many of them are well flushed by the discharge from hydraulic elevators. They are not part of the system now described.

The new system has an outlet through a large iron pipe draining the county jail, which delivers into Wolf River. This outlet is to be used permanently only during high stages of the river, when the back-water in the long permanent main would cause a liability to deposit. The permanent main will discharge below low water into the Mississippi River at the foot of Winchester street, south of the mouth of Wolf River. Its lower end will be of cast-iron pipe, with lead joints, and so much of it as is made in high and dry ground will be of brick. Its diameter is twenty inches. The flow can be turned at pleasure into the jail sewer, or into the permanent main by a swinging section or switch, working in a brick chamber. The twenty-inch brick main continues as far up as Jackson street; here it is forked to receive a twelve-inch vitrified pipe main running along the east side of the bayou, and a fifteen-inch vitrified pipe main west of the bayou. The extension of these mains beyond Gayoso street and a few sub-main branches are of smaller pipe. There are a few man-holes along these main lines, by which their working may be inspected. These two mains (twelve-inch and fifteen-inch) constitute the outlet channels for the whole area of the city, the lateral sewers entering on courses oblique to the direction of the flow, so that the discharge of each lateral, having considerable velocity from its rapid descent, will increase rather than retard the velocity of the current in the main, which it was necessary to lay with a comparatively slight fall, that of the fifteen-inch pipe being only two inches in 100 feet.

The lateral sewers are almost invariably six inches in diameter. In rare cases, where they serve as the outlets for more than three thousand feet in length, they are increased to eight inches. So far as the conformation of the ground and the division of property would admit, they have been laid in the alleys and not in the streets, thus affording direct communication with the backs of houses and avoiding the necessity for carrying house-drains under the buildings, the plumbing appliances being almost universally at the rear. In some cases the lots do not run through to the alley, and to accommodate houses so situated subordinate sewers have been laid in the streets, these being, where only one or two houses are to be accommodated, only four inches in diameter. Except in those rare cases where there are deep cellars to be drained the sewers are placed only about six feet deep unless irregularities of the ground have required a greater depth in passing through local elevations. At every point along each line where it is at all likely that at any future time a house may be built an oblique junction piece is built in with the sewer, its mouth being temporarily closed. Wherever a house is now standing, in order to protect the sewer from injury at the hands of careless workmen, to avoid the necessity for digging up the street, and to make the connection less costly to the householder, a four-inch branch is carried up to the lot line at a depth of three feet below the surface of the ground, which in that climate is a sufficient depth for house-drains. By this arrangement the householder, in making his connection, finds the public sewer connection at the limit of his own property. It has been the custom heretofore to make the connection between the house-drain and the sewer by a branch piece of the diameter of the house-drain, entering the sewer above its bottom and below its top. The house-connection branches used in Memphis are funnel-shaped, the top and bottom lines being tangent to the circumference of the sewer, so that the house drainage is delivered at the very bottom of the flow of the sewer, with a tendency to increase its velocity, and so that the ventilation of the sewer reaches its very top.

The lateral sewers have no man-holes or lamp-holes or communication of any sort with the surface of the street, except at one point near the lower end of each, where there is a fresh-air inlet, which may also serve for the inspection of the working of the sewer. This fresh-air inlet has a communication with the surface of the ground through a large and very open grating, beneath which a slanting plate of iron is placed to prevent dirt from falling into the sewer, throwing it into a receptacle at the side, from which it may be easily removed. This sloping plate need only be lifted to a vertical position to give a clear view of the sewer below. The rain-water either from the surface of the ground or from the roofs of houses is not admitted to the sewers. They serve solely for the removal of the waste-water of houses, manufacturing establishments, stables, etc. Under no circumstances is the pipe connecting a house of any size with the sewer allowed to be more than four inches in diameter. This is amply large for the most extensive establishments. For example, a guaging of the flow of the main sewer of the Grand Union Hotel in Saratoga in the height of the season, at the hour when the proprietor thought that the largest amount of water was being discharged, and when there were 1,300 inmates in the hotel' showed a stream barely sufficient to fill a pipe two and one-half inches in diameter. A rigid adherence to this limit of four inches insures the exclusion of matter large enough to clog the six-inch sewer, and throws the responsibility of excluding rubbish upon the householder, as he alone will suffer inconvenience from his neglect.

At the head of each sewer and of each branch of a sewer there is built a Field's flush-tank, having a capacity of about one hundred and twelve gallons. This tank is built of mason work under the surface of the ground, but above the level of the head of the sewer. It is supplied by a constant stream of water from the public water supply, barely sufficient to fill it once in twelve to twenty-four hours. This flush-tank is one of the essential features of the combination; indeed without it the use of any sewers not receiving storm-water would be extremely unsafe. Aside from this assuring of the removal of obstructions before they can accumulate to a dangerous extent, the use of the flush-tank has the further very important effect of carrying forward to the outlet, at least once in twenty-four hours, all of the organic matter which, if allowed to remain a longer time, would enter into a dangerous decomposition; for even in a six-inch pipe there is a tendency to deposit fecal matter and other solid substances toward the upper ends of the sewers where the regular flow has not yet accumulated sufficient volume to sweep them forward. Under ordinary systems these accumulations remain, producing the sewer-gas of which we hear so much, until the water of a storm sweeps them away. In the Memphis works such deposits are rendered impossible, and the production of sewer-gas as a consequence is substantially prevented.

There undoubtedly occurs, however, a coating of the walls of the sewer with grease and slimy matters from the foul outflow of houses even beyond the capacity of the flushing stream to remove it. These adhering substances undergo decomposition, and in the absence of ventilation they might do harm. The ventilation of the Memphis sewers, however, is so thorough and complete as to insure the dilution of the resultant gases formed. The supply of fresh air is sufficient to prevent the unhealthy decomposition usual in sewers, and the constant current through the pipes is sure to remove whatever gases may have formed, immediately and at all times. Aside from the fresh-air inlets indicated to supply a current for ventilation, it is a fundamental principle of the ordinance regulating house connections, that every connection, of whatever character, shall be continued, without an intervening trap, by a pipe fully four inches in diameter to and above the top of the house so connected. As house connection is compulsory, and as it is made a misdemeanor not to have at least one water-closet for every occupied house, when the work is completed there will be not less than 7,000 of these four-inch ventilating pipes for the forty miles of sewers in the city, being an average of one ventilator for every thirty feet of sewer. When this system is finished and is all in operation, — supposing the ordinance prohibiting the throwing of slops or other waste matters on to the surface of the ground remains in force,—Memphis will unquestionably be the best drained city in the world. Every house within its limits will have a well-ventilated connection with a public sewer, which sewer will be, at least once a day, washed thoroughly clean by the discharge of nearly two hogsheads of water into its upper end; and the velocity of discharge will be such that not more than three hours will elapse between the deposit of the wastes of the most distant houses into the sewer and the discharge of those wastes into the Mississippi River.

Some of the details of the construction of these sewers are different from those in common use. Ordinarily pipe sewers are laid from the lower end of the drain upward, so that water accumulating in the ditch is carried off by the sewers laid. Where absolute tightness of the joint is not an object, and where the pipe is large enough for the deposit of a certain amount of silt to be of little consequence, this answers very well; but it is impossible to make a tight joint when the pipe is required to carry water before the cement hardens. Then, too, with the small diameter here used absolute cleanliness is very important. Therefore the laying of each line was begun at its upper end, every effort being made to exclude soil-water absolutely, pressure of soil-water being relieved by the auxiliary tile drains to be described. It is a frequent objection to pipe sewers that slight projections of cement at the joint, act, by catching lint, rags, etc., as the nucleus for an obstruction. To prevent such asperities, the joints of these sewers have been laid in all cases with gaskets, a small rope of oakum being crowded into the collar before the cement is put on. It is found in practice that the collars or sockets of vitrified pipes are generally so large and so irregular that the bore of the pipe does not make a continuous concentric tube, the spigot end of the pipe usually dropping a little out of line, making at each joint a hump which interferes with the continuity of the fall and with the smoothness of the flow. To remedy this difficulty there was devised an "adjustor," to be inserted in the pipe, having three india-rubber bearings lapping over the joint to be made. By the turning of a screw these bearings are brought firmly against the inner circumference of the pipe and hold the two pipes absolutely concentric until the gasket is wedged in place, this joint being cemented only after the next one has been secured by its gasket, so that any jarring in the adjustment of the third joint shall be taken up by the gasket of the second without disturbing the cement of the first. This arrangement has been found in practice to work perfectly well and to secure an absolutely concentric conduit.

The natural soil of Memphis is generally very good and firm, but in many places, in grading the streets and alleys, old bayous and depressions have been filled. In such places the bottom is as bad as possible. In several instances the lower part of the trench was actually dug with buckets, and in one case the man laying the pipes sunk in the slush until his knee was down to the level of the flow line of the pipe. By no ordinary process could good work be done in such ground. The method devised to get over the difficulty was to support each pipe on two piles, made of boards eight inches wide, long enough to drive into firm ground and cut out at the top to a half circle fitting the outside of the pipe. These piles were driven until the bottom of the half circle was exactly at grade and the pipes were supported upon them. Where the amount of water was so great as to interfere with the setting of the cement, the trench was dug out considerably below the grade-line, the joints standing high and dry until firmly set. In laying the main sewers and elsewhere where the grade was slight, in addition to the measured grade given by the engineer, the mechanic laying the pipes was furnished with a long straight-edged board, just so much wider at one end than at the other as represented the required fall in the length of the board. The lower end rested on a peg driven in the bottom of the trench and its upper end on the flow-line of pipe already laid. It was returned to this position to test each pipe as laid, and each one was brought exactly up to its lower edge. The accuracy of its position was tested in each case by a spirit level applied to its upper edge.

It is believed that the whole system of sewer pipes is laid absolutely true to grade: that the pipes are absolutely concentric, and that the continuity of the whole system is mathematically exact. A doubt on this subject was expressed by a member of the National Board of Health who had watched the work with great care. He feared that in crossing a certain piece of very bad ground it had been impossible to keep the pipes in line. On opening the trench for examination it was found that the piles above referred to had performed their work perfectly, and that the tile drains had dried the ground so completely that the workmen did not even soil their shoes in making the excavation. Every joint was firm and without crack, and the work was pronounced completely satisfactory.

So far as the healthfulness of Memphis is concerned, it is believed that the natural wetness of much of the soil, and the springy condition resulting from the filling in of old bayous and swamps were as detrimental as was the absence of the means for removing filth. The draining of the soil was thought to be as important as the building of sewers. This soil drainage has been accomplished by the use of agricultural drain-tiles having a diameter of from one and one-fourth to three inches, and delivering, not into the main sewer, but beyond it into the bayou. As the sewers are between three and four hundred feet apart — too far for a complete draining of the soil by this means — a tile drain is being laid under the edge of the sidewalk at each side of each street leading from the river toward the bayou. So far as the experience of this spring goes the result is all that could be asked.

As above stated, much time was lost in discussion and still more by delay in securing a sufficient supply of pipes. During five weeks in February and March the rain was so heavy and so incessant as almost to put a stop to the work. The committee yielded to a clamor for doing the work of ditching and back-filling by contract. As was to be foreseen, and is always the case where mere common labor is but a small element of the cost, this system resulted badly, and the work was considerably retarded by the experiment, which, after sufficient trial, was abandoned. Notwithstanding this, at the end of May, in a little more than four mouths from the time of breaking ground, over twenty miles of sewers had been laid, including the whole of the main lines, with one or two trifling gaps, and pipes had been bought for the rest of the work. The total cost, including labor, material, engineering and incidentals had been about $137,000 — the disbursements of the last few weeks being estimated. The average cost per foot of the six-inch sewers for pipes, house-connection branches, ditching, laying and back-filling, not including engineering and inspection, is estimated at sixty cents.

Bayou Gayoso, of ill fame, is a deep winding gully through the heart of the city, which serves as the outlet for a water-shed of about five thousand acres. Its bad sanitary influence was exerted in two ways: — First: In many parts its shores were lined with privies whose contents flowed down its sides, and it was a convenient receptacle for all manner of filth from the houses along its course. It also received a number of drains, bringing water-closet and other refuse from houses sometimes at a considerable distance from it. All these things rendered it a foul, open sewer, of a most objectionable character. Second: It served as a channel for the penetration of the flood-waters of the Mississippi quite up to the heart of the town. This flood-water had no perceptible flow, and it stood at such a height as to lead to the complete saturation or overflowing of wide areas of occupied ground. Many houses near it are built on piles, and during the months of high water, nearly every year, they were entirely underlaid by a greater or less depth of foul, stagnant, scum-covered water. The district so affected was notoriously the worst, in its sanitary condition, of the whole city.

The improvement, which is to be completed next autumn, will consist of a dam for excluding the flood-water of the river, a low, valved outlet for the removal of the natural stream during low stages of the river, a steam pump to discharge the natural stream during high stages, and large flood-gates to discharge the water of heavy storms at all seasons. The pump to be used is a most simple and ingenious device for forcing water forward against a head, while allowing a free natural flow at ordinary stages of the river. This pump (the invention of Mr. Fijuje Van Salverda) has been largely used in Holland for more than thirty years, and was introduced to the notice of American engineers only at the Centennial Exhibition. Its application in American draining thus far has been most satisfactory, and it certainly offers advantages for such work far beyond anything used before. The Memphis sewerage, although not now entirely completed, is so far advanced and in such general use that its success is no longer a matter of question. Already the authorities of New Orleans and of Charleston are negotiating for the introduction of the same system in those cities, the work to be done by private corporations receiving monthly payments from householders. And now Baltimore, which is entirely without sewers, is making careful investigations with a view to the same solution of its difficulties.

THE ILLUSTRATIONS.

AN ARCHITECTURAL MEDLEY.

Notwithstanding the prosaic nature of our every-day life, there lingers amongst the members of the profession and the friends of architectural art a strong regard for what may be termed romantic and picturesque architecture. Of the former class there are several leading architects who work in this style, producing some most charming half-timbered domestic buildings, with quaint chimney-stacks, and studied irregularities.

Of the purely picturesque style, many of the "Queen Anne," or "Free Classic" buildings are good examples. Whilst admiring the beauties of this class of work, our better understanding will not permit us to subscribe to that excessive indulgence in architectural patchwork which is characteristic of some recent structures. We cannot approve of the desire to ape antiquity; to make a new house look like the "patchwork of centuries," with all the quaint conceits of mediæval buildings, not growing out of necessities, but stuck on.

Many of our architects can and do produce good substantial nineteenth-century edifices, characteristic of modern requirements, modern advancement, and modern thought, while

> "Some by old (forms) to fame have made pretence,
> Ancients in phrase, mere moderns in their sense."[1]

In the accompanying illustration (reproduced from the *Builder*) an endeavor has been made to incorporate some of the peculiarities of style advocated by several architects whose works are prompted by adoration for the romantic, picturesque, and antiquated. The drawing is intended to display the vagaries sometimes indulged in, at the same time that it conveys a not untruthful representation of what a building might ultimately become with the varied additions of several generations.

Whatever might be its merits as a drawing and fanciful composition, the author of it desires it should be looked upon as a warning against the too free indulgence of individual whim, constituting, as it does, a gentle satire upon designs, whereof it may be said, —

> "Such labor'd nothings, in so strange a style,
> Amaze the unlearn'd, and make the learned smile."

Jas. Geo. Buckle.

COTTAGE AT ASBURY PARK, NEW JERSEY, BELONGING TO U. S. GRANT, JR.

This cottage was built in 1878 at a cost, including fence, pump, and outhouses, of $1,500. First floor contains, parlor, 16 feet 9 inches by 11 feet, dining-room, 14 feet by 11 feet, with china-closet, small staircase hall and hat-closet, servants' bed-room 8 feet by 6 feet, kitchen 12 feet by 7 feet, with cellar under. On the second floor there are four bed-rooms, two large enough for double beds and two for single, one closet to each room. Three bed-rooms open upon upper veranda to which access can be had also from staircase hall.

OFFICE BUILDING, LEBANON, PA. MR. W. B. POWELL, ARCHITECT, LEBANON, PA.

The illustration represents an office building to be built near the Colebrook furnaces now in course of erection for Mr. Robert H. Coleman. The building is to be fire-proof, finished in hard-wood throughout. It is proposed to finish the walls of the main office in color, with a dado of tiles 4 feet 9 inches in height. The basement contains a laboratory, store-rooms, fuel-rooms, hot-air chambers, and minor apartments. All the iron-work where exposed is to receive appropriate decoration, and the brick arches between floor-beams are to be plastered and decorated in color. The estimated cost is $25,000.

HOUSES ON EAST SIXTY-SEVENTH ST., NEW YORK, N. Y. MR. JAMES E. WARE, ARCHITECT, NEW YORK, N. Y.

A GERMAN BOOK ON PLUMBING.[1]

It is not often that we have occasion to speak of a book with such unmixed praise, and praise, too, on so many accounts, as of the little pamphlet before us. As its name indicates, it is a *résumé* of the best modern practice in house plumbing and drainage, made up as well from observation and practice as by collation and selection from the works of a great number of the best writers on sanitary matters; a selection whose judiciousness will be best appreciated by those ex-

[1] *Anlagen von Hausentwässerungen* nach Studien Americanischer Verhältnisse, von W. Paul Gerhard. Berlin, A. Seydel. May be ordered through any German bookseller. Price in America, about 80 cents.

perts who are themselves most familiar with the literature of the subject.

The author's aim was to condense his matter as much as possible, stating principles, and giving rules for their application, in order that his book might have the widest practical use in the country where it was designed to circulate; but those who have known the difficulty of judging among the many conflicting theories and doubtful rules which have their advocates, will take pleasure in observing the precision with which Herr Gerhard has selected those which, if not proved to be the best, have at least a preponderance of evidence in their favor.

Beginning with a concise exposition of the nature and composition of sewer-gas, and the diseases which are attributed to it, or the ferments of which it may be the vehicle, we find the modes by which it is prevented from reaching the interior of our houses briefly treated of, the faults of some pointed out, and the merits of others carefully explained, with the help of illustrations of remarkable excellence. A systematic order is pursued in the treatment of the subject, and each principle established is summed up in an easily remembered phrase, as for instance, the following, which contains the whole theory of house-drainage.

"Two great requirements," the author says, "concern the householder, — (1.) to keep the gas of the sewers from the interior of the house; and (2.) to oxidize and make harmless the effluvium within the house-pipes by means of a constant current of fresh air through them."

Further on, in treating of the details of plumbing work, principles are set down in the same way, accompanied with necessary comments. For example, it is said "The fall of the drain should be as great as possible;" then follows: "A fall of 1 in 40 is desirable; at least, it must never be less than 1 in 100; to secure proper cleansing, the flow of water in the pipe must be at least 4 feet per second. The pitch from the house to the sewer should be as direct as possible, and without alteration in the gradient."

Traps and ventilation pipes, flush-tanks and disconnecting gratings are treated of in the same brief but thorough manner, and the young engineer or architect, or the intelligent householder, can get from these thirty-six pages all that he would probably be able to glean from the ponderous volumes of Latham and Denton, with a considerable amount of desultory reading and practical experience in addition.

From such scattered sources, health reports, technical journals, and so on, of course a large part of the information contained in the book is collected, but the author credits all such borrowed material with scrupulous honesty, reserving to himself not even the praise which he deserves for his care and success in sifting the best and most important part out of the mass of matter before him.

We can assure those of our readers who understand German, and do not feel themselves perfectly familiar with the science of house-drainage, that this little pamphlet will help them more to sound and practical knowledge than any single work with which we are acquainted, even of many times its bulk.

THE SANITARY CONSTRUCTION OF HOUSES.[1]

THE discussion of sanitary horrors which has of late occupied public attention has naturally created a demand for popular treatises in which may be found the principles of sanitary construction, or at least some tabulated and authoritative discussion of the matters so fragmentarily treated by the general press. It is in answer to this demand, as is stated in its modest preface, that this little book has been put forth, with the name of the author as a recommendation. The lectures of which it is made up were delivered in London and originally published in *Van Nostrand's Engineering Magazine*, and treat of the whole subject of the sanitary regulations necessary in dwelling-house construction. Beginning with a discussion of the soil upon which the house is to be built, the lecturer proceeds to deal with the construction of the walls, floors and roof, with the precautions to be taken in providing for ventilation, heating and lighting, with the regulation of the water-supply, and with the arrangements for the removal of refuse matters; closing by a detailed consideration of sewerage and drainage proper. No new theories are presented; the wide field under consideration is covered by closely compacted statements of acknowledged facts and principles, which are colored in a measure by the lecturer's own opinions. The expression of individual judgment is especially marked in the condemnation of all conservancy systems, and the strong recommendation of water-carriage as the means of disposing of house waste.

The lectures, when given, were illustrated by experiment, and by the exhibition of models and of patented devices, and these aids are greatly missed by the reader on this side the water, since Americans are more or less unfamiliar with the English patents so largely quoted. In studying the precautions advised by Prof. Corfield one is also reminded of a note of Col. Waring's upon Prof. Jenkin's little book on healthy houses, to the effect that our American plumbers must be more efficient than their English brethren. We have not the slightest hesitation in entrusting to our workmen undertakings which English authorities view as dangerously impracticable. Prof. Corfield, for instance, looks somewhat askance at the substitution of iron for lead in pipes, so cordially endorsed on this side the water, considering that imperfect joints are almost inevitable when iron pipes are employed. He considers, however, that the danger incurred by the use of lead in pipes and cisterns has been much exaggerated. A further difference between the requirements of an English and an American public is seen in the fact that these lectures deal with methods of heating in a manner quite incomprehensible to the American mind, by its brevity. Their suggestions, adapted to a climate much less severe than our own, and to a people habitually much less sensitive to degrees of temperature, are entirely inadequate to the ordinary conditions on this side the water.

The discussions, however, are on the whole full and satisfactory. The main faults of the book are its lack of forcible sequence of statement, and of clear and emphatic phrasing, and these are to be attributed to the fact that the book is merely a collection of lectures. It must be remembered that the text stands here, not only without the emphasis lent by the speaker in delivery, but also without the aid of illustration, of careful division into sections, or of attempt at tabulation, either by index or table of contents. While not attempting to rouse public attention by a brilliant and forceful consideration of general sanitary needs and principles, the book does claim to belong to that class published to satisfy inquiry into the details of sanitary construction, and it seems unfortunate that its form of presentation should thus detract from its usefulness.

[1] *Dwelling-Houses:* Their Sanitary Construction and Arrangements. By Prof. W. H. Corfield, M. A., M. D. New York: D. Van Nostrand, 1880.

TERRA-COTTA.

"TERRA-COTTA" means, broadly speaking, baked earth (*cotta*, literally "cooked"), and is an expression which, therefore, would seem to include a great variety of clay productions, from common brick to china and porcelain. Ordinary building-brick is, therefore, only the roughest and cheapest form of terra-cotta, made of comparatively coarse material, and subjected only to a low heat. China and porcelain are productions of special clays of very fine nature, not obtainable in large quantities, and specially suitable in their texture and appearance for ornamental production on a small scale, and of a fine type. What is now understood by the term "terra-cotta" is something which may be said to be midway between brick and the fine productions in china and porcelain. The material is one found in large quantities, and not in itself costly, often differing little in its original state from the best ordinary brick-clay,[2] but which is subjected to treatment which gives it a very different character from brick, the essential difference being in the manipulation of the clay, partly in fully grinding or kneading it, partly in the admixture of some other substances with it, so that it will bear a great heat without flying or twisting, and acquire thereby a surface of the most durable and impermeable description.

Manufacturers are divided in opinion and practice in regard to the compounding of the material for terra-cotta. One of the largest makers in England, — Mr. Blashfield, of Stamford, — mixes his clay with a considerable amount of other material.

But at the same time, it must be said that other authorities of equal practical experience do not recognize any necessity for the use of these foreign materials in terra-cotta. Messrs. Doulton, of Lambeth, employ simply the fire-clay from the beds in some of the southern counties (Dorset and Devon chiefly) mixed with a certain proportion of old terra-cotta broken up and ground to a fine powder. In former works at Lambeth (which has been for more than a century a home of pottery manufacture) this system was used, though it appears that the combination of the clay with fine sand and ground flint was also practised. What is certain is, that with the combination of ground pottery only it is possible to produce a material of most agreeable color, and which has all the appearance of being as completely indestructible as any terra-cotta that could be made. The ground pottery mixed with the clay is termed in the manufacture "grog;" the proportions in which it is used depend very much on the nature of the clay employed, which varies in regard to the proportion of ground material which it requires for a satisfactory result; and this has to be determined in special instances by the burning of test pieces variously compounded. There is one distinct and unquestionable advantage in this employment of the same materials and in as nearly as possible the same proportion always: the behavior of the material under firing, and its degree of contraction, may be counted upon to be always pretty much the same, whereas varied mixtures and combinations produce varied settings and contractions, and as the liability of terra-cotta to contract and twist in the kiln is one of the great practical difficulties in connection with the use of the material, it seems best to compound it so as to at least reduce these difficulties to a minimum. As far as shrinkage is concerned, the amount is pretty constant, and is well known. The material shrinks in burning one-twelfth of its original bulk, and this shrinkage is inevitable, and must always be counted on as a necessary stage in the manufacture. Twisting is not inevitable, though for a very long time it was practically nearly so; but it is a difficulty which has now been in the main got over, but the avoidance of which can only be secured by great care and attention.

The first operation with the clay consists in stacking it to dry in sheds, where it has to remain for a good many weeks, the time of course varying according to circumstances, state of the atmosphere, etc. When sufficiently dry it is pulverized and mixed with the other pulverized ingredient, whatever it be, which the manufacturer selects

[2] Not differing at all from fire-brick clay; the base and principal constituent of terra-cotta being, in fact, simply fire-clay.

to add to it, and the two are then thoroughly ground together in a pug-mill, under the action also of water, which is added to facilitate the thorough reduction and mixture of the substances. It is this necessary addition of water at this stage of the manufacture which causes one of the difficulties arising from subsequent shrinking in the kiln, the shrinking arising simply from the driving off of all the residue of water under the intense heat to which the material is subjected in that final stage. Consequently, the quantity of water admitted into the pug-mill is carefully adjusted by rule to the proportion of the solid material, as with the same proportion of water there will be always the same proportion of shrinkage. After the mixture in the pug-mill is thoroughly effected, there is another danger to which the material may have been subjected, the retention of air within it, which if overlooked and not attended to would be fatal to the pieces when in the kiln, as they would inevitably burst. To avoid this danger, after the clay comes from the pug-mills and is sufficiently dry to be cut into lumps, it is so cut with a wire into slabs or "wedges," and these are successively slammed down on each other with sufficient force to compress any cavities that may have been left in them and drive out all the air contained therein. The clay is then ready for use, either in modelling or moulding. If the object which is to be produced is to be a single one of its kind, or only a pair, then it may not be worth while to make a mould. If there is only a single one it certainly would not, provided the operation of firing is considered perfectly safe; but if the object modelled be of a very complicated description, and involving necessarily varying thicknesses of clay, and if it be artistically valuable as representing a high class of art-work, it may then be worth while to have made a mould for it, and produce it in that way, in order to save the entire loss of the artist's work and the necessity of designing it all over again, if there should be any accident in burning. But whether the artist's original work be placed in the kiln, or whether a mould be formed from it into which the clay is pressed, the important point is to get the bulk or thickness of material nearly the same in every part, otherwise twisting, from the heat not reaching all the material equally and simultaneously, is the certain result. Thus when a mould is used it is not filled up with clay *en masse*, but the clay is pressed against the sides only, the moulder following the varying surfaces of the mould so as to leave as nearly as may be an equal thickness of clay in every part; and if the mould is so large that a hollow shell of clay could hardly be trusted to retain its shape properly till burned, "struts" of clay are left from one side of the interior to the other, so as to hold the clay better together till burned, and at the same time give what in a large object would perhaps be a necessary increase of strength to the object after burning. The best average thickness is about an inch, unless the object is so large as to require greater thickness for the sake of strength. This necessity for even thickness applies equally to ornamental terra-cotta or to blocks for building purposes. In the latter case the even thickness is easily attained; the block becomes simply a hollow piece of terra-cotta with walls of equal thickness. Whether it would be left hollow in building would depend very much on how and where it was to be used; if the block had to be placed in such a position that great weight had to come on the hollow portion it would then be necessary to fill it up with cement or concrete or other material, care being taken that nothing should be used which swells in drying (as Portland cement), as the burned terra-cotta is absolutely inelastic, and any swelling of the filling material means merely the bursting of the block. In the case of ornamental work, and especially of statues, there is more difficulty in securing the even thickness of the material: the work has to be carefully hollowed out at certain parts so as to reduce the material where it is thickest, and want of care in this respect may lead to the loss of a valuable piece of work. There is also danger of the piece cracking before it goes into the kiln from unequal drying, by which one side or portion is contracted and pulls on the other portion which has not so quickly dried. Mr. Blashfield mentions another difficulty which he has had to guard against. The moulded objects are finished up by hand after moulding, and if the finisher leaves the surface at all unevenly finished, one part less smooth than the rest, which may happen sometimes from some partial tooling arising from an afterthought after the cast is partially dried, this unevenness of surface will be another source of distortion in the kiln; the moisture being naturally driven off most freely through the less smooth and more porous part of the surface, so as to contract soonest in the neighborhood of that portion. Thus it will be seen that in terra-cotta work there is emphatically many a slip 'twixt cup and lip, and it is only by long attention and experience that the terra-cotta design has been brought to its last stage in the kiln with a good chance of getting safely through. If it survive that fiery trial, and come out *totus, teres, atque rotundus*, it may thenceforth be said to have nothing to fear but absolute breakage by violence. Frost, rain, cold, or heat, have no further effect upon it; it has come out, after much difficulty and risk (rendered, however, less and less by long experience), an indestructible piece of work; provided always, be it remembered, that the firing is complete. As to the heat used in the kiln, all makers seem to agree in saying that they know nothing positive; the heat of the kilns is not guaged in any way (it surely might be), and all that can be said is that the object is to produce the greatest heat which the productions will bear without cracking; and this seems to amount to absolutely white heat.

For building terra-cotta, however, the great advantage is the close and absolutely impervious character of the material. Of the ornamental and artistic treatment of terra-cotta we will speak separately: in treatment as a building material it combines best with brick, along with which it can be entirely used as a facing material with a sufficient number of through tie-pieces to bond it into the wall. Mr. Waterhouse has also used it (Natural History Museum) as a screen and protection to internal iron columns, thus giving them a fire-proof casing, susceptible at the same time of very artistic treatment. The putting together of the material, to make the best possible work, requires some care and consideration; the pieces may, if desired, be flanged and rebated so as to hold together almost without the assistance of mortar; but this, of course, requires a good deal of care and consideration in the making. The outer surface of good and well-burned terra-cotta should be almost proof against any ordinary tools, which can merely scratch the skin of the material; and from this fact arises one of the difficulties in the way of the general introduction of the material in building. Alterations cannot be made in it as the work proceeds, not only because the pieces cannot be cut, but because considerable time is required for the modelling or moulding and burning, and the material cannot therefore be furnished at short notice like stone or brick. It is therefore necessary that the architect should have well matured his design in detail before the work is commenced, all the pieces having to be ordered a good while beforehand, and made precisely for the situations they are to fill. Considering the tendency in the present day to design everything in a hurry, and to get up details as they are wanted as the work proceeds (often in a very hasty manner), it may be said that in this respect the adoption of terra-cotta building ought to be a very good discipline for architects, and compel them to give more deliberate thought to the design of a building than is generally given at present; but we fear very few English architects like to take this amount of trouble; indeed, we have heard it urged as an objection, and it certainly fits very ill with the habits of the day, buildings being apparently always now required in a hurry, and the object being not to build well, but to build quickly. No permanently satisfactory architecture can, however, be produced in a hurry, and from this point of view, therefore, it might seem that the extensive adoption of terra-cotta might be highly favorable to the development of good architecture; but before this can be generally considered a recommendation, there must be a general feeling on the part of the public that good architecture is a thing worth giving time for. which at present hardly any one does think.

It must be observed that terra-cotta cannot be made in very large pieces, and therefore it cannot imitate, and should not aim at imitating, those features of stone architecture which require large blocks, such as large projecting cornices, etc. These can only be safely made in terra-cotta by the assistance of concealed artificial supports, making the thing a sham. Terra-cotta has much more of the nature of brick than of stone architecture; but this point may be better considered in speaking of the artistic treatment of the material. In regard to its cost as compared with that of stone, terra-cotta, as fixed in the building, costs (in plain walling) a little less than the same cubic amount of soft building stone (such as Bath), and 35 to 40 per cent less than Portland. In regard to comparative strength, some of Mr. Kirkaldy's experiments gave the crushing-weight of a 12 inch cube of Bath stone as 88 tons, that of Portland stone 283 tons, and that of a terra-cotta block of the same size as 442 tons; in comparison with brick, a good stock brick crushed under 17 tons (though we have seen a brick resist three times that pressure), and a terra-cotta block of the same size under 125 tons weight.

We have hitherto been speaking of unglazed terra-cotta as a material of homogeneous color. Its aid to polychromatic effect is, however, capable of being developed in a very elaborate manner. Variety may be obtained in unglazed terra-cotta by what is called "slipping," mixing two clays of different tones together in water to produce a third tone. This may be said to take in terra-cotta the same place as pot-metal in colored glass. But in glazed terra-cotta or "stoneware" the material can be painted in a great variety of colors, which are then fixed, and at the same time rendered more brilliant in effect. The glazed ware is formed by throwing salt into the fire when at a certain heat, which decomposes under the heat in the form of vapor, the soda suspended in which incorporates itself with the surface of the ware which is at a white heat, forming a glaze which allows the most delicate markings to appear without any obliteration. Thus any design in color is rendered both brilliant in surface and indestructible, without the least injury to its artistic effect. Various mineral colors are used, and the main color of the ground is also influenced by the nature of the fuel, as has been ascertained by experiment. How far this is the case may be judged by the statement of Mr. Doulton, in a short pamphlet on the use of terra-cotta, where he says, — "The delicate blue color of the ground in ancient Rhenish productions is due to the use of wood as the fuel in firing. We passed a piece of old Rhenish ware through our Lambeth kilns, with this result, that the body was changed to a similar color as the Lambeth, while the applied color lost much of its intensity." Stoneware is very largely used for drain-pipes and other such practical purposes, but it is also a very important element in the architectural and artistic capabilities of terra-cotta, of which we will speak in another number. — *The Builder.*

PRESSURE OF WIND ON CHIMNEYS.[1]

The chimney erected at Lowell by the Lawrence Manufacturing Company last year, is built of brick, and its outer shell is octagonal,

[1] Portions of a report made by Mr. James B. Francis to T. Jefferson Coolidge, Esq., Treasurer of the Lawrence Manufacturing Co.

with an ornamental cornice or capital. The inner shell, or flue, is cylindrical, with an air-space between it and the outer shell; the two shells not being bonded together, except at the openings at the base, but with projections in the brickwork, at intervals of about twenty feet in height, to afford lateral support by contact of the two shells. There are openings through two opposite sides of the base, one of them three feet and a quarter wide for the flue, and the other a doorway two feet and a half wide. The chimney is nearly surrounded by buildings, which shield about seventy feet of its height from the wind. On the southerly side there is an opening forty-eight feet wide, between Nos. 2 and 3 mills, which exposes that side. The lowermost eighteen feet is laid in hydraulic cement mortar, the remainder in ordinary lime mortar. The weight of the outer shell of the chimney, above the ground line, is estimated at six hundred and forty-four tons.

The principal dimensions of the chimney, I am informed, are as follows:

Height above the surface of the ground.....211 feet.
Diameter of the inscribed circle of the octagon near the ground..... 15 "
Diameter of the inscribed circle of the octagon near the top..... 10 ft. 1½ in.
Thickness of the outer shell near the base, 6 bricks, or..... 23½ inches.
Thickness of the outer shell near the top, 3 bricks, or..... 11½ "
Thickness of the inner shell near the base, 4 bricks, or..... 15 "
Thickness of the inner shell near the top, 1 brick, or..... 3¾ "

The foundation, I am informed, extends twenty-two feet below the ground line to hard gravel, containing many boulders; and is built of split granite stone, laid in cement mortar. The octagonal form is retained to the bottom of the foundation, where the inscribed circle is twenty-four feet in diameter. I do not find that there has been any settling of the foundation, or that there is any reason to doubt its sufficiency. Very soon after the chimney was built, and before the mortar had hardened, it was found that the top had swayed over about twenty-nine inches toward the east. This was evidently due, in main part at least, to a strong westerly wind which occurred at that time. It was soon brought back to the perpendicular, by sawing into some of the joints, and by other means.

I have pursued two distinct lines of inquiry in this investigation, viz.:

1. What are the dimensions usually adopted for such a chimney?
2. To estimate the force of a wind that would blow the chimney down.

There is a chimney at Boston Highlands, and another at East Cambridge, of nearly the same height as the Lawrence Manufacturing Company's. That at Boston, I am informed, was built by the Roxbury Chemical Company about 1844 or 1845, and is round, about two hundred and five feet high, and twenty feet and a half outside diameter at the base; thickness of wall near the base, about three feet and a half.[1] At this chimney, for some years, no part of the height has been shielded from the wind by buildings. The chimney at East Cambridge is at the works of the New England Glass Company, and was built in 1854, octagonal; and I am informed, is about two hundred and thirty feet high, and the diameter of the inscribed circle at the base, twenty-three feet. Thickness of the outer wall at base, three feet. The lowermost forty feet in height is shielded from the wind by buildings. The Merrimack Manufacturing Company's chimney, built in 1867, I am informed is two hundred feet eight inches high above the top of the underpinning, octagonal. Diameter of the inscribed circle at base, seventeen feet three inches. Thickness of outer shell at base, two feet eight inches. The lowermost forty feet is shielded from the wind.

The following table contains the form, height, and diameter at the level of the ground of some large chimneys in England and Scotland.

Description of the Chimney.	Height above the ground.	Diameter of inscribed circle at level of ground.
Square chimney at Cement Kilns, Dover Court, England	190 feet.	20 feet.
Round chimney at West Cumberland, Hematite Iron Works	250 "	25 feet 7 inches.
Round chimney at the Edingurgh Gas Works	264 "	26 " 3 "
Square chimney at the New India Mill, Dorwen, Lancashire, base 29 feet square, 42 feet high, shaft 24 feet high, carried up plumb	300 "	29 "
Round chimney at Bradford, Yorkshire, walls apparently 6½ feet thick at the base	300 "	26 "
Round chimney at Brook's Fire Clay Works, Huddersfield, England	312 "	31 "

In five of the six chimneys in the above table, the diameter at the base varies little from one-tenth of the height, and the same proportion holds in those of the New England Glass Company's Works, and at what was formerly the Roxbury Chemical Works. The Bradford chimney is much less, but the walls appear to be unusually thick at the base.

According to Péclet, an eminent French writer on heat and its applications, the diameter of the Lawrence Manufacturing Company's chimney, at the level of the ground, should be about twenty-one feet.

One-tenth of the height for the diameter of the base, I have long understood to be the rule commonly adopted. The diameter of the inscribed circle of the base of the Lawrence Manufacturing Company's chimney being fifteen feet, it is evidently much less than is usual in a chimney of that height.

The stability of the chimney to resist the force of the wind, depends mainly on the weight of its outer shell, and the width of its base. The cohesion of the mortar may add considerably to its strength; but I think it is too uncertain to be relied upon, and I have therefore, not attempted to take it into account, except to assume that it will maintain the outer shell entire, until it begins to fall. The inner shell will also, I think, add a little to the stability of the chimney, but it may be cracked by the heat, and its beneficial effect, if any, is too uncertain to be taken into account.

The effect of the joint action of the vertical pressure due to the weight of the chimney, and the horizontal pressure due to the force of the wind, is to shift the centre of pressure at the base of the chimney, from the axis toward one side, the extent of the shifting depending on the relative magnitude of the two forces. If the centre of pressure is brought too near the side of the chimney, it will crush the brickwork on that side, and the chimney will fall. A line drawn through the centre of pressure, perpendicular to the direction of the wind, must leave an area of brickwork between it and the side of the chimney, sufficient to support half the weight of the chimney; the other half of the weight being supported by the brickwork on the windward side of the line.

Smeaton, in 1759, published a table of the velocity and pressure of wind, which is substantially adopted by the present United States Signal Service, and from which I make the following extract:

Velocity of the wind, in miles per hour.	Perpendicular force on one square foot, in pounds.	Common appellations of the winds.
40 to 45	7.873 to 9.963	Very high.
50	12.300	A storm, or tempest.
60	17.715	A great storm.
80	31.490	A hurricane.
100	49.200	A hurricane that tears up trees, and carries buildings, etc., before it.

Mr. Frizell has examined the published records of Greenwich Observatory, from 1849 to 1869, and reports to me that the highest pressure of wind he finds recorded is forty-one pounds per square foot, and there are numerous instances in which it was between thirty and forty pounds per square foot. Prof. Henry, of the Smithsonian Institution, informs me that on Mt. Washington, N. H., a velocity of one hundred and fifty miles per hour has been observed, and at New York City, sixty miles an hour, and that the highest winds observed in 1870 were of seventy-two and sixty-three miles per hour, respectively.

Lieut. Dunwoody, Acting Signal Officer, Washington, in his letter to Mr. Frizell, of December 23d last, says, in substance, that the New England coast is exposed to storms which produce a pressure of fifty pounds per square foot.

The instrument used by the United States Signal Service for measuring the velocity of the wind records the time during which the wind passes each mile. The instruments with which the Greenwich observations were made gave the pressure of the wind direct, and it was observed there that the highest pressures were of very brief duration, from gusts. The instruments used by the United States Signal Service do not record the maximum velocities which would occur during gusts, and the maximum velocities are, therefore, greater than their observations indicate. Their records have been kept for about two years only, which is much too short a time to determine the maximum. I understand, however, that the pressure of fifty pounds per square foot, to which Lieut. Dunwoody says the New England coast is exposed, is based on observations of storms for the last fifty years.

Rankine, in a paper printed in the transactions of the Institution of Engineers, in Scotland, for 1867–68, says: "It had previously been ascertained by observation of the success and failure of actual chimneys, and especially of those which respectively stood and fell during the violent storms of 1856, that, in order that a round chimney, in this country, may be sufficiently stable, its weight should be such that a pressure of wind, of about fifty-five pounds per square foot, of a plane surface, directly facing the wind, or twenty-seven pounds and a half per square foot of the plane projection of a cylindrical surface, . . . shall not cause the resultant pressure at any bed joint to deviate from the axis of the chimney by more than one-quarter of the outside diameter at that joint."

According to Rankine's rule, the Lawrence Manufacturing Co.'s chimney is adapted to a maximum pressure of wind on a plane acting on the whole height of 18.80 pounds per square foot, or of a pressure of 21.70 pounds per square foot acting on the uppermost one hundred and forty-one feet of the chimney.

Rankine's rule is intended to provide for a chimney that will not be injuriously affected by a pressure of wind of fifty-five pounds per square foot, acting on the whole height of the chimney. My computation is for a different purpose; viz., to find the least pressure of wind that will blow the chimney down.

The results I have arrived at relating to the Lawrence Manufacturing Co.'s chimney, are as follows:

1. The dimensions and weight of the chimney are much less than have been usually adopted.

[1] This chimney, which was left almost uninjured by the destruction of the Chemical Works of which it formed a part, was condemned by the authorities after it had stood alone for several years, and thrown down some years since by the use of gunpowder.

2. That a wind producing a pressure of about forty-four pounds per square foot on a plane, corresponding, by the United States Signal Service table, to a velocity of about ninety-four miles per hour, will blow the chimney down.

I must remark that the result stated in 2, being deduced from imperfect data, is necessarily uncertain to some extent; it may be that the chimney would sustain a pressure somewhat greater than I have estimated; on the other hand, it may not sustain so much.

In view of all the considerations, I think it will not be safe to rely upon the chimney resisting a wind exceeding, say eighty-five miles per hour, corresponding to a pressure on a plane of about thirty-six pounds per square foot, and I think it is liable to such a wind; although one may not have occurred in this locality since the great September gale of 1815.

THE ERIE, PA., STAND-PIPE.

Erie, Pa., September 1, 1880.

To the Editor of the American Architect: —

Sir, — In reply to your inquiry concerning our stand-pipe, I would say that it was built by the Erie City Iron Works, the same firm who now are putting in the iron in the Hudson River Tunnel. They erected the stand-pipe to the height of 230 feet above the rock on which it rests, in eleven working-days, placing the base casting first in position, then raising the column on it, building under the topmost section and hoisting as each section was riveted till the full height was reached. A collar at the height of eighty feet, firmly guyed, rendered it quite stable, and the work was completed without an accident or a moment's delay. It was pronounced by the engineer, Mr. H. P. M. Birkinbine of Philadelphia, the highest stand-pipe in the United States, and his opportunity for knowing was very good, as he is reputed to be the pioneer in the erection of stand-pipes in the United States, having erected the one in Germantown in the year 1851, I think.

We have recently added eight feet to the top of our stand-pipe, which may be entitled boiler-making under difficulties. The rock on which the stand-pipe rests is ten feet above the level of the bay, at a few feet distance, making the top of the original stand-pipe 240 feet above the water, and now it is 248 feet, and so far as we know, the highest in this country. It is five feet in diameter, and the shell measures in thickness from three-sixteenths of an inch at the top, to seven-sixteenths at the bottom where the pressure is 104 pounds to the inch. The stand-pipe proper is enclosed in a brick wall from which it is separated by a space two feet in width, in which are built the stairs which conduct to the top of the tower. The work was done in 1868–9. Hoping this may answer your query, I remain

Yours respectfully, G. W. F. Sherwin.

NOTES AND CLIPPINGS.

A Large Sheet of Plate Glass. — A sheet of plate glass 9 feet 2 inches by 19 feet 2 inches was recently cast by the Jeffersonville, (Ind). Plate Glass Company.

Stability of Bramante's proposed Cupola for St. Peter's. — M. Alfred Durand-Claye has examined, both theoretically and experimentally, the strength of the cupola which Bramante projected for the church of St. Peter in Rome. He finds that it would have been stable with materials which would resist a pressure of eight kilogrammes per square centimetre (113.8 lbs. per sq. in.). It is interesting to find that modern scientific methods thus confirm the inspirations of a skillful architect whose numerous domes were projected by feeling rather than by mathematical knowledge.

Spontaneous Combustion of Charcoal. — Among the substances subject to spontaneous combustion, pulverized charcoal is said to be one of the most remarkable. Incidental to this phenomena a story is told that a load of charcoal was delivered in an outhouse of a clergyman in Leipzig and showed no signs of burning until the door by accident was left open, when the wind blew sprinklings of snow on the charcoal. The rapid absorption of oxygen from the melting snow caused the charcoal to ignite, and as the day was windy the whole range of buildings were burned to ashes. In this connection a fruitful and unsuspected source of fire suggests itself to those of our American house-keepers who burn wood as fuel, and who store the ashes in boxes or barrels. The accidental disturbing of such ashes, even after years, will cause them to ignite, provided the air is damp or foggy. The phosphuret of potash from decayed wood renders wood ashes highly inflammable, and mysterious cellar fires in the rural districts are, no doubt, in some cases, caused by this form of spontaneous combustion. — *The Fireman's Journal.*

Rain-water Gutters in Bosnia. — A private letter from Serajevo to the *Pall Mall Gazette* lets us into some of the mysteries of Austro-Hungarian "administration" in that city. "I may tell you a trick of the municipality, which robs the poor people after its own fashion worse than any Turkish bey. An order was given that all the houses must have rain-gutters within a certain time — I think twelve or eighteen days. Now it was very difficult to get the wood to make these gutters; a great many people could not, with the best of wills, get them in time. There are about ten thousand houses in Serajevo; one thousand had them up in time; the remainder were all fined ten guldens apiece (ten shillings, less the *agio*). Ten old women and fifty men were put in prison; and were kept in prison for thirty-six hours. Those who cannot pay are visited in their houses and shops, and goods are taken to the worth of five guldens. There is always some trick of this sort going on to get money; and then they make jobs among themselves to pocket it. Thus are law and order taught to the Bosnians."

Chemical Ventilation. — On the 18th inst., Dr. Richard Neale, in the presence of a number of engineers, gave a demonstration of a scheme to purify the foul air of tunnels, mines, cabins, churches, theatres, hospitals, and other buildings. The *Lancet* says: — The proposal promises to create a new era in ventilation. Nearly all attempts hitherto made to purify the air in crowded buildings have been mechanical, and have consisted of driving out the foul air by currents of fresh air. Dr. Neale's proposal, on the other hand, is a chemical one, and is designed to destroy the poisonous gases. It is not, of course, intended to supersede ordinary ventilation by currents, but rather to act as an auxiliary. The essence of the scheme is the adoption of some simple chemical facts. As the lungs of living beings appropriate oxygen and give off carbonic acid gas, Dr. Neale proposes to make a "chemical lung" which will appropriate carbonic acid and sulphurous gases from the air containing them, without yielding any products in exchange. The air in the tunnels of the Underground Railway was referred to as a conspicuous and well-known example of impurity irremediable by mechanical means. The principal deleterious gases in this instance are carbonic acid and sulphurous gases and carbonic oxide. All these, but especially the two former, may, Dr. Neale maintains, be easily got rid of by chemical means. By mixing a solution of sulphurous acid and water in a flask, Dr. Neale made an excellent imitation of the air at the Baker-street or Portland-road station. He then added a small quantity of solution of caustic soda, and agitated the flask briskly for a few seconds, and immediately the sulphurous smell was abolished. Into the same flask a current of carbonic acid gas was next passed, so that a lighted taper introduced into the flask was at once extinguished. After a few shakings a lighted taper was again introduced and burnt with a bright steady flame, showing that the soda had taken up the acid. Similar experiments were made with solutions of caustic lime.

A New Doric Temple in Magna Græcia. — Upon the site of the once flourishing city of Metapontum, now a small station of the railroad which skirts the Gulf of Taranto, there have long been known to exist the remains of two Greek temples. They are familiar from the great folio work of the Duc de Luynes. The first, the *Chiesa di Sansone*, is entirely overthrown, but remarkable from the beautiful fragments of terra-cotta, painted in red and black, recognized to have belonged to it. Of the second, the *Javola dei Paladini*, fifteen columns still stand erect. It is recently reported by private letters that the remains of still a third temple have here come to light; but the accounts rendered are so vague as not to make it certain whether the foundations of the *Chiesa* have been discovered, or whether the temple is one of which nothing whatever has hitherto been known. From the casual mention that its drums are of greater size than those of the columns of the *Javola*, the latter assumption appears more probable. The stones have been covered by a mound of rubbish and imposed earth, which is now being dug away. An area of 31 by 41 metres had been laid bare, up to the time of writing, — probably about half the extent of the original temple plan. Forty-five drums and twenty-two capitals have been found, the lowest stones of the shaft remaining in position upon the stylobate. Beside these, there are mentioned numerous terra-cotta fragments belonging to the decoration of the building, as well as coins, small bronzes, etc., and an inscription from which it appears that the sanctuary was dedicated to Apollo. The proportions of the columns and entablature are similar to those of the *Javola*, and it seems that the temples may have been erected in one age, — probably after the destruction of the Elian colony by the original inhabitants of lower Italy, between 600 and 586 B. C., that is to say, towards the end of the sixth or beginning of the fifth century, B. C. Further accounts concerning the discoveries will be awaited with great interest.

A Collector's Luck. — Mr. W. J. Loftie recounts the following anecdote in his chapter on "The Prudence of Collecting." "The late Canon R. was a man of taste. When he began life he was poor, and lived in a small house near the high road. One day a tinker came to him with his bag of old iron, and said he had heard that Mr. R. was a collector of curiosities. Presently, after much fumbling among the old iron, he brought out a bronze processional cross of the utmost beauty, made probably in the fourteenth century, and altogether such a magnificent example of the art that poor Mr. R.'s heart beat with excitement merely at the sight of it. His practised eye showed him, as he examined it, that the bronze surface had formerly been heavily plated with silver, and in places even with gold, and the cross must have been borne before some great abbot, possibly before an archbishop. With a trembling voice, for he had very little money, he asked the tinker how much he wanted for the cross. 'Sixpence, sir,' said the man; 'and indeed I think it's quite worth it, sir, — it is, I'm sure.' Mr. R. thought he was dreaming. 'Sixpence,' he repeated. 'Well, sir, I gave nearly that for it,' said the man; 'and there's more than the weight of copper in it.' Mr. R. was so agitated he could hardly summon up strength to take out the sixpence. As soon as the tinker had it in his hand, he picked up his bag, and walked away quickly. Mr. R. looked at the cross, and could hardly believe his good fortune. Then he looked at the retreating figure of the tinker. It seemed like robbery to give him only sixpence for such a treasure. He called him back. The man came back very slowly and doubtfully. 'Look here,' said Mr. R., 'I think this cross is worth more than sixpence. I'll give you a shilling.' The tinker looked twice at it and twice at the priest's face. Then he took it, and again departed. Mr. R. looked at the cross again, and went into the house with his treasure. But when he had laid it on the table, his mind was reassured, and again his conscience smote him. It was worth more than 1*s.* 6*d.* He would give the man half a crown — fortunately he had half a crown in his pocket. The tinker had nearly reached the gate. Mr. R. called him. He stopped. 'Look here, I think I have given you too little for that cross.' The man came no nearer. Mr. R. advanced toward him. He retreated. 'I'll give you half a crown. Here it is,' said Mr. R., putting his hand into his pocket. The tinker looked at him for a moment, then with a look of deep suspicion, he turned and took to his heels. And yet the cross was an art treasure for which the tinker might have got many pounds if he had been wise enough!"

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.]

231,886. PROCESS AND APPARATUS FOR COOLING AIR.—Leicester Allen, Brooklyn, N. Y.

231,891. ELEVATOR.—Philander Baker, Boston, Mass.

231,893. BRICK-KILN.—Joseph Blum, Chicago, Ill.

231,900. PIPE-CUTTER.—Eugene Convers, Oswego, N. Y.

231,903. PROCESS OF ATTACHING GLASS KNOBS TO SPINDLES.—John Dougherty, Somerville, Mass.

231,908. MACHINE FOR FORMING AND LAYING CONTINUOUS DRAIN-PIPES.—William Hamlet, Merced, Cal.

231,923. FILTERING FAUCET.—William H. McDonald, Chicago, Ill.

231,931. BLIND-OPERATOR.—E. Prescott, Hampton Falls, N. H.

231,937. APPARATUS FOR COOLING AND PURIFYING AIR.—Carl Seyler, Cleveland, Ohio.

231,939. WATER-METER.—J. Herbert Shedd, Providence, R. I.

231,958. WATER-METER.—Friedrich A. Einenkel, Neudörfel, near Zwickan, and Carl O. Müller, Zwickan, Germany.

231,960. PAINT.—William H. Hooper, Baltimore, Md.

231,967. VALVE FOR WATER-CLOSETS.—G. Milnes and W. H. Gants, San Francisco, Cal.

231,977. AUXILIARY SAW-HANDLE.—Emanuel Andrews, Williamsport, Penn.

231,979. PROCESS AND TOOL FOR DRIVING AND CLINCHING NAILS.—Charles P. Ball, Danville, Ky.

231,982. METAL ROOFING MACHINE.—William C. Bell, Savannah, N. Y.

231,990. BENCH-PLANE.—August P. J. Bossel, Virginia City, Nevada.

232,008. WATER-CLOSET VALVE.—John Demarest, New York, N. Y.

232,009. FLUSHING-CISTERNS.—John Demarest, New York, N. Y.

232,012. POTTERY FURNACE.—George Duryee, New York, N. Y.

232,062. SAW-FILING MACHINE.—Henry Reily, Rixford, Penn.

232,063. The same.

232,094. BENCH-HOOK.—Humphrey J. Williams, New York Mills, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

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

Maryland Institute for the Instruction of the Blind, remodeling present building, 92 Broadway.

A. Vogeler, four-st'y brick building, in rear of 164 and 166 Lombard St.

Maryland Infirmary, three-st'y brick building, cor. Lombard and Green Sts.

Conrad Lober, three-st'y brick building, in rear of No. 16 Lee St., between Light and Charles St.

24 building permits were issued for the week.

ALTERATION.—Mr. L. M. Reynolds is making extensive alterations and improvement to his dwelling, on Aisquith St., near Holland St., to the extent of $2,000; Mr. Wm. F. Weber is the architect.

STOCK YARD HOTEL.—Mr. E. F. Baldwin, architect, is preparing drawings for the various buildings for the Baltimore Stock Yard Co., consisting of a three-st'y brick hotel, 122' x 42'; three-st'y brick building, for stable and carriage-house, 38' x 214'; brick storage house for feed, 40' x 100'; frame house for sheep, 272' x 336', and several other very large buildings for other stock.

Boston.

BUILDING PERMITS.—*Brick.—Marlborough St.*, for Frank B. Jones, 1 dwell., 24' x 48', two stories and mansard; Jas. McNeil, builder.

Commonwealth Ave., No. 263, for Arthur Hunnewell, 1 dwell., 36' x 74', four stories; Vinal & Dodge, builders.

Commonwealth Ave., No. 265, for Chas. T. Lovering, 1 dwell., 28' x 74'; four stories and mansard; Webster & Dixon, builders.

South St., Nos. 26–30, for Samuel E. Brackett, 1 mercantile, 22' x 55', four stories and mansard; Holmes Bros., builders.

South St., between East and Essex Sts., for Leopold Morse, 1 mercantile, 114' x 70', five stories; J. H. Kelley, builder.

Bismark St., opposite Germania Ave., for Boylston Lager Beer Brewery, ice-house, 42' x 48', two stories; Jas. McMorrow, builder.

South St., Nos. 32 *and* 34, for Jas. E. Bailey, 1 mercantile, 22' x 52', five stories; James Smith, builder.

South St., Nos. 36 *and* 38, for Thomas Goddard, 1 mercantile, 22' x 49', five stories; Jas. Smith, builder.

Harwich St., near Yarmouth St., for John F. Mead, 12 dwells., 22' x 35', three stories; Thomas R. White, builder.

Harwich St., near Yarmouth St., for John F. Mead, 2 dwells., 22' x 35', three stories; Thomas R. White, builder.

Wood.—Commonwealth Flats, near Eastern Ave., for New York & New England R. R. Co., 1 freight warehouse, 206' x 586'; Jones & Benner, builders.

Albany St., Nos. 486–492, for R. G. Morse & Co., 1 storage, 77' x 130', three stories; Watts H. Bowker, builder.

Kemble St., near Gerard St., for Williams Iron Foundry Co., 1 foundry, 64' x 79'.

Texas St., near Buffalo St., for B. & A. R. R. Corporation, sheep-house, 80' x 220'; Albert H. Glover, builder.

Texas St., near Buffalo St., for B. & A. R. R. Corporation, 1 sheep-house, 172' x 220'; Albert H. Glover, builder.

Jeffries St., near Summer St., for Hills & Wright, 1 storehouse, 50' x 90'.

Mystic Wharf, for Lehigh Valley Coal Co., coal pockets, 30' x 120'; Young & Ryan, builders.

East Sixth St., near M St., for Wm. T. Eaton, 2 dwells., 19' x 32'; Wm. T. Eaton, builder.

Havre St., No. 136, for Robert Ring, 1 dwell., 22' x 54'; Archibald Macauley, builder.

Brighton Ave., near Webster Ave., for Mrs. J. F. Frye, 2 dwells., 20' x 32', two stories; J. M. Berry, builder.

Brooklyn.

BUILDING PERMITS.—*Prospect St.*, one two-st'y brick stable, 66' x 76' 6'; owners Obermeyer & Liebman, cor. Bushwick Av. and Prospect St.; architect, John Platte; builder, George Lehrian.

Conselyea St., No. 19, 1 two-and-a-half st'y frame dwelling, 21' x 36'; cost, $2,500; owner, Edward Joyce, 27 Conselyea St.; carpenter, C. L. Johnson; mason, George Quinn.

Hooper St., 1 two-st'y brown-stone dwell., 19' 6" x 45'; cost, $5,000; owner and carpenter, C. L. Johnson, 56 Ninth St.; mason, George Quinn.

Ninth St., 3 two-st'y brown-stone dwells, 18' x 43'; owner, M. Mullady.

John St., cor. Pearl, 3 five-st'y brick factory and storage, 67', 32', and 67' x 100'; owners, Arbuckle Bros., 57 Front St., New York; carpenter, F. D. Norris; mason, J. J. Walton.

Hart St., Nos. 181 *and* 183, 2 two-st'y brown-stone dwells., 20' x 40'; cost, $4,000 each; owner, M. C. Baker, 270 Yates Ave.; mason, E. N. Wood.

Graham Ave., 1 three-st'y frame tenement, 25' x 55'; cost, $3,500; owner, David Barth; architect, Thomas Walling; builders, Walling & Fenwick.

Chicago.

CHURCH.—The corner-stone of a new Catholic church in All Saints' parish, of which Rev. E. F. Dunne is pastor, was laid Sunday afternoon, at the corner of Kossuth and Wallace Sts.

PRESBYTERY.—The cost of building a presbytery for St. James's Catholic church, corner of Wabash Ave. and Twenty-Ninth St., having been guaranteed, work will be begun at once.

Cincinnati.

BUILDING PERMITS.—The following building permits were issued by the Board of Public Works for the week ending September 10, 1880:

Theodore Riestenberger, two-st'y brick, State Ave. near Gest St.; cost, $1,450.

Daniel Koch, three-st'y brick, cor. Oak St. and Eden Ave.; cost, $4,000.

W. A. Brooks, repair three-st'y brick, cor. Seventh and Cutter Sts.; cost, $1,500.

Kuhlman & Buening, four-st'y brick, cor. Fourteenth St. and Central Ave.; cost, $7,500.

J. Wm. Goldkamp, three-st'y brick, No. 20 Pike St.; cost, $4,000.

J. Wm. Goldkamp, two-st'y frame, Sheridan St., between McMillan and Forest Ave.; cost, $3,000.

Silas T. Jennings, repair four-st'y brick, cor. Eighth St. and Broadway; cost, $4,000.

Kemmie & Rosenstiel, double two-st'y frame, Copeland St., near Montgomery Road; cost, $3,500.

J. R. King, two-st'y frame, No. 548 East Third St.; cost, $4,000.

Elizabeth Thorndick, brick house, six rooms, cor. Scott and Eleventh Sts.; cost, $2,900.

I. C. Thomas, three-st'y brick house on Seventh St., near Washington; cost, $3,050.

Detroit, Mich.

BUILDING PERMITS.—John Brennan, two frame dwells., Nos. 635 and 639 Mullett street; cost, $1,200.

A. C. Varney, frame dwell., on Warren Avenue, near Fourth street; cost, $1,700.

A. C. Varney, frame double dwell., Nos. 9 and 11 Joy street; cost, $4,500.

A. C. Varney, brick dwell., No. 114 Lincoln avenue; cost, $5,000.

Susan Hamilton, brick dwell., 43 William street; cost, $4,000.

New York.

BUILDING PERMITS.—*One Hundred and Thirty-First St.*, one-st'y brick office and stable, 50' x 20'; cost, $2,000, owner, Chas. Amman, One Hundred and Thirtieth St. and Eighth Ave.; architect, Chas. Baxter.

East Eighty-Second St., Nos. 134 *and* 136, 2 three-st'y brown-stone dwells., 17' and 18' x 50'; cost, $9,000 each; owner, James Philp, 1667 Broadway; architect, W. Hone; builder, John Askey.

First Ave., cor. One Hundred and Fourth St., four-st'y brick tenements, 25' x 54'; cost, $7,000 each; owner, Wilhelmina Juch, 335 East Seventieth St.; builder, Wm. A. Juch.

One Hundred and Fourth St., 6 four-st'y brick tenements, 25' x 54'; cost, $7,000 each; owner, Wilhelmina Juch, 335 East Seventieth St.; builder, Wm. A. Juch.

Second Ave., cor. Thirty-Eighth St., six-st'y brick factory, 60' x 125' x 90' x 125'; cost, $60,000; owner, Louis Ettlinger, cor. Mott and Bleecker Sts.; architects, H. J. Schwarzmann & Co.

Second Ave., 3 five-st'y brick tenements, 29' 4" x —; cost, each, $10,000; owner, Louis Ettlinger; architects, H. J. Schwarzmann & Co.

Thirty-Eighth St., 2 five-st'y brick tenements, 25' x 82'; cost, each, $10,000; owner, Louis Ettlinger; architects, H. J. Schwarzmann & Co.

Eighth Ave., No. 285, three-st'y brick store, 19' x 100'; cost, $12,000; owner, J. B. Hillyer, 4 East Sixty-Sixth St.; architect, Paul F. Schoen.

West Fifty-Eighth St., No. 505, 1 one and two story brick stable and factory, 22' x 100' 5"; cost, $7,000; owners, Wm. Zinsser & Co., 197 William St.; architect, Wm. Kuhles.

Rivington St., Nos. 276, 278, 280, 282 *and* 284, two-st'y brick church, 87' 6" x 70'; cost, $25,000; owner, M. K. Jessup, 52 William St.; architect, J. C. Cady; builders, Sinclair & Wells and E. Snedeker.

West One Hundred and Twenty-Third St., No. 128, four-st'y brown-stone tenement, 25' x 68'; cost, $12,000; owner, Sarah Darragh, 301 East One Hundred and Twenty-Second St.; architect, John E. Darragh; builder, Thomas Darragh.

Elizabeth St., Nos. 191 *and* 193, four-st'y brick stable and shop, 50' x 93'; cost, $16,000; owner, Jonas Stolts, Bowery; architect, Wm. José.

Fifty-Eighth St., two-st'y brick stable and carriage-house, 75' x 40' x 25'; cost, $7,000; owner, Conrad Stein, Fifty-Seventh St.; architect, Wm. José.

Fifth Ave., cor. One Hundred and Twenty-Third St., 6 three-st'y brown-stone dwells., 20' x 50'; cost, each, $16,000; owner, etc., A. B. Van Dusen, cor. One Hundred and Twenty-Fourth St. and Fifth Ave.

Ave. B, three-st'y frame dwell., 22' x 32' x 35'; cost, $10,000; owner, O. M. Partridge, Fordham; builders, John Treanor and E. L. Studwell.

Sixty-Fifth St., three-st'y brown-stone tenement, 20' x 55'; cost, $16,000; owner, E. Conrades, 270 East Seventy-Eighth St.; architect, Wm. José.

Grove St., five-st'y brick factory, 50' x 97' 4'; cost, $25,000; owner, Patrick O'Thayne, Seventh Ave., cor. Twenty-Eighth St.; architect, Geo. B. Pelham; builders, Von Dolsen & Arnott, and Jeans & Taylor.

ALTERATIONS.—*Thirteenth Ave.*, cor. Twenty-Fifth St., one-st'y brick extension, 97' x 98'; cost, $6,000; owners, J. & W. Lyall, on premises; architect W. Graul.

East Fourth St., No. 75, raised one-half st'y; interior alterations, etc.; cost, $5,000; owner, P. Gommel, 15 Ave. A.; architect, W. José; builders, P. Schaeffler and Grissler & Fausel.

Fifty-Eighth St., one-st'y brick extension, 32' x 37', interior alterations; cost, $8,000; owner, the F. & M. Schaefer Brewing Co.; architect, Julius Kastner; builders, R. Huson and Hoffman & Schwartz.

Seventeenth St., one-st'y brick extension, 25' x 37', interior alterations, etc.; cost, $8,000; owner, City of New York; architects, N. Le Brun & Son.

Marion St., one-st'y brick extension, 25' x 45' 6", interior alterations, etc.; cost, $9,000; owner, City of New York; architects, N. Le Brun & Son.

East Sixteenth St., No. 23, dig out for cellar up to new alley and new wall, etc.; cost, $2,000; owner, A. G. Fox, 45 West Thirty-Third St.; builder, J. Bogert and J. Wessells.

West Fifty-First St., No. 143, raised two stories; cost, $2,000; owner, A. Livingston, 91 Wall St.; architects, Thom & Wilson and M. Reid.

Twenty-First St., Nos. 525 *and* 527, raised one-st'y, also, three-st'y brick extension, 20' x 40'; cost, $2,000; owner, Jas. C. Winch, 354 West Twentieth St.; builder, Chas. F. True.

Philadelphia.

BUILDING PERMITS.—*South St., No.* 1927, three-st'y building, 12' x 42'; John Eisman, contractor.

Twenty-First St., near Race St., two-st'y building, 20' x 70'; contractor, James McGarvey.

South Front St., No. 14, store building, 16' x 70'; owner and builder, W. Strode.

Haverford St., near Thirty-Sixth St., dwell., 15' x 50'; owner and builder, Wm. Tracy.

Broad St., cor. Master St., school of design building, 34' x 140'; Benjamin Ketcham & Son, contractors; owners, Philadelphia School of Design.

Reed St., between Thirtieth and Thirty-First Sts., two-st'y factory building, 65' x 380'; contractor, Thos. Little.

Frankford St., cor. Orchard St., furnace-building, 60' x 90'; contractor, Wm. C. Taylor.

Filbert St., No. 4229, two-st'y dwell., 16' x 40'; contractor, Wm. Bunch, Jr.

Venango St., near Richmond St., 2 two-st'y stores and dwells., 17' x 35'; owner and builder, J. Morrow.

Duryeas Lane, between Miller and Clinton, three-st'y dwell., 18' x 46'; contractor, George Hearst.

North Fifth St., No. 1748, three-st'y pottery, 50' x 100'; T. & J. W. Hague, owners and builders.

Girard College Grounds, three-st'y building, 80' x 309'; architect, J. H. Windrim; contractor Allen B. Rooke.

Allegheny Ave., near Richmond St., two-st'y storehouse, 68' x 165'; owners and builders, Messrs. Baeder & Adamson.

Caldwell St., cor. Front St., two-st'y factory, 18' x 36'; Samuel Henderson, contractor.

Front St., cor. Columbia Ave., five-st'y factory building, 50' x 62'; owners, Boggs & White.

Reed St., No. 1834, two-st'y dwell., 16' x 40'; Jos. Stuckey, owner.

Buttonwood St., near Broad St., two-st'y factory 34' x 65'; Nutz & Worthington, contractors.

Belgrade St., cor. Crease St., two-st'y building, 18' x 20'; Wm. Steel, contractor.

Oxford St., near Mascher St., 1 four-st'y and 1 three-st'y factory, each 35' x 66'; Wm. Steel, contractor.

Fifth St., cor. Somerset St., two-st'y house, 18' x 48'; H. B. Hartzell, contractor.

Westmoreland Ave., between Twentieth and Twenty-First Sts., three-st'y dwell., 16' x 64'; D. M. Blyler, contractor.

Eighth St., near Shunk St., three-st'y dwelling-house, 34' x 34'; W. J. Smith, contractor.

Lancaster Ave., No. 3602, three-st'y building, 15' x 36'; owner and builder, A. B. Thomas.

Twenty-Third St., cor. Race St., one-st'y foundry, 20' x 48'; W. L. Atkinson, contractor.

Susquehanna Ave., near Twenty-Ninth St., 2 two-st'y dwells., 18' x 44'; Samuel Stewart, contractor.

Germantown Ave., No. 2643, two-st'y store and dwell., 18' x 61'; John Mander, contractor.

Branch St., No. 312, four-st'y factory, 18' x 62'; Thomas McCarthy, contractor.

Harmony St., near Fourth St., 2 two-st'y dwells., 15′ x 30′; David Chambers, contractor.

Walnut St., No. 2021, three-st'y brick building, 18′ x 20′; Allen B. Rorke, contractor.

Norris St., cor. Clearborn St., three-st'y dwell., 17′ x 44′; Samuel Sabins, owner and builder.

Salmon St., No. 1832, three-st'y dwell., 16′ x 33′; Robert Buchanan, contractor.

Hancock St., No. 2506, two-st'y dwell., 18′ x 40′; contractor, Jacob Faerber.

Sumner St., near Twenty-Ninth St., 2 two-st'y dwells., 14′ x 32′; Israel W. Supler, owner.

Germantown Ave., above Wyoming Ave., a church building, (Presbyterian) 60′ x 98′, with tower 125′ high; James H. Windrim, architect; cost, $25,000.

Walnut St., No. 1421, extensive alterations are being made to the residence of Mr. J. E. Gillingham; Mr. Addison Hutton, architect.

Fairhill St., cor. Somerset St., 2 two-st'y stores and dwells., 15′ x 28′; Theodore Hackett, owner.

Fifth St., near Clearfield St., three-st'y dwell., 18′ x 30′; C. H. W. Keyser, contractor.

North Twenty-Sixth St., No. 1533, addition to oil factory, 18′ x 60′; John L. Baldwin, owner.

Front St., between Norris and Diamond Sts., 2 three-st'y stores and dwells., 18′ x 60; E. Schmidt, contractor.

Mt. Vernon St., No. 1023, three-st'y dwell., 18′ x 56′; John T. Saunders, contractor.

Fifth St., cor. Rising Sun Lane, two-st'y store and dwell., 18′ x 44′; M. Ahern, owner and builder.

Christian St., near Fourth St.; school building, 30′ x 57′; George Mandersfield, contractor.

Moseley St., Nos. 1216 *and* 1218, 2 two-st'y dwells., 16′ x 40′; Joseph McGuckin, owner and builder.

Garden St., near Jenks St., 2 two-st'y dwells., 16′ x 28′; A. W. Linn, contractor.

Messrs. Wilson Bros. & Co. have charge of the construction of a new iron bridge for the Columbia and Greenville R. R. Co., at Broad River, S. C.; the iron-work is being made by the Passaic rolling mills, at Paterson, N. J.

The Pennsylvania R. R. Co., are about to build an addition, 46′ x 78′, to their present office building on Fourth St., below Welling's Alley; Messrs. Wilson Bros. & Co., architects.

Messrs. Wilson Bros. & Co. have completed the plans, and bids are now being taken for new depot corner of Merrick & Filbert Sts., this city. The building will have a frontage of 193′ on Merrick St., and 180′ on Filbert St. It will be six stories high, with tower rising 180′. The whole to be built of granite; owners, Pennsylvania R. R. Co.

The Pennsylvania Trust Co. are rebuilding their offices No. 431 Chestnut St., at a cost of $15,000; superintendent, O. Bradin: Addison Hutton, architect.

Insurance Buildings.—The new office building for the Union Insurance Company, cor. of Third and Walnut Sts. is being rapidly pushed to completion. It is expected to be ready for occupancy by Oct. 15th.

The Old Farquhar Building on Walnut St. below Third has been torn down to make room for the new building for the Insurance Company of North America, and workmen are busily engaged laying foundations for the new structure.

The Spring Garden Insurance Co., No. 421 Walnut St., are making extensive improvements, the old building is being remodelled and a new front (granite) being put in; the contractors are Messrs. Wood & Tracy; architect, T. P. Chandler, Jr.

Building Materials.—There are no changes to note in building materials this week. There is considerable activity in building and the fall trade in building materials promises to be brisk, and prices will pro bably advance somewhat.

Springfield, Ill.

Houses.—George H. Helmle, architect, has just completed plans for the following buildings and improvements:

West Monroe St., two-story brick dwelling-house, eight rooms; cost, $4,000; A. H. Fisher, owner.

North Fifth St., two-story frame dwelling-house, eight rooms; cost, $3,500; owner, T. S. Little.

South Fifth St., store, 40′ x 60′, with 20′ x 100′ extension, two stories high; cost, $6,000; owner, T. C. Smith.

North Sixth St., store building, 80′ x 80′, two stories high; cost, 8,000; owner, J. A. Mason.

South Fourth St., cottage, five rooms; cost, $1,200; owner, W. G. Langeman.

North Sixth St., two-story brick dwelling, five rooms; cost, $1,500; owner, T. S. Little.

North Ninth St., two frame cottages, six rooms; cost each, $1,500; owner, F. W. Tracy.

West Jefferson St., two-story cottage, six rooms; cost, $1,600; owner, James Gourley.

Hotels.—The Revere House, cor. Fourth and Washington Sts., is being remodelled at a cost of $2,000.

The St. Nicholas Hotel is being remodelled at a cost of $5,000, from designs furnished by E. F. Gehlman; contractor.

Store.—*East Monroe St.*, store, 20′ x 80′, three stories high; cost, $3,500; architect, G. A. Sutton; owner, J. M. Forden.

St. Louis.

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

Owners' Name.	Use.	Str's.	R'ms.	Cost.
E. A. Wilson,	Dwell.	2	8	$5,000
C. Hofmann,	Dwell.	2	36	10,000
W. C. Walls,	Dwell.	2	12	3,000
Kupferle & Boiselier,	Foundry.	3	8	10,000
Wm. Trange,	Dwell.	2	12	3,000
F. Manser,	Dwell.	2	9	5,000
Hydepark Brewing Co.,	Ice-house.	1	1	6,000
J. M. Carpenter,	Dwell.	3	8	5,000
J. K. O. Hearn,	Dwell.	3	10	3,750
L. Mayer,	Dwell.	2	12	3,600

General Notes.

Albany, N. Y.—The Calvary Baptist Society is building a fine church of Philadelphia brick and Longmeadow freestone, on the corner of State and High streets; Wm. M. Woolett, architect; Wm. Turner, contractor for mason-work; James & Marra contractors for stone-work, Springfield, Mass.

L. D. Hammond, Esq., will build, on Howard St., a three-st'y brick cottage, Queen Anne style; cost, $3,000; Palliser, Palliser & Co., architects, Bridgeport, Conn.

Adams, Mass.—The plans for St. Mark's Church have been awarded in competition to W. C. Brocklesby, architect, of Hartford, Conn. Work will be commenced this fall.

Bryn Mawr, Pa.—House for E. T. Townsend, cost, $12,000; builders, Stacy Reeves & Son; architect, Addison Hutton, of Philadelphia.

House for Mr. Geo. S. Lovell; cost, $7,000; builder, J. T. McBride; architect, Addison Hutton.

House for Col. J. A. Wright; (day work) cost, $5,000; architect, Addison Hutton.

Bridgeport, Conn.—Mr. P. T. Barnum is building an addition to a block on State St., and is also remodelling the block already there at an expense of $7,000, from plans by Mr. Henry A. Lambert.

Mr. W. F. Hayes is about building a double frame house, on Barnum St., to cost about $5,000; Mr. Henry A. Lambert, architect.

Mr. Eli Dewhurst is about building a brick block on Harriet St., from plans by Mr. Henry A. Lambert, architect.

The police-station is being remodelled, at an expense of $8,000, from plans by Mr. Henry A. Lambert.

Concord, N. H.—The new building for the St. Paul's School, which takes the place of the old one burnt some time ago, is nearly completed. It is a four-story brick building, trimmed with Concord granite, with a frontage of 150 feet. The total cost is about $65,000; Mr. Geo. H. Young, of Boston, is the architect.

Des Moines, Io.—The bricklayers throughout the city "struck" for higher wages, September 6; they have been getting $3.00 per day and demand an advance of fifty cents per day. This being "State Fair" week the bosses will stop all work until it is over, as it is thought most of the men will have spent their surplus funds and will then be anxious to go to work again.

Emporia, Kan.—Messrs. Haskell & Wood, architects, of Topeka, Kan., have in hand the following work:—

Hotel Coolidge; brick, three stories high; 90′ x 130′; cost, $23,000.

Congregational Church; stone, 72′ x 85′; cost, $11,000.

First Methodist Episcopal Church; stone; cost, $10,000.

Fisher's Island, N. Y.—Mr. George H. Bartlett is about building a dining pavilion 72′ x 60′. E. Burdick of Norwich, Conn., architect.

Fredericksburg, Va.—Mr. Chas. E. Cassell, architect, of Baltimore, is preparing drawings for Trinity Episcopal church, 36′ x 72′, to be brick and granite to window-sill level, and above to be frame covered with slate; to have seating capacity of 400; inside finished with Southern yellow pine, and open timber roof; cost, $8,000.

Gloversville, N. Y.—D. F. Cowles is building a two-st'y frame Queen Anne cottage; cost, $3,000; work done by the day; Palliser, Palliser & Co., architects, Bridgeport, Conn.

Harrisburg, Pa.—Mr. Addison Hutton, of Philadelphia, is the architect for a large dwelling, Queen Anne style; owner, Mr. A. J. Dull.

Hartford, Conn.—A dwelling house upon Woodland St., is being built from plans by Mr. George Keller, architect.

A large dwelling-house upon Washington St., for Mr. J. H. Root, is being built from plans by W. C. Brocklesby, architect.

The residence of Mr. G. W. Bartholomew, upon Capitol Ave., is undergoing alterations from plans by W. C. Brocklesby.

Mr. F. C. Withers is the architect of a dwelling-house now building upon Woodland St.

Holyoke, Mass.—Mr. John Delaney is about building a double brick house, with brown-stone finish, on the corner of Dwight and Elm Sts.; E. C. Gardner, of Springfield, architect.

Mr. Guyott is about building a six tenement block of brick, with Sutherland Falls marble finish, on Park St.

Louisville, Ky.—Andy Barnett is to alter a two and one-half story brick dwelling, on the corner of East Broadway and Highland Ave.; cost, $1,100.

J. B. Mathers & Bro., are to build a two-story brick warehouse on Twenty-Sixth St., between Beatty and Lewis; cost, $10,000.

St. John's German Evangelical Church is to build a two and one-half story brick parsonage on Market St., between Clay and Hancock; cost, $3,400.

Mauch Chunk, Pa.—Mr. Addison Hutton, of Philadelphia, is the architect for a Sunday School and chapel of St. Mark's Church.

Newton, Mass.—Mr. W. H. Emery, of Boston, is building a frame house 60′ x 76′; W. C. Brocklesby, of Hartford, Conn., architect.

New Orleans, La.—The New Orleans Cotton Exchange offers only one prize of $500 for the successful design in the competition for its new building, which closes Oct. 1.

Newport, R. I.—It is stated upon tolerably good authority that plans for a hotel at or near the beach, to accommodate 500 guests, have been submitted to gentlemen interested in the project. The owners of the land upon which it is proposed to build have agreed to take its value in stock.

Norwich, Conn.—An addition of six rooms is being built to the Broadway School House, from plans by Mr. E. Burdick.

North Topeka, Kan.—Messrs. Haskell & Wood, of Topeka, are the architects of the school-houses which are to be built in this place, at a total cost of $32,000. They are also to build the M. E. Church, at a cost of $5,000.

St. Mary's County, Md.—Mr. C. E. Cassell, of Baltimore, is remodeling a church in St. Mary's County, Md., and adding vestry rooms and chancel; also, St. Luke's church, Norfolk, Va., is to double its present capacity, at a cost of $10,000.

Springfield, Mass.—Dr. David Clark is building a brick house, with free-stone finish, on Maple St., from plans by E. C. Gardner.

Mr. F. L. Harmon is building a brick house, on Pearl St.; Mr. J. L. Perkins, architect.

Mr. Henry C. Hamilton is building a brick house, on State St., from plans by J. L. Perkins.

A hose-house is being built on Worthington St., of brick, with granite finish.

A guard-house is to be built for the U. S. Armory, of brick, with free-stone finish; James & Marra, contractors for stone work.

Mr. Francke W. Dickinson is building a frame house, on Temple St.

Mr. W. H. Wilkinson is building a frame house on Maple St., to be occupied by the Rev. Mr. Terhune, D. D., pastor of the First Church; cost, about $9,000; Mr. J. L. Perkins, architect.

Williamstown, Mass.—A new gymnasium for the college is being built. A museum and cabinet have lately been presented to the college, and the building will be erected from plans by a New York architect.

Walpole, Mass.—Mr. J. Wm. Beal, of Boston, is the architect of the new town hall. It is a two-st'y brick building, and will cost $30,000. Messrs. J. W. Coburn & Co., of Boston, are the contractors.

Worcester, Mass.—Mr. S. C. Earle, of Boston, is drawing plans of alterations for Dr. Sargent's house; cost, $5,000.

Westfield, Mass.—The Episcopal Society is building a church of brick, and Longmeadow freestone finish; J. W. Walkley, mason-work; James & Marra, Springfield, Mass., contractors for stone.

West Chester, Pa.—House for G. J. Scattergood; cost $8,000; (day work) Addison Hutton, of Philadelphia, architect.

House for Mr. George M. Rupert; cost, $8,000; same architect.

Wolf Trap, Va.—Messrs. Wilson Bros. & Co., architects, of Philadelphia, have completed plans for a fine hotel for the Richmond & Danville R. R. Co.

Industrial.

Holyoke, Mass.—The Holyoke Glazed Paper Works are to build a four-story mill, 130 feet long.

Milwaukee, Wis.—At the Chace Glass Works there is to be erected another building for a third furnace.

Mobile, Ala.—Adam Glass has purchased land, on which he will erect a large factory this fall.

Orange, Mass.—The Orange Gold Medal Sewing Machine Company broke ground last week for an addition to the new shop, which is to be 130′ x 50′, and two stories high.

Philadelphia, Pa.—Messrs. John Williams & Son are about to build a large woollen mill, 48′ x 198′ on Twelfth St. above Carpenter; Mr. W. R. Chapman, contractor.

Messrs. T. & W. Hague are putting up a fine pottery, 90′ x 60′, at 1748 North Fifty-Fifth St.

R. C. Taylor & Co. are building an addition 60′ x 100′ to their foundry, corner Frankford and Orchard Sts.

The Tide Water Pipe Line Co. are about to erect extensive works at Chester, Pa.; the work will be done under the supervision of their engineer, Mr. J. E. Morse.

Springfield, Mass.—The Springfield Sewing Machine Co. is considering the question of building a new factory.

Tilsonberry, Can.—A beet-sugar factory to be erected here is to be 450 feet in length, and two stories in height.

Bids and Contracts.

Boston, Mass.—The contract for building the extensive warehouse of the New York & New England R. R. Co. has been awarded to Messrs. Jones & Benner, of Philadelphia.

Conshohocken, Pa.—The contract for a Sunday School building was awarded to Mr. J. S. Hipple; cost, $6,000; Mr. Addison Hutton of Philadelphia, architect.

Montpelier, Vt.—Daniel Cushing & Co., of Lowell, Mass., are making an iron tower for the court-house, 15′ x 40′. They have also made all the galvanized iron cornice work for the building. They are also doing the galvanized iron-work for the new opera-house at Manchester, N. H.

Milford, Mass.—The building committee of Music Hall have awarded the contract for completing the building above the foundation to Dearborn Bros., of Hudson, for $30,000, to be finished by February 1, 1881. This does not include plumbing, heating, frescoing or stage setting. The total cost of the building, including land, will be about $43,000.

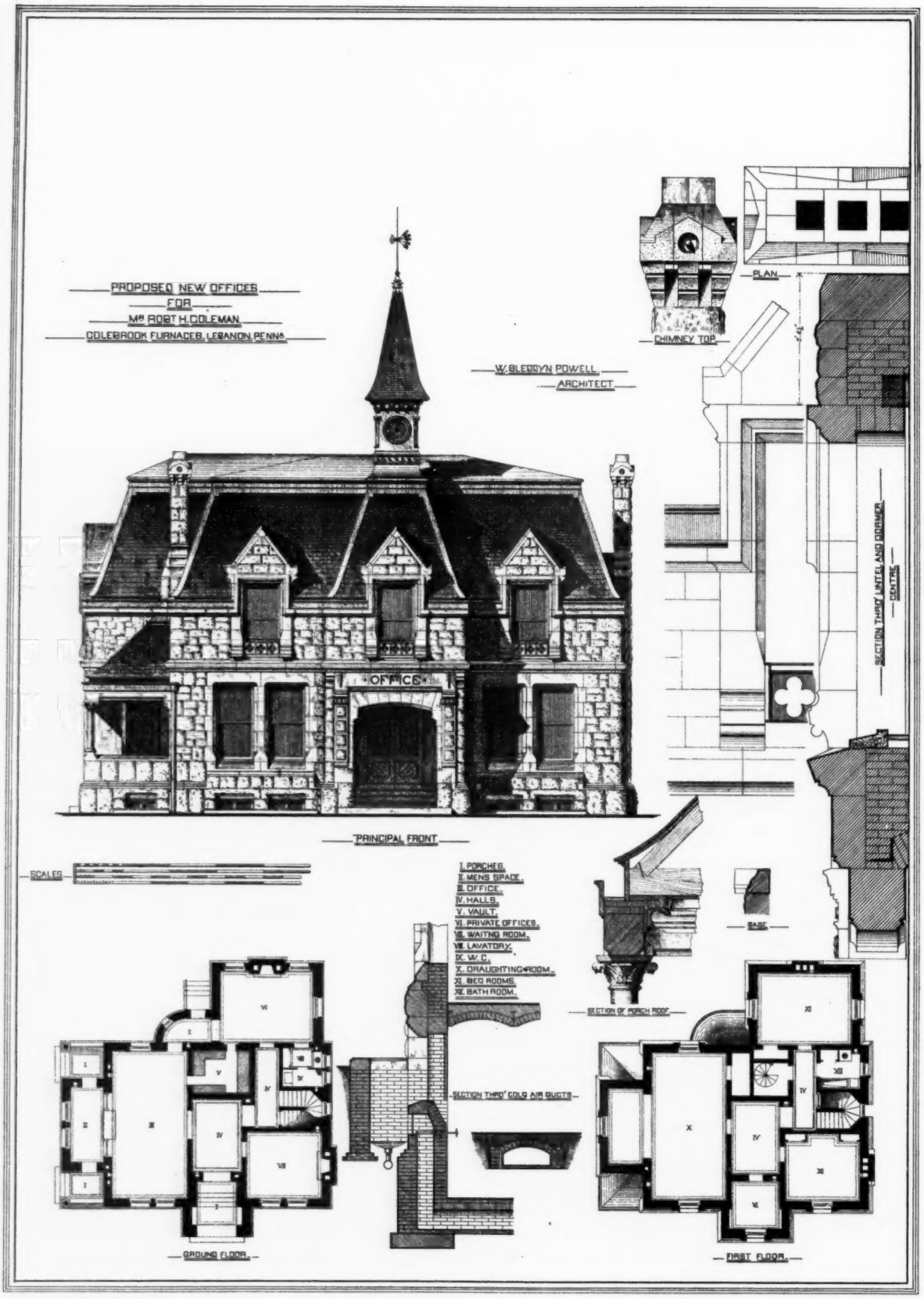
Middletown, Conn.—Bids for work on the new building for the industrial school at Middletown were opened Monday. The bids accepted were as follows: carpenter work, Church Brothers; this firm did the joiner work on the Rogers home. Mason work, Butler & Dix. The opening of the bids on tinning was postponed on account of the parties interested not having had time enough to complete their estimates.

New York, N. Y.—The Fire Commissioners have awarded the contract for erecting the new headquarters for Engine Co. No. 44, on Seventy-Fifth St., near Third Ave., to John McGuire, for $14,875.

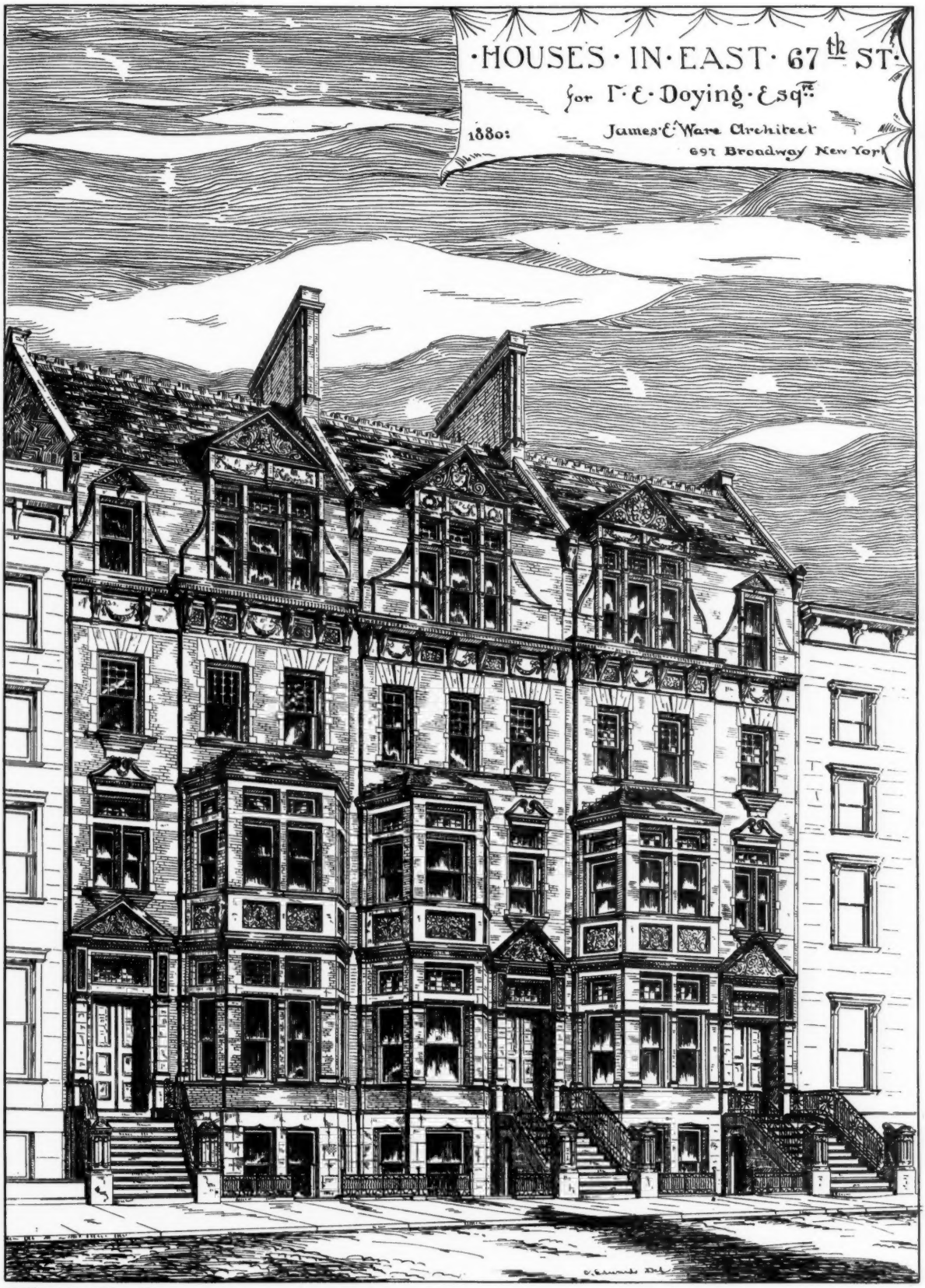
Pittsburgh, Pa.—The Pittsburgh, Cincinnati & St. Louis management have closed the contract for building new passenger depots at Pleasant Valley, Woodstock, Cable, Westville, Conover, Knightstown, Charlottsville, Greenfield, Philadelphia and Cumberland. Contracts have also been awarded for building new freight depots at Knightstown and Greenfield.

Topeka, Kan.—Contracts have been recently awarded to Smith & Sargent, at $16,000, for building the Hotel Gordon, which is to be four stories high, and to measure 46′ x 128′.

The same parties have the contract, at $23,970, for building the stone M. E. church, which is to measure 94′ x 116′.



The Heliotype Printing Co. 211 Tremont St. Boston.



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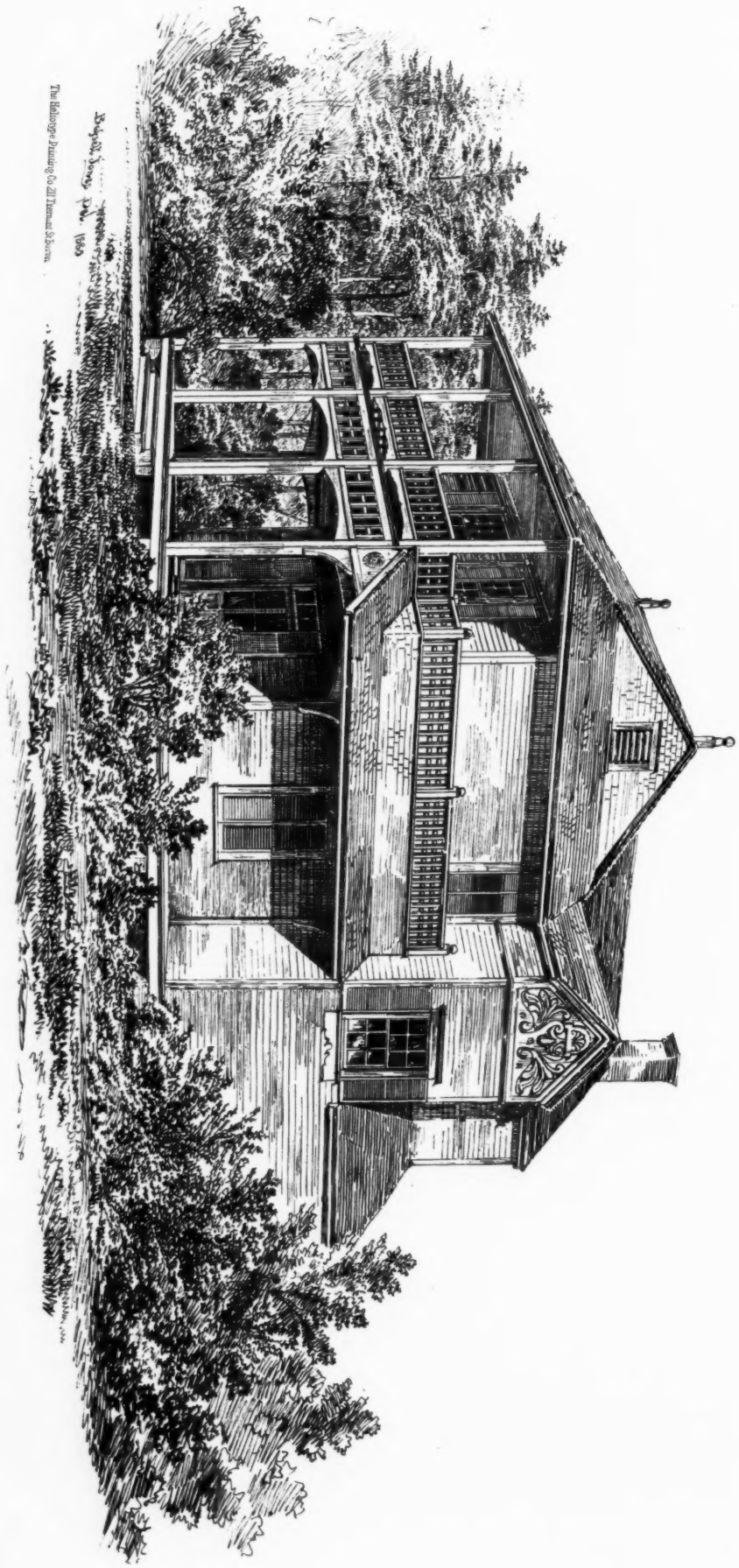
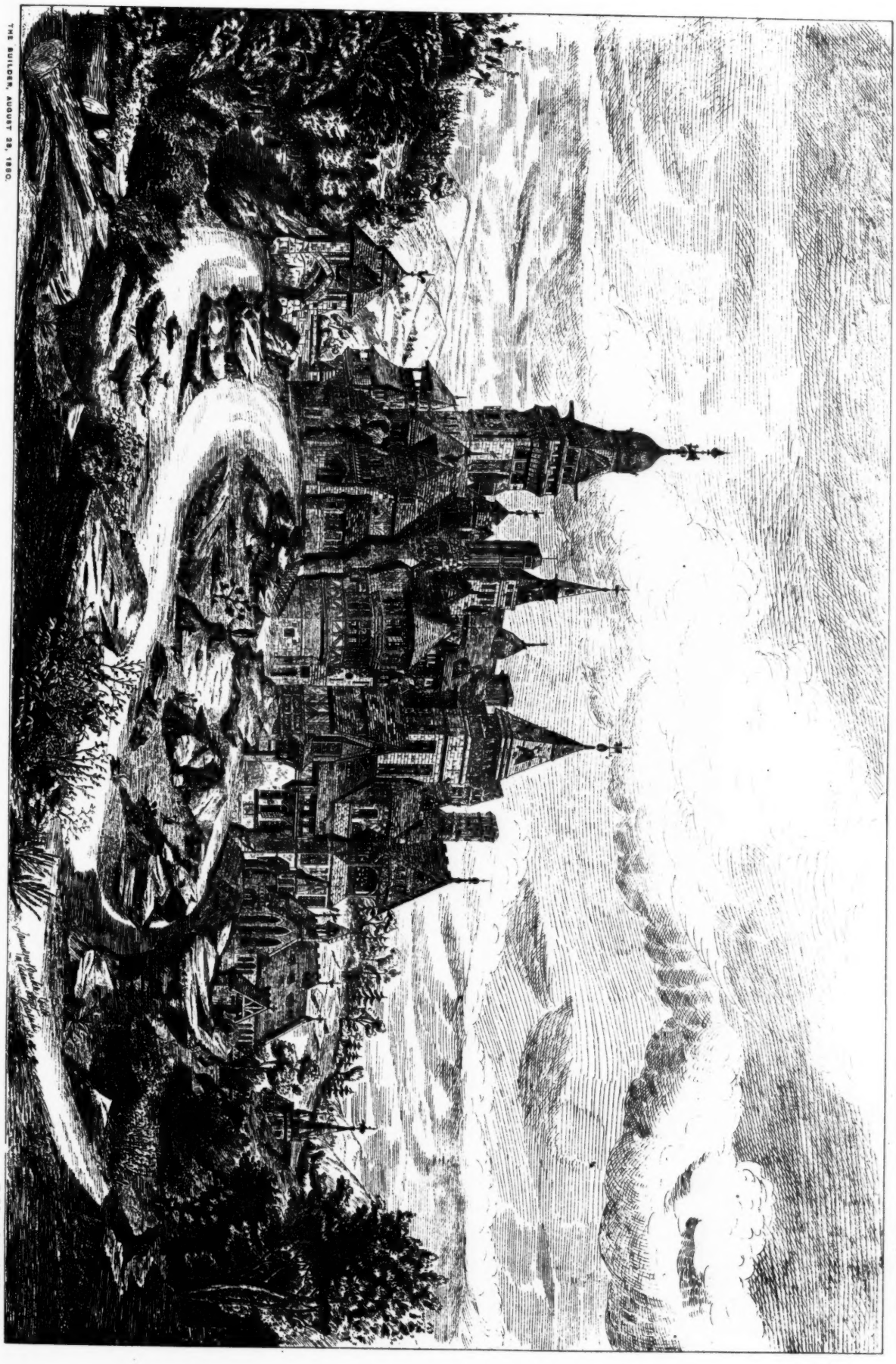


COTTAGE FOR U. S. GRANT JR.
Asbury Park, N. J.



THE BUILDER, AUGUST 28, 1880.

AN ARCHITECTURAL MEDLEY.

The Heliotype Printing Co. 211 Devonshire St. Boston.